

**Substance and Organism as a Whole:
Aristotelian-Thomistic Anthropology and Holistic
Contemporary Biophilosophy**

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*The New Definitions of Death for Organ Donation:
A Multidisciplinary Analysis from the Perspective of Christian
Ethics* (Peter Lang, 2018)

Aristotelian-Thomistic (Aris/TA) Metaphysics

1. Holistic
2. Four causes (formal, final, efficient, material)
3. The form is the cause which accounts for the intelligibility of an entity as well as its properties and functions.

Holistic Contemporary Biophilosophy (HCBP)

1. Emerged from a climate of accelerated progress in Cartesian mechanistic biology as scientists slowly come to recognize that life and organism cannot be explained in mechanistic terms.
2. 'Systems thinking:' seeking to understand *why* organisms are put together the way they are, instead of focusing on *how* they are put together.
3. A rediscovery that nature has a final end, but avoiding the question of the formal cause.
4. Limits itself to the phenomenological dimension of the philosophy of nature.

Aris/TA Substance View (Hylomorphism) of the Human Person

1. Substance = substantial form (soul) + prime matter
2. "The soul is a substantial form, because it places man in a determinate species of substance, no other substantial form intervenes between the soul and prime matter." (*QDA, a. 9*)
Note: it is entrenched in our language to say 'substance = soul + body'
3. Substance view is ontologically grounded, i.e., human personhood is based on human nature and not in any arbitrary set of brain-dependent capacities. The substance view remains immune to the influence of technological/scientific progress.

Fundamental Characteristics of Substance

1. is a particular ‘this something’ (*hoc aliquid*) that subsists in itself and not part of another being
2. is the unifying center of all the various attributes/properties (accidents) that belong to it
3. is the unifying center which grounds the identity of a person throughout his existence as he undergoes changes (e.g., the acquisition of brain functioning during fetal development, or the loss of brain functions because of dementia or severe brain injury)
4. has its own internal principle; hence, has in itself both internal unity and coherence

Organism as a Whole (OW) [i]

1. is an independent living unit *completed* in itself; is not a part of a greater living whole
 2. The biological finality of OW is its own self-preservation, the *telos* to which all life processes and functions of its subsystems and organs are directed.
 3. is *indivisible*, that is, it cannot be divided to produce two or more living organisms
 4. Growth and senescence does not change the *identity* of OW over the course of its existence; it remains one and the same even after having suffered the (non-fatal) loss of some of its parts, whether physically or functionally.
- In sum, OW is an *integrative unity* with four characteristics: completion, auto-finality, indivisibility, and identity.

Organism as a Whole (OW) [ii]

1. The concept of OW does not require the organism to be whole or complete, as long as it can continue functioning despite loss of some of its subsystems. “Individual subsystems may be replaced (such as, by pacemakers, ventilators, pressor) without changing the status of the organism as a whole” (Bernat, 1984, *The Definition, Criterion, and Statute of Death*).
2. That OW is what it is of a particular kind, and that it remains integrated as a unity despite the loss and/or replacement of some of its subsystems, bespeak the presence of a *principle of integration which configures, organizes, directs, and maintains all the different parts functionally and structurally into an organized whole*.

OW vs. Whole Organism

1. Whole organism: sum of its organs, tissues, and cells
2. OW: includes, in addition to the sum, the network of numerous complex, dynamic, and ordered mutual interactions occurring at multiple levels within the organism— from the interactions between molecules at the intracellular level to interactions at the levels between cells, organs, and organ systems—all of which are necessary operations to keep the organism integrated and whole, and interacting with its environment in response to its needs.
3. Human death must be understood in terms of organismic death (i.e., death of OW) and not in terms of death at biolevels above or below the organism.

‘Whole and Parts’ Relationships in Substance View
and in HCBP (i)

1. The organic whole is greater than the sum of its parts.
2. The living whole is ontologically prior to its parts.

‘Whole and Parts’ Relationships in Substance View
and in HCBP (ii)

3. Therefore:
 - (i) the activity of the whole cannot be fully explained in terms of the activities of the parts isolated by analysis
 - (ii) no part of any living unity and no single process of any complex organic activity can be fully understood in isolation from the structure and activities of the organism as a whole
- (E. S. Russell, 1930, *From Mechanistic to Organismal Biology*).
- In brief: no part can account for the whole, and a part is intelligible only with reference to the whole. An *ex-vivo* part cannot exist on its own.

