

Maria Montessori's Metaphysics of Life

Maria Montessori is not generally known as a philosopher. She is best known for 'Montessori' schools around the world that bear her name, and for her (oft-misunderstood¹) 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).² 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 twentieth century, the Hegelian Antonio Labriola (see Tralbalzini, 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 that of William James (see Frierson, 2014; James, 1906; Santucci, 1963), whose philosophical-psychological writings she cites throughout her works.

Despite this 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,³ 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; Tralbalzini, 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 be

¹ There are many excellent discussions of Montessori's philosophy of education within communities of Montessori educators, of which the most notable book-length treatments include Nancy Rambusch's classic *Learning How to Learn* (Rambusch, 1964) and Angeline Lillard's more recent *Montessori* (Lillard, 2016), not to mention the many articles published in venues such as the *NAMTA Journal*. Among philosophers of education, however, she is generally ignored, or treated as a romantic who idealizes children and promotes unregulated liberty, or— as by Dewey — criticized for fostering overly restricted and formulaic approaches to education.

² For abbreviations and editions of Montessori's works, see the reference list at the end of this article.

³ See, e.g., Rambusch, 1964, as well as many contributions to *The NAMTA Journal*, *The AMI Journal*, and *Montessori Life*.

accepted by all' (Montessori, 1992: 95). Much of Montessori's pedagogy *can* stand even if one rejects her metaphysical vision, but emphasizing pedagogy and ignoring 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. Most generally, her metaphysics is a metaphysics of *life*, so her metaphysics includes considerable emphasis on the philosophy of biology, though I show in section four that even seemingly biological claims ultimately apply to the universe as a whole. Because, for Montessori, 'The educator must be one inspired by the deep love of life' (MM 59), her metaphysics of life permeates her pedagogical corpus. I thus draw from throughout her corpus to articulate a coherent Montessorian metaphysics. However, this metaphysics is laid out most explicitly in the introduction and first chapters of Montessori's early (1910) *Pedagogical Anthropology*, where she directly tackles the evolutionary theories of her contemporaries; in her elementary materials (e.g. *From Childhood to Adolescence* and *To Educate the Human Potential*), where she describes how the basic nature of the universe should be taught to elementary school children; and in occasional essays (such as 'The Unconscious in History') that directly tackle metaphysical themes. Montessori obviously did not develop her metaphysical views in a vacuum. While situating her metaphysics in the historical-cultural context of late nineteenth and early twentieth century continental philosophy would be a different and much grander project that is my aim here, I offer some requisite background in section one and periodically gesture towards central alternatives to her view – most importantly, Darwinian evolutionary theory – and important influences on her. This provides a set of starting points for further investigation of Montessori in her historical context.

1. A Metaphysics of Life: Introduction and context

The central concept of Montessori's metaphysics is the concept of life. To see the importance of this concept, it helps to start with Montessori's approach to psychology and the philosophy of mind. Elsewhere, I have shown how Montessori critiques empirical psychology for treating human beings as mere physical systems.⁴ She endorses Wilhelm Wundt's 'definition' according to which 'all methods of experimental psychology may be reduced to one, namely, carefully recorded observation of the subject' (MM 72-3), but she rejects widespread

⁴ See Frierson, 2015.

positivist psychological theories from Fechner and Wundt to her contemporaries, arguing that they are ‘arbitrary and superficial’ (SA 86) and exhibit a tendency in ‘experimental psychology’ to ‘adopt ... more or less the standard of laboratories of *physics*’ (SA 98). In place of various physicalist approaches to human persons, she insists that psychology be understood as a vital *biology*. An 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). However, the 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.

For a philosopher developing a metaphysics of life at the close of the nineteenth century, Charles Darwin’s *Origin of Species* is an obvious and important background text.⁵ Darwin wrote in a context of debates between preformationists who argued that organisms were preformed at creation and merely unfolded over time and mechanists who argued that natural physical processes gave rise to new variations. He provided the basis for a new sort of mechanism in biology that showed how apparently teleological, purposive structures of organisms could emerge from causal processes that are not intrinsically teleological. Random variations in organisms give rise to increasingly refined and apparently teleological structures through natural selection, that process whereby ‘Owing to the struggle for life, any variation, however slight and from whatever cause proceeding, if it be in any degree profitable to an individual of any species,

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

. . . will tend to the preservation of that individual, and will generally be inherited by its offspring' (Darwin, 1859/1985:115). 'Evolution' occurs through purely mechanistic processes.

