

THE SOUL IS A TRAPPED GAS

JUSTIN E. H. SMITH

In Thomas Pynchon's 1997 *Mason & Dixon*, Charles Mason, Sr., the father of one of the two great American explorers, claims to believe

that bread is alive,—that the yeast Animalcula may unite into a single purposeful individual,—that each Loaf is so organized, with the crust, for example, serving as skin or Carapace,—the small cavities within exhibiting a strange complexity, their pale Walls, to appearance smooth, proving, upon magnification, to be made up of even smaller bubbles, and, one may presume, so forth, down to the Limits of the Invisible. The Loaf, the indispensable point of convergence upon every British table, the solid British Quartern Loaf, is mostly, like the Soul, Emptiness.

Is bread in fact like the soul? It is well known that our own word for the biotic condition does not descend from the same distinguished Indo-European lineage as *bios*, *vita*, *vie*, and so on. Instead *life*, along with the related Germanic cognates such as *Leben* and *leven*, took the place of *bios* and its variations thanks to the intervention of the humble *loaf*, which originally had none of the connotation of the verb "to loaf," but had instead only to do with bread. Indeed, *loaf* is a cognate of the Russian word for bread, *khleb*, and also of the Gothic *hlaiþ*. At some point, then, and I really do not know when, the ancient Germanic tribes started using the word for bread to denote life itself, since, obviously, bread sustains life, is a condition of life, and thus, in some primitive way of thinking into which it is not all that hard to work one's way back, *is* life.

It is quite likely that Mason, Sr. is being made by Pynchon to paraphrase a commonplace of what was often called "chemical philosophy" or "chymistry," but since the eighteenth century has been marginalized, in a classic case of what C. S. Lewis once called "chronological snobbery," as "alchemy": the primitive, irrational ancestor of chemistry. Chymistry, or alchemy, or whatever you wish to call it, had as one of its central goals the isolation of the "essences" or "spirits" of things through laboratory means such as distillation. In Johann Agricola's *Chymische Medicin* of 1638, for example, we are given practical advice for the distillation of spirit out of flesh, blood, sugar, and, of all things, bread. The *spiritus panis*, which Agricola describes as a vapor that remains in the glass bubble of the alembic after the alchemist has performed his operations, is a sort of "pure bread,"

or bread reduced down to its very essence. It is to bread what my immortal soul is to me.

Another work, dating from 1667, offers a recipe for *spiritus panis*, oder *Brodgeist*, which is "to be prepared from the best flour, and having all the properties of fresh bread, one spoonful of which taken in the morning shall serve a man for his daily food."¹ Or here is a striking recipe from the 1778 edition of the *Algemeen huis-houdelijk-, natuur-, zedekundig-, en konst-woordenboek* (General Dictionary of the Household, Nature, Custom, and Art):

Spirit of bread; Spiritus panis: *take two pounds of coarse rye bread, cut it into small pieces, and place them in a glass retort; set it in the sand, and cover the container; then distill [it] with a weak flame, until some fluid moves over it; then open the container, separate the fluid obtained from the oil by [pouring it] through blotting paper; next rectify the fluid in a bain-marie, in order to draw out from the sour spirit the phlegma that first moves over [it].*²

And as late as 1830, we find in a *Pharmacopoeia universalis* another recipe for *spiritus panis*, this time involving wheat bread (*panis triticeus*). Charles Mason, Sr., in short, does not appear to have come up with his view of bread entirely alone. Many others believed it has a spirit, too.

Of course, for the chymists almost everything has a spirit: thus in various authors we find instructions for distilling the *spiritus nivis* (spirit of snow), *spiritus roris* (spirit of dew), *spiritus urinosus* (spirit of urine), and so on. But still, not everything was deemed suitable for spirit extraction, only those things that were thought to be in themselves something—that were thought to have an essence, which, in the traditional way of thinking, was tantamount to having a soul-like, immaterial quiddity that makes the thing the sort of thing it is. There is no spirit of porridge or cake, since these are just recombinations of other, more fundamental ingredients, and thus, to use Gottfried Wilhelm Leibniz's terminology, are mere *entia per aggregatum* (entities by aggregation).

Bread itself is a recombination of a few very basic ingredients: water, flour, and yeast. But the perception that Mason, Sr. seems to share with the chymists is that the addition of yeast to the flour amounts to a sort of artificial creation of laboratory life, where the flour is the matter, and the yeast is the soul. Bread and animals are both often conceived as the products of fermentation, occurring in the latter case through sexual reproduction, and in the former case through the baker's art. Thus René Descartes maintains that the "semens of the



Francisco de Zurbarán. *St. Hugo of Grenoble in the Carthusian Refectory* (detail), ca. 1633.

two sexes, mixing together, serve as a leaven for one another." If you want to generate a living creature, Descartes thinks, you don't really need an immaterial soul to guide the process at all. You just need to start off with an ingredient akin to yeast, an ingredient that is capable of bringing about fermentation. For mechanist natural philosophers such as Descartes, fermentation served as a perfectly suitable *Ersatz* for the work in nature that had earlier been carried out by soul-like principles.

