Susan WALDSTEIN
Ave Maria University, USA

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READING NATURAL HIERARCHY IN A TRINITARIAN KEY

ODCZYTYWANIE HIERARCHII NATURALNEJ W KLUCZU TRYNITARNYM

Abstract

Susan Waldstein's „Reading Natural Hierarchy in a Trinitarian Key" shows, against the background of both St. Bonaventure and St. Thomas, that the entire order of nature, from inanimate rocks to human beings, is a display of the splendor and generosity of God. The differences we see in creation and the hierarchy of creatures are not random. On the contrary, they are the result of the infinite beauty and goodness of God: „Creatures must be essentially different so that they can represent God's goodness in different ways and degrees"

Keywords: Ecology, natural hierarchy, trynitology, St. Bonaventure, Saint. Thomas Aquinas, kindness, creation

Streszczenie

W artykule zatytułowanym „Odczytywanie hierarchii naturalnej w kluczu trynitarnym" Susan Waldstein pokazuje, w kontekście prac zarówno św. Bonawentury, jak i św. Tomasza, że cały porządek przyrody, od skał nieożywionych po istoty ludzkie, jest przejawem wspaniałości i hojności Boga. Różnice, które widzimy w tworzeniu i hierarchii stworzeń, nie są przypadkowe. Przeciwnie, są one wynikiem nieskończonego piękna i dobroci Boga: „Stworzenia muszą być zasadniczo różne... aby mogły reprezentować dobroć Boga na różne sposoby i w różnym stopniu"

Słowa kluczowe: Ekologia, hierarchia naturalna, trynitologia, św. Bonawentura, św. Tomasz z Akwinu, dobroć, stworzenie

> „The different levels of natural beings express different aspects of God's goodness and make possible an ordered whole in which lower parts serve higher parts and each part serves the whole"
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> For Christians, believing in one God who is trinitarian communion suggests that the Trinity has left its mark on all creation. Saint Bonaventure ... teaches us that each creature bears in itself a specifically trinitarian structure, so real that it could be readily contemplated if only the human gaze were not so partial, dark, and fragile. In this way, he points out to us the challenge of trying to read reality in a trinitarian key[1].

In his new encyclical *Laudato si',* Pope Francis encourages us to see the reflection of God in all that exists so that „our hearts are moved to praise the Lord for all his creatures and to worship him in union with them"[2]. He tells us that an aesthetic education is a prerequisite to an ecological conversion: „By learning to see and appreciate beauty, we learn to reject self-interested pragmatism. If someone has not learned to stop and admire something beautiful, we should not be surprised if he or she treats everything as an object to be used and abused without scruple"[3].

One of the aspects of natural beauty that is too little appreciated today is the ordered hierarchy of beings in nature. Indeed many scientists who ascribe to neo-Darwinism explicitly reject it. They violently reduce the wealth of their own experience by holding that the only real things are the ultimate particles; everything else is an epiphenomenon of the arrangement and motion of the ultimate particles. They say that animals and plants are more or less complicated bundles of chemical reactions. As Nobel laureate biologist Jacques Monod writes succinctly, „Living beings are chemical machines"[4]. There is only a quantifiable difference between living and nonliving: „Living beings may be distinguished

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[1] Francis, *Laudato si'* 239 (hereafter cited as *LS*).

[2] Ibid., 87.

[3] Ibid., 215.

[4] Jacques Mound, *Chance and Necessity: An Essay on the Natural Philosophy of Modern Biology* (New York Vintage Books, 1971), 45.

from all other beings including crystals by a purely quantitative criterion. They can transmit a quantity of information several orders of magnitude greater than any nonliving being"[5].

The theory of Neo-Darwinism excludes any basis for counting one organism higher than another, since all natural beings are conglomerations of molecules which came about by chance. Random motions of molecules, obeying necessary laws of matter, led to the development of the present rich variety of living things--including the complex „higher" mammals and man.

This theory claims to show how foolish it is for man to claim a special place in the world for himself. Man can no longer think that he is the highest being on earth if he is the product of blind chance. If all that is important is a superior power of survival and reproduction, then bacteria are better adapted than humans. Metaphysical ladders leading to God are cut off.

> The chimpanzee and the human share about 99.5 per cent of their evolutionary history, yet most human thinkers regard the chimp as a malformed, irrelevant oddity while seeing themselves as stepping-stones to the Almighty. To an evolutionist this cannot be so. There exists no objective basis on which to elevate one species above another. Chimp and human, lizard and fungus, we have all evolved over some three billion years by a process known as natural selection[6].

Neo-Darwinists hold that there are no essential differences between different kinds of natural beings like lizards and humans. Indeed there are no kinds or species, only individuals that are more or less like each other.

While common sense and Catholic doctrine suggest that this is nonsense, mechanism has obscured for many the significance of hierarchy in nature. My goal in this article is to highlight the vast differences in the grades of being in nature and to reflect on the theological and specifically trinitarian meanings of this hierarchy. I hope to contribute to the kind of wisdom about nature that

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[5] Ibid., 13.

[6] Robert Trivers, foreword to *The Selfish Gene,* by Richard Dawkins (New York: Oxford University Press, 1976), v.

Pope Francis has called for, a wisdom that contemplates God „in the beauty of the universe"[7], rather than considering nature „something formless, completely open to manipulation"[8].

1. OBSERVING HIERARCHY

> The metaphysician becomes aware not only of the multiplicity and variety of the forms of being, but of their hierarchy as well. With the real, the metaphysician is given in a flash of light, to see that being involves modes of value organized among themselves according to „more" and „less" There is the hard texture of the rock; we find more being, however, in the „living silk" of the peony and the rose. There is still more being in the „stretch" of the bird's desire. And what can we say of the agility of the human mind, quicker than lightning, which moves, without hindrance, in space and time?[9]

The best way to investigate hierarchy in nature is to look at the differences in the qualities and activities of members of distinct grades of beings. Let us look at the differences: first, between living and nonliving creatures; second, between plants and animals; third, between different levels of animals; and fourth, between irrational animals and men.

1.1. Living and nonliving

When one looks at living things such as oak trees or elephants and compares them to nonliving things such as rocks or lakes, one is struck by their unity and goodness. Most of us are more interested in plants and animals than rocks because living things have a unity, self-possession, and self-motion that nonliving

[7] *LS,* 246.
[8] Ibid., 106.
[9] *Pierre-Marie Emonet, The Dearest Freshness Deep Down Things: An Introduction to the Philosophy of Being (New York: The Crossroad Publishing Company, 1999), 89.*

things lack. They can do many more things. Chip away at a rock and it will get smaller but not less rock. It does not seem to do anything to stop one from chipping away at it. It is indifferent. But living things are in no way indifferent. They constantly do things for themselves. As soon as there is life, there is something like impulse or desire, because living things must constantly metabolize, take in nourishment to maintain themselves or they die[10]. Darwinian theory takes as a given the „struggle for existence", that all living things try as hard as they can to preserve their life and reproduce.

In generation an acorn develops itself in an orderly way from a very small seed coming from parent trees into an enormous oak tree of the same kind. Likewise an elephant develops itself from a single-celled zygote into a two-ton mature elephant, like its parents. This growth and development does not just consist of adding more molecules like more Lego bricks to make a bigger Lego elephant. Living things organize themselves and build themselves different kinds of parts[11]. They are enormously complex wholes consisting of trillions of parts ordered in levels from molecules to cells, to tissues, to organs, to systems, to the whole. At every level each part has a specific function, which serves the whole. Even the simplest bacterium is staggeringly complex at the biochemical level[12]. Living things also maintain themselves. They take in nourishment and turn it into themselves or into fuel for their activities or to keep warm. Living things heal themselves. If they are cut, they regrow tissue. Plant cuttings will often grow into a whole plant. Many animals have immune systems, which protect the animal from infections.

