

Next time you're in a hospital, don't forget
of you for passing gas, you'll have
the best defense science can offer:
"It wasn't me. It was them."

THE BACTERIA INSIDE MY GUT



by George Liles

Let's face it: Everybody does it. Madonna, the Fresh Prince—everybody. Every day. In fact, most of us pass gas an average of 14 times a day.

The weird thing is that even though everybody does it, it's nobody's fault. The phenomenon scientists call *flatulence* is sim-

PEOPLE HAVE BEEN KNOWN TO EXPLODE DURING SURGERY WHEN ELECTRICAL OPERATING EQUIPMENT IGNITED GAS IN THEIR INTESTINES.

ply a result of having millions of microbes living in your large intestine. They hang out munching on food you can't use. What

they give you back is gas, the fuel that makes you fire. Some thank you for a nice place to live and free meals, eh?!

EATERS DIGEST

It all starts before the food even gets into your mouth. Just

the thought of your mom's special 18-secret-ingredient lasagna gets your mouth watering. You

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INS AND OUTS OF DIGESTION

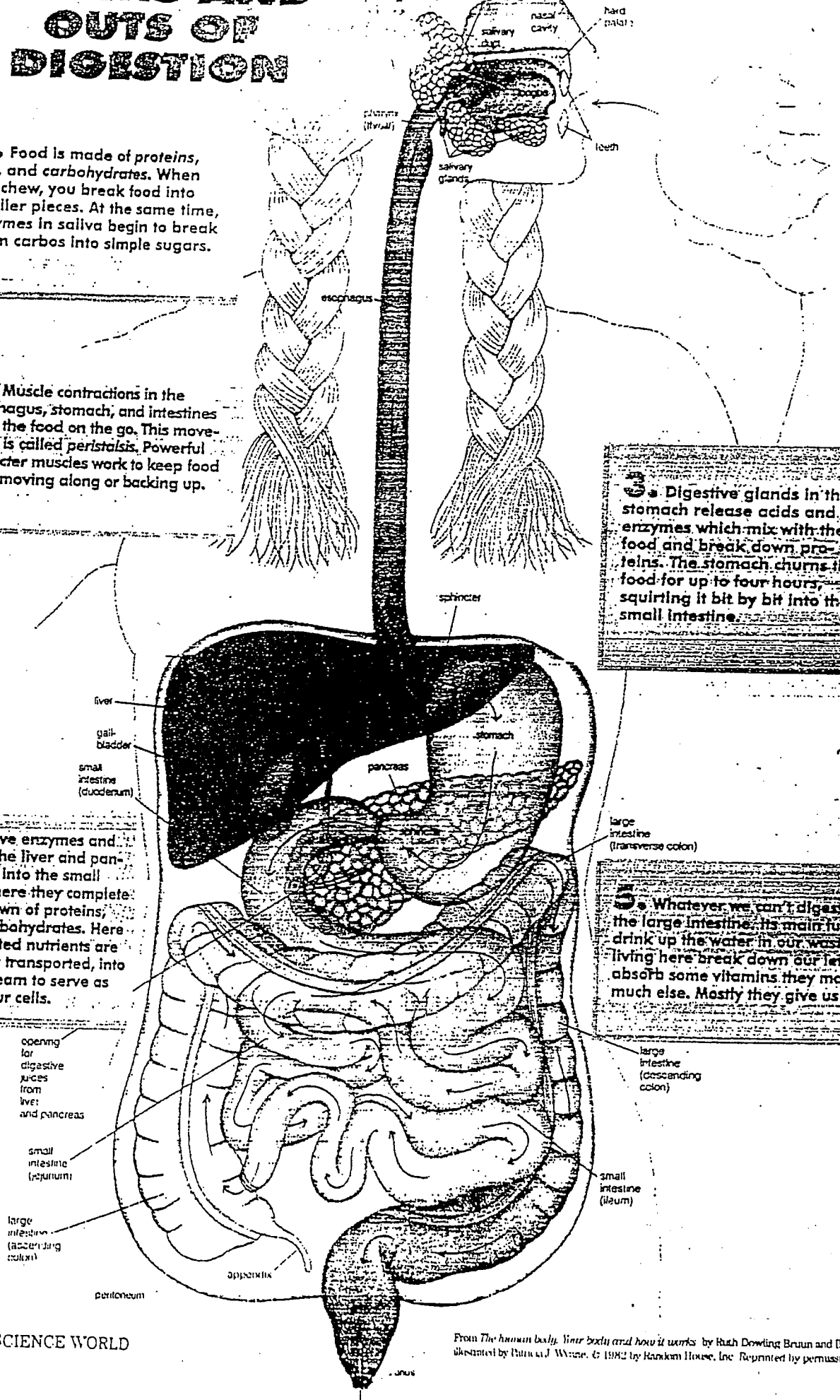
1 Food is made of *proteins, fats, and carbohydrates*. When you chew, you break food into smaller pieces. At the same time, *enzymes in saliva* begin to break down carbs into simple sugars.