Before there was any conception of fermentation as a process in nature, there was a widespread idea that the generation of natural beings starts from a sort of bubble that encloses a certain gaseous heat. Consider in this connection Aristotle's account in *On the Generation of Animals* of what happens in the spontaneous generation of "lower" organisms:

*Animals and plants are formed in earth and in the water because there is water in earth, and there is pneuma [i.e., spirit] in water, and there is soul-heat in all pneuma; so that in a way all things are full of soul. Hence plants and animals quickly form once this gets enclosed; and when this enclosing happens, when the corporeal liquids get heated, a sort of frothy bubble is formed. Now the difference between the various creatures which are produced in this way are due to the stuff which makes up the envelope around the soul-source.*³

While in Greek natural philosophy this kind of generation was generally limited to lower animals (in particular, the base, pestilential critters we never catch *in flagrante delicto*), in medieval Islamic philosophy the possibility was held open, in principle, of the spontaneous generation [*tawallud*] of any natural being whatever, including human beings. Here, for example, is the Andalusian philosopher Ibn Tufayl's twelfth-century account of the reported spontaneous generation of a human being:

In a pocket of earth on that island, over the years, a mass of clay worked until hot and cold, damp and dry were blended in just the proper way, their strengths perfectly balanced. This fermented mass of clay was quite large, and parts of it were in better equilibrium than others, more suited than the rest for becoming human gametes. The midmost part was the best proportioned and bore the most perfect equivalence to the make-up of man. The clay laboured and churned, and in the viscous mass there formed what looked like bubbles in boiling water. In the very middle formed a tiny bubble divided in half by a delicate membrane and

*filled by a gaseous body, optimally proportioned for what it was to be. With it at that moment joined "the spirit which is God's" (Qur'an 15, 28-29), in a bond virtually indissoluble.*⁴

Now if this sort of thing does not happen very often, for Ibn Tufayl this rarity results only from the fact that, ordinarily, the material conditions of nature, considered along with what we might call the "bullar" conditions, or those pertaining to the properties of bubbles, are not right for the generation of a creature as excellent as man. In the example just cited, the end product results not just from the "stuff which makes up the envelope around the soul source," as Aristotle had said, but also from the optimal *proportion* between this envelope and the gaseous body that fills it. The view of the body as an envelope or a pouch—consider the taunt of the fourth-century Democritean philosopher Anaxarchus: "Pound, pound the pouch that contains Anaxarchus, you do not pound Anaxarchus"—is widespread in antiquity. Here Ibn Tufayl seems to promote a sort of hylomorphism according to which the body-soul compound is, as it were, bubble wrap, and the kind of thing a creature is results not just from the nature of the soul-source trapped in the bubbles, nor from the material nature of the envelope that enbubbles the gaseous soul-source, but rather from the nature of the fit between these two basic principles.

The seventeenth-century Belgian chemist Jan Baptista van Helmont posited a theory of *bullae* as lying at the origins of the forms and qualities not just of spontaneously generated animals, but indeed of all the diverse things of nature. His theory is a sort of inversion of corpuscularianism, as it maintains that the basic ingredients of nature are not hard, solid particles, but rather empty spaces, or almost empty: they are filled with a trapped gas or, in van Helmont's nice distinction, a subvariety of gas known as *blas*, the special ethereal *flatus* that comes from the stars, influences the weather, and, in its manifestation as *blas humanum*, animates the human body. As we read in the 1662 translation of van Helmont's *Ortus medicinae*: "The Stars are to us for signes, times or seasons, dayes and years. Therefore they cause the changes, seasons, and successive courses or interchanges. To which end, they have need of a twofold motion, to wit, locall and alterative. But I signifie both these by the new name of Blas."⁵ In van Helmont's pneumatic chemistry, entities in the natural world do not take on the form they have as a result of being built up out of fundamental components such as corpuscles or atoms, in the way, for example, that a

house is built up out of bricks. Rather, for him, entities come to have their particular forms because their spirituous substance, their gas or *blas*, influences the surface features of the bubbles that contain them. Natural beings are thus not constituted as clumps of particles, but rather as the foam on the sea, and a human body, to the extent that van Helmont is clear about this, is best understood as a cluster of *blas*-filled bubbles.

