

The Metaphysics of Maria Montessori

Maria Montessori is not generally known as a philosopher. She is best known for the Montessori schools around the world that bear her name, and for her (oft-misunderstood) pedagogical ideas about children's liberty. But after completing her medical degree and spending several years in professional medicine and psychiatry, including working with children, Montessori left most of her professional responsibilities to enroll in a PhD program in philosophy at the University of Rome, in order, as she put it, to "undertake the study of [...] the principles on which [pedagogy] was based" (MM 33).¹ There she studied under philosophers such as Giacomo Barzellotti (for history of philosophy); Pietro Ragnisco (moral philosophy); and one of the most important Italian philosophers of the early 20th century, Antonio Labriola (see Trabalzini 2011:39). Even her more empirical studies in psychology and anthropology (particularly with Guiseppi Sergi and Sante DeSanctis) were infused with an intense mood of "evolutionary positivism" (see Cimino and Foschi 2012; Foschi 2012), a philosophical approach that was further enhanced through her time in Paris, where she studied the thought of Itard and Seguin (cf. Foschi and Cicciola 2006). At the same time, her personal interest in psychology intersected with a general (albeit minority) Italian interest in American pragmatism, particularly William James (see Frierson 2014; James 1906; Santucci 1963), whose philosophical-psychological writings she cites throughout her works.

Despite her own philosophical background, and her engagement with philosophers like Nietzsche, James, and Bergson; Montessori's philosophical thought has not been taken seriously. At most, some have focused on her philosophy *of education*, and there has been some discussion of her feminism (Babini and Lama 2000, Babini 2000) and her place in the history of psychology (see Babini 2000, Foschi 2012, Kramer 1975, Trabalzini 2011). But even her own grandson, in an exposition of her account of "cosmic education," dismisses Montessori's "ultimate explanation of this [cosmic] task" as a view that merely "belongs to her personal philosophy and need not

¹ For abbreviations and editions of Montessori's works, see the reference list at the end of this article.

be accepted by all” (Montessori 1992:95). Of course, her metaphysics *is* part of her philosophy, and much of her pedagogy can stand even if one rejects her metaphysical vision. But the emphasis on her pedagogy *to the exclusion of* her “personal” philosophy has prevented an adequate discussion of that philosophy in its own terms.

The present essay aims to elucidate the core features of Montessori’s metaphysics. I do so as a philosopher, seeking to show how this metaphysics is a plausible alternative worth taking seriously today. I thus focus on developing a coherent metaphysics from Montessori’s writings and lectures, rather than primarily trying to situate her in her historical-cultural context. And rather than pedagogy or historical intellectual movements, I use recent philosophy as a framework for articulating the plausibility of her views. Still, in laying out this metaphysics for a contemporary philosophical audience, I also aim to provide a richer and more detailed background to her metaphysical views for those interested in other features of her thought, including her practical pedagogy. Montessori’s metaphysics infuses her educational materials, particularly the “Great Lessons” that are part of most Montessori elementary curricula. And most generally, her metaphysics is a metaphysics of *life*, and, as she so aptly put it in one of her first books, “The educator must be one inspired by the deep love of life” (MM 59).

1. Life, Mind, and Cosmos

In his *Mind and Cosmos*, Thomas Nagel raises problems for conceptions of the cosmos that seem incompatible with the realities of mental life. He calls for a new metaphysical conception of the cosmos, one that can integrate human consciousness, cognition, and values into a unified conception of Nature.

[W]ould an alternative secular conception be possible that acknowledged mind and all that it implies [...] as a fundamental principle of nature along with physical law? Could it take the form of a unified conception of the natural order, even if it tries to accommodate a richer set of materials than the austere elements of mathematical physics? (Nagel 2012:22)

In this paper, I argue that Montessori provides just such a metaphysics,² one informed by her immersion in the (biological and medical) sciences and deeply influenced by concepts arising from work with young children. One of Montessori's central insights, gleaned from both medical biology and childhood development, can be appreciated in the light of Nagel's claim that the central "problem [...] is this: What kind of explanation of the development of [conscious] organisms [...] could account for the appearances of organisms that are not only physically adapted to the environment but also conscious subjects?" (Nagel 2012:44). Regarding evolution of conscious *species*, even the raw data for addressing this problem are difficult to access; we have never witnessed the emergence of a conscious (much less a thinking) species from an unconscious one (much less from inorganic matter).³ But in the conception, embryonic development, and early infancy of children, we *can* access the development of conscious *organisms* from unconscious physical states, the "creation of faculties, the creation of consciousness" (1946:31), and even "the coming into existence of subjective individual points of view" (Nagel 2012:44) from complex but not-yet-conscious bundles of organic matter. As Montessori explains,

We must dig into the deepest mystery of human life; we must reach the nucleus from which all is formed, the apparent non-existent psyche of the newborn child. He has the power to develop everything which is in man. He creates a being who can orientate himself in the environment. Without language, he learns to speak; without intelligence, he constructs it; he coordinates his movements and [...] becomes interested in things. Nothing existed. Everything has been constructed by him. In him we are confronted with the mysterious, miraculous fact of creation. (1946:20, cf. 29)

Through her lifelong study of how conscious thought and action emerge in children, particularly in what she called "the spiritual embryo" (from birth through

² At least, *almost* just such a metaphysics. A full explanation of how she satisfies Nagel's aspirations would require more details about her philosophy of mind than I have space for in this article. Moreover, her metaphysics, while it can accommodate secular versions, is not specifically secular, and certainly not secular in the anti-theistic way Nagel endorses.

³ Here I leave aside, as Nagel does, the possibility of genuine Artificial (conscious) Intelligence.

approximately age 6), Montessori formulated a conceptual apparatus that emphasizes the “creative power of life” and the continuity between life and mind. As she articulated her program of “cosmic education” for older children, she applied concepts of “life” the cosmos as a whole. The result is a scientifically-informed metaphysics that incorporates notions of teleology and even unconscious thought and action into the basic principles of the universe. By formulating a history of the cosmos using conceptual tools she developed for explaining (individual) consciousness, Montessori offers, at least as a first approximation, a response to Nagel’s challenge. At the same time, she sets up a metaphysical structure conducive to her accounts of agency and to her pedagogical, ethical, and even political theories.

The central concept of Montessori’s metaphysics is the concept of life. Elsewhere, I have shown how she critiques much empirical psychology for treating human beings as mere physical systems.⁴ In place of this physicalist approach, she insists that a better analogy for psychology is *biology*; the psyche is a kind of *living* system. This emphasis on life is reflected in her epistemology, where knowledge is part of the *life* of the knower, not a disengaged view from nowhere (see Frierson 2014). And it lies at the core of Montessori’s conception of proper pedagogy, which takes as its central object the “*living individuality*” of the child (PA 18, see too PA 11, SA 98). But this concept of “life” goes far beyond psychology and pedagogy, permeating Montessori’s entire metaphysical framework. In describing elementary school curricula, she explains that everything – and particularly all science and all history – is “correlated to a central idea, of greatly ennobling inspiration – the Cosmic Plan in which all, consciously or unconsciously, serve the great Purpose of Life” (EHP 1). She postulates “a significant unity of method in all natural building,” claiming that “It is clear that nature follows a plan, which is the same for an atom as for a planet,” where the “basic principles of nature’s plan” are most clearly “revealed,” not in physics, but in “embryolog[y]” (EHP 76, cf. UH 23-24). From her characterization of the nature of life, Montessori works towards an explanation of psychological and social realities on the one hand and of the basic structure of the cosmos on the other.

⁴ See {Author, forthcoming, reference deleted for blind review}.

Montessori's metaphysics of life involves two essential elements: teleology and interconnectedness. Her conception of vital teleology is heavily influenced by early work in genetics – particularly by Hugo DeVries (PA 47, AbsMind 48-9), but also Carl Naegeli (PA 46), Gregor Mendel (PA 50-1) and Charles Manning Child (EHP 76) – that focuses on the internal, teleologically-ordered unfolding of biological formative processes. And this teleological conception also draws from French and Italian evolutionary positivists and thereby (indirectly) from Spencer and Humboldt.⁵ The teleological directness of living systems, both in general and in several of its particular features, informs and was confirmed by Montessori's pedagogical work with children. And these emphases give rise to an oft-repeated appeal to a “cosmic plan” and a conception of “evolution” as inherently *teleological* and *perfectionist*. Particularly as her thought develops, however, Montessori also increasingly emphasizes what we would now call an *ecological* dimension to this cosmic plan. Living systems are teleologically ordered not merely towards their own development but also towards goods of the (eco-)systems in which they have essential roles to play. §§2-3 explain these two fundamental features of Montessori's metaphysics of life.

Once her core metaphysics of life is clear, I turn to the relation between life and basic physical-chemical forces on the one hand and human psychology on the other. Montessori does not *limit* metaphysical teleology and interconnectedness to “life” in the traditional sense. She extends this general picture to include the “cosmos” as a whole, and within that account, she articulates a metaphysical vision within which life, while paradigmatic, is only “one of the creative forces of the world” (EHP 19). Biology has “its special laws” (EHP 19) that are irreducible to mere physical or chemical laws, but the general notion of a “cosmic task” that is at once embryological and ecological, teleological and interconnected, applies even to “inanimate natural objects” (EHP 27, cf. UH 23). §4 lays out how this teleological and interconnectionist metaphysics can apply to non-living nature and thus completes the basic structure of Montessori's metaphysics.

⁵ For discussion of some of these influences, see Cimino and Foschi 2012; Foschi 2012; Foschi and Cicciola 2006. A full discussion of the historical context of her metaphysics would reward study but is beyond the scope of the present essay.

Two issues remain in order to develop a complete metaphysics that could meet Nagel's challenge. First, Montessori might seem to fall short of Nagel's aspirations for a "secular" metaphysics because of her periodic reference to God's role in creation. §5 takes up the role of God in her metaphysics. Unlike Nagel, she is not committed to an *atheistic* conception of nature; she freely appeals to "the will of God" (EHP 50) in explaining her metaphysical conception of the cosmic plan. However, she is careful to free her metaphysics from any particular conception of any particular god, and she articulates her teleological and interconnectionist cosmic plan in a way that does not rely on supernatural intention or intelligence at all. Thus while her metaphysics in general can be – and for her is – theistic, it need not be. Second, the approach articulated here stops short of actually explaining the structure of human consciousness. The metaphysical framework developed provides a *prima facie* plausible foundation for that philosophy of mind, but does not elucidate it. Montessori does not merely work from life back to more basic physical principles; she also works out from life to the *conscious* and *intelligent* living beings that emerge from unconscious and unintelligent beginnings. She primarily shows this through her studies of embryology and early childhood development, in the course of which she articulates notions of the unconscious mind and the embodiment of cognition that provide for a straightforward link between the teleological metaphysics developed here and a sophisticated philosophy of mind. Because these aspects of her view are sufficiently complex, I reserve them for another paper.

