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# Gulp

Written by Mary Roach

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# Gulp

• ADVENTURES ON THE ALIMENTARY CANAL •

*Mary Roach*



ONEWORLD

A ONEWORLD BOOK

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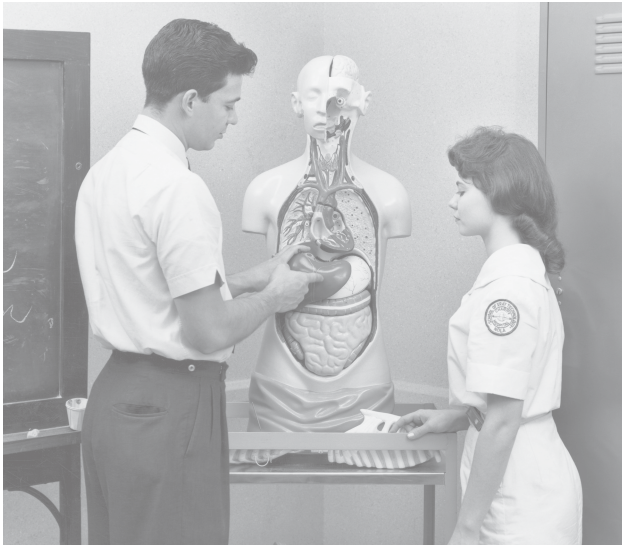
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## *Introduction*



**J**n 1968, on the Berkeley campus of the University of California, six young men undertook an irregular and unprecedented act. Despite the setting and the social climate of the day, it involved no civil disobedience or mind-altering substances. Given that it took place in the nutritional sciences department, I cannot even say with confidence that the participants wore bell-bottomed jeans or sideburns of unusual scope. I know only the basic facts: the six men stepped inside a metabolic chamber and remained for two days, testing meals made from dead bacteria.

This was the fevered dawn of space exploration; NASA had Mars on its mind. A spacecraft packed with all the food necessary for a two-year mission would be impracticably heavy to launch. Thus there was a push to develop menu items that could be 'bioregenerated', that is to say, farmed on elements of the astronauts' waste. The title of the paper nicely sums the results: 'Human Intolerance to Bacteria as Food'. Leaving aside the vomiting and vertigo, the thirteen bowel movements in twelve hours from Subject H, one hopes the aesthetics alone would

have tabled further research. Pale grey *aerobacter*, served as a 'slurry', was reported to be unpleasantly slimy. *H. eutropha* had a 'halogen-like taste'.

Some in the field looked askance at the work. I found this quote in a chapter on fabricated space foods: 'Men and women ... do not ingest nutrients, they consume food. More than that, they... eat meals. Although to the single-minded biochemist or physiologist, this aspect of human behaviour may appear to be irrelevant or even frivolous, it is nevertheless a deeply ingrained part of the human situation.'

The point is well taken. In their zeal for a solution, the California team would appear to have lost a bit of perspective. When you can identify the taste of roadside lighting, it may be time to take a break from experimental nutrition. But I wish to say a word in defence of the 'single-minded biochemist or physiologist'. As a writer, I live for these men and women, the scientists who tackle the questions no one else thinks – or has the courage – to ask: the gastric pioneer William Beaumont, with his tongue through the fistulated hole in his houseboy's stomach; the Swedish physician Algot Key-Åberg, propping cadavers in dining room chairs to study their holding capacity; François Magendie, the first man to identify the chemical constituents of intestinal gas, aided in his investigation by four French prisoners guillotined in the act of digesting their last meal; David Metz, the Philadelphia dyspepsia expert who shot X-ray footage of a competitive eater downing hot dogs two at a time, to see what it might reveal about indigestion; and, of course, our Berkeley nutritionists, spooning bacteria onto dinnerware and stepping back like nervous chefs to see how it goes. The meals were a flop, but the experiment, for better or worse, inspired this book.



When it comes to literature about eating, science has been a little hard to hear amid the clamour of cuisine. Just as we adorn sex with the fancy gold-leaf filigree of love, so we dress the need for sustenance in the finery of cooking and connoisseurship. I adore the writings of M.F.K. Fisher and Calvin Trillin, but I adore no less Michael Levitt ('Studies of a Flatulent Patient'), J. C. Dalton ('Experimental Investigations to Determine Whether the Garden Slug Can Live in the Human Stomach'), and P.B. Johnsen ('A Lexicon of Pond-Raised Catfish Flavor Descriptors'). I'm not saying I don't appreciate a nice meal. I'm saying that the human equipment – and the delightful, unusual people who study it – are at least as interesting as the photogenic arrangements we push through it.

Yes, men and women eat meals. But they also ingest nutrients. They grind and sculpt them into a moistened bolus that is delivered, via a stadium wave of sequential contractions, into a self-kneading sack of hydrochloric acid and then dumped into a tubular leach field, where it is converted into the most powerful taboo in human history. Lunch is an opening act.

**M**Y INTRODUCTION TO human anatomy was missing a good deal of its own. It took the form of a headless, limbless moulded-plastic torso\* in Mrs Claffin's science classroom. The chest and rib cage were sheared away, as if by some unspeakable industrial accident, leaving a set of removable organs in full and lurid view. The torso stood on a table in the back of the room, enduring

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\* Similar products exist to this day, under names like 'Dual Sex Human Torso with Detachable Head' and 'Deluxe 16-Part Human Torso', adding an illicit serial-killer, sex-crime thrill to educational supply catalogues.

daily evisceration and reassembly at the hands of ten-year-olds. The idea was to introduce our young minds to the geography of their own interior, and at this it failed terribly. The organs fit together like puzzle pieces, tidy as wares in a butcher's glass case.\* The digestive tract came out in parts, oesophagus separate from stomach, stomach from intestines. A better teaching tool would have been the knitted digestive tract that made the rounds of the Internet a few years ago: a single tube from mouth to rectum.