At least as important as Darwin himself were his nineteenth century followers, particularly Herbert Spencer and Ernst Haeckel. Guido Cimino and Renato Foschi rightly note that 'Italian positivism' during the time of Montessori's graduate education 'had a strong imprint of an evolutionary kind inspired by Spencer and Haeckel', and Montessori's mentor in medical anthropology – Giuseppi Sergi – was actively translating Spencer's works into Italian during the period that Montessori worked with him (Cimino and Foschi, 2012: 310, 313). Spencer, perhaps most famous today for his introduction of the term 'survival of the fittest' (Spencer, 1884/2002: 444), was one of the most important nineteenth century defenders of Darwin's evolutionary theory, and he explicitly applied this theory to human psychology. Unlike Darwin, Spencer incorporated Lamarckian features of development, and his conception of 'evolution' was much more progressive than Darwin's. That is, he insisted, more than Darwin himself, that biological systems tend towards increased complexity, individuality, and self-sufficiency. He also, unlike Darwin, ascribed evolution to a tendency of all things to strive for their own individual survival (see Spencer *Principles of Biology, Social Statics*; cf. Darwin's *Descent of Man*). Haeckel (cf. 1913: 97), most famous for his dictum that 'ontogeny recapitulates phylogeny', was another important Darwinist, who Montessori rightly describes as 'the most noted supporter' of 'the materialistic theories of life' (PA 38). Like Spencer, he was less committed to the specifics of Darwin's approach than to three important and related features of his view: the emphasis on the evolution of species, the explanation of that evolution in terms of accrued gradual adaptations to environmental conditions, and the insistence that the appearance of teleology is a consequence of forces that are essentially non-teleological.

Montessori's shares with this broadly Darwinian conception of life an interest in explaining human psychology in terms of naturalist, evolutionary processes, but she differs from Darwinian evolutionary naturalist projects in three important ways: she accepts teleology as a central and irreducible component of evolutionary processes, she emphasizes ecological and interconnectionist approaches to evolution more than her Darwinian contemporaries, and she extends teleology – and in that sense, a metaphysics of life – to the cosmos as a whole.

These divergences from standard Darwinian theory can be understood in terms of other important influences on Montessori during this period. During her time at the University of

Rome, the dominant voice within the philosophy faculty was Antonio Labriola, Professor of Moral Philosophy and Pedagogy at the University of Rome from 1874-1904,⁶ whose neoHegelian and Marxist approach to philosophy permeated the courses in philosophy and pedagogical theory that Montessori would have taken in the University. As an important early Italian Marxist philosopher, Labriola favored a scientific materialism of which teleology is an appropriate and even essential part.

At the same time but from a very different perspective, William James's pragmatism was an important influence on Italian philosophy, particularly among students, during the early twentieth century (see James, 1906; Santucci, 1963). James's sharp critiques of Spencer's evolutionary theory (see especially James, 1878) and his pioneering *Principles of Psychology* (1890, published in Italian in 1901⁷) were important backdrops for Montessori's development of her own philosophical views. Particularly in her later works, she draws on James to articulate the conception of experience and cognition that lies at the heart of her epistemology (see Montessori SA 179; James, 1890:402; Frierson, 2014), and James is an important influence as she thinks about how to integrate a naturalist account of life with the nature of consciousness.

A third important influence during this time was Montessori's engagement with the French 'psychologie pathologique' during her 'considerable time' at the Salpêtrière and Bicêtre in Paris (DC 25). Here the influence was, as in the case of Darwin, largely negative, in that while she drew from these psychologists the need for a new approach to psychology, she largely rejected what she saw as an overly mechanistic approach to human personality. A more positive French influence during this period may have been Léon Bourgeois. While most famous for his radical political views, Bourgeois was a leader of the 'solidarist' movement that emphasized an anti-Spencerian – and even anti-'Darwinian', given how Darwin was understood at the time – rejection of the 'struggle for life' in favor a principle of 'cooperation for life' (Foschi and Cicciola, 2006:278). However much this solidarism emphasized political implications, it also involved a metaphysical vision according to which, as Bourgeois put it, 'Laws of ... heredity, adaptation, ... [etc.] 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, quoted in Foschi and Cicciola, 2006:278).