Ordinary experience tells us that living things act for a purpose. Life is good and living things work to maintain their life and to pass it on to their offspring. They grow, develop, and organize themselves toward a goal, the mature form of the organism.

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[10] Hans Jonas, *The Phenomenon of Life: Toward a More Philosophical Biology* (Chicago: University of Chicago Press, 1982), 4.

[11] Leon R. Kass, *Toward a More Natural Science* (New York: The Free Press, 1985), 254-57

[12] See Michael J. Behe's description of the immensely complicated steps in the synthesis of one molecule in the bacterial cell (Michael J. Behe, *Darwin's Black Box* [New York: The Free Press, 1966], 149).

They nourish themselves and heal themselves for a goal, namely to preserve their lives. They spin webs, build nests, and burrow tunnels for a variety of goals. The many activities animals perform in order to maintain and reproduce their life become part of their purpose. It is good to be a bird and this goodness includes eating worms, flying, singing, and building nests. Even plants exhibit purposeful activities besides generation and development, such as bending toward the light. These activities are not consciously planned and directed by the organism the way a man weaves a blanket or builds a house; nevertheless, the organism clearly works toward and accomplishes many goals that are good for it. Moreover these goals can belong to a wider group than the individual organism. Plants produce seeds and fruits; parent animals perform many activities for the sake of reproducing their species. Ants and honeybees are famous for their division of labor to promote the good of the whole colony[13].

Thus we see many differences between living and nonliving things. An organism is an individual, which moves itself toward inwardly determined goals. It acts for its own sake. It develops itself, organizes itself, maintains itself, and reproduces itself. Life „exhibits in each individual instance a striving of its own for existence and fulfillment"[14]. Organisms are not only more complex structures than nonliving beings; they also have the capacities for many more kinds of activities. They have a richer way of being.

1. 2. Plants

Next, let us first consider the life of a plant. Since it is without mobility, a plant must be contiguous with its food source. It must continually metabolize and so it must continually take in nourishment. There is a very limited relation between the plant and other things; the plant's needs correspond to its inclination to keep bringing in food and metabolizing it. The plant can stay rooted in the ground as it develops into its mature form and reproduces it. It

[13] Leon R. Kass, „The Permanent Limitations of Biology", in *The Ambiguous Legacy of the Enlightenment,* ed. William A. Rusher (Lanham, MO: University Press of America, 1995), 120-41.

[14] *Jonas,* Phenomenon of Life, *61.*

achieves its highpoint in flowering and bearing fruit. It produces and reproduces a magnificent form[15].

The riches of shape and color of flowers make it impossible to explain flowers simply as organs of reproduction, organs of survival of the species. Their beauty and diversity vastly surpass what would be strictly necessary for that task. Their beauty of color and form must themselves be an intended purpose of nature; they are organs of expression or revelation of the Intelligence that shaped nature.

But the plant exhausts its possibilities in nutrition, growth, and reproduction. These vegetative powers are found wherever there is life. They are powers flowing from the form, which organizes the body of the living thing, making it to be this particular kind of body, which is alive and wants to stay alive and mature and reproduce. The plant form is not material, i.e., is not a body, but is also not separable from the body, which it organizes. Yet it is not simply the shape or boundary of an organism as is the form of a statue. It is an interior principle, which develops the body into this visible structure and gives it these powers of self--motion. Aristotle and St. Thomas call it a soul. It gives the plant a certain beauty and depth because the observer is aware of an inward principle of unity which is manifested in the outer form, lot this reason, even the humblest living flower is more beautiful than any artificial one[16].

Nevertheless, the activities this inner „immaterial" form empowers all consist of moving and organizing matter. It does not transcend matter except by forming it, maintaining the form, and reproducing the form while exchanging the particular matter it forms. „Immaterial" in the case of plant or animal souls does not mean something that can subsist without matter, as it does in the case of human souls; plant and animal souls do not have immaterial being; they are not beings but principles of the being of the composites, i.e., that by which the organisms have a certain kind of being-life.

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[15] Ibid., 99-107.

[16] Michael M. Waldstein, „Expression and Form: Principles of a Philosophical Aesthetics According to Hans Urs von Balthasar" (PhD diss., University of Dallas, 1981), 89.

St. Thomas considers the reproductive power the most noble of the vegetative powers because it reaches beyond the individual to its offspring. In this way it approaches the sensitive power; it is a kind of bridge to the sensitive power of animals, which can reach out to all bodies[17]

1. 3. Animals

The simplest animal has a higher, more immaterial power than plants. It can transcend its matter by sensation. It takes in the form of the other as other. Sensation is a kind of knowledge; it always involves at least an elementary form of consciousness, which plants lack altogether. With knowledge comes a new kind of appetite. Following the sensation of objects, there follows a conscious attitude toward the object sensed, either desire or fear. Hence, the animal stands as a self vis-a-vis the world, unlike a plant. It can stand at a distance and perceive and move toward what it desires or flee what it fears. Thus these three powers of sensation, desire (or emotion), and local motion are also very connected with each other and with the distance the animal has from the world and in particular from its food[18]. But they are not restricted to helping the animal obtain food; they also make possible communication, social life such as courting and parenting, making things like nests or tunnels, and even play.

Sensation has many grades of perfection in animals. It can vary from the primitive feeling of pressure or pain that causes an amoeba to flee certain chemical substances to the complex hearing of a Beethoven symphony. At the lowest end, sensation is difficult to distinguish from plant tropisms. There is however a clear distinction between sensations in higher animals like lions and tropisms in higher plants like sunflowers. The lion sees a gazelle and wants to devour it, so he runs after it. The sunflower, on the other hand, bends toward the sun without possessing any awareness of it. This occurs due to phototropism, in which sunlight destroys plant growth hormones called auxins on the sunny side

[17] Thomas Aquinas, *Summa theologiae* I, q. 78, a. 2 (hereafter cited as *ST*).

[18] Jonas, *Phenomenon of Life,* 104-105; Aristotle, *De anima* 111,9-10, 432a 435b.

of the plant. This causes the cells in the shaded side of the plant to grow longer. The longer cells on the shaded side cause the stem to bend toward the light.

2. GRADES OF ANIMALS

Recent studies of animal behavior and instincts have been a counterweight to the excessive focus on biological parts in bio chemistry and molecular genetics. Ethologists have found that instincts-innate inherited behaviors of animals are much more variegated than expected. Some behaviors seem to be inherited in a very rigid completed form, while in other cases the behaviors are much more flexible and open to change. Bird song is a lovely example of the wide range of flexibility among inherited behaviors. Some birds, such as warblers, even if raised in complete isolation from other birds, will begin to sing the typical song of their species as soon as they are developed enough. Other birds, such as finches, need to learn the song of their species. If they are exposed only to the song of some other kind of bird during their youth, they will learn the typical song of the other species and sing it the rest of their life. Other birds, such as the mockingbird or parrot, retain openness to learning new songs or sounds during their whole life[19]

We will sketch a few representative behaviors in animals of different rank in order to see what light animal behavior sheds on hierarchy. If animals are for the sake of their activities, we should find in their activities a „progressively richer realization of the idea, the type of animal life"[20].