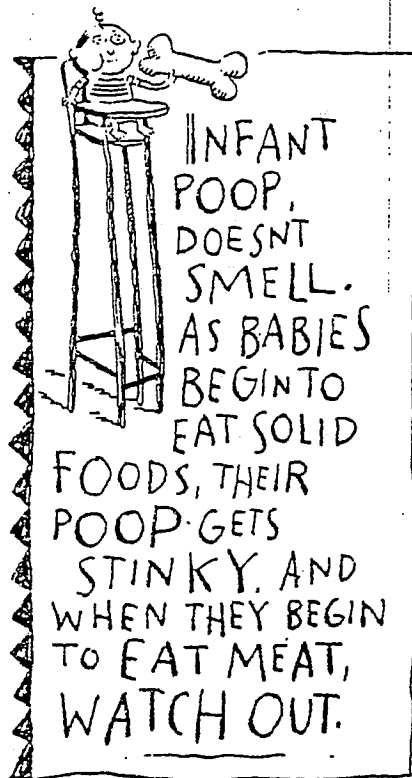
2 Muscle contractions in the *esophagus, stomach, and intestines* keep the food on the go. This movement is called *peristalsis*. Powerful *sphincter muscles* work to keep food from moving along or backing up.

3 Digestive glands in the *stomach* release acids and enzymes which mix with the food and break down proteins. The *stomach churns* the food for up to four hours, squirting it bit by bit into the *small intestine*.

4 Digestive enzymes and fluids from the *liver and pancreas* empty into the *small intestine*, where they complete the breakdown of proteins, fats, and carbohydrates. Here *all* the digested nutrients are absorbed, or transported, into the *bloodstream* to serve as fuel for all our cells.

5 Whatever we can't digest moves to the *large intestine*, its main function is to drink up the water in our waste. *Bacteria* living here break down our leftovers. We absorb some vitamins they make, but not much else. Mostly they give us gas.





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take that first bite and start chewing the food into smaller pieces. At the same time, *digestive enzymes* in your saliva start to break the food down *chemically*—into the simple *nutrients* of which it's made.

Having savored your mom's handiwork, you swallow, sending the partially digested food to your stomach, where still other enzymes go to work on it to release more nutrients. Three or four hours later, the food, now resembling a mashed-up milky liquid, passes into your small intestine. There, the digestive process continues and the nutrients are absorbed into your blood for all of your cells to use.

But hold on: Your body doesn't have enzymes to digest *everything*. Take those infamous beans (*please*), not to mention cabbage, cherries, watermelon, and a host of other *high-fiber* foods. These foods contain lots of *oligosaccharides*, a group of sugars found in

some plant fibers. Your body has no enzymes to digest oligosaccharides, so foods containing them pass undigested into your *colon* (the five-foot-long large intestine). That's where the bacteria go to work.

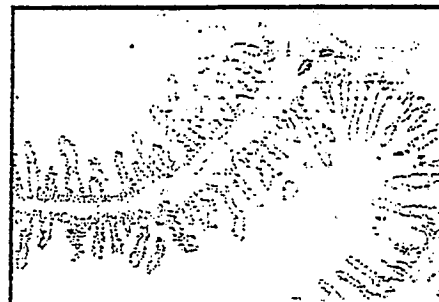
THEY DID IT!

More than 5,000 species of microbes hang out in this lower end of your *gut* (the name scientists give to the whole digestive tract from mouth to anus). The bacteria couldn't ask for a better home. The colon is warm and moist—a perfect environment for growth and reproduction. And it contains none of those acids that kill bacteria in the stomach and small intestine. Best of all, it offers a steady food supply. All the microbes have to do is kick back and wait for your leftovers to drop in.

