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Physiological Self-Regulation: The Eighteenth-Century Modernization of the Human Body

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Long neglected in the history of ideas, one leading science in the age of Enlightenment was physiology. It was an area for tremendous innovation, not only affecting medical-anthropological knowledge in the narrow sense but also the age's cognitive and social doctrine. This, in turn, left an influence on the great complex of subject- and system-centered philosophies unfolding in Germany around 1800. For the drastic changes unfolding in the previous decades with regard to doctrines of the human body proceeded on various levels and involved disparate realms, in a modern scientific landscape gaining contour at that time. The following discussion represents an effort to describe some of the main features of this landscape.[1]

I. The Turn from Humoral Pathology.

Whatever differing notions were at work in individual cases, traditional European medicine generally conceived of the human body as a receptacle filled with fluids: the well-known humors. Corresponding to the body's common division into three zones (head, torso, and lower body) with three correlative realms of the soul, these fluids were differentiated according to rank. The finest, most noble substances

[1] The discussion summarizes main arguments in my book *Körperströme und Schriftverkehr. Mediologie des 18. Jahrhunderts*, München 1999, esp. 54, 112. The book contains a more detailed bibliography.

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were in the head, where they sustained the body's intellectual functions; the breast-area was the seat of the vital functions (breathing and circulation) and their spiritual correlatives; in the lower region, carefully separated from the higher zones by the diaphragm, the animal desires ruled, their vehicle being the impure fluids of the liver, digestive tract, and sex. But despite this hierarchy, the relationship between *spiritus* and *humores* was marked by active transformation. They could turn into each other and—in case of disease—replace each other as well; they mutually communicated shortage and superfluity, since the corporeal innards were largely conceived amorphously and basically obeyed hydraulic-quantitative laws.

This inner permeability corresponded to an outer openness. Through exhalations and inhalations, the individual body was not only tied to other bodies but to the entire cosmos. This system of cosmological correspondence is most manifest in the doctrine of temperaments, whose classificatory framework brought together the influence of stars, seasons, and elements with the physiological features of each individual corporeal soul.

If we were to anachronistically read the modern opposition between the self and what is alien to it back into pre-modern Europe, then we could describe that period's prevailing view of the body as heteronomous in a complex way. This is at the very least the case on a level of practical power, for rule was grounded on power of disposition over the body. Juridically liable persons were not considered apart from their naked physical vulnerability—something we see most clearly in the realm of criminal law.[2] Corporeal punishment was the standard counterpart of a legal offence, hence an integral element of governmental-administrative power.

It is important to note that corporeality was not simply defined by what was "alien" to it in the age's network of social power-relations, but rather in relation to the basic dimensions of space and time. This was the case for the temporality of human existence in that every individual was perceived as merely a scarcely noticeable link in an eternal genealogical chain, his existence an interim, birth a continuation and transmission of life instead of a new beginning.[3] When it came to the spatial dimension, the human body could only exist as

[2] Michel Foucault, *Surveiller et punir: Naissance de la prison*, Paris 1975, 9.

[3] The ideas of corporeal non-completion accompanying this rhythm of creaturely existence were described by Michail Bakhtin, in *Rabelais and His World*, Cambridge, London 1968, 18, 315 and passim.

one element in a network of sympathetic linkages and dependencies beyond its own borders.[4] Until far into the early modern period, its place was firmly fixed in the cosmos by *magia naturalis*. The principle of similitude tied each of its parts with other elements of the spiritual and creaturely world. The doctrine of the humors, of the corporeal fluids, which offered a synoptic view of astral, animalistic, and characterological elemental orders, simply excluded the idea of a subjective identity with oneself.[5]

The same can be said in relation to physiology of the senses. According to antique pneumatology, sensory perception did not take place on the bodily surface (for instance, on the eye's retina) but rather emerged through the encounter between material corporeal effluences and those coming from external objects. The physiological area of contact, like its sympathetic counterpart, was by no means circumscribed by the empirical physical borders. Even after the early modern shift to a mechanical conceptual model, which at least on a philosophical level dissolved the mutual sympathy between the world and ego in favor of their polarization, pre-rational affinities of this sort persisted on the level of lived experience. Before the old pneumatic-fluid corporeal model with its indeterminate unity and borders became outmoded, the cognitive postulate of reason needed its follow-up in a series of rationalizations and disciplinary measures.