Substantial Form (Soul) [i]

1. First actuality (*entelechia*) which actualizes the ‘body’ (prime matter) to make it the body of a living being of a particular species
2. Principle of life, hence, always in act.
3. “Since life is manifested through various operation, that by which we primarily perform each of all these vital actions is the soul. For *the soul is the primary principle of our nourishment, sensation, and local movement; and likewise of our understanding.*” (*ST I, q. 76, a. 1*).
4. The manifestation of multifarious life activities is the empirical evidence indicative of the non-localized presence of the soul in the body.

Substantial Form (Soul) [ii]

1. The soul is a unity of its powers (capacities) which relate to one another in a strict ontological hierarchy, in which the lower power is a precondition for the existence of the higher and where the higher powers are explained as contributory to the lower functions.
2. The first and most foundational power of the soul, in virtue of which all living things have life, is the vegetative power. Its presence does not require the presence of other powers. Hence, the presence of vegetative functions is by itself a necessary and sufficient condition to indicate that something is a living thing. (*De Anima, Book II, 413a20-416b31*)

OW, a Living System with Spatial-Temporal Dynamic Hierarchical Organization (i)

1. Hierarchical organization: a multilevel nesting of systems within systems like Russian dolls.
 - a. In very simplified terms: cells – tissues – organs – organ systems – OW. The summit of the hierarchy is OW itself, the living organism, and not any particular body part.
 - b. Great heterogeneity of parts at different levels of the hierarchy, and each part possesses more than one functional or regulatory property. Hence: complex part-part and part-whole relations.

OW, a Living System with Spatial-Temporal Dynamic Hierarchical Organization (ii)

2. Dynamicity: the interdependent and mutual relations among the parts correspond to a complex and giant network of nonlinear dynamics, from the molecular to the macroscopic level. In this network, the “causal control within a system is not limited to one specific level within a hierarchy but rather distributed throughout a system or network.” (Marcum, 2009, *The Conceptual Foundations of Systems Biology*).

OW, Organizational Circularity

That the parts in the body are interconnected in a network of interdependencies is clearly evident in the following simplified sketch: (i) every part in the body depends on blood circulation to receive its required nutrients and eliminate its waste; (ii) but the blood itself must be pumped, hence its dependence on the heart; (iii) the blood must also be properly oxygenated and cleared of excess of carbon dioxide; hence its dependence on the lungs; (iv) the inflation of the lungs, in turn, needs the activity of the diaphragm (and intercostal muscles); (v) the activity of the diaphragm requires the neural input from the midbrain respiratory center; and (vi) the latter, in turn, needs to be triggered by some increase of carbon dioxide in the blood. The functional co-dependencies between the parts thus follow a pattern of organizational circularity.

OW, an Autopoietic System

1. Autopoiesis: every living organism, from unicellular (an amoeba) to complex multicellular (man) is a factory that makes itself from within.
2. Autopoiesis: an uninterrupted phenomenon by which an organism constantly produces within itself its own components. These are in turn integrated into the same dynamic network of ordered processes which produces the components, and which constitutes the organism as a unity.
3. The organism is a closed network system with *organizational circularity*, works by itself and for itself, in an endless turnover of components under conditions of continuous perturbations and compensation of perturbations.

‘Metabolism,’ the Fundamental Phenomenon of Life

1. Metabolism is an *immanent and constitutive* property of every living organism.
2. Metabolism (understood in the fullest sense) involves bodily functions and processes at multiple levels, from the assimilation of nutrients and oxygen to the intracellular biochemical processes, and the excretion of waste and carbon dioxide, all of which are necessary for maintaining OW in a dynamic steady state (homeostasis).
3. At the core of metabolism is the production of ATP (adenosine triphosphate), a high-energy macromolecule needed by all life forms. Since it is produced in the mitochondria of cells, it is widely distributed throughout the human body.

Summary

1. Coextensive concepts: Life – Substance – OW – Integrative Unity – Autopoiesis – Metabolism
2. *Autopoiesis and metabolism are immanent and constitutive, hence absolutely not substitutable.*
3. Aris/TA anthropology recognizes the foundational importance of vegetative life. HCBP confirms that metabolism is foundational to life.
4. The uninterrupted production of ATP in mitochondria throughout the body closely mirrors the non-localized and ‘always in act’ characteristics of the soul. Macroscopically, the uninterrupted blood flow throughout the body is another mirror thereof.