2.1. Sponges: Porifera

First we will look at some of the very lowest multicellular invertebrates, sponges. They can barely be distinguished from

[19] Adolf Portmann, „Beyond Darwinism: The Special Position of Man in the Realm of the Living", *Commentary* (November 1965): 39-40.

[20] F. J. J. Buytendijk, cited in *Approaches to a Philosophical Biology,* ed. Marjorie Grene (New York: Basic Books, 1968), 147.

plants. They always live attached to rocks or some other object in the sea. Their life consists in siphoning seawater; they take in seawater, digest the microorganisms floating in it, and then expel it. Their only sense is touch, but since they have no central nervous system only the cells that are actually touched respond to stimuli. They live next to each other, but have no social life[21].

2. 2. Hunting wasps

Insects already show a much higher degree of awareness and behavior. Let us look at some experiments of Henri Fabre with digger-wasps. The mother wasp of each species preys on only one particular quarry: one species of locust, spider, beetle, or caterpillar. The female *Ammophila carpentris* immobilizes a large caterpillar with eight stings each in exactly the right place along the back to paralyze but not kill it[22]. Then she drags the prey into the hole she has dug and lays an egg on it. When the larva hatches, it finds fresh meat waiting for it. She is clearly no machine; she must find and recognize the hawk-moth caterpillar; she must remember where her hole is and drag the prey down into it; she must find the exact spots to sting her prey or it will either fight her and be too dangerous and difficult to drag or it will die and rot before the egg hatches. There is a remarkable wisdom to her instinct but also remarkable limitations. When Fabre removed the caterpillar and egg from the breeding hole, she carefully closed it up in the same way as if there were still an egg to protect; she was unable to change her behavior when the reason for it disappeared[23].

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[21] Lynn Margulis and Karlene V. Schwarz, *Five Kingdoms: An Illustrated Guide to the Phyla of Life on Earth* (New York: W. H. Freeman and Company, 1995), 176-77.

[22] J. Henri Fabre, *The Insect World of J. Henri Fabre,* ed. Edwin Way Teale and trans. Alexander Teixeira de Mattos (Boston: Beacon Press, 1991), 3HH 89.

[23] Ibid., 197-202.

2. 3. Birds

Birds exhibit a much richer way of life. They not only take care of their eggs in the nest by sitting on them, but also feed their progeny after hatching and teach them such things as how to fly, how to scratch for bugs, how to sing their special song, and even what to fear[24]. Many bird „couples" cooperate in incubating the eggs and feeding the fledglings.

Higher animals like birds and mammals have a true youth rather than metamorphosis like insects. Only animals with slowly maturing young can have the elaborate social life involved in parents caring for their young and teaching them[25]. Most birds are monogamous at least for the breeding season and many for years or even for a lifetime, as banding birds is increasingly demonstrating. This is especially astonishing in the case of migratory birds, which may fly thousands or even tens of thousands of kilometers twice a year on their migratory journeys. Still they either stay together or manage to find each other again when they reach their breeding areas in the spring[26]. We suppose that bird monogamy is at least partly connected to the shared life of the parents as they care for their young together.

Clearly monogamous birds recognize an individual, their mate, and become attached to it. Birds that migrate thousands of kilometers twice each year evidently must have a strong desire to be with each other in order to end up together every spring. Many bird pairs keep the same territory for years or for life.

Lyrebirds, which often pair for life, also keep the same territories year after year. Their lives show astonishing developments in social life and learning. The female lyrebird picks out a territory in the thickets of the mountain gorges of Australia. She alone builds the nest, usually in the same place year after year, broods the eggs, and feeds the young. The male is far from inactive, however. He has an adjoining territory where he performs for his

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[24] Konrad Z. Lorenz, *King Solomon's Ring: New Light on Animals' Ways* (New York: Meridian Books, 1952), 143-92.

[25] *Adolf Portmann, Animal Forms and Patterns: A Study of the Appearance of Animals (New York: Schocken Books, 1967), 151-64.*

[26] Adolf Portmann, *Animals* as *Social Beings* (New York: The Viking Press, 1961), 219-33.

mate. He scrapes earth and leaves together to build as many as twenty platforms, which he uses for his performances. There he enacts an elaborate dance in which he spreads out his lyre-shaped tail feathers and turns in a semicircle in one direction and then in another, shaking his tail and singing what may be the most variegated birdsong in the world. Besides his own specific lyrebird melody, he may add as much as a half hour of other sounds that he has imitated: not only other species of birds' songs (although often many of these), but also sounds of water trickling, power saws buzzing, dogs barking, and cats meowing. He adds to his song year by year and may live as long as twenty-five years. Another male may join in from the border of his territory and sing the lyrebird's own specific melody in chorus. The platforms upon which the male performs his shows of song and dance are like so many rooms of his house, which he keeps clean to be ready for his performances. The male continually improves his territory by making new platforms. He impresses himself upon the area, making it more his own and more of an expression of himself[27]

The lyrebird shows evidence of great openness to learning. He keeps adding new pieces to his song for his whole life. This shows much more self-directedness than birds which inherit their song readymade or even than those birds who, as fledglings, have a short time of openness to learning one song, normally the song of their species from their parents. The whole behavior of lyrebirds clearly exceeds usefulness for survival. Perhaps the male's shows encourage the female to be faithful in her brooding and feeding duties, but sharing the work would be a much more obvious development if survival were the only criterion.

2.4. Mammals

We have most familiarity with mammals. They live with us as pets or farm animals and we ourselves are mammals. We observe them sensing and feeling emotions. They communicate with us by their barks and wagging tails or meows. Nobel laureate

[27] Ibid.

naturalist Konrad Lorenz describes canine communication in the following passage:

> When your dog nuzzles you, whines, runs to the door and scratches it, or puts his paws on the wash basin under the tap, and looks at you imploringly, he does something that comes far nearer to human speech than anything that a jackdaw or goose can ever „say"... The dog wants to make you open the door or turn on the tap, and what he does has the specific and purposeful motive of influencing you in a certain direction...
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> My bitch Stasie, ...having once eaten something which disagreed with her, wanted to go out in the night. I was at that time overworked, and slept very soundly, so that she did not succeed in waking me... This desperate situation finally induced her... to do a thing which was strictly forbidden her: she jumped on my bed and then proceeded literally to dig me out of the blankets and roll me on the floor. Such an adaptability to present needs is totally lacking in the „vocabulary" of birds: they never roll you out of bed[28].

These behaviors of dogs are not innate. Each dog learns how to make its needs known to its owner in its own way and can adapt its methods of communication to the situation.

Higher mammals have a large capacity for affection or attachment and not only for other members of their own species. Max, a friend's horse, moped so disconsolately when his owner went off to college that a donkey was bought to keep him company. He soon cheered up and became good „friends" with the donkey. They were inseparable companions for years until Max died at a ripe old age. Many dogs exhibit strong attachments to their masters, such as sleeping near their master's chair.

In the wild, many kinds of mammals such as wolves, elephants, and primates have elaborate social behaviors connected with hunting, courting, mating, childcare, and social ranking.

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[28] Lorenz, *King Solomon's Ring,* 99-100.

They live in clans with rulers and work together to get food and protect the clan.