All humoral-pathological treatment was aimed at promoting a healthy balance of the fluids (*eucrasias*) or, in the case of illness, at correcting their imbalance (*dyscrasias*). This imbalance was itself understood in basically quantitative terms: as an excess or paucity of fluids. For the clients noted by those doctors who have left us a published record (generally, members of an upper social stratum) the problem tended to lie in excess rather than paucity. For this reason treatment was centered on both dietary regimes and evacuation therapy. From bodies always menaced by tumefaction, pernicious fluids were washed

[4] Disease was thus only a medical problem to a small extent. The body's medicalization is a facet of its removal from a cosmological framework. See Robert Muchembled, *Invention de l'homme moderne. Sensibilités, moeurs et comportements collectifs sous l'Ancien Régime*, Paris 1988, 275.

[5] There is strong intellectual-historical evidence for this. Early modern anthropology is inconceivable outside a conceptual framework including doctrines of creation, astrology, and microcosm-macrocosm correspondences; the "human being" is here anything but an isolated substrate. See Fritz Hartmann, Kurt Haedke, "Der Bedeutungswandel des Begriffs Anthropologie im ärztlichen Schrifttum der Neuzeit," *Sitzungsberichte der Gesellschaft zur Beförderung der gesamten Naturwissenschaften zu Marburg* 85 (1963), 39–99, esp. 47.

out through bloodletting, purgatives, vomitives, and indeed sexual stimulation by the doctor's hand.

Hence the main direction of such therapies was from inside to outside. Because of fluids being hampered in their natural drainage, a disease-bearing substance had gathered in the body and had to be artificially removed. The body's *closed interior* was considered pathogenic; the doctor was responsible for opening it up—for restoring exchange with the social and cosmological spheres.

In the course of the Enlightenment, the old catalogue of medical measures centered around humoral equilibrium fell into disrepute. Increasingly, an economical relationship to the circulating fluids came to steer the perception of both doctors and laypeople. For its part, the practice of therapeutically drawing out the sexual secretions directly collided with the premises of the anti-masturbation campaign that had begun to unfold in this period. Even bloodletting—the medical panacea against indispositions of every sort—was increasingly perceived as both anti-natural and a dangerous weakening of the body. With its leeches and cupping glasses, the barber's practice attracted suspicions linked to a popular nineteenth-century literary motif: vampirism. Such reevaluations reflected a general change in the notion of health, which the Enlightenment sensibility understood as not resting on the body's disburdening opening to the outside, but rather on its self-preservation: a capacity to defend itself from exogenous sources of disease. The focus of medical treatment was thus reversed: instead of an expulsion of illness from the body, it now needed protection from pathogens trying to penetrate from the outside.

II. The Body's Closure

In this manner, the procedure of expulsion of excessive fluids was embedded in a traditional conceptual world in which the human body's periphery—both skin and sense-organs—served as a transmission zone for a close exchange with the environment: a process that was not simply pulsative and punctual but rather, corresponding to the original meaning of the term "sympathy," was a chemical phenomenon involving the steady influx and reflux of materially diffuse fine particles.[6] Johann Ambrosius Hillig's *Anatomie der Seelen* (1737)

[6] On this concept in its classical formulation, see Rudolph E. Siegel, "Sympathy as a Diagnostic Concept," in *Galen's System of Physiology and Medicine. An Analysis of his Doctrines and Observations on Bloodflow, Humors and Internal Diseases*, Basel, New York 1968,

can thus define friendship—this entirely in the spirit of the older period—as "a friendship between two things which are gladly together, emerging from their exhalations (*Ausdünstungen*), which easily unite."[7] The corresponding article in Zedler's *Universal-Lexicon* still treats such perceived phenomena in an objective-analytical tone. The putatively indisputable evidence for long-range sympathetic effects presented by the author is necessarily derived from material effusion:

> But we . . . presume that three things have to be present in every sympathy and antipathy, namely a body which produces *effluvia* or small particles [*Theilgen*], then another body which takes in such *effluvia*, and furthermore a means, namely air, through which the said *effluvia* are brought from one place to another.[8]

The Enlightenment tried to dry up this effluvian zone, above all others. The anthropology of the century's second half shifted sympathetic effects to the terrain of feeling, in the process discovering the life of the nerves and psyche; hygiene's complementary achievement involved the miasmic excretions previously ascribed to the realm of sympathy—now they were discredited as either unpleasant or harmful.

But the old body's outer shell was not only permeable in respect to such magical relations. The doctrine of fluids, supplemented by the intertwined, mediating concept of a *spiritus* penetrating all metabolic processes as a fine material substance,[9] formed the foundation upon

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360–82. In both Galen and the later tradition, two forms of sympathy were at work: sympathy as the mutual effects of the bodily organs, on the basis of certain similarities, through nerve transmission and fluid transfer; and sympathy between bodies through exhalation and contact. "Influence" was originally a purely astrological concept (Latin influxus); the entry in Zedler's Universal-Lexicon offers only this context, i.e. none with an intellectual content**.** See Johann Heinrich Zedler, ed., *Grosses-vollständiges Universal-Lexicon aller Wissenschaften und Künste*, 1732–54, vol. 8, Graz 1961–64, 546.