2. Life's Teleology: Embryology, Evolution, and Education

2.1. Teleology.

Given her focus on life, not to mention the tone of "evolutionary positivism" in her formative educational context of Rome (see Foschi 2012) and Paris (Foschi and Cicciola 2006), teleology is an unsurprising emphasis in Montessori's metaphysics. In a late lecture, she explains that "In nature there is no creation of an organ without [...] functioning" (1946:124). And in her first published book, she invokes "final causes" as one of two "properties [...] characteristic of life."

The term *final causes* refers to a series of phenomena that are met with [...] ⁶ where there is life, and that tend towards a definite purpose or *end*. [For example, l]iving organisms take nutriment from their environment, to the *end* of assimilating it, that is, transforming it [...] into a [...] living part of themselves [...] [F]or [another] example, [consider] the transformation of the fertilized ovum into the fully developed individual [...] Another form of final cause is seen in the *actions* of living creatures, which reveal [...] a consciousness that even in its most obscure forms guides them towards a destined *end*. (PA 40)

She speaks freely about “the purpose of nature” (e.g. 1946:89) and a “cosmic task” or “purpose” (e.g. 1946:89; AbsMind 56, 147). The notion that “life” has intrinsic, teleological principles of development in both the physiological and psychic realms is central throughout Montessori’s philosophy. Teleology takes place at both individual and species levels, as forces of life lead human beings (and other living things) to act in ways that cultivate their full development as people and that drive the human species towards progress. This teleology is natural force, a “creative energy” as “the urge of life for the normal development of the individual. This is not a casual energy, like the energy of a bomb that explodes. It has a guide, a very fine directive – an unconscious directive – the aim of which is to develop a normal person [or other organism]” (1946:225).

Throughout her philosophy, Montessori defends her conception of teleology in terms of developmental biology (embryology and proto-genetics), evolution, and pedagogy. “Embryology,” she explains, “can point a direction for ourselves” (AbsMind 45) since it “has as its [...] aim, to uncover the creative process, the way in which a body, which did not exist, comes to shape itself for entry into the world of the living” (AbsMind 36). With respect to theories of evolution, Montessori argues that animal species have a directedness, a tendency to develop towards certain sorts of increased perfection:

⁶ Montessori here says that final causes are met with “only” where there is life. In §4, I argue that in later works (and implicitly even in PA), she extends her teleological metaphysics to inorganic nature as well.

[A] great universal power [...] is the force of life itself in the process of evolution. It drives every form of life irresistibly towards evolution, and from it come the impulses to action. But evolution does not occur by luck, or by chance, but is governed by fixed laws (AbsMind 252)

In her pedagogy, this teleology takes on a special role. Thus her early *Montessori Method* explains,

By education must be understood the active *help* given to the normal expansion of the life of the child. The child is a body which grows, and a soul which develops – these two forms, physiological and psychic, have one eternal font, life itself. We must neither mar nor stifle the mysterious powers which lie within these two forms of growth, but we must *await from them* the manifestations which we know will succeed one another. (MM 59)

In all three areas, Montessori emphasizes that teleological causation functions by means of creative forces that express themselves according to determined but discontinuous patterns over the course of development. While she appeals, at times, to “conscious” movement towards particular ends (e.g. PA 40), teleology is first and foremost *unconscious*, a matter of particular processes being explicable in terms of goals rather than an assertion that such processes consciously aim for goals. Conscious intention is a particular way in which teleology manifests itself in human beings and some higher animals (see AbsMind 252-3), and it is a useful *analogy* for teleological causation (see UH 11; EHP 24-5; AbsMind 83). But precisely because it is merely analogical, one does better to consider the lives “of animals and plants” as manifesting a “creative unconscious,” a natural tendency to develop in creative ways even without conscious intent (see UH 10).

Montessori’s metaphysical teleology has several important features. First, it is *basic* or *fundamental*. Unlike many contemporary biologists, she does not see teleology as a useful heuristic that abbreviates what are fundamentally efficient-causal forces of molecular interaction and/or environmental natural selection. This aspect of her view will become increasingly clear over the course of this article, and I return to it in assessing her theory in the conclusion. Second, as I discuss next, teleology is *internal*. Living things are teleological by virtue of innate forces by which they propel

themselves towards particular ends. Teleology is not best understood in terms of external causes changing a living system, but rather as a future-oriented causal power *within* a system effecting its own developments in suitable conditions. Third, teleology is oriented not merely towards some end or other, but towards *perfection*. And fourth, teleology is discontinuous in both time and space; progress towards perfection does not occur in a uniform manner, and particular changes in parts of a system can initially seem unrelated to the eventual perfection of the system. In this sense, Montessori's conception of metaphysical teleology is more "intelligent" than some contemporary alternatives, more the teleology of an engineer or master chef than of an arrow heading to a target or a rock falling towards the center of the earth.

2.2. Internal teleology and the nature of "evolution."

In an important early work, Montessori discusses several different theories of "evolution," starting with that associated with "the glorious name of Darwin." As she summarizes "materialistic theories of evolution" like Darwin's, "according to these theories, the environment is regarded as the chief cause of the evolution of organic forms" (PA 46). She rightly notes that the burden of evolution, on Darwin's account, occurs through "the struggle for existence and [...] natural selection" (PA 46, cf. Darwin 1859:115).⁷ But Montessori explains and defends the quite different "theories of evolution" proposed by Naegeli and DeVries (PA 46, cf. DeVries 1909),⁸ both of whom were important biologists who helped set the stage for modern genetic theory and thereby for the modern synthesis in biology. In describing their differences from Darwin, Montessori emphasizes how *internal* teleology takes precedence over environment-based natural selection:

Naegeli [...] attributes the variability of species to *internal* rather than external causes – namely, to a spontaneous activity, implanted in life itself, and analogous

⁷ For a helpful discussion of Darwin's view and early alternatives (including DeVries), see Kirschner and Gerhart 2005, especially pp. 10-37.

⁸ For some discussion of these figures, see Bowler 1989:248, 267f. For broader discussion of the Modern Synthesis, see e.g. Bowler 1989: 325ff.; Kirschner and Gerhart 2005; and Depew and Weber 1995.

to that which is witnessed in the development of an individual organism, from the primitive cell up to the final complete development [...] The internal factor, namely life, is the primary cause of *progress* and the *perfectionment* of living creatures, while environment assumes a secondary importance, that of *directing* evolution, acting at one time as a stimulus toward certain determined directions of development; at another, permanently establishing certain useful characteristics, and still again, effacing such forms as are unfit. (PA 46-7)⁹

One aspect of Montessori's position here is already implicit in Darwin and has now become standard biological orthodoxy. Natural selection operates only in the context of given variations, so environment can only drive evolution if there is an antecedent cause of sufficient variations of the right kind. Nailing down exactly what causes those variations remains an important problem within contemporary biology, though the discovery of DNA and its operations (and "errors") has provided a framework for answering that problem (see Depew and Weber 1995; Kirschner and Gerhart 2005). During the early 20th century, however, Darwin's unexplained source of variation left room for metaphysically-loaded conceptions of variation, and Montessori offers just such a conception. On her general teleological account, the universe is teleologically-ordered towards the "perfectionment" of living creatures (both as individuals and as species). While such a general teleology would be consistent with either external (natural selective) or internal drivers of such development, Montessori (with Naegeli and DeVries) emphasizes internality. Life causes progress from within. She even claims that the standard roles assigned to natural selective pressures – establishing or effacing specific variations – can ultimately be traced to internal causes, the resilience

⁹ She sees something similar in DeVries's work:

DeVries ... after having witnessed the spontaneous and unforeseen transformations of a certain plant ... without the intervention of any external phenomenon admitted the possibility of the unexpected occurrence of other new forms, from a pre-existent parent form, and to such phenomena he gave the name *mutations* ... Species, therefore, cannot be transformed by external causes or environments ... (PA 47)

For a clear and concise discussion of DeVries, Darwin, and the modern synthesis, see Kirschner and Gerhart 2005: 21-26.

and adaptability of the internal factors themselves. Finally even if (or when) one comes to give refined efficient-causal accounts of the origins of variation, such explanations will describe only the *mechanism* by which the “internal factor, namely life,” which is always already metaphysically teleological, stimulates variations that are conducive to evolution.

The focus on an internal source of teleological causation is consistent with traditional final-causal accounts, such as Aristotle’s, that emphasize the orientation towards a purpose as part of the “essence” or “nature” of a thing. And by connecting this internal basis for teleology with the laws of life, Montessori also reconciles an ultimate appeal to teleology with immediate explanations in terms of efficient causes. Hawthorne and Nolan have recently highlighted the notion of what they call “fundamental” teleological causation, that is, “teleological explanation [that] need not itself be true in virtue of some underlying efficient causal facts” (Hawthorne and Nolan 2006:267). But it is important to see that teleological causation could be fundamental in this sense and still compatible with the possibility of efficient-causal explanations if those efficient-causal explanations are true in virtue of the teleological ones. This relationship between teleological- and efficient-causal accounts is exactly what is needed in embryological accounts. That is, the development of the individual organism occurs the way it does because the DNA (with other developmental drivers) efficient-causally brings about various sorts of changes in the embryo and fetus. And the child develops (psychologically) because various instinctive susceptibilities efficient-causally bring about attentive orientations in various ways. But these efficient-causal mechanisms are themselves explained in terms of the purpose for the mature organism of the developments they cause. The embryo has the DNA it does because this configuration will efficient-causally generate the structures it does. Montessori extends to all biological explanation this embryological logic whereby efficient causality is subordinated to teleology. *All* biological processes, including natural selection itself, are governed efficient-causally as they are *because* these efficient-causal mechanisms promote (final-causally) various ends.

2.3. Perfectionist teleology.

Traditionally, teleological metaphysics involves evaluative concepts. Aristotle exemplifies this tendency, identifying the end towards which something tends as the “good” of that thing (see *Nicomachean Ethics* 1094a3). In principle, one could articulate a teleological metaphysics stripped of such evaluative notions (see Hawthorne and Nolan 2006), but Montessori’s teleological metaphysics, like Aristotle’s, involves a value-loaded telos. For her, living things have a “natural tendency,” a “drive for self-perfection” (CSW 42; EP 72). Individuals strive to perfect themselves, the evolution of species takes place as “new [...] more perfect forms of life appear” (EP 23), and – as we will see in §3 – all things ultimately work together towards a holistic perfection.