⁶ See Brown, Collinson, and Wilkinson, 2012:426.

⁷ See Cimino and Foschi, 2012:323.

Despite their background influence, these philosophers, psychologists, and biologists are not the dominant referents when Montessori describes her own approach to life; instead, she typically focuses on the important work of early *embryologists*, to whom she rightly ascribes ‘other theories of evolution less familiar than that of Darwin’ (PA 46).⁸ These theorists differ from Darwin in allowing a more prominent role to teleology (see especially PA 40-42) and especially to seeing teleology as *internal* to living forms and not merely a by-product of environment (see especially PA 46-50). Starting with a conception of vital teleology 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) – Montessori extends this perspective both conceptually and empirically. Empirically, to studies of literal human (and animal) embryos, she adds investigation of what she calls the ‘spiritual embryo’, the human being during the early formative years of its consciousness (roughly from birth to age six). She describes how early childhood development provides an intensive qualitative window into the processes by which new kinds of beings – human beings with advanced cognitive systems – are able to self-create in the universe.

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)

Conceptually, Montessori provides a framework for understanding the sort of teleology involved in the development of young children, and of living systems in general, and even – in her ‘cosmic education’ – in the universe as a whole.

⁸ Embryology provides a particularly important methodological key, for Montessori, for solving the “hard problem” of consciousness. 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). 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) from complex but not-yet-conscious bundles of organic matter.

These emphases give rise to Montessori's 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 (in line with Bourgeois's critique of Spencer) 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.

Finally, 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 within which biological 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).

In the rest of this article, I lay out three core features of Montessori's metaphysics of life. I start, in section two, with her account of teleology, emphasizing how teleology is internal, perfectionist, discontinuous, and irreducible. She espouses an evolutionary naturalism, but not a reductive materialism that would eliminate teleology in favor of *mere* accretions of environment-induced adaptations. In section three, I turn to a crucial feature of Montessori's metaphysics that distinguishes it from the (metaphysical) individualism of biologist-philosophers like Herbert Spencer. For Montessori, both teleology and evolution are essentially holist or ecological. Finally, in section four, I show two important ways in which this teleological and interconnectionist metaphysics can apply to non-living nature; Montessori completes her metaphysics by extending her teleological metaphysics of 'life' to include the whole cosmos. There are many further issues worthy of discussion. One could investigate how Montessori's metaphysics relates to alternatives offered by her contemporaries (or by ours), what role God plays in her metaphysics,⁹ how precisely her account of teleology allows for a naturalistic philosophy of mind, and so on. The present paper provides an important background for and, I hope, provocation to those further inquiries.

⁹ In a longer version of this paper, I show that while Montessori often appeals to God, her teleological metaphysics of life does not essentially depend upon any particular theistic commitments.

2. Teleology

Given her focus on life, not to mention the tone of ‘evolutionary positivism’ in her formative educational contexts, 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 only¹⁰ where there is life, and that tend towards a definite purpose or *end*. Living organisms take nutriment from their environment, to the *end* of assimilating it, that is, transforming it ... into a ... living part of themselves ... [F]or 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)

Montessori 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:

¹⁰ Although Montessori here says that final causes are met with “only” where there is life, I argue in section four 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 – embryology, evolution, and education – 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 Darwinian and neo-Darwinian ‘materialist’ evolutionary theories from Haeckel and Spencer to the present, which reduce teleology to mere mechanism (PA 38, 46), Montessori does not see teleology as a useful heuristic that abbreviates what are fundamentally efficient-causal forces of environmental natural selection and/or molecular interaction. Second, teleology is *internal*. Living things are teleological due to 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.