[7] Joh. Ambrosius Hillig, *Anatomie der Seelen, darinne derselben Logicalische und Moralische Natur des Verstandes, Willens, Mental-Gedächtnis der Phantasie, Affecten, Sensual-Gedächtnis des Leibes* . . ., Leipzig 1737, 149.

[8] Johann Heinrich Zedler, ed., "Sympathie," *Grosses-vollständiges Universal-Lexicon aller Wissenschaften und Künste*, vol. 41, 1732–54, Graz 1961–64, 744–50, here 748.

[9] See e.g. Johann Conrad Glaser, *De spiritu hominis vitali*, Leipzig 1681, where the essence (idea) of *spiritus aeris*, taken in with inhalation, is described as closely related to the body's own version of the same substance and capable of being transformed by it immediately. Still resonating here are pneumatological concepts from the old psychophysics grounded in an essential identity between air, breath, and soul. At the same time, all excretions are carried out through life spirits so that metabolism represents a single streaming of spirit through the body. The mediating function of this fine substance thus consists not only in joining psyche and soma into a unity, but also in rendering the human body and the external world into a fluid continuum. The articles on the different forms of *spiritus* in Zedler's *Universal-Lexicon* show how long ideas and ways

which old European school- and popular medicine could even begin to understand somatic processes as fluid-exchange with the environment.[10] The exhalative and inhalative processes were related to the ever-more precisely analyzed gas-exchange taking place in animal bodies; but beyond that, they formed a spatial atmosphere penetrated by "subtle streams"[11] in which human beings could influence each other through a kind of auratic emanation. "The body is thus open in all its parts to the material of the environment," writes Senac.[12] In this realm as well, physiological and social interactions were not yet sundered: "All living bodies," comments the famous Swiss Enlightenment doctor Tissot,

> exhale each moment an astonishingly thin moisture, perhaps through half of the sweat-pores of our skin: an extremely delicate moisture far more significant than all our other evacuations. At the same time another type of sweat-pore takes in a portion of the liquids surrounding us, bringing them to our vessels. . . . It has been proven that in some cases this inflow is very considerable. Strong persons exude more [than they take in]; but the weak, who have almost no atmosphere of their own, have more inflow; and that exuded portion, or that effluvium for persons who feel healthy, contains something nourishing and strengthening which, when taken in by another person, furnishes new strength. These remarks explain how the young girl whom old David marries gives him fresh strength.[13]

On the one hand, the skin serves to remove superfluous and harmful liquids; on the other hand it is the organ of intake, capable of being infiltrated by material influences of all kinds. The discussions over the danger of bathing here offer rich evidence. In a conceptual framework prevailing until the mid-eighteenth century, water not only

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of thinking from doctrines focused on the temperaments continued to play a role in anorganic chemical theory: alcohol-distillation thus frees from the "phlegma" of water and so forth. Johann Heinrich Zedler, ed., "Spiritus," *Grosses-vollständiges Universal-Lexicon aller Wissenschaften und Künste*, vol. 39, 1732–54, Graz 1961–64, 111.

[10] See the rich documentation and further references in Barbara Duden, *Geschichte unter der Haut. Ein Eisenacher Arzt und seine Patientinnen um 1730*, Stuttgart 1987, 24 and passim.

[11] Jean-Baptiste Senac, *Traité de la structure du coeur, de son action, et de ses maladies*, vol. 2, Paris 1749, 65.

[12] Senac 65.

[13] Samuel Auguste David Tissot, *L'onanisme. Dissertation sur les maladies produites par la masturbation*, Lausanne 1764, 114. Even here, Tissot discovers an argument against onanism, for in coitus the effluvium is particularly great and if not mutual would inflict a loss on the body: "but the self-polluter only loses and gains nothing in return." (Tissot 116).

shared its elementary powers with the body but also penetrated it, leading to excessive strain on the blood vessels.[14] The organological idea that the epidermis is not a passageway for the influx and reflux of humoral substances but rather a protective barrier between inside and outside only began to set in toward the later part of the century.[15] Water now began to be seen as a substance maintaining the skin's intactness precisely in this protective function.