Montessori never lays out a systematic definition or analysis of her notion of perfection. To some extent, given that it applies to varieties of living things, this indeterminacy is intrinsic to the concept. Like Aristotelian “excellence” (*arête*), “perfection” gets determinacy in the context of particular kinds of things. Acorns strive for perfection as (oak) trees, and human embryos strive for perfection as human beings. But Montessori does describe general qualities of perfection and uses these to make sense of the evolution of *species*, that is, how a species can develop into a more perfect species (see EP 23, EHP 24-5). Some general claims, such as that creative energy is “the urge to specialize” (1946:83) or that “the tendency of nature is to put itself in order” (1946:141), will be revisited in §3. But much of her reflection on development towards perfection comes in the human case, where it involves an increase of “energies and mental capabilities” (AbsMind 207) along with a “drive” (AbsMind 209) towards activity and a self-control (AbsMind 213). Perfection requires “integrat[ion]” wherein “all [...] parts act together in the service of the individual” (AbsMind 203). In the case of non-human nature as well, Montessori sees a general increase in capabilities and the emergence of more complex systems of powers integrated into coherent wholes as distinguishing features of perfection. In all of these cases, greater perfection allows more “creative power.” That is, “the impulse to activity [...] tends to its own upkeep” (EHP 19). Perfection involves integration of “energies” or capabilities into an

increasingly complex, coherent, and essentially *active* whole.¹⁰ An increase in perfection is an increase in the variety, complexity, and efficacy of these powers and a consequent increase in the range of possible kinds of activity available to an organism.¹¹

One might see Montessori's inclusion of value-loaded notions in a teleological metaphysical framework as an illicit "naturalistic fallacy," an inference from what is (final causes) to what ought to be (the "good" or "perfection"). Alternatively, one might see value-loaded teleology as an illicit intrusion of ethical norms into scientific investigation of nature, imposing on the data an orientation towards some "good." At times, Montessori seems susceptible to both charges. She repeatedly offers exhortations such as that "Nature is the teacher of life – let us follow her ways!" (EHP 77), and her claims about the relative imperfections of Crinoids compared to other forms of life (e.g. EHP 24), not to mention her references to "deficients" who fall short of human perfection (e.g. Calif 306), can seem like dangerous impositions of moral concerns into scientific investigation.

But Montessori's appeal to "perfection" as the nature end of living things is better understood in terms of contemporary discussions of "life" as an irreducible, proto-normative kind of concept (see M. Thompson 2009; E. Thompson 2007). Philippa Foot puts the point in a particularly Montessorian way, with a clear sense of the medical analogy:

I believe that evaluations of human will and action share a conceptual structure with evaluations of characteristics and operations of other living things, and can only be understood in these terms [...] *Life* will be at the center of my discussion, and the fact that a human action or disposition is good of its kind will be taken to be simply a fact about a given feature of a certain kind of living thing. (Foot 2001:5)

¹⁰ The role of "activity" or "agency" in our understanding of life, along with the conceptual incoherence of trying to define this kind of activity without essential (circular) reference to the concept of life itself, is a theme of Thompson 2009.

¹¹ For a similar conception of the end of biological development, see Thelen and Smith 1994: xiv. They reject fundamental (and essentially internal) teleology, but their conception of the end of development is consonant with Montessori's view.

Michael Thompson elaborates a similar point in terms of his post-Fregean analysis of life, within which a “natural-historical judgment” about a living thing involves an “inner natural teleological description” that is “normative” in that it “supplies [...] a standard” for the application of “concepts of good, bad, defect and pathology” (Thompson 2009:79-81).¹² While Michael Thompson comes at the connection between life and value from an anti-reductionist standpoint, Evan Thompson reaches similar conclusions in the context of his explanation of life in terms of “autopoiesis.” On this account, “life” is not an irreducible category¹³ with normative implications but an isolation of certain kinds of systems in the world – those with what he calls an “autopoietic” structure – where autopoiesis itself involves “the two-fold purposes of identity (self-production) and sense-making (adaptivity and cognition)” (E. Thompson 2007:153). For Evan Thompson, as for Michael Thompson and Philippa Foot, “vital structures have to be comprehended in relation to norms” (Thompson 2007:74) according to which they seek to conform to “optimal conditions of activity” (Thompson 2007:147, quoting Merleau-Ponty 1963:148). However metaphysically basic one makes the concept of life, Foot and the Thompsons all highlight how conceptions of the “good” or “perfection” can lie implicit in the concept of “life” itself. And this shared general commitment to normative ideals implicit in living beings captures what is essential to Montessori’s metaphysical perfectionism.¹⁴

¹² Thompson even adds that “natural-historical judgments ... possess certain further possibilities of combination – in particular, of ‘teleological’ combination with others of the same form” (2009:77), thereby offering one model for how individually teleological concepts of life encourage and enable Montessori’s ecological and interconnectionist teleology (see §3).

¹³ But see E. Thompson 2007:162-5, where he argues that “life can be known only by life” (162). Autopoiesis is recognizable as such because it is a basic category of *our* understanding of the world.

¹⁴ Both Thompsons resist metaphysical teleology and vitalism, albeit in very different ways (e.g. M. Thompson 2009: 77-9; E. Thompson 2007:153). In that sense, they are strange bedfellows for Montessori (and for each other). But all of them share a common commitment to teleology and thereby normativity as intrinsic to living systems. And *that* commitment is the focus of this sub-section.

2.4. Discontinuous, step-wise, long-range teleology.

One natural way to think of teleology is along the model of an arrow heading towards a target or a rock falling towards the earth. On both accounts, there is a target towards which the object or system is headed, and it moves steadily towards that target. Superficially, the growth of an acorn into an oak or an embryo into a mature animal or an infant into an intelligent and capable adult also involve one thing gradually becoming more and more like its ultimate end state. But Montessori, informed by a much less superficial understanding of both biological and psychological-pedagogical development, argues that systems develop towards their end states through a process that begins with the cultivation of distinct and initially independent local perfections, which are then unified into a more complex and qualitatively different whole. One element of this view is structural, or we might even say spatial; various elements of an eventual system develop independently, pursuing their own local perfection, before being united into a more perfect and qualitatively different whole. Another element is temporal. Biological individuals do not uniformly pursue improvement in every respect. Rather, each form of development is available only (or primarily) during its particular “sensitive period.” Rather than seeing an acorn steadily develop into an oak tree, Montessori sees different components of the acorn developing towards specialized ends at appointed times before being integrated into a single coherent goal, the tree. These teleological principles of discontinuity are particularly evident, for Montessori, in children’s development. As she says after a short discussion of embryonic development, “Bring this reasoning to the psychic field and you will understand what happens with the child. All the various constructions join together to create the unification of the individual” (1946:154). As Esther Thelen and Linda Smith have recently put the point, “development appears to be modular and heterochronic” (Thelen and Smith 1994:xvi).¹⁵

¹⁵ Thelen and Smith 1994 provides extensive further evidence of these discontinuous features of human (and animal) development. Like Montessori, they also see developmental processes in psychology, biology, and even basic physics as continuous with one another. Unlike Montessori, however, they resist any internal teleological basis for development (see especially Thelen and Smith 1994:xviii).

Montessori ties the first aspect of her discontinuous conception of teleology – that is, the fact that different elements of a system develop independently before being unified – to the work of Charles Manning Child, who developed an account of physiological gradients to explain embryological development.

It was in 1924 that the embryologist Child revealed those points of febrile activity called Physiological Gradients, not all starting together, or with the same intensity, but each with its own tempo, pursuing an independent course. To begin with, the unit cells were exactly like all the others, but through their activity they grew to differ and became specialized, for the formation of an organ, and last came the circulatory and nervous systems to link the organ with others, similarly created in independence, but to a different functional end.

These are found to be the basic principles of nature's plan:

1. The freedom and independence of organs in their several developments.
2. Development through specialization of cells.
3. The unification of organs by the circulatory system of the blood.
4. Directive communication established by the nervous system. (EHP 76)

This teleology involves separate preparation of individual organs for the sake of the whole into which they eventually integrate. Biological development is not a stepwise increase in mass or even refinement. Rather, particular aspects (organs) of an organism develop, often to their mature state, before being integrated into a coherent unity that makes specific functions (and thereby, the specific natures) of those organs clear.

[N]ature's objective has been attained [when] [...] all the functions that were developed independently at a previous stage are joined together to form a unit. In the embryo, the different organs have different functions that are developed separately and when they are all completely developed, the last embryonic stage is the one in which all these different organs are unified. (1946:154)

Montessori compares this process to the “culinary art [where d]ifferent ingredients are separately prepared, carefully manipulated and patiently left perhaps to simmer gently till a desired condition is reached, before being added to the dish where the additional flavor is required” (EHP 68). In the case of the embryo, the individual organs develop before being linked into a unity by the circulatory and nervous systems. Likewise for

the human “spiritual embryo” (from birth to age 6), successive developments of individual capacities for movement, sensory acuity, and so on are “at first carried on separately [...] [but] must in the end become integrated” (AbsMind 203). In all cases, the final product has a fundamentally different character – “something uniform and new [...] that was not previously there” (EHP 68) – than its parts. The specific reasons for individual developments lie in their contributions to the whole.

The second aspect of teleological discontinuity – the temporal – is drawn from Hugo DeVries’s conception of “sensitive periods” of development. Rather than steady progress towards some particular end, organisms (and species) remain static for long periods of time and then undergo sudden and rapid development. As she explains with respect to individual organs,

In the vital process of forming an organism, we can nowhere discern a totality which grows as a whole; nor does growth proceed regularly and gradually. The development of each organ occurs separately around about points of activity. The activity of these points lasts for a limited time and is extinguished when the organ has appeared [...] [T]here are also sensitive periods, which play an important role in guiding the animal’s *behavior* till it can live in the outer world. This has been shown by the Dutch biologist DeVries, and we find it paralleled precisely in the child’s psychological development – a fact which persuades us that human nature is true [...] to life’s methods. (AbsMind 94)

The concept of “sensitive periods,” which proves fundamental to Montessori’s pedagogy, is based on a basic biological principle adopted from DeVries, the claim that development of particular organs occurs at a specific time and for only a short period. Vital teleology is temporally discontinuous. The heart develops rapidly and then (mostly) stops developing; the nervous system develops later, and equally rapidly, and then (mostly) stops developing. Language acquisition develops at a particular age (around 1-3 years), and even within this general skill, particular features (auditory discrimination, vocabulary acquisition, labial dexterity, and so on) develop at particular stages after which further development is limited and difficult. In general, organisms tend towards their ends in fits and starts, with long periods of stasis – or better, “accumulation” (AbsMind 39, 51) – interrupted by short bursts in which particular

features emerge to be integrated, eventually, into the coherent whole that is the goal of the whole process.