Leibniz, in turn, would generalize Helmontian bubble theory to provide an account of the origins of the form and qualities of the entire cosmos. For Leibniz, as he explains in his *Theoria motus concreti* [Theory of Concrete Motion] of 1671, van Helmont's "Archeus" or fermentative principle in nature, "is really the ether that operates through the *bullae* and, using acid and alkali as its instruments, brings about natural processes, in particular fermentation—the *digestio rerum fermentantium* [the digestion of fermenting things]." Leibniz goes on to sweepingly claim that bubbles are "the seeds of things, the stems of species, the receptacles of the ether, the basis of bodies, the cause of consistency and the foundation of all of the variety that we admire in motions." He believes that "if these were absent, all things would be as sand without lime, and expelled ether would fly away in the gyration of dense bodies, and would condemn our earth to death."

Whoever accurately considers the matter, Leibniz claims confidently, "will discover nothing more true" than that "all water is a congeries of innumerable bubbles," while "air is nothing but subtle water," and thus by transitivity air is nothing but bubbles as well. And what of the Earth? "It is not to be doubted," Leibniz answers, by now predictably, "that it consists entirely in bubbles, for glass is the basis of the earth, and glass is a dense bubble." What wonder, then, he reflects, "that with the terrestrial globe transformed by the action of the light and made fluid, dense or terrestrial things should be changed into glass, water and air into finer bubbles?"

In the words of Walter Pagel, Leibniz's theory amounts to a "surprising application of fermentation to cosmology," in which "divine ether is made to penetrate the major part of matter which becomes the earth, and to be enclosed in *bullae*." The "terr-aqu-aëreo globe," as Leibniz calls it, is in fact nothing other than a great mass of bubbles, which we can better understand by studying the formation and behavior of bubbles in lakes, oceans, wells, and, perhaps most significantly, in the blowing of glass. Of course, glass-makers typically devote a great deal of effort to the removal of bubbles from glass itself, but this does not negate the point that the blown-glass object takes the shape it does when the breath of an

external agent is injected into it, like God's breath into Adam, and thereby gives it whatever form it may have. Glass, I think Leibniz means to say, is always glass *and* breath, just as for a hylomorphist a corporeal substance is always body and soul (or soul-like substantial form). The glass traps the breath, and the breath in turn serves to give the glass shape. The pair form into a sort of hardened, frozen bubble that then serves as an artisanal monument to the relationship between body and its formal principle.

For the *bullae*-theorists, then, the world consists entirely in bubbles, not atoms. Some are frothy, and some are crystalline, and some fleshy. But, to return to the question of bread with which we started, what about doughy bubbles?

Much has been made about the fact that, later in life, in correspondence with the Jesuit Bartholomaeus Des Bosses ("Bartholomew of the Bumps," which will surely have to be a topic for another occasion), Leibniz identifies bread as a classic case of an *ens per aggregatum*. This identification gives rise to all sorts of problems for understanding how the communion wafer could be a true substance or *ens per se*, namely, the corporeal substance of Christ himself. But of course the communion wafer in question is *unleavened* bread: there is no ferment in it, which is to say, following the reasoning of Agricola, van Helmont, and even, in his mechanized way, Descartes, it has no vital principle. Perhaps, then, the real miracle of at least Catholic transubstantiation (unlike that of the Greek rite: in Athens I have seen ample chunks of thick, bubbly bread passed out to paupers as the body of Christ), is not that Christ's soul comes to inhabit a chunk of bread (for, if bread is really a living being, then this would just be a fairly mundane case of transmigration), but rather that it comes to inhabit a bit of flatbread, that is, bread with no ferment, no life, no bubbles to trap the soul. Christ may just as well be said to inhabit a glass of non-alcoholic grape juice (which, in my own soulless, suburban, crypto-Protestant Catholic school, he was).

The figure of the soul as trapped gas has very deep roots, or at least the soul as breath or spirit: again, it was not until van Helmont's coinage of the word *gas* in the seventeenth century, along with its less successful twin *blas*, that we first had available to us the word that would come to denote, leaving aside plasma, one of the three basic states of matter. Consider the following illustration from the vast repository of ancient Indo-European insight. In Russian, the phrase *ispustit' dukh* means literally "to let out the spirit," but can also mean, depending on context, either "to give up the ghost" or

“to fart.” Why then do we not often die of flatulence? Perhaps it is this condition, and not the much-vaunted orgasm, that is the true *petite mort*, leaving us as it does among the living, but giving us a passing whiff of our rank, shadowy, will-o'-the-wisp existence to come.

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- 1 Johann Rist, *Die alleredelste Erfindung der ganzen Welt* [The Most Noble Foundation of the Whole World] (Frankfurt: Johann Georg Schiele, 1667).
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opposite: Mid-eighteenth-century pharmaceutical flask to hold tincture incorporating *spiritus panis*. The word *spiritus* has been replaced on the flask by its alchemical symbol. Courtesy Technisches Museum, Vienna.



TRA:
CORALLI: C.
PAN.