2.1. 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' and including those of Lamarck and Haeckel (PA 46, 38). As she summarizes such 'materialistic theories of evolution', '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).¹¹ However, Montessori defends quite different 'theories of evolution' proposed by Naegeli and DeVries (PA 46, cf. DeVries, 1909), two important biologists who helped set the stage for modern genetic theory and thereby 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 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)

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,

¹¹ For helpful discussion of Darwin's view and early alternatives (including DeVries), see Bowler, 1989:248, 267f.; Kirschner and Gerhart, 2005: 10-37. For discussion of the Modern Synthesis, see too Bowler, 1989: 325ff.; Depew and Weber, 1995.

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 twentieth century, Darwin’s unexplained source of variation invited 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 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.

2.2. 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). When James criticized Spencer for pretending to eschew teleology, he put it in terms of values: ‘such a definition as [Spencer’s] is precise, but ... it is frankly teleological’ in that it ‘postulates a distinction between mental action pure and simple and *right* mental action’ (James, 1878:6). In principle, one could articulate a teleological metaphysics stripped of such evaluative notions (see Hawthorne and Nolan, 2006), but Montessori’s teleological metaphysics – like those of Aristotle, Hegel, and Labriola – 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).¹²

¹² 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”).

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). She makes 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), 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, perfection involves a general increase in capabilities and the emergence of more complex systems of powers integrated into coherent wholes. Combined with the claim that ‘the impulse to activity ... tends to its own upkeep’ (EHP 19), this might seem to support a broadly Spencerian notion that organisms’ complexity arises from self-preservation. But what tends to its own upkeep is not the organism per se, but its impulse *to activity*. Greater perfection allows more ‘creative power’, and Montessori shares less with Spencer than with William James’s view that ‘our world is *incompletely* unified teleologically and still trying to get its unification better organized’ (James 1907:142). However, her indeterminate teleological perfectionism is closer to that of Emerson or Nietzsche than Aristotle, Darwin, Hegel, or even James. She approvingly quotes Nietzsche’s *Thus Spake Zarathustra*, saying, ‘I wish the man who has conquered himself, who has made his

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. However, 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) or Philippa Foot’s point that “evaluations of human will and action share a conceptual structure with evaluations of characteristics and operations of other living things” (Foot, 2001:5) or even Christine Korsgaard’s comparison between human rational agency and animal agency (Korsgaard, 2009:35-40).

soul great ... who desires to ... create a son ... better, more perfect, stronger, than any created heretofore!’ (MM 69). She claims,

man can reinforce his own strength by other powers which will urge him on upwards towards the infinite..., that is, towards the supernatural life. Yes, to be *more* than man. This is a *dream* to him who lacks faith; but it is the realizable goal, the aim of life, to him who has faith. (SA 9:266)

She endorses the Nietzschean ideal of raising oneself – and thereby the species – to something higher that has heretofore been, and she even sees (as we will discuss in section four below) human beings as part of the destiny of the cosmos itself to give rise to new, ‘higher’, creative forces (e.g., AbsMind 215).¹³ In general, perfection involves integration of ‘energies’ or capabilities into an increasingly complex, coherent, and essentially *active* whole. 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.

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

One natural way to think of teleology is as a gradual movement towards a destination, like a hiker ascending towards a summit or a rock falling towards the earth. Darwin describes evolution this way, as a ‘slow and gradual’ process (Darwin, 1859: 97, 236, 300, 317), and this view became even more popular during the late nineteenth and early twentieth century. In a contribution to a memorial volume dedicated to Charles Darwin that was often cited during the early twentieth century, W. B. Scott explained the point clearly, saying that the evolution of horses ‘show[s] a slow, steady progress in a definite direction, all parts of the structure participating in the advance ... [I]t should be emphasized that the changes are gradual and uninterrupted’ (Scott, 1909: 190). Neither Darwin nor Scott advocated accounts that were teleological in their ultimate basis, but the notion of gradualism also typified many teleological accounts, for which there is a target, and the object or system moves slowly and gradually 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 seem to involve one thing gradually becoming more and more like its ultimate end state.

Montessori, however, informed by sophisticated observations of both biological and psychological-pedagogical development, argues that systems develop towards their end states

¹³ As we will see shortly, however, she disagrees with the hierarchical and anti-democratic thinking that pervades much of Nietzsche’s thought.

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).¹⁴

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.