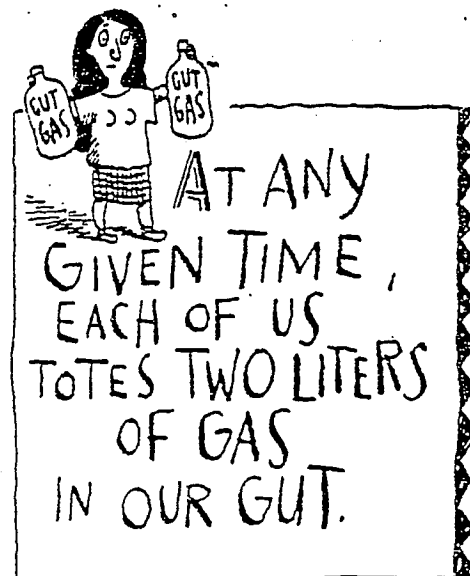
Then it's feeding time. To these critters, your leftovers represent opportunity, not waste. That's because the microbes have the enzymes to break down foods *your* enzymes can't touch. And they do the same thing with their food that you do with yours: They *metabolize* it, converting the nutrients to energy or using them to build new cell structures.

"Toot" bad for us that they do it right on the spot, in our large intestines, because in the process of metabolizing nutrients, the bacteria give off gaseous wastes. (We too produce gas when our cells

Courtesy University of Washington



Millions of villi: Food isn't really *inside* you until its nutrients enter your bloodstream, where they're available for all your cells to use. This *absorption* of nutrients occurs in the small intestine, which is well-equipped for the job. Its lower end is lined with millions of tiny fingerlike projections called *villi* (above). The walls of the villi are only one cell thick, so nutrients can easily pass through and into tiny blood vessels on the other side.



Peter Spaack

NEWBORN BABIES
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prevent certain kinds of cancer and may prevent heart disease.

The good news: Scientists are looking at ways to make the best-known offending foods a bit less offensive. For example, people who have difficulty digesting milk can now take enzyme supplements that do their digesting for them—no milky leftovers for the hungry bacteria in the large intestine.

One scientist is going after the granddaddy of them all: the bean. He wants to genetically engineer beans with fewer oligosaccharides to deprive the bacteria of at least some of their feast.

For now, though, one thing is certain: The old playground ditty is true. Beans (and all other indigestible foods) are a musical fruit. But remember, the *bacteria* are the ones tooting the horns.

metabolize nutrients, but it exits our bodies via our lungs.)

You may be familiar with some of the bacteria's gases: nitrogen, oxygen, carbon dioxide, hydrogen, and methane. They make up most of the air you breathe, and a good 99 percent of the "atmosphere" in your large intestine. But they're not the ones that smell. It's the other one percent you have to watch out for.

No one's exactly sure which of the other 200 trace gases is the stinker. The prime suspects are *skatole* and *indole* (both by-products of protein digestion) and *sulfide* gases, which are responsible for the smell of rotten eggs.

WHAT CAN I DO?

Maybe you're thinking you can stop this nasty business—kill off the bacteria by refusing to feed them the foods they like (anything you can't digest, that is).

The bad news: Most foods contain at least some indigestible fiber for bacteria to feast on. And it wouldn't be very healthy to avoid them. Nutritionists and doctors say fiber helps

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Peter Spack

PASSING
GAS
IN PUBLIC
WAS
AGAINST
THE LAW IN
ANCIENT
ROME.



Name _____

"Bacteria Inside My Gut"

Answer the following questions on your own sheet of paper:

- 1) What is the scientific name for "gas"?
- 2) Explain what, specifically, is in high fiber foods that we are unable to digest and why?
- 3) Where, exactly, do the "bacteria in your gut" live and what makes this area so comfortable for them?
- 4) Why do the bacteria produce gas?
- 5) We produce gas the same way as bacteria but where is our gas released?
- 6) What non-smelly gases do bacteria produce?
- 7) What smelly gases do bacteria produce?
- 8) Why isn't it a good idea to cut down on unwanted gas by avoiding high fiber foods?
- 9) What are scientists trying to do to make certain foods less offensive?

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