In this manner, in face of the older, permissive and osmotic image of the body, Enlightenment medicine insisted on its functional closure—on a limitation of its exchange with the outer world. There was now a general increase in restrictions involving metabolic exchange with the environment: emitting something gradually came to be seen as potentially no less harmful than taking in an infective agent. Composed of dietetic input-output limitations, a second skin—a skin ever-more impermeable in both directions—was thus laid around the body. This consigned a new task to the corporeal periphery: protecting the body's interior on the one hand from "uncalculated dirt-streams"—from "dirtying, contact, admixture, supplementation, bleeding" ("*Besudelung, Berührung, Beimengung, Zusatz, Abzapfung*");[16] and on the other hand, from the draining of fluids and energies, which is to say from emission into a now alien surrounding world. Before being dispensed with by a genuinely immunological thinking, the fluid paradigm had begun to turn against itself.

III. Blood-Circulation as a Self-Regulative System

The hygienic measures beginning to draw a *cordon sanitaire* around individual bodies were supplemented with an economy of penury seeing the blood and various secretions as bearers of forces whose expenditure was useless, indeed harmful.

Gradually the principle became entrenched that withdrawing fluids meant weakening, and that the quantity of blood had to remain

[14] Georges Vigarello, *Concepts of cleanliness: changing attitudes in France since the Middle Ages*, Cambridge 1988, 93.

[15] See Senac 65: "This continuous flux & reflux, or this reciprocal action of the arteries that pour out diverse liquids, & veins that again take in these poured liquids & bring them back to the heart." Over the following decades, dieticians did their best to reduce the "type of circulation subject to alien & external agents" (Senac 65) that affected the body in its porosity.

[16] Christian Barthel, *Medizinische Polizey und medizinische Aufklärung. Aspekte des öffentlichen Gesundheitsdiskurses im 18. Jahrhundert*, Frankfurt/Main, New York 1989, 131.

constant if circulation was to achieve its maximum effect. By the turn of the eighteenth century, in the age of Goethe's classicism, a thrifty corporeal understanding of this sort had become common currency in educated circles. A dietetics book of 1793 celebrated the prudence of "nature," striving towards retention of the totality of all her functions:

> As a clever state-economist [*Staatswirthin*], she acts according to fixed plans, maintains the activity of each single portion of the whole, distributes blood in proportionate equality for the animation and nourishment of the entire body. . . . she never allows the expenditures [*Ausgaben*] to exceed the quantum of receipts [*Einnahme*].—No useful fluid is unnecessarily wasted to the damage of the animal economy.—The most beautiful harmony rules among all parts when the soul refrains from destroying the animal mainsprings through passionate despotism and does not disturb the peaceful course of the bodily functions.[17]

What came, overlaid with a controversy spread over decades, was a gradual reversal of plausibilities. It is the case that here as in many similar cases, we can observe a temporal space between the theoretical discrediting of a practice and its actual end; hence, traditional bloodletting remained customary until the mid-nineteenth century—before sinking into medical history, isolated efforts at rehabilitation excepted.[18] But this apparent continuity masked a shift of accent, and this in two respects. In the first place, bloodletting increasingly seemed an activity of uneducated and conservative "village barbers."[19] At the same time, along with handling indications more critically and precisely, the medical elite gained a different sense of the purpose of drawing blood. A plethora of the substance was now seen less as a cause than as a symptom of a given illness; and bloodletting was no

[17] Franz Anton May, *Medicinische Fastenpredigten, oder Vorlesungen über Körper- und Seelen-Diätetik, zur Verbesserung der Gesundheit und Sitten. Erster Theil*, Mannheim 1793, 350.

[18] For a more detailed discussion, see Elke Angelika Maibaum, *Der therapeutische Aderlaß von der Entdeckung des Kreislaufs bis zum Beginn des 20. Jahrhunderts. Versuch einer kritischen Neubewertung*, Herzogenrath 1983, 27 and passim.

[19] In this manner the practice was inscribed in the prevailing opposition between manual and intellectual labor. The transformation of nourishment into the body's own nutritional liquid (*chylus*) and then into blood forms a sensitive physiological chain: "How thriftily, then, must students and those handworkers who sit quietly economize with bloodletting, because their weakened digestive tools need more time to draw good milk-juice from nourishment; and because of this true full-bloodedness is a rare occurrence. Village barbers suggesting a bloodletting should not be so readily obeyed. The blood is quickly drained, but not so easily replaced. Mental labor devours the blood's spiritual element, lessening full-bloodedness through that alone." May 36.

longer understood as restoring a balance of fluids, but rather—less directly and more modestly—as encouraging the organism's self-healing process through eased circulation.[20] Although it may have occasionally led to similar measures, the argumentative approach at work here had abandoned surplus-centered theory.