At the level of species, too, both DeVries and Montessori endorse temporally discontinuous evolution. Based on his observations of sudden and dramatic mutations, DeVries argued that “new species are *created* [suddenly and] unexpectedly” (quoted in PA 47, cf. DeVries 1909:3):

the mechanism of transformation is not that of a succession of very gradual variations [...] On the contrary, what produces stable characteristics is a *revolution* prepared in a latent state, but unannounced in its final disclosure. A parallel to this is to be found, for example, in the phenomenon of puberty in its relation to the evolution of the individual. (PA 47, cf. AbsMind 48-9)

Montessori rightly notes that after DeVries’s observations of sudden and dramatic mutations, “It became possible to envision other possibilities than that of the slow adaptive transformations of the Darwinian hypothesis, which required immense periods of time” (AbsMind 49).¹⁶ For Montessori, what has come to be called a “punctuated equilibrium” model of evolution (see Gould 2002, 2007) is not a violation of broadly naturalistic conceptions of evolution, and hence not a reason in itself to posit a supernatural “intelligent designer.” Rather, it opens room for a different way of thinking about natural teleology as a matter of long and gradual stasis interrupted by “crisis” or “upheaval,” scattered “biological or geological epochs in which new, higher, more perfect forms of life appeared, as totally new conditions of existence on earth came about” (EP 23). She emphasizes the parallel between this species-level punctuated equilibrium and the individual embryological and developmental “sensitive periods,” suggesting that species, like individuals, have long periods of gradual accumulation before bursting forth into sudden transformations.

One important implication of her discontinuous conception of teleology can be seen by contrast with the approach recently articulated by Hawthorne and Nolan.

¹⁶ DeVries’s particular examples turn out to be special cases (see Kirschner and Gerhardt 2005) and his particular account of the nature of such mutations has been surpassed by contemporary genetics and molecular biology, but the general principle that evolution is episodic rather than gradual has gained renewed support from paleobiological evidence (see Gould 2002, 2007).

Hawthorne and Nolan take as their chief exemplar of final causation (for the sake of discussion) the case of a falling rock. And they particularly consider the problematic case when a rock drops straight down into a bucket (not its ideal location) rather than moving around the bucket to get closer to its final end (the center of the earth). In order to make sense of how final causation could lead a rock to move straight down even when a different path would take it closer to its goal, they posit a theory of final causality that “invites the image that rocks act blindly towards their ends” while rejecting the alternative view according “to which rocks act with foresight” (Hawthorne and Nolan 2006:276).¹⁷ For them, “teleological explanation as applied to unthinking matter is apt to be of the blind sort” (Hawthorne and Nolan 2006:276). But the best way to understand the kinds of teleology that Child and DeVries study *is* in terms of something like acting with foresight. There is a genetic program that unfolds towards the emergence of a particular phenotype. Though “unthinking matter,” the embryo or acorn need not follow a continuous or direct path towards its ultimate end.¹⁸ Different parts of an eventual systematic whole develop independently for the purpose of the whole. And some parts of a whole can *degenerate* or *fail to develop* when such degeneration or failure serves the eventual whole: “Victory in self-fulfillment can only come to the All, and to secure it some are content to sacrifice their own progress towards perfection of form, remaining inferior and humble workers” (EHP 26). The umbilical cord, so important at certain phases of development, is discarded later; the roots of the oak continue to grow but undergo few qualitative changes after the initial growth of the sapling; and the (human) child’s interest, ability, and self-cultivation in skills of hanging and swinging gives way to more adult movements of typing and walking.

¹⁷ In particular, they posit the principle, “At any time *t*, a rock will follow a continuation *c*₁ of its path in such a way that for every other continuation *c*₂ compatible with the constraints, there is a period after *t* such that they rock has greater end velocity on *c*₁ than on *c*₂ during that period” (Hawthorne and Nolan 2006:276).

¹⁸ In §4, we return to the issue of *inanimate* things. Montessori does take this discontinuous theory to apply to “an atom [or] a planet” as well as to living systems (EHP 76).

3. Ecology, Interconnection, and Harmony

3.1. Ecological Teleology.

§2 described Montessori's teleological metaphysics as it applies to individual organisms and particular species. For her, living things are fundamentally driven by internal creative forces operating along discontinuous pathways towards an increase of organized, activity-conducive complexity. But despite her insistence upon internal drivers for teleological development, Montessori does not see *individual* teleology as the most basic metaphysical teleology. Instead, teleological orientations of individual organisms and species, like that of individual structures *within* organisms, ultimately serve a more comprehensive purpose (see PA 39; 1946:29).¹⁹ She explains that “[p]lant life and animal alike now have to be considered from two points of view, and the more important is that of their function in the cosmic plan.” Both “points of view” are teleological, but at different levels:

One side of evolution deals with the satisfaction of vital needs, defense, survival of the species, and growth by modifications towards perfection. Another – and stronger – factor in evolutionary processes is concerned with the cosmic function of each living being, and even of inanimate natural objects, working in collaboration for the fulfillment of the Purpose of Life. All creatures work [...] ²⁰ for themselves,

¹⁹ In this focus on interconnection, Montessori may have been influenced by the important role of “solidarity” and “solidarism” in French positivism during the early 20th century (see Foschi and Cicciola 2006:277-81). Solidarism emphasized “cooperation for life” over the “struggle for existence” (Clark 1984; cf. Foschi and Cicciola 2006; LaVergata 1992, 1997). As Louis Bourgeois, one of the most important and influential proponents of this view, put it, “Laws of species—laws of heredity, of adaptation, of selection, of integration and disintegration—are nothing but different aspects of the same general law of mutual dependence, that is the law of solidarity of the elements of universal life” (Bourgeois 1906: 45, cited in Foschi and Cicciola 2007:278). As this section will show, Montessori largely follows this solidarist interpretation of evolution, though she sees it as *consonant with* rather than a strict alternative to individual evolution towards perfection.

²⁰ Montessori here claims that they work “consciously” for themselves, and she goes on (here and elsewhere) to distinguish what she calls the “conscious” and “unconscious” purposes of the organisms. In these contexts, her use of the term “conscious” is a metaphorical way of referring

but the real purpose of their existence remains unconscious, yet claiming obedience [...] So the trees and plants might consciously exalt their desire for sunshine and vital need of carbon dioxide for nourishment, unconscious that nature has given them these instinctual urges for the purpose of preserving the purity of the air, on which depend all higher life on earth [...] [and t]he bee who robs the flower of its nectar is aware only of his own need or the hive's, not that the flower's need of his visit is as great for its purpose of reproduction, for perpetuating the life of the species. (EHP 26-7, cf. CSW 106-7)

While there is a *local* striving for perfection of the individual and the species, these teleological principles are ultimately subordinated to a more fundamental “[v]ictory in self-fulfillment [that] can only come to the All” (EHP 27), a “cosmic charity” (EP 117n), an overarching “purpose of nature” (1946:89) in which

Life appears as a worker, as an “agent of creation.” Its various components are led by their several instincts to perform special functions directed to the maintenance of the “order of nature.” Each task is indispensable; each individual is concerned more with the advantage of the evolution of the whole in which all take part than with its own salvation. (UH 10)

As we will see in §5, Montessori sometimes connects this *universal* purpose with a “governing intelligence” or “Divine Spirit” (see EHP 30, CSW 95, Secret 212). Most often, however, she explains in scientific terms the ordered teleology within which individuals serve the good of the whole. One example is Montessori's concept of biological “adaptation.” She explains that “Adaptation to the environment is necessary for all living creatures” (1946:80), but then conceives of that adaptation not in the purely individual terms of the “old idea [...] that we lived in the environment and absorbed as [...] much as possible for ourselves from the environment” but as a process whereby “[e]ach species' adaptation to the environment shows us what the purpose and useful work of each is, the work which each contributes towards universal harmony”

to that internal teleological drive that is directed towards the perfection of the individual, as she periodically makes explicit by calling this terminology “fantasy” (UH 12) and saying things like “a coral polyp, if capable of conscious expression ...” (EHP 27) or “If animals were to become self-conscious...” (AbsMind 56).

(1948:87-88). Biology thus cannot be limited to the study of “those things that each species does for the maintenance of its life” but must also include “the important work which is done by each species individually for the harmony of all” (1946:84).

Her conception of the fundamental contribution of biological interdependence anticipates the growth and emergence of ecology as a fundamental component of biology. In a late articulation of her view, she cites the connection between scientific ecology and interconnectionist teleology:

Ecology is a study of the different behaviors of animals, and it reveals that they are not here to compete with each other, but to carry out an enormous work serving the harmonious upkeep of the earth. When we say they are workers, we mean that each one of them has a purpose, a special aim to fulfil and the result of these tasks is our beautiful world. [...] Behavior does not merely fulfil the desire to continue to live. It serves a task which evidently remains unknown and unconscious to the being [...] If animals were to become self-conscious, they would be conscious of their habits, of the beauty of the places in which they live, but certainly the corals would never realize or understand that they are the builders of the world, nor would the worms which fertilize the earth consider themselves agriculturists, nor would others consider themselves the purifiers of the environment and so forth. The purpose which places the animals in relation to the earth and its upkeep would never enter their consciousness. Yet life and its relation with the surface of the earth, the purity of the air, the purity of water are dependent upon these tasks. So there is another force which is not the force of the desire for survival, but a force which harmonizes all the tasks. Let us say that each one is important [...] because it carries out tasks which are useful to the whole and the effort of each is to try and reach the place allotted to it and the task which it is to fulfil. That is why we said that there was a pre-established plan, and that the organs were formed to fulfil this plan. This pre-established plan puts the animals in relation with the task that they have to accomplish upon the earth. Nor is the [only] purpose of life to perfect oneself, nor only to evolve. The purpose of life is to obey the hidden command which ensures harmony among all and creates an ever better world. We are not created only to enjoy the world, we are created in order to evolve the cosmos. Today the influence

of the existence of a cosmic plan is gradually changing the theory of the linear evolution of past times. (AbsMind 56²¹; see too 1946:87-90, 165)

Though put in unfamiliar terminology, these ecological principles are now familiar facts. Organisms exist in ecosystems and fill various niches within those ecosystems, niches that both provide what is necessary for the organisms and serve eco-systemic purposes. Montessori's account of adaptation provides at least some rudiments of a mechanism by which the individual/species-level fitness and the ecological fitness are integrated. Organisms must adapt to their environments, and they do so in part by serving functions within those environments. The interdependence of life is such that *wholly* parasitic life would undermine the ecosystems of which it is a part and fail to thrive over the long term.²² But unlike most contemporary biologists, Montessori sees a more basic teleology underlying these processes. For her, the ecological function of the organism is not merely the result of efficient-causal processes of selection and (consequent) adaptation. As in the individual case, teleology is *fundamental*. Adaptation is central to living organisms *because* it provides a mechanism for directing evolution in a way conducive to the promotion of ecological harmony.