*Tube* isn't quite the right metaphor, as it implies a sameness throughout. The tract is more of an enfilade: a long structure, one room opening onto the next, though each with a distinctive look and purpose. Just as you would never mistake kitchen for bedroom, you would not, from the perspective of a tiny alimentary traveller, mistake mouth for stomach for colon.

I have toured the tube from that tiny traveller's perspective, by way of a pill cam: an undersized digital camera shaped like an oversized multivitamin. A pill cam documents its travels like a teen with a smartphone, grabbing snapshots second by second as it moves along. Inside the stomach, the images are murky green with bits of drifting sediment. It's like footage from a *Titanic* documentary. In a matter of hours, acids, enzymes, and the stomach's muscular churning reduce all but the most resilient bits of food (and pill cams) to a gruel called chyme.

Eventually even a pill cam is sent on down the line. As it breaches the pylorus – the portal from the stomach to the small

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\* In reality, guts are more stew than meat counter, a fact that went underappreciated for centuries. So great was the Victorian taste for order that displaced organs constituted a medical diagnosis. Doctors had been misled not by plastic models, but by cadavers and surgical patients – whose organs ride higher because the body is horizontal. The debut of X-rays, for which patients sit up and guts slosh downwards, spawned a fad for surgery on 'dropped organs' – hundreds of body parts needlessly hitched up and sewn in place.

intestine – the décor changes abruptly. The walls of the small intestine are Silly Putty pink and lush with millimetre-long projections called villi. Villi increase the surface area available for absorbing nutrients. They are the tiny loops on the terry cloth. The inside surface of the colon, by contrast, is shiny-smooth as cling film. It would not make a good bath towel. The colon and rectum – the farthest reaches of the digestive tract – are primarily a waste-management facility: they store it, dry it out.

Function was not hinted at in Mrs Claffin's educational torso man. Interior surfaces were hidden. The small intestine and colon were presented as a single fused ravelment, like a brain that had been thrown against the wall. Yet I owe the guy a debt of thanks. To venture beyond the abdominal wall, even a plastic one, was to pull back the curtain on life itself. I found it both appalling and compelling, all the more so because I knew a parallel world existed within my own pinkish hull. I mark that primary school classroom as the point at which curiosity began to push aside disgust or fear or whatever it is that so reliably deflects mind from body.

The early anatomists had that curiosity in spades. They entered the human form like an unexplored continent. Parts were named like elements of geography: the isthmus of the thyroid, the isles of the pancreas, the straits and inlets of the pelvis. The digestive tract was for centuries known as the alimentary canal. How lovely to picture one's dinner making its way down a tranquil, winding waterway, digestion and excretion no more upsetting or off-putting than a cruise along the Rhine. It's this mood, these sentiments – the excitement of exploration and the surprises and delights of travel to foreign locales – that I hope to inspire with this book.

It may take some doing. The prevailing attitude is one of disgust. There are people, anorexics, so repulsed by the thought of their food inside them that they cannot bring themselves to eat. In Brahmin Hindu tradition, saliva is so potent a ritual pollutant that a drop of one's own spittle on the lips is a kind of defilement. I remember, for my last book, talking to the public-affairs staff who choose what to stream on NASA TV. The cameras are often parked on the comings and goings of Mission Control. If someone spots a staffer eating lunch at his desk, the camera is quickly repositioned. In a restaurant setting, conviviality distracts us from the biological reality of nutrient intake and oral processing. But a man alone with a sandwich appears as what he is: an organism satisfying a need. As with other bodily imperatives, we'd rather not be watched. Feeding, and even more so its unsavoury correlates, are as much taboos as mating and death.

The taboos have worked in my favour. The alimentary recesses hide a lode of unusual stories, mostly unmined. Authors have profiled the brain, the heart, the eyes, the skin, the penis and the female geography, even the hair,\* but never the gut. The pie hole and the feed chute are mine.

Like a bite of something yummy, you will begin at one end and make your way to the other. Though this is not a practical

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\* *The Hair*, by Charles Henri Leonard, published in 1879. It was from Leonard that I learned of a framed display of American presidential hair, currently residing in the National Museum of American History and featuring snippets from the first fourteen presidents, including a coarse, yellow-grey, 'somewhat peculiar' lock from president no. 6, John Quincy Adams. Leonard, himself moderately peculiar, calculated that 'a single head of hair of average growth and luxuriousness in any audience of two hundred people will hold supported that entire audience' and, I would add, render an evening at the theatre so much the more memorable.

health book, your more pressing alimentary curiosities will be addressed. And some less pressing. Could thorough chewing lower the national debt? If saliva is full of bacteria, why do animals lick their wounds? Why don't suicide bombers smuggle bombs in their rectums? Why don't stomachs digest themselves? Why is crunchy food so appealing? Can constipation kill you? Did it kill Elvis?

You will occasionally not believe me, but my aim is not to disgust. I have tried, in my way, to exercise restraint. I am aware of the website [www.poopreport.com](http://www.poopreport.com), but I did not visit. When I stumbled on the paper 'Fecal Odor of Sick Hedgehogs Mediates Olfactory Attraction of the Tick' in the references of another paper, I resisted the urge to order a copy. I don't want you to say, 'This is gross.' I want you to say, 'I thought this would be gross, but it's really interesting.' Okay, and maybe a little gross.