A millennia-old tradition thus came to an end. Within this tradition, the art of healing had mainly consisted in releasing a substantialized evil from the body, in the form of spoiled juices, toxic miasmas, and decayed flesh. The magic model of "expulsion" left the scene, the focus of medical activity broadly shifting from a principle of *removal* treating the body as a polymorphous and passive aggregation of fluids to one of *supply*, promising active powers of self-healing and prevention. The diseased organism was now supplied with two sorts of substance: medicine was meant to strengthen its inner dynamic, and low doses of stimulants were meant to augment its immune reactions. The second half of the eighteenth century ushered in the principle of inoculation: an injection of disease running directly counter to the main direction of humoral-pathological ideas.[21]

In a certain manner, the full meaning of Harvey's famous discoveries could only be understood with this paradigm shift: namely, that the body, with its circulating blood, possesses a system allowing far-reaching self-regulation.[22] One mid-nineteenth century pioneer in

[20] "The view maintaining that bloodletting or any other means of art [actually] heals disease is false and highly dangerous. Only the organism, only its dynamic-material activity, only its living chemical nature [*Chemismus*] heals diseases. The means are indeed only means; properly and suitably chosen, they only support this striving for health . . ." Friedrich Alexander Simon, *Der Vampirismus im neunzehnten Jahrhundert oder über wahre und falsche Indikation zur Blutentziehung* . . . , Hamburg 1830, 219. This conceptual shift emerges very clearly in Reil's theory of fever. See Johann Christian Reil, *Ueber die Erkenntniß und Cur der Fieber*, 5 vols., Halle^2 1799–1815, vol. 1, § 34 and passim.

[21] See Vigarello 129. Vigarello directly connects inoculation with the fashion for cold baths: "The body was no longer simply a passive machine. Other strategies existed. It became possible to make use of the body's own strengths, to solicit, once again, internal and active dispositions. This did not happen by chance; the hygienists of the cold bath and those of inoculation were often the same people . . . The real change was social: the belief in an autonomous strength, invented by a bourgeoisie confident of its own physical power, and confident, above all, of powers totally independent of the ties and codes of blood."

[22] See Thomas Fuchs, *Die Mechanisierung des Herzens. Harvey und Descartes—Der vitale und der mechanische Aspekt des Kreislaufs*, Frankfurt/Main 1992, 72: "In the traditional conception, the metabolic movement essentially passed through the organism: nourishment and air streamed inwards in order to be again consumed in the periphery, transformed into blood and *spiritus*. In its openness for this 'vertical' movement of air and earth, animal life remained largely attached to the vegetative realm; this was mirrored in the

this area was François Quesnay, who in three works presented new foundations for the practice of bloodletting.[23] Quesnay placed special value on his observation that nothing such as "emptiness" occupies blood vessels when fluid is removed from them, but that they adapt to the diminished circulatory quantity through contraction. He thus dismissed the iatromechanical idea that on quantitative grounds alone, bloodletting allowed freer, accelerated circulation to the remaining blood;[24] this idea was replaced with the now-prevailing theory that blood pressure depends on the blood vessels' tonus and only indirectly on the amount of blood.

Other than with the older calculation of flow-speed on the basis of rigid quotients—vessel-volume and content—a mode of *dynamic self-regulation* was thus now attached to the process of blood circulation. Hence, the body was no longer meant to be managed like a hydraulic machine, but demanded that attention be paid to the complex inner interaction of the vital functions; it was now to be understood as a non-segmented *auto-referential whole*. Quesnay allows intervention in the self-steering of the *oeconomie animale* only

> in those extreme cases where injecting some reforms may be necessary, in order to reestablish the equilibrium of solids & liquids in the natural order by remedying only that which is in excess or that which is lacking; in such a manner that one must be at least as attentive to evading an excessive diminution of liquids as removing an excess of plenitude; for errors of art are to be feared more than those of nature; because the former are far more frequent & much more excessive than the latter, which are produced

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peaceful, deliberate quality of the streams and metabolic processes, in the image of the 'terrace garden.' . . . It was central warmth alone that endowed animals with more than vegetative life.—Only now, with advent of the closed circulatory system—a system no longer representing simply a phase of passage but maintaining itself in movement and that, connected everywhere with itself, is in simultaneous movement like the planetary spheres—the organism confronts the outer world with an anatomical substrate of its autonomy and self-perpetuating dynamic. It emerges as something *moving in itself,* and this is a precondition for its external (spatial) movement."

[23] François Quesnay, *Observations sur les Effets de la Saignée* . . . , Paris 1730, and *L'Art de guérir par la Saignée* . . . , Paris 1736, and *Traité des Effets et de l'Usage de la Saignée*, Paris 1750.