Her reflections on adaptation and ecology support a metaphysical vision wherein purposive self-direction towards individual perfection is integrated with and ultimately subordinated to a "cosmic plan" within which "All living beings are destined to contribute to the well-being of other living beings" (Adol 56). And the way in which each contributes to the well-being of all is not mere reciprocal support or mutual

²¹ The page number is given to the Owl edition cited in the bibliography, but this passage in its entirety does not appear in that (revised) edition. Rather, it appears in an earlier edition published by The Theosophical Publishing House, Madras, India, in 1949, p. 90.

²² The claimed interdependence between individual/species evolution and ecosystemic good is not absolute. Some individuals will thrive – at least temporarily – to the detriment of their ecosystems or species. In other cases – Montessori specifically mentions the evolutionary stasis of certain species (see EHP 22, 24-5) – organisms or species will fail to thrive or even go extinct for reasons that are primarily ecological. What is good for individual life is not always good for life as a whole. But Montessori's "adaptation" provides for integrating these two teleologies.

sustenance, but rather towards a complex of harmonious, mutually reinforcing, ever-more-active forms of life. Within this whole, each individual component is teleologically ordered towards increasing its own perfection, but also towards the good of the whole: “all is strictly interrelated [...] We may compare it with a tapestry: each detail is a piece of embroidery; the whole constitutes a magnificent cloth” (Adol 23).

3.2. Internal teleology revisited.

In §2.2, we saw that, for Montessori, teleology is internal to organisms themselves. Final causes work through efficient-causal mechanisms – DNA, instinct, and so on – in the systems that develop towards given ends. In that section, we saw how teleology could be both fundamental and reconcilable with efficient-causal explanation if the latter sort of explanation is based on the former. And this sort of explanation is perfectly suited to the ways in which developmental biologists (and psychologists) explain development. But there remains a widespread view that the internal bases of development – the DNA or the basic psychological structures – can themselves be ultimately explained in terms of further efficient causes. A standard Darwinian view posits that organisms’ DNA, which efficient-causally brings about purposive development, itself evolved through mechanisms of random variation and (non-purposive) natural selection (see e.g. Dawkins 1976; Dennett 1995: 73-79). In that sense, one might deny any *real* metaphysical teleology because an account only involves fundamental teleology if there is no efficient-causal story about the origin of the relevant efficient-causal mechanisms (the DNA or the instincts).

In contrast to this neoDarwinian reduction of teleology to efficient causation, however, Montessori takes the logic she applies to individual cases and extends that to the evolution of species. That is, just as DNA operates in accordance with the efficient-causal laws in the way that it does in order to bring about various (good) ends, so too processes of variation and natural selection operate efficient-causally in the way that they do for the sake of various (good) ends. Thus in a subtle ecological revision of the standard neoDarwinian model, Montessori explains natural selection as follows: “species, having unconsciously reached their limit of usefulness and being unable to adapt themselves to conditions making new demands on them, disappear from the ranks of life” (EHP 27). On the one hand, this explanation is consistent with the standard

model of natural selection: extinctions occur when organisms of a particular species are unable to adapt to new conditions. But on the other hand, the explanation is fundamentally ecological and teleological; maladaptation occurs when a species is no longer “useful.” These two explanations, for Montessori, sit perfectly side-by-side, because both the teleological directedness and the capacity for adaptation are internal states of the relevant organisms (or species). In that sense, the relationship between efficient and teleological causation merely gets pushed back another step, and Montessori can reasonably say that the efficient causal mechanisms – variation and selection – exist and operate in the way that do for the sake of the teleological purpose (ecological interconnectedness). By extension, Montessori explains the origin of particular life forms (and, as we will see in §4, even of life itself) in terms of *teleological* rather than *merely* efficient-causal explanations, that is, in terms of what Dennett would call “skyhooks” *as well as* “cranes” (Dennett 1995:73), or better – and in sharper opposition to Dennett – skyhooks holding up cranes.

Of course, one can (and Montessori does) push back the level of efficient-causal explanation even further, explaining the sources of variation and the nature of selective pressures in terms of more fundamental or prior efficient causes (laws of chemistry and physics operating in the context of prior conditions). Even the basic and broadly teleological structure of life itself can arguably be explained by a more fundamental description in terms of efficient-causal chemical and physical forces. But for Montessori, as we will see in the next section, even those most basic forces are integrated into a “cosmic purpose.” The question of whether teleology is fundamental cannot be answered by looking at *particular* cases and asking whether efficient-causal explanations are sufficient for those cases. Any particular efficient-causal explanation appeals to forces and powers governed by particular laws, and one can always ask why those laws have the forms that they do. For Montessori, any particular case will involve teleological explanation insofar as the efficient-causal mechanisms, tracing these all the way down to the basic forces of the *cosmos*, are explained by appeal to a cosmic purpose. And at *that* level – the explanation of why the most basic efficient-causal mechanisms have the form they do – there cannot be a further and ultimate efficient-causal explanation. There remains an open question about whether one should posit

teleology; one might deny that *any* explanation is needed for these basic structures.²³ But the notion of fundamental teleology is not ruled out by the possibility of efficient-causal explanations of particular effects, and *Montessori's* conception of internally-driven teleology even *requires* some such explanation. Moreover, introducing fundamental teleology helps make sense of the explanatory power of teleological explanation in the context of biological systems,²⁴ and this benefit provides one strong reason for favoring the inclusion of basic teleology in one's metaphysics.

Pushing teleology to the level of ecosystems (and even the cosmos) might seem to threaten the conception of teleology as rooted in *internal* creative powers oriented towards organisms' *individual* perfection. And Montessori limits individual-perfectionist teleology by ecological-holist teleology. She is explicit that ecological purposiveness towards "the cosmic function of each living being" is a "stronger" than individual tendencies to "grow[...]towards perfection" (EHP 26-7), and she claims that both with respect to individual organisms, such as those "made to be eaten," and entire species, such as the "more complex Trilobites" that gave way to simpler forms of life, "the cosmic plan needs sacrifice" of "individual goods" (EHP 24-5). While admitting that individual teleology is sometimes sacrificed to ecological goods, however, she more commonly emphasizes that the ecological goods are brought about *through* individual teleology. Thus not only are all ecologically-oriented forces internal to organisms – a matter of individuals' "vital instincts" (EP 117n) – but Montessori insists that "[t]he fulfillment of a great work [for the sake of the ecosystem] brings with it the happiness of the living beings who are charged with it" (Adol. 32). While nature can sacrifice individual goods for the sake of the whole, more often individuals in nature are

²³ Here we have reached somewhat familiar territory. This argument for the need to give a fundamental explanation of why the universe has the structure that it does is the basic form of first-cause arguments for the existence of God, and many of the standard objections against such arguments – e.g. in Hume 1779/2007 – can be raised anew for the existence of teleological explanation. But at the very least, such arguments provide a helpful way to articulate what is involved – or could be involved – in positing fundamental teleology.

²⁴ Arguably, this is why Kant takes the objective purposiveness of organisms to imply a purposiveness of the universe as a whole. See his *Critique of the Power of Judgment*, 5:377f.

both “egotists who just enjoy their own life” and “obedient agents of the harmony of nature” (1946:90). Moreover, the *kind* of good towards which the cosmos as a whole tends is one that *requires* individuals’ pursuits of their own perfection. Harmonious *complexity* depends upon uniting already complex (that is, internally perfect), active beings into an even more complex whole, which in turn depends upon each’s pursuit of individual perfection (see e.g. EP 102-3).

In the end, Montessori develops a metaphysics of life that posits individual organisms teleology oriented towards their own and their species’s perfection while also operating by efficient-causal natural laws that ultimately serve the good of the whole ecosystem (and eventually cosmos).

4. From Biosphere to Cosmos

The central concept of Montessori’s metaphysics is the concept of life. She finds in this concept a basis for natural teleology, both in the tendency of each organism (and species) towards its own perfection and in the coordinated development of individuals within natural ecosystems. Thus far, one might take this metaphysics to be *limited* to living organisms. Montessori emphasizes that life is a distinct “creative force [...] with its special laws that are studied in biology” (EHP 19), and she often *contrasts* life and mere “material” forces, such as when she objects to “materialist theories of life, of which Haeckel is the most noted supporter, [for whom] *life* was derived from a form of matter” (PA 38). These sorts of claims might lead one to restrict the scope of natural teleology to living things alone.

In fact, however, Montessori extends her conception of cosmic teleology beyond life, and she does so in two importantly different ways. First, she extends the *telos* of living things to include non-living features of the universe. That is, living things aim not merely for their own perfection, nor even for the perfection and harmony of all life, but for a perfection and harmony that includes non-living things. This extension is a relatively straightforward corollary of her ecological orientation and one about which Montessori is consistent throughout her works. Second, she extends *teleology* to non-living features of the universe. Merely saying that the function or purpose of living things involves non-living does not imply that non-living things themselves *have*

functions. At some times – e.g. in her rejection of Haeckel – Montessori seems to identify teleology with life, suggesting that to be teleologically-ordered *is* to be alive. But she equally often describes non-living nature not only as part of the *end* of nature but also in terms that imply a teleological orientation *of* non-living things. Thus while life is paradigmatic for metaphysical teleology, that teleology ends up including basic chemical and even purely physical entities.

4.1. Abiotic *teloi*.

The first way in which teleology extends beyond life itself arises from Montessori's expansive conception of the "ecosystem" to which living things belong. While on the one hand "life [...] can be regarded as an energy that maintains life itself" (EP 67), life also serves purposes in the ecosystem specifically relating to its abiotic factors. Thus "life creates rocks and soil and [...] sustains the harmony of the earth" (EP 66); it is "the force that creates the world" (EP 94) and "upon which depend not only the different forms of living beings but also the evolution of the earth itself" (CSW 106).

The earth must be regarded as having been created by animal life, for the earth's soil as presently constituted is the work of forms of animal life. How can the air and sea remain pure[...]? Why don't the oceans become a solid mass because of the calcium carbonate constantly deposited in them by rivers? It is plant life that maintains the balance of the atmosphere, and it is animal life that maintains the balance of the oceans. (EP 94, cf. AbsMind 56)

The trees [...] purify the air, [...] the coral [...] filters the sea [...] to keep the water pure[. T]he animals that populate the earth are unconscious of their cosmic mission, but without them the harmony of creation would not exist. (EP 117n)

The ecosystem is not merely the interaction of living beings, but includes the mutual dependence of living *and non-living* systems. Thus insofar as individual teleology is subordinated to ecological, the ultimate "cosmic function" of life is directed towards non-living as well as living nature. Most generally, "The animals [and other living things] all form one trained and disciplined army which battles to preserve the harmonies of nature" (AbsMind 56).