¹⁴ 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). The most important proponent of this discontinuous thesis in the early twentieth century was Hugo DeVries. The most important proponent within more recent biology has been Stephen Jay Gould, whose theory of “punctuated equilibrium,” while non-teleological, shares with Montessori an emphasis on discontinuous evolution.

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 six), 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 from its parts, 'something uniform and new ... that was not previously there' (EHP 68). 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 Montessori 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; see too Secret 37-47)

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 one to three years old), 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). Likewise, against Darwin, Montessori argues that

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).¹⁵ For

¹⁵ 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

Montessori, what has come to be called a ‘punctuated equilibrium’ model of evolution (see Gould, 2002, 2007) opens room for 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.¹⁶

3. Ecology: Teleology applied to the whole

The previous section 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 those of individual structures *within* organisms, ultimately serve a more comprehensive purpose (see PA 39; 1946:29). In this focus on interconnection, Montessori may have been influenced by the important role of ‘solidarity’ and ‘solidarism’ in French positivism during the

general principle that evolution is episodic rather than gradual has gained renewed support from paleobiological evidence (see Gould, 2002, 2007).

¹⁶ One important implication of her discontinuous conception of teleology can be seen by contrast with the approach recently articulated by Hawthorne and Nolan. Hawthorne and Nolan take as their chief exemplar of final causation (for the sake of discussion) the case of a falling rock. 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). 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. 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.

early twentieth century (see Foschi and Cicciola, 2006:277-81). Solidarism emphasized ‘cooperation for life’ over Spencer’s ‘survival of the fittest’ or even Darwin’s ‘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, and – like Bourgeois – she sees it as *consonant with* rather than a strict alternative to individual evolution towards perfection.

For Montessori, ‘[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’ (EHP 6:26). Here 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 individual and species 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 in the whole. All creatures work consciously¹⁷ for themselves, 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)

Each striving for individual and even species-level perfection is ultimately subordinated to a more fundamental ‘[v]ictory in self-fulfillment [that] can only come to the All’ (EHP 27). Here

¹⁷ 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 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 frequently indicates through using consciousness language counterfactually when referring to lower organisms, using phrases such as “a coral polyp, if capable of conscious expression ...” (EHP 27) or “If animals were to become self-conscious...” (AbsMind 56).

again Montessori echoes her contemporary, the solidarist Bourgeois, who insisted that from cells to organisms, primary elements ‘tend to existence and to individual development; nonetheless a close solidarity unites them ...; they evolve, and their evolution is a function of collective evolution’ (Bourgeois, 1906:54, 57; quoted in Foschi and Cicciola, 2006:278). What Bourgeois calls ‘solidarity’ or the ‘sympathetic action ... of universal ... evolution’ (ibid.) is dubbed by Montessori as 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)

While Montessori sometimes connects this universal purpose with a ‘governing intelligence’ or ‘Divine Spirit’ (see EHP 30, CSW 95, Secret 201), she usually 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’ (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 (1949), she explicitly cites this 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.

(Montessori, 1949:89-90¹⁸; 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 serve eco-systemic purposes and provide what is necessary for the organisms. 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

¹⁸ This quotation is from a version of *The Absorbent Mind* published by The Theosophical Publishing House, Madras, India, in 1949, based on her lectures during her time in India (1937-45). It does not appear in the revised *Absorbent Mind* published by Montessori-Pierson and listed in my bibliography of Montessori's works.

which it is a part and fail to thrive over the long term.¹⁹ 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 and – in a more Hegelian or Nietzschean vein – the ‘evolution’ of the cosmos.

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’ where ‘all living beings are destined to contribute to the well-being of other living beings’ (Adol 56). Pushing teleology to the level of ecosystems might seem to threaten the conception of teleology as rooted in *internal* creative powers oriented towards organisms’ *individual* perfection. Montessori certainly limits individual-perfectionist teleology by ecological-holist teleology, explicitly saying that ecological purposiveness towards ‘the cosmic function of each living being’ is ‘stronger’ than individual tendencies to ‘grow...towards perfection’ (EHP 26-7) and claiming that 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 *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.

¹⁹ The claimed interdependence between individual/species evolution and ecosystemic good is not absolute. Some individuals will thrive – a 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.