[24] Quesnay's sharply critical opinion of an approach based on pure quantification is most apparent in an appended chapter of the *Traité*, "Des Saignées abondantes," 487: "However that has been, above all starting with the discovery of circulation until the present, the doctrine of the medical doctors authorizing abundant bloodletting." Quesnay nevertheless finds a medical use for the practice in many cases; but it is mainly aimed at an alteration in the mix of substances in the blood, not on a lessening of the amount in circulation.

> by a regulated & instituted mechanism, in order to only produce effects useful for its own conservation.[25]

Quesnay's three-volume *Essai physique sur l'oeconomie animale* (1736) offers a detailed look at the approaches at work in a theory of unified physiological organization.[26] This is particularly noteworthy in light of Quesnay's role—besides his having been a physician—as the founder of the first theory of economic circulation, physiocraticism. Recalling the old analogy between the human body and the body of state,[27] the correspondences between his biological and social models point to the concept of self-governance as taking hold in very different areas of the eighteenth century's systematic thinking.[28]

In this context, a mutual exchange and influence between physiological and economic conceptual forms was characteristic. In economic theory starting with Locke, a central concern is how local surplus production can pass beyond necessary consumption and be brought into a trade cycle profitable to all sides. Supplies are not meant to be hoarded but rather exchanged, the medium being money. For according to Locke, the great advantage of money is its capacity to conserve the "overplus" of originary production; it can "transform perishable into imperishable substance."[29] Through this process, the surplus gains a particular quality: being lastingly disposable in an abstract form that is convertible in all directions. At the same time, this excess is no

[25] Quesnay, *Traité* 553, 555.

[26] François Quesnay, *Essai physique sur l'oeconomie animale*, 3 vols., Paris[2] 1767. On circulation see vol. 3, 418–19, where Quesnay attacks both the image of the body as a "machine hydraulique" (419) and its therapeutic consequences.

[27] The analogy always takes in blood-circulation. See Michael Stolleis, *Pecunia nervus rerum. Zur Staatsfinanzierung in der frühen Neuzeit*, Frankfurt/Main 1983, 65: "An additional favored image is of money as blood running through the veins and sustaining the body. . . .Taxation was interpreted as bloodletting; with excessive taxation one warned of a 'bleeding to death' of the patient."

[28] August Oncken, *Geschichte der Nationalökonomie*, part 2, Leipzig[2] 1920, 315. We find a direct—even graphic—comparison between both models of circulation in H. Denis, "Die physiokratische Schule und die erste Darstellung der Wirtschaftsgesellschaft als Organismus. Der Kreislauf des Blutes und der Kreislauf der Güter," *Zeitschrift für Volkswirtschaft, Socialpolitik und Verwaltung* 6 (1897), 89–99.

[29] Birger P. Priddat, *Das Geld und die Vernunft. Die vollständige Erschließung der Erde durch vernunftgemäßen Gebrauch des Geldes. Über John Lockes Versuch einer naturrechtlich begründeten Ökonomie*, Frankfurt/Main 1988, 40. Locke's formulation is as follows: "And thus came in the use of Money, some lasting thing that Men might keep without spoiling, and that by mutual consent Men would take in exchange for the truly useful, but perishable Supports of Life." Peter Laslett, ed., *John Locke: The Second Treatise of Government*, Cambridge 1967, 318.

longer useless; it can be exchanged, and the "overplus" beyond mere subsistence is the condition for exchangeability. Condillac, a voice of the French Enlightenment, would take this up when designating merchants as "channels of communication through whom surplus flows. It moves from places where it has no value to places where it takes on value; and everywhere it lodges itself, it becomes wealth. Hence, the tradesman in a way makes something from nothing."[30]

Like a *creatio ex nihilo*, trade thus allows locally useless, superfluous products to become potential wealth. Nothing is too much; rather, it can simply find itself in the wrong place. The solution lies in a type of circulation that—in contrast to with simple taxation—makes possible a steady exchange of money and goods: "It is necessary that through circulation, money transform itself in a way into everything suitable for maintaining life and vitality in the political body. . . . If some object stops this circulation, commerce languishes."[31]

It is no coincidence that physiological metaphors are employed here. Wherever economists wrote on the salutary effects of exchange, the image of blood-circulation suggested itself. This was especially the case for the physiocrats. Just as physicians did, they stressed the healthfulness of circular flow and the danger of stagnation.[32] The tendency to unify regional supply systems and consider them a single,

[30] Abbé Etienne Bonnot de Condillac, *Le Commerce et le gouvernement. = Oeuvres de Condillac*, vol. 4, Paris 1798, 59.

[31] Condillac 133.