Mammals exhibit the greatest capacity of all animals for self--direction, an amazing ability to learn, which sometimes is mistaken for rationality. Chimpanzees can solve problems like how to get bananas that are too high to reach; they can make tools by plucking twigs, pulling off the leaves, and sticking them into termite holes to fish out the termites. They can also be taught to use sign language or plastic chips to indicate things they want. They can change many elements of their behavior according to changing circumstances[29]

Animal instinct approaches more closely to reason in the higher animals, especially in primates. They can do many activities by their sensitive estimative powers that resemble activities stemming from the freedom of man. They also show fondness for each other, communicate with each other, live in organized societies, and care for and teach their young. Thus there are clearly different grades of animals from sponges to primates. As one considers animals in ascending grades, they show themselves to possess more and more clearly their own center of consciousness, emotion, and action. They demonstrate an increasing ability to learn, to communicate with others, to interact socially, and to show affection.

2. 5. Man: Animal with a difference

Yet, there is still a higher way of being alive, our own human way. We can think and talk; we can perform experiments, write articles about hierarchy in nature, build cities, paint, sculpt, sing and dance, build cathedrals and worship God in them. We know that we are decisively different from other animals from the very fact that we are the only ones that can wonder about the difference. It is the power of reason with its accompanying power of will that make man an essentially new kind of animal, a new kind of being.

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[29] Marie George, „Thomas Aquinas Meets Nim Chimpsky: On the Debate about Human Nature and the Nature of Other Animals", *The Aquinas Review* 10 (2003): 1-50.

Our unique way of experiencing the world and acting on it, as well as our ways of communicating with each other and living together are the more remarkable because we are so similar to our nearest animal cousins, the primates, in our sense organs, brain, and whole bodily structure. Yet what could be more different from a formal dinner party than an ape gulping down a banana? In the one case there is feeding, satisfaction of a primary appetite, in the other case there is dining, in which the food takes secondary place to the social communications for which it provides the opportunity. Animals do not even use plates in the wild. We sit at tables, raised above the ground, and often covered by tablecloths with candles, flowers, fine china, and crystal. Instead of using our mouths or hands to grasp the food, we use silver forks, knives, and spoons. No matter how hungry we are, we wait to begin eating until certain rituals such as prayers, toasts, and perhaps a few words from the host or host ess have taken place. There are rules for seating and for the order of dishes: in Italy one always has pasta as the first course; in Austria one has soup[30].

There is a radical discontinuity between man and beast; thinking is essentially different from sensing. Thinking is the grasping of the universal natures of things, while sensing is awareness of particular sensible bodies. When I think about birds, I can think about what is common to all birds; whereas I see only this particular black and white chickadee. Thus thinking differs from sensing because its objects are the universal, unchanging, and immaterial natures of things, while the objects of the senses are sensible qualities in particular sensible bodies. Therefore there is an essential difference between animals that are merely sensitive and animals that are rational. Language, science, choosing means to ends, art, and religion are all signs of rationality[31].

Since man can grasp universal natures, he can use language. He gives names to the natures that he understands. Members of a culture can communicate with each other because they can establish by convention the names to be used as symbols for these natures. Hence language is rightly considered a sign of rationality.

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[30] Leon R. Kass, *The Hungry Soul: Eating and the Perfection of Our Nature* (Chicago: The University of Chicago Press, 1999), 131-92.

[31] George, „Aquinas Meets Chimpsky", 6-9.

Moreover, through reason man can think about all of being. He becomes related to all that is. He can acquire science because he can understand things' natures and properties and the essential or accidental connections between them. Thus science is also a sign of rationality. Furthermore, through reason, man can grasp (in a partial way) the natures of immaterial things, hence belief in God or gods and the immortality of the soul and in general religion is a most certain sign of rationality.

Two of the most successful experiments in teaching language to primates were with Washoe, a female chimpanzee, who learned eighty-five words in American Sign Language in three years, and one with Nim Chimpsky, who learned to use one hundred twenty--five plastic symbols after intensive training for four years[32]. The average length of utterance was between 1.5 and 2.2 signs[33]. The minimal language that they were able to learn was not true language in which the symbol was understood to stand for a universal nature; rather, the symbols were associated with results so that the sign for banana meant „something that will get a banana from my master"

> The function of the symbols of an ape's vocabulary appears to be not so much to identify things or to convey information... as it is to satisfy a demand that it use that symbol in order to obtain some reward[34].

An average human child, on the other hand, has a vocabulary of a thousand words at the age of three, often without much special effort on the part of the parents[35]. Children are intensely curious about the world around them, and language is far more for them than an activity useful for acquiring things. They are constantly asking questions, describing things, and making up stories. They already have a strong religious sense, as this anecdote from Sofia Cavalletti, the founder of the Catechesis of the Good Shepherd, shows:

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[32] Robert Agros and George N. Stanciu, *The New Biology* (Boston: New Science Library, 1987), 68.

[33] George, „Aquinas Meets Chimpsky", 40.

[34] Herbert Terrace, cited by Agros and Stanciu, *The New Biology*, 81.

[35] Agros and Stanciu, *The New Biology,* 81.

> This one [example] involves a three-year-old girl who grew up without the slightest religious influence. The child did not go to nursery school; no one at home, not even her grandmother, who was herself an atheist, had ever spoken of God; the child had never gone to church. One day she questioned her father about the origin of the world: „Where does the world come from?" Her father replied, in a manner consistent with his ideas, with a discourse that was materialistic in nature; then he added: „However, there are those who say that all this comes from a very powerful being, and they call him God" At this point the little girl began to run like a whirlwind around the room in a burst of joy, and exclaimed: „I knew what you told me wasn't true; it is Him, it is Him!"[36]

This little girl was using language to discover the truth about the origin and meaning of the world and above all to reach knowledge and a relationship with the immaterial Creator. No scientists have observed chimpanzees using language in ibis way. Nor have any animals ever been observed to practice religion.

Through reason, man also has an essentially new level of freedom. Because he has an intellect capable of grasping universal being and a will capable of loving universal goodness, he can understand his natural ends as ends and choose suitable means to achieve them. He can understand and compare various natural ends like nutrition and religion and choose to fast from food as an act of worship. The ends he shares with animals, as in the case we saw with eating or in reproduction, are fulfilled in a new human context where fulfilling the demands of friendship (as in marriage), the intellectual life (as in the Symposium), or religious life (as in sacred meals like the Pass- over or the Mass) regulate and enrich the animal acts of eating or generation to an essentially new level. Thus the ability to set goals, especially immaterial goals, and to devise the means to acquire them is a sign of man's rationality.

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[36] Sofia Cavalletti, *The Religious Potential of the Child: Experiencing Scripture and liturgy With Young Children*, trans. Patricia M. Coulter and Julie M. Coulter (Chicago: Liturgy Training Publications, 1992), 31-32.

Paradoxically, human freedom is perfected most of all in a voluntary bond, a vow. Both in marriage and in the religious life, humans hold the rest of their life in their hands and promise to live by a certain form until death. They give themselves in their entirety either to a human spouse in marriage or to their divine spouse in the religious life. In this gift of self, „the whole person, including the temporal dimension, is present"[37] This gift of self is possible only for humans, because they are the only animals that possess themselves in their reflective self-consciousness and freedom.

Man's richer way of life requires a long childhood and youth. Human generation is not complete with producing a physical body; there must be spiritual generation as well, a passing on of human culture. Most obviously language but also art, science, and religion must be handed down from one generation to another[38].