Now one might understand this ecosystemic teleology as *ultimately* rooted in the value of life, a matter of life working for the good of abiotic features in order to preserve itself. Sometimes, Montessori seems to reduce ecological goods in this way; thus when she insists that “without [plants and animals,] the harmony of creation would not exist” she immediately adds “and life would cease” (EP 117n), suggesting that the promotion of ecological harmony is subordinated to the goal of “maintain[ing] life itself” (EP 67). But her considered view is more comprehensive, that there is a systemic good to the complex interactions of components in an ecosystem that surpasses the value of the life within it. In fact, she even suggests that life arises to meet a need for order that *precedes* (both metaphysically and temporally) the origin of life itself:

Besides the *hydrosphere* and the *atmosphere* there is also the immense multitude of vital energies that forms the *biosphere*. Were it not for these, were the earth abandoned to the mercy of non-living energies, it would soon be plunged into the primitive chaos, into the confusion of the elements. (UH 17)

[L]ife undergoes changes together with the evolution of the earth. It is not that life needs to attain a perfection for itself, but, being an intrinsic part of creation, it does its part in transforming the world, its variations being more related to the earth’s needs than to its own urge to perfection. (EHP 20)

In these passages, the earth itself has needs much like those we have already described in the context of bio-teleology. The earth “needs” – that is, is better insofar as it has – well-ordered complexity. And *life* is a mechanism for creating and preserving such complexity. Thus Montessori describes the “origin” of life in terms of solving a problem for inanimate nature:

[R]ivers have been bearing to the ocean quantities of calcareous matter, sufficient to have choked it up [...] if left unhindered. Earth and water might have blended again a muddy chaos, but that has not happened [...], for the catastrophe was averted by the activity of living things, who stepped in to the rescue when the laws governing inanimate nature began to prove insufficient. (EHP 23)²⁵

²⁵ This principle of life solving a problem faced by inanimate nature is a central theme of the “The Story of the Coming of Life,” one of five “Great Lessons” consistently taught as part of

Montessori compares “the biosphere, or sphere of life” with “the fur [...] of an animal,” a “part of the earth’s body” whose “function is to grow with it, not only for itself, but for earth’s upkeep and transformation” (EHP 19).

Thus Montessori extends the function of each living thing not only beyond itself to its species, and beyond its species to its (biotic) ecosystem, but ultimately to the good of the earth as a whole. At times, she goes even further. In one important passage discussing humans’ goals, she claims, “Above and beyond all these goals, which have to do with the interests of specific interests or groups, there is something that involves all [hu]mankind and perhaps even the universe itself, creation, cosmic harmony” (EP 66). The creation of a relatively local harmoniously ordered complexity may even serve a *cosmic* purpose, perfecting the universe itself.

4.2. Abiotic teleology.

Even if teleology extends to abiotic elements of nature in the sense that part of the function of living beings involves harmony with and the “good” of abiotic elements of the ecosystem, this sense of teleology need not imply that non-living things have functions in their own right. One might even think that teleological directedness is what distinguishes living from non-living nature. In fact, however, Montessori’s conception of metaphysical teleology, while originally derived from reflection on the nature of life, extends to include abiotic nature as well.

Montessori regularly applies teleology to inorganic elements. She refers to “the cosmic function of each living being, and even of inanimate natural objects” (EHP 27), and when she claims that “Nature is [...] a harmony, a plan of construction,” she explicitly says, “Everything fits into the plan: rocks, earth, water, plants, man, etc” (1946:89). In describing the “creative unconscious” by which “plants and animals” exhibit a teleology that we can consider by “analogy [with] the life of man,” Montessori explicitly says that “This analogy [...] refers to the behavior of all living things *and to that of the majority of great natural forces*” (UH 10, emphasis added). And when

the Montessori elementary curriculum. As one teacher put it, life arises just when “It looked as if all the order that had been created was breaking up” (Harrington 15)

illustrating her basic teleological structure with embryological development, she adds that such development “revealed to us a significant unity of method in all natural building. It is clear that nature follows a plan, which is the same for an atom as for a planet” (EHP 76). The plan that describes how embryos develop through internal, discontinuous striving towards perfection also describes the activities of atoms and the development of planets.

This teleological ordering of abiotic nature is not limited to nature *as a whole*. Individual atoms have their own teleological orientation (EHP 76). Thus Montessori conceives of chemical reactions – structured by both valences of relevant atoms and various chemical affinities – in teleological, quasi-intentional, terms:

[T]he elements [...] must [...] have an affinity which causes them to seek one another. They could be said to have an instinct that pushes them to seek out one rather than another [...] It is as though there were present in the atoms an interior force that gives them the possibility of choice [...] They are driven to choose, to form a stable compound that will be a new substance [...] All of creation – water, rock – derives from the atoms which seek each other out, unite to each other, and, together, lead to a new creation. (Adol. 50)

What could be construed as a brute, contingent physical-chemical fact – that some compounds are stable and others not – is, for Montessori, teleological; atoms *seek* to form stable compounds, and hence set up the preconditions for chemistry, geology, and ultimately biology. The “stability of compounds [...] is a particularity of inorganic chemistry” (Adol. 53), and the new compounds, in turn, have their own natural tendencies, their own interior forces, and ultimately, their own “tasks.” As she explains with respect to water, “The cosmic function of water is to dissolve rock [...] This part of the study of water – the most mysterious because it concerns what the eye does not see – is precisely the one that arouses the most interest” (Adol. 27). She even emphasizes, with specific reference to water, that the efficient-causal laws are ultimately subordinated to the teleological ones. As she explains,

Let us note that the [efficient-causal] laws of nature [in this case, that solids are heavier than liquids] are not absolute. It is necessary that water become lighter

upon solidifying, and this occurs contrary to all the laws. If water were an animal, one could say that it acts this way by adaptation. (Adol 26)

Likewise nebulae serve to “form stars” quite unlike them in character (1946:34), and stars in turn form the basic atomic elements of the cosmos.

Thus Montessori understands abiotic nature teleologically, both as a whole and in its individual constituents. In part, this teleological orientation of abiotic nature is already implicit in her claims that living things include abiotic harmony in their ends. If “living things [...] stepped in to the rescue when the laws governing inanimate nature began to prove insufficient” (EHP 23), then those laws of inanimate nature must have been insufficient *for* something. If teleology only enters the scene with life, then there can hardly be *teleological* reasons for the origin of life itself. But teleology does not enter only with life. Not only do individual chemical elements and compounds have functions, but the pre-biotic system of forces is teleologically directed towards ordered complexity. When this system threatens to devolve into muddy chaos, it must create new forces – biological ones – that can help it fulfill its purpose. But this implies an original purpose.²⁶ And this provides Montessori with what her one-time collaborator, the Italian physicist Luigi Fantappie, described as a “single synthesis of the whole sensible universe, which it seems interesting and only natural to call ‘the unitary theory of the physical and biological world’” (Fantappie 1951:96).²⁷

²⁶ Note that hers is not a vitalist or panpsychic account. She does not literally ascribe *life*, much less *consciousness*, to basic elements of the universe, and she even insists that with life, new laws emerge. But everything in nature is *teleological*.

²⁷ The metaphysical connections between Montessori and Fantappie are much more important than this brief mention suggests. Montessori met with Luigi Fantappie, and in a lecture course in Italy in 1950, she specifically ties her conception of development to the notion of “syntropy” that he articulated nearly ten years earlier (see Feez 2007:ch.4, pp. 15-16; Chaitin-McNichols 1992:42-3). As he described his initial formulation of this concept, Fantappie wrote

Suddenly I saw the possibility of interpreting a wide range of solutions (the anticipated potentials) of the wave equation which can be considered the fundamental law of the Universe. These solutions had been always rejected as “impossible”, but suddenly they appeared “possible”, and they explained a new category of phenomena which I later named “syntropic”, totally different from the entropic ones, of the mechanical, physical and

chemical laws, which obey only the principle of classical causation and the law of entropy. Syntropic phenomena, which are instead represented by those strange solutions of the “anticipated potentials”, should obey two opposite principles of finality (moved by a final cause placed in the future, and not by a cause which is placed in the past) and differentiation, and also non-causable in a laboratory [...] It appeared to me clear that these “syntropic”, finalistic phenomena which lead to differentiation and could not be reproduced in a laboratory, were real, and existed in nature, as I could recognize them in the living systems. (quoted at www.syntropy.org, accessed April 1, 2014, see too Fantappie 1951)

The basic principle is explained aptly, albeit without the use of Fantappie’s technical term, in Montessori’s *From Childhood to Adolescence* (Adol), when she describes the flow of minerals into the oceans and the consequent formation of corals as symbolic of different kinds of forces in nature: “One represents the forces that destroy [that is, entropic ones] and the other the energies that simultaneously reconstruct [the syntropic ones]” (Adol 29). While the second law of thermodynamics posits (the increase of) entropy as a basic principle of physics in the universe, syntropy opens room for an alternative principle, one according to which physical systems are attracted towards *increase* in order and complexity. For both Montessori and Fantappie, the power of seeing syntropy or teleological causation at play in basic physical forces comes with the possibility of a unified natural science:

We thus reach an explanation of life which, on the one hand implies no new special agent (“vital force”), for the syntropic phenomena obey *the same laws* and equations as those governing mechanical, physical phenomena, i.e. entropic ones; while, on the other hand, it calls attention to differences that are much deeper than those of any vital force. Indeed, in the case of life it is no longer a matter of forces or other causes; the essential difference is that there are no longer causes but *ends*. We thus reach one single synthesis of the whole sensible universe, which it seems interesting and only natural to call “the unitary theory of the physical and biological world.” (Fantappie 1951:96)

A couple decades later, and with explicit reference to Fantappie, the (double) Nobel-prize-winning biologist Albert Szent-Györgyi articulated and defended a similar approach to integrating physical and biological sciences (albeit without the same commitment to seeing teleology as metaphysically basic, cf. Szent-Györgyi 1974:17). Beginning with the conviction that “I am unable to approach this problem [roughly, that of the need for multiple subsystems to

4.3. Emergent creative forces.

According to the account in §4.2, *all* nature is teleologically ordered towards harmoniously-ordered, complex activity. At the level of basic physics, this can be understood in terms of something like Luigi Fantappie's conception of syntropy, according to which physical systems are attracted to increased order and complexity. At higher chemical levels, it can be seen as atoms coalescence to form complex molecules with new, more complex, forms of acting on one another. In both contexts, it reflects what Albert Szent-Györgyi called an "innate drive of matter which led to the origin of life" (Szent-Györgyi 1974:22-23). Montessori fleshes out the nature of this development in more detail in terms of conflicts that arise when individuals' internal drives towards perfection come into conflict with the harmonious unification of the forces through which these drives are realized. This tension, teleological at its base, gives rise to a further teleology, the development of higher-level "creative forces" with their own teloi. Thus, for example, life itself emerges from conflicts at lower (chemical) levels of teleological organization. Montessori explicitly compares the emergence of life from mere chemistry by analogy with the emergence of social and political structures arising from conflicts between individual wills:

Something similar [to socio-political organization] happens in the field of chemistry, when elements such as hydrogen, carbon, oxygen, and nitrogen are captured by life in order to build organic molecules. In the inorganic world, the

develop in conjunction] without supposing an innate 'drive' in living matter to perfect itself," Szent-Györgyi goes on to suggest that

Maybe this drive is not an exclusive property of living systems but is the property of matter in general ... It may have been this innate drive of matter which led to the origin of life and played, later, an important hand in its evolution. (Szent-Györgyi 1974:17, 22-23)

For all three figures, teleological directedness in biological systems is best explained in terms of a basic, anti-entropic organizational principle in non-living matter itself. Fantappie comes into this idea through quantum mechanics, Szent-Györgyi through molecular biology, and Montessori through embryology and developmental psychology, but all see in it the hope for the kind of naturalistic unification of the sciences that would explain human consciousness, cognition, and values.

substances are of a simple nature. Some few elements join together a small number of their atoms to form water, carbon dioxide, salts, phosphates, nitrates, etc., in accordance with the law of affinity, which renders them attractive to some and repulsive to others, but organic molecules imprison masses of atoms [...] Life, to compose its substances, uses the same atoms as does inorganic nature, but it gives them a new organization, imperialistic in type. And yet the elements which are forced into the great enterprise of constructing dynamic living organisms still keep their innate tendencies, that love through which they unite to form water [...] or that hate that makes it impossible for them to exist together. As soon as the vital tension ceases and death befalls the living body, the chemical elements again regain [...] the primitive freedom of the inorganic world [...] Compared to these [primitive] modes of existence, those formed under the empire of life were “supra-natural” substances. (UH 23-24, cf. EHP 19; EP 23)

The universe as a whole is teleological in the sense that there is, intrinsic to each elementary component, a drive towards more intense and complete expression of its distinct form of activity. But this drive, even in matter itself, is adaptive, in that everything seeks to express individual perfection through forming more complex, harmonious wholes with other components of nature. In some cases the integrated complexity threatens to dissolve into chaotic disorder. But when the system is able to emerge from such threats (and in particular cases, it often does not), it does so through the construction of a new kind of substance, something that from the standpoint of the previous stage appears “supra-natural.”²⁸ Thus stable inorganic compounds are “supra-natural” from the standpoint of atomic physics. And organic compounds that change in environmentally-responsive and potentially self-duplicating ways are supra-natural from the standpoint of inorganic nature. Life is a supra-natural consolidation and organization that gives rise to “special laws” and a teleological orientation that is more directed, more active, more specific, and more apparent than that in abiotic nature. The

²⁸ Life is “supra-natural” relative to mere chemistry because it is an emergent structure with laws that are irreducible to the “nature” of the lower (chemical) level. (For one discussion of this irreducibility in contemporary philosophy of science, see Kitcher 1984.

universe is teleological in its foundations, and the complexity, activity, and we might even say agency of that teleology increases over time. Moreover, this process is not yet complete. For Montessori, life itself is a natural force that has given rise to yet higher creative powers with their own special laws. The first and most important of these are psychological laws; some living beings, preeminently human beings, are conscious, intelligent, creative agents. In that sense, conscious mind is a natural continuation of the same sort of teleological process that gave rise to life itself.²⁹

5. The Role of God in Montessori's Metaphysics

In issuing his challenge to develop an alternative to neoDarwinism, Thomas Nagel explicitly seeks “an alternative *secular* conception” (Nagel 2012:22). In this section, I argue that Montessori provides a metaphysics that meets this desideratum. But it is important to note that, unlike Nagel (see 2012:22, 25-7, 95), Montessori is not “strongly averse” to theism (Nagel 2012:12);³⁰ she was a practicing Catholic throughout her life, applied her pedagogical theories to religious instruction³¹, and explicitly discusses God in several of her published works. Despite her personal religious faith, however, and even her periodic inclusion of theology in philosophical reflections, Montessori carefully articulates her metaphysics to be free from specific theological commitments. Thus her metaphysical framework can stand alone as a conception of nature that shows how human mental life fits into a comprehensive conception of nature. Those with independent religious commitments (of various kinds) can integrate Montessori's metaphysics with those religious commitments. On its own, however, it provides just the kind of alternative secular conception Nagel is looking for. In this section, I start with a brief overview (in §5.1) of the place of God in Montessori's thought, before turning (in §5.2) to my defense of the claim that Montessori articulates

²⁹ Further articulation of Montessori's philosophy of mind is a topic for another paper.

³⁰ Strictly speaking, Nagel claims here only to be strongly averse to the thesis that human beings have a *sensus divinitatis*, but his atheism is strong and clear throughout this book. See Nagel 2012:22, 25-7, 95.

³¹ See especially the essays collected in CC and Mass.

her teleological metaphysics of life as a framework that stands independent of theological commitments.

5.1. Montessori and Religion.

Maria Montessori grew up as a Roman Catholic. Despite her emphasis on scientific training and a broadly “positivist” education both in medical school and in the philosophy faculty at Rome, she remained a faithful Catholic throughout her life.³² In an important letter to Cardinal Pomeili written in 1917, Montessori makes explicit both her commitment to the truth as articulated in Catholic doctrine and the ultimately spiritual basis of her life’s work:

[W]hatever error may have been found in [my method,] I am ready to correct it, because I believe that all the truth is in the Catholic Church, and that whatever is contrary to it is certainly an error, the repercussion of which would fall back on the destiny of humanity. Nevertheless, I believe that not only in my sentiments is there nothing against the truth of the Church, but if there has appeared in any of my writings anything which seems against it, that is an error of expression, and involuntary error which I would immediately withdraw. Furthermore I am convinced that it is precisely my religious faith which has inspired me in my method, which I had indeed taken from the church. I believe that this method of

³² There is evidence that she underwent a particularly intense period of involvement with the Catholic church during the time of the first Children’s Houses (see especially Foschi 2008) and some evidence that she was formally involved with theosophy (see Foschi 2012; Trabalzini 2003; Wilson 1985). There were also strong anti-Montessorian reviews and pronouncements from Catholic intellectuals in Italy (see Foschi 2012:69-73; Foschi 2008). But while Foschi’s claim that “the only surviving and valid relationship was that between Montessori and theosophy” (Foschi 2008:252; see too Lama 2002) may be true in an *institutional* sense in that theosophists but not the Catholic Church provided formal support for her educational efforts, I see no evidence that she ever rejected her Catholic faith, even in her most positivist or theosophist phases. From start to finish, she was a committed Catholic. But, as I argue in this section, she made both her pedagogy and even her basic metaphysics independent of this faith.

education is an instrument placed by God in my hands; and that God showed me this instrument and placed it in my hands for His own ends.³³

Montessori does not merely support Catholic theology by holding her teachings within the limits of that theology. Her writings often positively endorse the existence of God and specifics of Catholic doctrine. This tendency is most prominent in work specifically devoted to religious instruction, such as *The Child in the Church*, where she says (to pick just a couple examples) that “God has fixed the manner of conception, development, and birth [...] [T]he principle part of man, his soul, does not come from man at all, but is created directly by God” (CC 13) and that “supernatural growth is linked up with the use of the means which God Himself has determined, of which the sacraments and prayer are the most important” (CC 15). And often she articulates her most important claims about the value of children in theological terms: “we must not just see the child, but God in him” (CSW 98).

Moreover, even when not specifically dealing with religious themes, Montessori often articulates her metaphysics in theological or quasi-theological terms. Thus in laying out the interdependence of living and non-living elements of the ecosystem and describing the fragility of the atmosphere on which we depend, Montessori goes on, “But we are not haunted by this danger [...], being assured that God protects us!” (EHP 22). In her explanation of the importance of natural teleology in terms of “the guiding instincts, with which is bound up the very existence of life in its cosmic function[, which are] delicate inner sensibilities, *intrinsic to life*,” she goes on to suggest,

We might [...] look on them as divine thoughts working in the inmost centers of living creatures, leading subsequently to action on the outer world in realization of the divine plan. The guiding instincts have not the impulsive character of episodic struggles, but those of an intelligence, a wisdom leading creatures on their journey through time (the individuals) and through eternity (the species). (Secret 212, cf. 1946:154)

³³ From a translated extract of a letter by Maria Montessori to his Excellency Cardinal Pomeili, 1917. Translated by C.M. Standing, available in the Standing Archive at Seattle University, accessed in February, 2014.

She offers illustrations of various “marvels of nature” and adds that “We have always considered these as a manifestation of the divine” (CSW 95). And, again in the context of laying out her metaphysical teleology, she explains that “Here we have another factor, not visible but immaterial. This the Spirit, the Divine Spirit, intelligence, acting, guiding. The tiniest creatures have their guide which leads them on step by step” (CSW 95-6). For Montessori, “the cosmic plan” at the center of her metaphysics “may also be called the Will of God” (EHP 50); natural teleology is the reflection of “a governing intelligence” (EHP 30).

5.2. Montessori’s Metaphysics and their Religious “Parallel Course.”

While the discussion in §5.1 shows how religious Montessori’s metaphysics can be, here I show that this religiously-loaded interpretation is only one way that she articulates her fundamental metaphysical principles. On several occasions, Montessori offered lectures on pedagogy in both a “neutral course” and a coinciding “parallel course” specifically for Catholics (see CSW 29). Similarly, I suggest that her fundamental teleological metaphysics does not depend upon any particular theological commitments, even if she also offers parallel explanations of that metaphysics in specifically theological terms. Cynically, we might see this as a symptom of Montessori’s willingness to be “engaged with various aspects of positivism, theosophy, Catholicism, and also liberalism and fascism [...] to be able to promote [her approach to] modernization in education” (Foschi 2012:14-15). More sympathetically, we can recognize here an effort to develop a metaphysics that would articulate something like what Rawls called an “overlapping consensus” (Rawls 1971:388), in this case a pedagogy – and a metaphysics – that can be endorsed by various different religious (or secular) orientations. For the purposes of grounding an account of human consciousness, and particularly for the development of a practical pedagogy, Montessori’s specifically Catholic Christian commitments are not necessary. Personally, and in conversation with fellow Catholics, Montessori conceives of her “cosmic plan” as the plan of a Christian God overseeing the universe in his benevolent providence. This might seem to make that metaphysics a poor option for secular thinkers and might even raise red flags of creationist anti-Darwinism or contemporary Intelligent Design. But her religious faith is integrated with an informed scientific

understanding of the world, and her emphasis on teleology is based more on developments in genetics and ecology than any particular antecedent theological commitment. More importantly, despite the passages cited earlier in this section, Montessori's explanation of her metaphysics deliberately isolates her general account of teleology from any specific theological defense of that teleology.