[32] Two examples: "It is important to observe here that there is revenue from this circulation of money, as there is from that of blood. Everything must circulate without cessation: the slightest stop would be stagnation." Victor de Riqueti, Marquis de Mirabeau, *Philosophie rurale ou Économie générale et politique de l'agriculture* . . . , 2 vols., Amsterdam 1764, vol. 1, 56. Mirabeau, the father of the revolutionary, was one of the most zealous proponents of physiocratic doctrine. Turgot, who in his work as finance minister, tried to realize physiocratic principles, goes into more detail: "This continuous advance and return of capital is what constitutes *what must be called the circulation of money*; this useful & fecund circulation animating all of society's work, maintaining the movement & life in the body politic, & of which we have good reason to compare to the circulation of blood in the animal body. For, if through some kind of derangement of the order of outlay of the different classes in society, the entrepreneurs would stop drawing their advances with the profit which they have a right to expect, then it is clear they will be obliged to reduce their enterprises. . . . ; that poverty will take the place of wealth." A.R.P. Turgot, "Réflexions sur la formation & la distribution des richesses," *Ephémérides du citoyen*, vol. 12 (1769), 93.

This metaphorics is also commonplace in the German-speaking realm; See, for example, Johann Heinrich Gottlob von Justi, *Staatswirthschaft oder Systematische Abhandlung aller Oekonomischen und Cameral-Wissenschaften, die zur Regierung eines Landes erfordert werden*, vol. 1, Leipzig 1758, 259, § 243.

immanent structure was common to both realms. In a turn from the hydraulic, machine-based model, both economic societies and human bodies would from now on be understood as *organisms*. In both cases, the difference with the usual corporeal model lay in the surplus value of production no longer being viewed as an alien material within an equilibrium adjusted toward subsistence, but as an element that could be reinvested, in this way injecting new energy into the cycle.

It is clear that with this shift, the old economic-political instruments would also be altered. Quesnay's *tableau économique* represented a calculating model that reproduced the flow of goods in terms of its innate natural laws, which would simply be destroyed through arbitrary interference.[33] The abstract primacy of circulation rendered obsolete the mercantilist concern with assuring the state's active trade balance through tariff regulations. Beyond this, it tended to annul the hierarchic gradations inside the body of the state between its center and periphery, above and below, in favor of an interconnection of all elements based on a division of labor.

The old homeostasis thus rendered itself dynamic. Calculations no longer ended up solely with a surplus in one location and with a concomitant lack in another location—the problem of luxury—or having to be balanced through artificial exports. Such forms of surplus were of course still to be found, but they were now understood as flawed functioning and signs of being de-natured. The physiocrats were bitter opponents of every type of wealth not transformed into societal labor as investment capital[34]—roughly parallel, on a dietetic level, to negligent living leading to a surplus that the body could not absorb: "Let us leave the truffles, morels, and mushrooms to those who . . . serve their stomachs and gums alone, and have enough time to wash the results of the dainty-eating [*Schleckerei*] out of their bodies with laxative drinks and enema-chests."[35] But such habits were, so to speak, remainders from an increasingly antiquated way of thinking and living. The natural condition was no longer defined as a subsistence economy in the sense of Aristotelian *autarkeia*, but

[33] Quesnay, *Tableau économique*. See also Oncken 343 and Wolfgang Petzet, *Der Physiokratismus und die Entdeckung des wirtschaftlichen Kreislaufes*, Karlsruhe 1929, 80 and passim.

[34] Against the theory that luxury promoted trade and thus, indirectly, the common good, Quesnay established a strict distinction between consumptive and investment output. See Auguste Oncken, ed., *François Quesnay: Oeuvres économiques et philosophiques*, 1888, Aalen 1965, art. "Population", 263–69.

[35] May 142.

as surplus-production furthering trade.[36] "The more wealth produced by men beyond their consumption, the more useful they are for the state," writes Quesnay,[37] his pronouncement offered in his capacity as a theorist of the circulation of both blood and money. If, on the one hand, altered physiological forms of thought now found their use in the economy, bodies were on the other hand assigned the task of literally embodying the new economic causalities. For in the grinding habitualizations of daily life, what here presented itself as a breakthrough to the idea of a complete and seamless circulation led to a dissolution of the old regulative system of surplus and wastage through a morality of absolute corporeal self-control.