> The blessing of offspring, however, is not completed by the mere begetting of them, but something else must be added, namely the proper education of the offspring... .
>
> Now it is certain that both by the law of nature and of God this right and duty of educating their offspring belongs in the first place to those who began the work of nature by giving them birth, and they are indeed forbidden to leave unfinished this work and so expose it to certain ruin[39]

Pope Pius XI warns us that truly human generation involves the spiritual formation of a child as well as his or her physical generation. Ignoring education leads to disaster.

Thus we have seen that the closer one looks at nature, the clearer it is that there is an order from less perfect to more perfect beings. As one considers the difference between nonliving and living beings, between plants and lower animals, between lower animals and higher animals, and between animals and man, one sees more unity, more capacities for operations, more knowledge,

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[37] John Paul II, *Familiaris consortio*, 11.

[38] *Grene, Approaches to a Philosophical Biology, 48-49.*

[39] Pius XI, *Casti connubii*, 16.

more freedom, and more love. There is a greater inwardness and a progressively richer way of being.

3. FORMAL CAUSES OF HIERARCHY

3. 1. Substantial form

What accounts for these different levels of being? What makes a rock a rock, an oak tree an oak tree, and a lion a lion? What makes a man different from an exquisitely designed robot? What gives natural beings unity, shape, their specific character, inclinations, and activities?

The prevailing view among scientists is that the material elements and their structural arrangement are responsible for each thing's being. The difference between the levels of being is accounted for by the increasing complexity of the design. Evolutionary philosopher Michael Ruse sums up this reductionist attitude: „I accept ontological reduction and methodological reduction with enthusiasm. I think there is one basic world stuff, and the way to do good science is by seeking ever-smaller entities-genes good, molecules better"[40].

But plants and animals are not collections; they are sub stances with their own natures. It is far more reasonable to follow Aristotle in arguing that there is a per se principle, which he calls form and St. Thomas calls substantial form, responsible for the being of natural things rather than just an accidental principle like arrangement of parts. A manmade object like a house has a form but it comes to it from the outside, from the builder. Each part of the house, such as the bricks and boards, must exist first and then the builder puts them together in a structure. He imposes an exterior order on the parts that gives them the form of a house. Plants and animals, as we have already seen, develop themselves. Their parts do not exist before they do, but come into being as parts of the living whole. The animal does not take two eyes and glue them onto its head. It actually grows the eyes.

[40] Michael Ruse, cited by Lawrence Dewan, „St. Thomas's 'Fifth Way' Revisited", *Universitas* (Taipei) 31.3 (March 2004): 64.

When it dies, the eyes also cease to exist as eyes. Thus plants and animals have an internal principle of order, development, and motion. Aristotle calls this internal principle of motion, nature. He says both the matter and the form are nature, but most of all the form since the matter is only potentially a plant or animal. It is the form that makes the matter to actually be this particular animal or plant with these parts and this shape and these powers of movement[41]. How else could they develop themselves into mature organisms, sense, move themselves, and reproduce?

A common answer of scientists today is that genes or deoxyribonucleic acids (DNA) are sufficient explanation for the development of organisms from zygote to adult. Is this possible? DNAs are macromolecules that store genetic information in a code. This information encodes how some of the many proteins of the body are to be made. But how is this information turned into a living plant or animal? There must be something that „reads" the information encoded in the DNA, which is exactly the same in every cell in the body, and „decides" what part is to be activated and when in each cell and tissue. Noncoding DNA is responsible for some of the regulation as are the cytoskeleton and the plasma membranes, which are in turn influenced by the architecture of the ovum[42]. But none of this is sufficient to explain development. A cell that is separated from an embryo does not develop into an animal or human body part. Whatever would have „told" that cell how to develop if it had been part of the embryo is missing[43]. This dependence of the part on the whole seems to be a sign that the whole animal exercises causality on the development of each part for the sake of the whole. Since the substantial form accounts for the unity of the whole, it must be the whole in virtue of its form that exercises this causality.

DNA contains a message in code. The organism, already made actual by its substantial form at fertilization, expresses itself in

[41] Aristotle, *Physics* II.1, 192b-193b; John Goyette, „Substantial Form and the Recovery of an Aristotelian Natural Science", *The Thomist 66* (2002): 522-24.

[42] Jonathan Wells, *The Myth of Junk DNA* (Seattle: Discovery Institute Press, 2011); Jonathan Wells, „Membrane Patterns Carry Ontogenetic Information That Is Specified Independently of DNA", *BIO-Complexity* (2014), http://bio-complexity.Org/ojs/index.php/main/article/view/BIO-C.2014.2.

[43] Kass, *The Hungry Soul,* 43; Goyette, „Substantial Form", 525-29.

the message of the DNA, which it then uses as an instrument to develop itself cell by cell. „I would suggest that it is the plant or animal form that encodes itself into the DNA, and that the form is what the DNA serves to communicate. The form is both speaker and message in DNA", says Robert Sokołowski[44]. However, it seems better to say that the composite is the speaker who encodes its form as the message. The form alone cannot act; it is always the composite, the being that acts.

3. 2. God's ideas

Doubtless there is another speaker, the first Speaker, who speaks the forms or ideas of all things in his Word. St. Thomas tells us that the Father creates all things according to the plans or patterns which he speaks in the Word.

> For the Father, by understanding himself, the Son, and the Holy Spirit, and all other things included in this knowledge, conceives the Word; so that thus the whole Trinity is spoken in the Word; and likewise also all creatures: as the intellect of a man by the word he conceives in the act ol understanding a stone, speaks a stone[45].

Words, forms, and all creatures are representations of God. God's creation is never random- indeed, it cannot be, since *logos* is intrinsic to creation. God, the divine artist, creates each creature (along with the matter it is made of) according to his idea of the creature to be. This idea is both the form by which God knows the thing and the form according to which God creates it. The ideas of those things, which God actually has created or will create, St. Thomas also calls exemplars since they are the patterns according to which God creates them.

These exemplars cannot, however, exist in a manifold way in God or he would not be perfectly simple. Rather, in knowing his own essence, God also knows the proper ideas of all things. For

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[44] Robert Sokołowski, „Formal and Material Causality in Science", *Proceedings of the American Catholic Philosophical Association* 69 (1995): 64.

[45] *ST I*, q. 34, a. 1 ad 3.

God knows his essence perfectly both as it is in him and as each creature can participate in it. The substantial form in each material creature flows from its idea in God. Hence the form expresses God as able to be imitated in this particular limited way[46].

But every creature has its own proper species, according to which it participates in some degree in likeness to the divine essence. So far, therefore, as God knows his essence as capable of such imitation by any creature, he knows it as the particular type and idea of that creature; and in like manner as regards other creatures.[47]

God's exemplars are thus the external formal causes of the different natures in their different grades of being; while the substantial forms are the internal cause of the degrees of being of creatures.

4. THEOLOGICAL REFLECTIONS ON HIERARCHY

We have observed the different grades of beings in nature and considered the formal causes of their gradation. What theological significance can we discover in the different degrees of natural creatures?

4.1. Representation of God's beauty

„God created the world to show forth and communicate his glory. That his creatures should share in his truth, goodness, and beauty-this is the glory for which God created them"[48]. Pope Francis explains, „When we can see God reflected in all that exists, our hearts are moved to praise the Lord for all his creatures and to worship him in union with them"[49]. God is the master artist who made all things good and beautiful, so that men could

[46] Gregory T. Doolan, „The Causality of the Divine Ideas in Relation to Natural Agents in Thomas Aquinas", *International Philosophical Quarterly* 44.3 (September 2004): 393-409.

[47] *ST* I, q. 15, a. 2.