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 natural laws that ultimately serve the good of the whole ecosystem (and eventually cosmos).

Furthermore, the way in which each contributes to the well-being of all is not mere reciprocal support or mutual sustenance: rather, it involves fostering a complex system of harmonious, mutually reinforcing, ever-more-active forms of life. As William James aptly put it in the quotation mentioned in §2.2, 'the world is [as yet] incompletely unified and is still trying to get its unification better organized' (James, 1907:142). Montessori adds to this philosophical point her own elegant metaphor of the process of coalescing teleological perfection whereby 'all is strictly interrelated' as each individual is teleologically ordered towards increasing its own perfection but also towards the good of the whole: 'We may compare it with a tapestry: each detail is a piece of embroidery; the whole constitutes a magnificent cloth' (Adol 23).

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, making her views more a philosophy of biology than a comprehensive metaphysics.

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 things 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. Equally often, however, she 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)²⁰

²⁰ 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 the Montessori elementary curriculum.

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. In her elementary materials, in particular, where she lays out details of her overall metaphysics, she refers to ‘the cosmic function of each living being, and even of inanimate natural objects’ (EHP 27). 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 one of her more explicitly metaphysical essays, when describing the ‘creative unconscious’ by which ‘plants and animals’ exhibit a teleology that we can consider by ‘analogy [with] the life of man’, Montessori unambiguously 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 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.²¹ 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).

4.3. Emergent creative forces.

According to this account, *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 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:

²¹ 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*.

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 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. 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’.²² 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 universe is teleological in its foundations, and the complexity, activity, and we might even say agency of that teleology increases over time.

²² 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.)

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, Montessori contributes to a common project among early twentieth century – and present-day – philosophers, the explanation of how conscious mind can be a natural continuation of the same sort of (teleological) process that gave rise to life itself.²³

5. 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 drew from and engaged with strands of evolutionary naturalism in thinkers from Hegel and Darwin to Haeckel, James, and Bourgeois. Montessori's metaphysics emphasizes a concept of life involving 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. Her 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, and the importance of giving a metaphysics that can make sense of the reality of human consciousness. 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 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

²³ Further articulation of Montessori's philosophy of mind as an outgrowth of her metaphysics is a topic for another paper.

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).²⁴ There is a fundamental difference between those like Gould – and Darwin and Nietzsche – for whom ‘contingency rules’ (Gould, 1989:301) and those like Montessori – and Hegel, Marx, Labriola and Bergson – for whom, as Thomas Nagel has recently put it, ‘mind and everything that goes with it is [teleologically] inherent in the universe’ (Nagel, 2012:15²⁵). It is true that evolutionary theory as such does not in itself *imply* or *depend upon* any teleological conception of perfection. Organisms undergo 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. 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. Darwin, Nietzsche, and their heirs (such as Gould) may be particularly interested in the sheer power of contingency; Montessori emphasizes underlying

²⁴ Particularly when emphasizing ecological interconnection, Montessori sometimes is guilty of the 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 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.

²⁵ Nagel would not necessarily affirm my addition of the world “teleologically” here. 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.

teleological and ecological laws. She thereby provides a coherent, naturalistic, teleological, and interconnectionist metaphysics of life.²⁶

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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.

CSW *Child, Society and the World: Unpublished Speeches and Writings*. Oxford: Clio Press, 1989.

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.

²⁶ As Montessori recognized, intellectual work always takes place within communities of support. I thank the many who have helped me think through Montessori's philosophy in more rigorous ways, starting first and foremost with my family, and then my students at Whitman College, especially the students in my Education and Autonomy courses. Special thanks go to Jack Eiford and Sara Vesneske, both of whom spent a summer working through Montessori's ideas with me; Sara offered specific comments on this article in particular. Thanks too to the Perry Endowment for Student-Faculty research at Whitman College, which made those collaborations possible, and to the Spencer Foundation and Earhart Foundation, who provided generous financial support for this project.

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- SA *Spontaneous Activity in Education* (reprinted as *The Advanced Montessori Method I*). Oxford: Clio Press, 1991 (originally 1918).
- Secret *The Secret of Childhood*. New York: Ballantine Books, 1966 (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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