IV. The Nervous Organism: On the Physiology of the Modern Subject

Self-regulation was the principle allowing conception of the "body" as a closed system: a system establishing itself autonomously against the environment's direct influence. The application of the principle allowed emergence a new mode of being tied to natural bodies, and with it a new science: biology as the doctrine of self-actuating life.[38]

The shift from the body-as-vessel to the body-as-system (to encapsulate a complex process) was accompanied by a changed type of interior physiological differentiation. The old doctrine of three zones, still embedded in the Aristotelian idea of a hierarchy of locations, each with its own capacity, lost its validity. In place of such a topical order, a model differentiated according to *organ functions* emerged on the scene. It would no longer be possible to observe that, in line with

[36] In the eyes of modern economists, stinginess—as the static maintenance of acquired possessions—is just as damaging as luxury; both withhold the means necessary for the production apparatus. This is already the subject of a detailed note on the third page of Turgot. He concedes, in formal agreement with scholastic criteria, that "avarice is a true mortal sin" (Turgot 130), but the formula's meaning is directly reversed: avarice is now not a striving for profit but, precisely, a refusal to partake in the profit-economy.

[37] Quesnay, art. "Population," *Oeuvres économiques et philosophiques*, 253.

[38] See Michael Sonntag, "Die Seele und das Wissen vom Lebenden. Zur Entstehung der Biologie im 19. Jahrhundert," in *Die Seele. Ihre Geschichte im Abendland*, eds. Gerd Jüttemann et al., Weinheim 1991, 294–318; here 295: "Before the late eighteenth century, there is no biology. This means, not only that the concept does not exist, but that there is also no independent knowledge of living things and no genuine object of such knowledge. Information is lacking about the major organic functions and their connections—about the characteristics distinguishing, in principle, living things as such from raw material."

humoral transformationism, women with menstrual problems bled from the knees or men with kidney stones passed urine through their eyes; the limitless potential for replacing one fluid with another—a process only restricted by the higher principle of volume-constancy—disappeared from empirical medicine. Instead, for the first time in their history, human beings were endowed with an organism within which a highly complex exchange between individual organs unfolded: organs possessing their own distinct tasks and always operating according to their functional logic.

This conceptual shift also meant that the smooth interplay of body parts could no longer be secured through a hierarchic command-chain (still the case in the rationalistic corporeal models influenced by Descartes) but instead needed a more complex and mobile form of steering. In other words, the communicative demands within the organism increased. The new medical paradigm acknowledged this fact in assigning the *nervous system* the role of steering-authority within the body. Previously managed in the corporeal repository through the viscous, lethargic humors, physiological communication now shifted in the new type of organism to the fast-conducting networks of diversified nerves, the focus of intense scrutiny by physicians in the eighteenth century's closing years. Where the fluids distributed themselves according to hydraulic rules, thus being subservient to gravity among other things, modern paths of propagation came to be associated with the *vis nervosa*: ether, magnetism, galvanism, electricity. In this period, the writing devoted to the energetic, transmaterial quality of the nerve-stream and its functional equivalents is endless; something tantamount to a mysticism of nerves—its participants including, not least of all, philosophical authors like Herder—was in fact in play.

We can see here that the shift from a humoral to a neurological corporeal model was not merely significant for the internal dynamic of human physiology. Beyond that, it determined the mode for integrating the individual body into a social collective: no longer through contagious and miasmic "local traffic," but by way of higher, more spiritual and—from the vantage of physical technology—more nervous frequencies. The aberrancies of the body's condition themselves underwent reorientation. Instead of taking the path of indigestions, *vapeurs,* plethora (excess of blood) and other disturbances of balance between corporeal ingress and egress, they preferred the subtler option of nervous malady. Thus emerged the psychosomatic symptomatologies stamping the modern corporeal image. Function and functional disturbance, sociality and asociality, were newly modeled in correspondence

with the medical paradigm-shift—with all the consequences that this break had for the anthropological sector in general.

The degree to which phantasms of a happy *unity with oneself* were tied to the neurosensory image and feeling of the body is striking. Looking backward, nerve-mysticism—together with its media, playing such a great role from *Empfindsamkeit* to Romanticism in medical anthropology, *Naturphilosophie,* doctrines of communication, and imaginative literature—tied the outmoded mechanical-hydraulic corporeal model to experiences of dissolution and loss of ego. Within this framework, the bodily self (in full analogy with the working of consciousness in contemporary philosophy of the subject) acted upon itself as a dynamic, living organism. In a certain sense, it thus *created itself* rather than simply being open, machine-like, and passive to external stimuli: an insight that even in scientific tractates was imbued with a tenor of exultant *unio mystica*. But already around 1800, voices emerged pointing to endogenous and unmasterable effects associated with the new regime of nervous self-governance.[39] This was the physiological locus of the *unconscious*, a concept that would first make life difficult for the autonomous subject—which it would then overcome, with Freud.

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[39] See Albrecht Koschorke, "Poiesis des Leibes. Johann Christian Reils romantische Medizin," in *Romantische Wissenspoetik. Die Künste und die Wissenschaften um 1800*, eds. Gabriele Brandstetter, Gerhard Neumann, Würzburg 2004, 259–72.