[48] *Catechism of the Catholic Church* (Vatican City: Libreria Editrice Vaticana, 1992), 319.

[49] *LS,* 87.

perceive how much greater and more beautiful the author of this beauty must be.

> For all people who were ignorant of God were foolish by nature; and they were unable from the good things that are seen to know the one who exists, nor did they recognize the artisan while paying heed to his works; but they supposed that either fire or wind or swift air, or the circle of the stars, or turbulent water, or the luminaries of heaven were the gods that rule the world. If through delight in the beauty of these things people assumed them to be gods, let them know how much better than these is their Lord, for the author of beauty created them. And if people were amazed at their power and working, let them perceive from them how much more powerful is the one who formed them. For from the greatness and beauty of created things comes a corresponding perception of their Creator. (Ws 13:1-5).

God has made things to represent and participate in his being. „All things are made, so that they in some way imitate the divine beauty... Nobody takes care to shape and represent anything, except for the sake of beauty"[50]. How do the differing grades of natural beings contribute to the representation of divine beauty? Each creature represents or expresses the divine goodness in a different way. God is called both a rock and a lion in the Old Testament; he is compared to both a mother and a father.

> Because his goodness could not be adequately represented by one creature alone, he produced many and diverse creatures, that what was wanting to one in the representation of the divine goodness might be supplied by another. For goodness, which in God is simple and uniform, in creatures is manifold and divided; and hence the whole universe together participates in the divine goodness more

[50] *Thomas Aquinas, In librum Beati Dionysii de divinis nominibus exposilio, ch. IV, led. 5. n. 353-54.*

> perfectly, and represents it better than any single creature whatever[51].

Each finite creature can only reflect a finite aspect of the infinite goodness of God, though precisely in its finitude, each creature reaches its own fitting perfection. Therefore many different kinds of creatures can reflect more of his perfection.

Furthermore, since creatures differ in degree of perfection, they can be placed in order. A certain beauty arises from the order of the beings of this world among each other.

> The multitude and distinction of things has been planned by the divine mind and has been instituted in the real world so that created things would represent the divine goodness in various ways and diverse beings would participate in it in different degrees, so that out of the order of diverse beings a certain beauty would arise in things, a beauty which shows the divine wisdom[52].

Creatures must be essentially different (and not only different individuals of the same species) so that they can represent God's goodness in different ways and degrees. While a million blue butterflies migrating is an astonishing and beautiful sight, they do not reflect God's goodness as well as a million different species. Moreover, each living thing depends on countless different natural beings for its existence. Butterflies need oxygen to breathe and flowers from which to suck nectar and dirt for the plants to live in and the earth to dwell on and the sun to give light and heat. From the order of dependence of natural creatures on each other, an ordered whole is created which is the best and most beautiful thing that God created[53]. Pope Francis insists on the importance of the relationships among creatures:

The universe as a whole, in all its manifold relationships, shows forth the inexhaustible riches of God... . Hence we need to grasp the variety of things in their multiple relationships... As the Cate-

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[51] *ST* I, q. 47, a I

[52] Thomas Aquinas, *Compendium theologiae,* lib. I, cap. 102, end.

[53] Thomas Aquinas, *Summa contra gentiles* II, 39, n. 7 (hereafter cited as SCG).

chism teaches: „God wills the interdependence of creatures. The sun and the moon, the cedar and the little flower, the eagle and the sparrow: the spectacle of their countless diversities and inequalities tells us that no creature is self-sufficient. Creatures exist only in dependence on each other, to complete each other, in the service of each other"[54].

A cosmic solidarity arises from the mutual dependence of creatures on each other.

4.2. Web of cosmic relationships

According to Pope Francis, these relationships manifest the triune character of the Creator, who is not alone but always three persons in relationship to each other.

> The divine persons are subsistent relations, and the world, created according to the divine model, is a web of relationships. Creatures tend towards God, and in turn it is proper to every living being to tend towards other things, so that throughout the universe we can find any number of constant and secretly interwoven relationships. This leads us not only to marvel at the manifold connections existing among creatures, but also to discover a key to our own fulfillment. The human person grows more, matures more, and is sanctified more to the extent that he or she enters into relationships, going out from themselves to live in communion with God, with others, and with all creatures. In this way, they make their own that trinitarian dynamism which God imprinted in them when they were created. Everything is interconnected, and this invites us to develop a spirituality of that global solidarity which flows from the mystery of the Trinity[55].

The unity of order of the Trinity, which is reflected in the cosmos, is the circular order of the processions. The Son comes forth from the Father and returns to him in the Love that is the

[54] *LS*, H6.
[55] Ibid., 240

Holy Spirit. St. Thomas speaks about two kinds of unity in the Trinity when he comments on the phrase from John's gospel, „that they may be one; even as we are one" (Jn 17:11).

> The Father and the Son are one in two ways: by essence *(per essentiam)* and so he says, I and the Father are one (John 10); and by the harmony of love *(consonantia amoris)* and this union is through the Holy Spirit, and about this union it says in John 17, „that they may be one in us as we are one", namely by the harmony of love, for it is in this way that we are all one in God, and not by essence. For if there were no other union in God except by essence, the Lord would not have said, „That they may be one in us as we are one" Therefore it is understood about the unity, which exists by the harmony of love[56].

The three divine persons are not only one because of their undivided essence; they are also one because of their love for each other. St. Thomas claims that there is an analogous harmony of love between men. Pope Francis claims that there is an analogous harmony of love in the cosmos as a whole. „God of love, show us our place in this world as channels of your love for all the creatures of this earth"[57] Since the cosmos is composed of millions of different kinds of substances, it can never have essential unity like the Trinity, or even like a single species, such as man, but it does have the formal unity of an organized whole composed of different parts[58]. However, God is not like a builder that places boards, nails, and glass in an order according to an extrinsic plan that he alone possesses. He is more like a conductor that directs an orchestra composed of musicians, each of whom has memorized his part and understands how it fits in the whole. The subhuman parts of the cosmos do not explicitly understand the goal but they do have instincts or natural desires implanted in their nature,

[56] *Thomas Aquinas, Lectura romana in primum Sententiarum Petri Lombardi, d. 10, q. 3 ad 3.*

[57] *LS*, 246.

[58] Charles De Koninck, *The Cosmos in the Writings of Charles De Koninck*, vol. 1, trans. and ed. Ralph Mclnerny (Notre Dame: University of Notre Dame Press, 2008), 316-17.

by which they move themselves toward the goal. They enjoy as their own good the order of the universe.

God's exemplars are formal causes not only of the being of things but of their operations by which they are ordered to each other and to the end of the whole universe. God is not only Creator but also Lord; he directs all things in their actions toward their end, by his providence.[59] St. Thomas compares God to a general directing his army in the battlefield. Expanding on this metaphor, just as the general's plan includes the number of officers and other ranks, their weapons, actions and interactions, and even uniforms, God's plan includes the number of humans, the number of lower species, their characters, activities, interactions, and even their appearances. Everything is for the sake of the order of the whole; different uniforms and caps show the rank a soldier has, which in turn defines his role. The order of the whole is for the sake of victory[60]. This is a marvelous metaphor for the natural world. Even the appearances of animals and plants are important because they manifest their rank in the hierarchy of nature[61]. Victory in the metaphor corresponds to the representation of God by the whole world through the ordered activity as well as substantial being of each of its parts. Men and angels alone attain God in another way, directly, through knowing and loving God[62].