While Montessori consistently describes ecological teleology in terms of a "cosmic plan" and occasionally ascribes this plan to "God," she much more often uses more generic language, referring to "creation" itself as a regulator or claiming that "In nature, there is a wisdom that guides formation" (1946:154). In her most detailed published articulation of the history of the universe, she starts her account by saying that "we may usefully call to our aid some myths or fairy-tales, but they must be such as symbolize truths of nature, not the wholly fantastic" (EHP 19) and then, when at one point she invokes the divine, she says, "we can imagine a committee of Angels or Devas – according to the religion we profess – those sons of God who direct earth's natural forces" (EHP 24). In these contexts, she explicitly distances her overall metaphysical teleology from any particular theology, and while she still implies that members of her audience will have *some* religion, what is essential is merely a framework, of whatever kind, for making sense of the notion of teleologically-organized development. Thus her claim that "the cosmic plan [...] may also be called the Will of God" (EHP 50) cuts both ways. Those with antecedent religious commitments are free to see the teleology in the universe as established by a "governing intelligence," but in doing so they must see that intelligence as operating *in and through* a teleology that is always *internal* to natural entities themselves. And those without such commitments are free to read references to God or God's will (or angels or devas or whatever other categories are used in the context) as expressing analogically the fact that the universe behaves teleologically, according to a plan, governed by the kind of intelligence normally associated with minds.

More importantly, Montessori emphasizes throughout her works, even when she invokes God, that teleology is *internal*. Even insofar as organisms serve a cosmic purpose that goes beyond themselves and their species – that is, insofar as teleology is ecological and interconnected – the *basis* for this teleology, the "location," so to speak,

of the plan, is *within* each organism: “It is not that God has created the world, but that every creature has an inner activity” (CSW 96). Thus when we look at the appeals to God discussed in the previous section, we often find just this shift of emphasis, from the role of God to the role of internal natural teleology. Her commonplace religious confidence “that God protects us!” is immediately followed with the insistence, “But the fact is that He works through agents in this protection that He gives to all His children, and we owe them gratitude and some understanding of the part they play” (EHP 22). Rather than a straightforward grounding of teleology in religion, Montessori here is *interpreting* religious confidence in divine providence *in terms of* an internal but ecologically-oriented teleology of individual, natural agents. And her claim that we can look at guiding instincts as divine thoughts is doubly hedged, both as a claim about how we *might* look at them, and as a claim merely about how to *look at* these instincts. Unsurprisingly, the same text refers to these guiding instincts, only a few pages later, as “command[s] *of nature*” (Secret 215, emphasis added), dropping any theological overtones. And the claim we should look to “the Divine Spirit” since “the tiniest creatures have their guide which leads them on step by step” is immediately followed by an elaboration of that view that emphasizes, not a detached God but an immanent intelligence *within* those creatures:

All this shows the intelligent operation of beings. It is an intelligence which urges them to operate. One example is that of a butterfly resorting to a plant with which it has had nothing to do and laying its eggs on the underside of the leaf. It does this because if the eggs were on the top they would be washed away by the rain. The butterfly does not act with intelligence, but in an intelligent way. (CSW 95-6)

And within her most specifically publication on education, she insists that the way “discover the Spirit and Wisdom of God operating in the child” is “to discover the laws of the child’s development” (CC 14). Her point is to use the appeal to divinity to direct attention toward the natural, internal teleology immanent in nature itself.

Thus even in the passages where she most directly appeals to God or the divine, specifically theological concepts are inessential to her metaphysics. Her core metaphysics is essentially one of an internal teleology within which creatures pursue greater individual perfection within the constraints of their ecological role in a more

perfect whole. Her invocations of God primarily highlight the dignity of these individual creatures. And she is explicitly willing to embrace – at least within what we might call her “public” metaphysics – any underlying theological (or non-theological) metaphors supporting this core teleological focus.

Early in her career as an educator, Montessori deliberated about whether to found a religious order dedicated to the education of children, but decided against it, largely on the grounds that she did not want to limit her most important ideas to the narrow range of a particular religious tradition but rather should “give them to the world.”³⁴ Throughout her life, she remained at once a scientist and a devoted Roman Catholic. But in her metaphysics as in her pedagogy, she subordinates specifically religious accounts of the world to general scientific principles that can be shared across religious traditions and even by those with no religion. She thus provides a metaphysics that is compatible with various religions but is, in itself, “secular.”

6. Conclusion

Over the course of her life, through her studies of children and their development, her immersion in developing biological and geological sciences, and her philosophical training, Maria Montessori developed a complex metaphysics of life. This metaphysics was prescient in several respects, anticipating the importance of variability (genetics) in evolution, the role of ecology and the shift from individuals/individual species to ecological wholes, the importance of giving a metaphysics that can make sense of the reality of human consciousness, and the need for a metaphysical framework that can accommodate teleology and emergent properties without necessary appeal to God. Her main contributions come from her methodological insight that basic principles of the universe in which human beings live can be gleaned from careful observation of the emergence of the human mind in the

³⁴ This quotation, and the account of this decision, are taken from Schulz-Benesch 1997. A very different account – according to which she tried to found a religious order but was rejected by the Vatican – is offered in Cohen 1969:317. I can find no independent evidence to support Cohen’s claims, which he claims are based on (unpublished) interviews of Montessori’s son on June 5, 1968 in Santa Monica.

young child. The fullest development of this insight depends upon Montessori's philosophy of mind and ultimately her ethical and pedagogical theories. But from these observations she articulated her basic principle that complex systems emerge from simpler ones through goal-directed activity within the context of an interdependent whole.

In some respects, Montessori's teleological conception of evolution might seem merely a throw-back to bad misreadings of "evolution" as "progress" from which contemporary biologists, by and large, seek to free themselves. Stephen Jay Gould has described the "straightjacket of linear advance" that infects even "the definition of evolution: the word itself becomes a synonym for progress," arguing instead that in fact, "Life is a copiously branching bush, continually pruned by the grim reaper of extinction, not a ladder of predictable progress" (Gould 1989:32, 35).³⁵ There is a fundamental difference between those like Gould (and Darwin) for whom "contingency rules" (Gould 1989:301) and those like Montessori (and Nagel) for whom, as Nagel put it, "mind and everything that goes with it is [teleologically³⁶] inherent in the universe" (Nagel 2012:15). And Gould is correct that evolutionary theory does not in itself *imply* or *depend upon* any teleological conception of perfection. Organisms undergo

³⁵ Particularly when emphasizing ecological interconnection, Montessori sometimes is guilty of the very worst forms of teleological overstatement, as when she explains the purpose of the ocean currents by pointing out that "This is why, even though no vegetation exists in the frozen regions, a quantity of pieces of wood may be found there" for human use (Adol. 33). One important response to accusations of exaggerated teleology is to emphasize the *pedagogical* role of even overstated teleological stories: "These anecdotes are as interesting to the children as fables" (Adol. 33). For very young children, particularly dramatic ways in which different features of the world provide benefits to each other can prepare the mind for more scientifically respectable accounts of ecological interdependence, and progressivist stories of the development the horse (see Gould 1989:36-7) can prepare for the more complex stories of progress Montessori eventually wants to tell. But I focus here on the more philosophically substantive response to this concern.

³⁶ This is not an addition Nagel would necessarily affirm. Though he is sympathetic to teleological accounts of the universe, he neither commits to them nor refers to them in the context of this particular quotation.

variations, and some variations persist. Often, but not always, the reasons have to do with adaptive success, but adaptive success need not imply any conformity to any notions of excellent or perfection. And the source of those variations *could* be merely random. In that sense, Montessori's "myth" (EHP 19) of Life goes beyond what is strictly implied by the "facts" of evolutionary theory. But her teleological conception of life, as a basic feature of her metaphysics, rightly informs rather than being established by her conception of biological evolution. And *given* a teleological conception of the world, evolutionary biology provides a story of development that fits well within that conception of the world. Remember that for Montessori, the "creative force" of life is continuous with other "creative forces" implicit in the chemical and physical laws of the universe. And there is simply no denying that these forces *have* been creative, in that they have "created" an intricate life-filled world, not to mention the myriad and complex galaxies, planetary systems, crystal formations, and ocean currents in the "non-living" parts of the universe. Gould is particularly interested in the sheer power of the contingency of it all; Montessori emphasizes underlying laws with ecological and teleological orientations.

Montessori's metaphysical conception of life is thoroughly naturalistic, but in a teleological and interconnectionist way that provides a foundation for an account of the human mind as emergent from tensions already implicit within the teleological order of life and an account of human values in terms of both individual perfection and contribution to a cosmic whole. This paper has laid out only the basic structure of her account, the foundation on which these further developments are laid. The structure of this metaphysics provides at least a plausible *prima facie* response to Nagel's challenge. And for that *philosophical* reason, it is superior to neoDarwinian approaches like Gould's that base human mentality, cognition, and values on mere contingency.

Bibliography.

Abbreviations.

For texts by Maria Montessori, I use the following abbreviations (and editions) throughout this article.

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- 1946: *The 1946 London Lectures*. Amsterdam: Montessori-Pierson Publishing, 2012.
- AbsMind *The Absorbent Mind*. New York: Henry Holt and Co., 1995 (originally 1949).
- Adol *From Childhood to Adolescence*. Amsterdam: Montessori-Pierson Publishing Co., 1996 (originally 1948).
- Calif *The California Lectures of Maria Montessori, 1915*. ed. R. Buckenmeyer. Oxford: Clio, 1997.
- CC *The Child in the Church*, ed. E.M. Standing, originally published by the Catechetical Guild Educational Society in 1965, republished by Chantilly, VA: The Madonna and Child Atrium.
- EHP *To Educate the Human Potential*. Amsterdam: Montessori-Pierson Publishing, 2007 (originally 1948).
- EP *Education and Peace*. Oxford: Clio Press, 1992 (originally 1949).
- Formation *The Formation of Man*. Trans. A.M. Joosten, Chennai: Kalakshetra Press, 1955.
- Mass *The Mass Explained to Children*. Roman Catholic Books, 1932.
- MM *The Montessori Method*. Trans. A. George, New York: Frederick A. Stokes, 1912.
- PA *Pedagogical Anthropology*. New York: Frederick Stokes, 1913 (reprinted in 2012 by Forgotten Books).
- SA *Spontaneous Activity in Education* (reprinted as *The Advanced Montessori Method I*). Oxford: Clio Press, 1991 (originally 1918).
- Secret *The Secret of Childhood*. Hyderabad: Orient Longman, 1996 (originally 1936).
- UH “The Unconscious in History,” in *The NAMTA Journal* 37 (2012):7-25 (originally published in *The Montessori Magazine* in 1948)

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