St. Thomas sums up the order of the ends of creatures in the article „Whether corporeal things were made on account of God's goodness?"[63] He says that the universe was created as a whole consisting of parts. Each part exists for the sake of its own proper act, as plants exist in order to grow, blossom, and reproduce; second, the lower parts exist for the sake of the higher parts, as plants also exist so that animals will have food; third, all parts exist for the perfection of the whole as all plants and animals as well as the elements and man exist for the perfection of the co-

[59] *ST* I, q. 22, a. 2.

[60] *ST* I, q. 103, a. 2 ad 2 (details added).

[61] See Portmann, *Animal Forms*, 68-86. An argument is made that animal forms correspond to the nobility and intelligence of animals. Lower animals have no heads at all. The higher the animal, the more the head stands out, either because of a long neck, mane, horns, or special coloring.

[62] *ST* 1, q. 103, a. 2 ad 2; *SCO* 111, 113.

[63] *ST* I, q, 65, tt, 2.

smos; and finally the whole exists for an extrinsic good, namely to represent divine goodness for the glory of God.

All lower creatures exist to serve man since he alone of corporeal creatures can attain to God by knowing him and loving him. Hence *Gaudium et spes* states that human beings are the only creatures on earth that God has willed for their own sake[64]. Irrational creatures cannot be loved simply for their own sakes, by a love of friendship, because they cannot properly possess their own good. They do not have the knowledge or freedom to be master of their good. Nor are they capable of participating in a life of friendship since they cannot share in a life of reason[65] Lower creatures serve man by providing for his bodily needs and also for his spiritual needs by leading him to glorify God for his goodness, beauty, and wisdom as shown forth in creation.

On this most general level, we can make a first answer to the meaning of hierarchy in nature. The different levels of natural beings express different aspects of God's goodness and make possible an ordered whole in which lower parts serve higher parts and each part serves the whole. The cosmos shows forth God's goodness and wisdom more than any individual creature could because there is greater depth to the beauty that arises from billions of creatures working together over billions of years to form an ordered whole. Furthermore, the web of relationships among creatures manifests the relationships among the divine persons. There is a harmony of love among cosmic beings as there is among the persons of the Trinity.

4. 3. A ladder to God

Can we find more meaning to natural hierarchy? Pope Francis points us toward his namesake St. Francis and his interpreter, St. Bonaventure, who writes about seeing the divine Artist expressed in his creatures in many of his works. In his *Life of St. Francis,* St. Bonaventure describes the way St. Francis saw God in all creatures. „In beautiful things he saw Beauty itself and through his vestiges imprinted on creation he followed his Beloved every-

[64] *Gaudium et spes, 24.*
[65] *ST* II-II, q. 25, a. 31.

where".[66] Just as we can see that an animal is alive or that a child is happy or sad, St. Francis saw God shining out of each creature. St. Bonaventure compares the sensible world to a sign that is given to man to lead him to its author.

> They [creatures] are vestiges, representations, spectacles proposed to us and signs divinely given so that we can see God. These creatures, I say, are exemplars, or rather exemplifications presented to souls still untrained and immersed in sensible things so that through sensible things which they see they will be carried over to intelligible things which they do not see as through signs to what is signified[67]

Since we are rational animals that naturally come to knowledge through our bodily senses, God leads us to himself through other sensible bodies. But we cannot see God through creatures without his help. They become stumbling blocks to us, in our fallen nature, trapping us in sensible pleasures or at least vain knowledge. Hence we must pray for God's aid in ascending „Jacob's ladder"[68].

> By praying in this way, we receive light to discern the steps of the ascent into God. In relation to our position in creation, the universe itself is a ladder by which we can ascend into God. Some created things are vestiges, others images; some are material, others spiritual; some are temporal, others everlasting; some are outside us, others within us. In order to contemplate the First Principle, who is most spiritual, eternal, and above us, we must pass through his vestiges, which are material, temporal, and outside us... We must also enter into our soul, which is God's image, everlasting, spiritual, and within us...
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> We must go beyond to what is eternal, most spiritual, and above us, by gazing upon the First Principle[69]

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[66] *Bonaventure: The Soul's Journey into God, the Tree of Life, the Life of St. Francis, ed. Ewert Cousins (New York: Paulist Press, 1978), 263.*

[67] Ibid., 76.

[68] Ibid., 63.

[69] Ibid., 60 (emphasis added).

Bonaventure tells us that there is a ladder of creatures of different levels of being. In contemplating this order, we ascend from rung to rung up to the Creator. This is the fourth way of St. Thomas. It would make no sense if creatures did not differ in goodness and being. St. Thomas begins the fourth way with the observation that some things are more or less good, true, or noble. But things are only said to be more or less in reference to something that is most. If the only differences among natural beings were how well they survived, as Darwin tried to maintain, then the latest would always be better than its predecessors. There could never be a best because every organism would or, at least, could be surpassed in the long run by another variety with more favorable adaptations.

If, as Jacques Monod maintains, quantity of information transmitted is the only difference between nonliving and living beings or between various kinds of living beings, then again there is no best because the measure is a quantitative measure of information, which can always be surpassed, unlike a closeness of approach to a maximum[70].

This materialist approach is most strikingly insufficient when one considers the almost infinite distance between chimp and man. Pope Francis writes about human superiority:

> Each of us has his or her own personal identity and is capable of entering into dialogue with others and with God himself. Our capacity to reason, to develop arguments, to be inventive, to interpret reality and to create art ... are signs of a uniqueness which transcends the spheres of physics and biology. The sheer novelty involved in the emergence of a personal being within a material universe presupposes a direct action of God and a particular call to life and to relationship on the part of a „Thou" who addresses himself to another „thou"[71].

There may be only a small difference in chimp and human DNA and a somewhat bigger difference in the size and complexity of their brains, but there is an almost infinite distance in their

[70] *Monod, Chance and Necessity, 45.*
[71] *LS,* 81.

powers. Humans are persons who can enter into relationships not only with each other, but also with God. Man has a subsistent immaterial soul that is capable of grasping the essences of beings, their hierarchy, and even of grasping „being" in itself and its ultimate Source. This implies a certain infinity of the human mind. Clearly chimps are immeasurably far from this infinity.

One cannot grasp the fourth way if one has no concept of poverty or richness of life that cannot be measured quantitatively. One can speak truly of higher and lower beings only if one has grasped the substantiality of beings and the goodness of their activities. Then it can make sense to say one being is higher than another because it can do more kinds of activities and better ones. To be able to grow and reproduce is better than not being able to do so; to sense and move is better than not to sense and move. To have five senses is better than having only one sense; to think and love and choose and make beautiful things for the sake of beauty is better than not being able to do so.

We see a second meaning to natural hierarchy. Understanding that natural beings exist in grades from lower to higher is essential for natural theology. It gives one some slight idea of what it means that God is the most noble, the most beautiful, and the most perfect fullness of being, in which all other beings participate.

4. 4. Traces of the Trinity

Pope Francis teaches that „the Trinity has left its mark on all creation" and that before original sin, „the reflection of the Trinity was there to be recognized in nature 'when that book was open to man and our eyes had not yet become darkened.'"[72] This reflection of the Trinity was not visible to natural knowledge, but to prelapsarian Adam and Eve, it was evident by supernatural grace and faith. St. Bonaventure suggests in his biography of St. Francis that by an extraordinary grace, St. Francis was able to see God in creatures in almost the same way as graced man before the Fall[73]. St. Bonaventure finds a mark of the Trinity, visible by faith, in the weight, number, and measure in each creature.

[72] *LS*, 239.

[73] Bonaventure: Life of Francis, 263.

> In the first way, that of contemplation, we consider things in themselves and see in them weight, number, and measure: weight, by which they tend to their position; number, by which they are distinguished; and measure, by which they are limited. Thus we see in them mode, species, and order as well as substance, power, and operation. From these, as from a vestige, we can rise to knowledge of the immense power, wisdom, and goodness of the Creator[74].

Even in material things, he finds measure, by which things are limited to be one thing (substance); number, by which they are distinguished from each other (species or form); and weight, by which they incline toward their place (order). These attributes are commonly appropriated to the Father, Son, and Holy Spirit although St. Bonaventure does not make this last step explicit.

St. Thomas also argues that there are traces of the Trinity in all creatures. He says that every effect must represent its cause, and the processions of the persons are the causes and types of creation. Therefore, there must be some marks of the divine persons in every creature. He explains the second premise by comparing creation to human art. He says that every craftsman makes an artifact through a plan or idea of the artifact in his mind and by the love for the artifact in his will.

> God the Father made the creature through his Word, which is his Son; and through his Love, which is the Holy Spirit. And so the processions of the Persons are the types *(rationes)* of the productions of creatures inasmuch as they include the essential attributes, knowledge and will[75].

St. Thomas distinguishes two ways that effects can represent their causes: either by simply representing the causality of the cause but not its form as smoke represents fire or also by representing the likeness of the form as when a child represents his or her father. The first type of representation he calls *vestigium* or footprint. This is usually translated by the word trace or vestige in English, but footprint is wonderfully concrete. One can imagine

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[74] *Bonaventure: The Soul's Journey into God, 64.*

[75] *ST* I, q. 45, a. 6.

that just as Robinson Crusoe discovered the presence of another man, Friday, on the island through his footprints in the wet sand, we can discover God's presence in creation through his footprints in his creatures. The second type of representation he calls image, which he reserves for rational or intellectual creatures. These alone possess intellect and will, which provide a specific likeness to the Trinity sufficient for them to be called image[76].

But every creature represents the Trinity at least as a trace, according to St. Thomas. Each creature, inasmuch as it is a substantial unity, standing in itself and not in another, is like the Father, who is the principle not from a principle. Every creature bears the mark of the Son inasmuch as it was formed according to a word or plan, and the mark of the Holy Spirit inasmuch as it was formed with a certain order or relation to some good, which we will call love[77].

We have discovered that the different grades of being possess these three marks of individuality, form, and inclination to different degrees. We can now argue that a reflection of the Trinity is found in them in a gradated way. Unity or individuality and subsistence is most feebly possessed by lifeless things like stones, increasingly by plants, more so by animals, and most perfectly by men, who are self-conscious and self-directive. Pondering the increase in unity and individuality, we approach some faint notions of the Father, the principle not from a principle.

Likewise we have seen how the substantial form grows in dignity ascending the hierarchy of natural being. It expresses itself primarily in an exterior shape in the inorganic. In plants its expression includes growth and development, flowering and reproducing. In animals the form expresses itself in more and more activities, including sensation and local motion such as flying or swimming. In sensation, the animal's being is expanded to include the forms of the sensible things around it. Finally, in man, the form reaches the dignity of image of God, because of man's intellect and will. Through these powers, he too has an inner pro-

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[76] *ST* I, q. 93, a. 6.

[77] *ST* I, q. 45, a. 7. St. Thomas refers to St. Augustine, who also found these three as a trace of the Trinity (Augustine, *The Trinity*, trans. Edmund Hill [Brooklyn: New City Press, 1991], 213).

cession of word and love[78]. Meditating on the expansion of form in cosmic beings from mineral to man, we begin to see some likeness of the Son who bears the „very stamp of his [God's] nature" (Heb 1:3). He is „the one perfect Word to which nothing is lacking, which is like the art of the almighty and wise God, full of all the living and unchanging ideas, which are all one in it"[79]

Finally we have also seen a gradation of relating power or tendency, in the ladder of natural beings. Since God created all creatures by his will in order to communicate his goodness to them, his will is participated in them through their appetite for the good. He orders each creature to his goodness by their various appetites for the goods that will perfect them[80]. Each creature will reflect him and thereby attain him best when they achieve their perfection as a mature part in the order of the whole. Lifeless matter and plants have certain natural inclinations without knowledge. Animals also have a sensitive appetite by which they can desire particular sensible objects. But men have a rational appetite or will by which they can consciously love what is good and, in particular, each other and Infinite Goodness who is Love itself. As we meditate with the eyes of faith on the perfecting of appetite in human love and friendship, we grasp some intimations of the Holy Spirit, who is the divine person proceeding as Love.

Our understanding of the Holy Spirit can be further deepened by a meditation on the increasing levels of freedom. Every level of cosmic being shows an increase of spontaneity or freedom. What comes from nature is determined to one. The inclination necessarily follows the form. So the inclination of magnets to be attracted to each other or for rocks to fall downward is not free. There is an interior principle that causes them to be moved in this way, but there is no possibility of doing anything differently unless an exterior agent intervenes. Plants show more spontaneity in growth and reproduction; there is clearly an interior principle that allows them to move themselves. However there is not yet freedom and choice as man experiences those realities; an acorn will always grow into an oak, never into a pine tree. Yet a plant

[78] *ST* I, q. 34, a. 1 ad 3.
[79] Augustine, *The Trinity*, 213.
[80] *ST* I, q. 59, a. 1.

can bend to the right or the left depending on where the light is coming from; its roots will grow in different directions depending on where the source of water is. Animals approach closer to freedom. Lower animals that have only touch, such as mussels, do not show much improvement over plants. They do open and close their shells according to whether the tide is in or out, but spontaneous activity is certainly very limited. Higher animals with all five senses, however, show a great amount of spontaneity. They constantly alter their behavior according to what they sense. They pursue prey and flee predators because they see them; they court mates, sometimes with quite elaborate rituals of song and dance; and in many other ways they regulate their behavior according to sense impressions which they take in by their own sensing activity. With man we meet true freedom for the first time. Humans are persons because they have reason and will. They possess themselves and can give themselves to another in friendship. Yet they have a depth which remains mysterious and unfathomable. The „I" is a center of consciousness and desiring, fearing, loving, deciding; it is a living source that never runs dry. Dickens writes movingly about the mystery of the innermost personality of each human in *A Tale of Two Cities:*

> *A* wonderful fact to reflect upon, that every human creature is constituted to be that profound secret and mystery to every other... . Something of the awfulness, even of Death itself, is referable to this. No more can I turn the leaves of this dear book that I loved... No more can I look into the depths of this unfathomable water, wherein, as momentary lights glanced into it, I have had glimpses of buried treasure and other things submerged. It was appointed that the book should shut with a spring, for ever and for ever, when 1 had read but a page. It was appointed that the water should be locked in an eternal frost when the light was playing on its surface, and I stood in ignorance on the shore[81].

We cannot get to the end of understanding another human, because they are endless. They are open to the Infinite: Infinite

[81] Charles Dickens, *A Title of Two Cities* (New York: Barnes and Noble, 1993), 9-10.

Truth, Beauty, and Goodness. Because man can understand the universal good in its goodness, he longs for Good itself. Nothing less can satisfy him; no particular good can quench his infinite thirst for the Infinite[82]. Reflecting on the ladder of spontaneity that reaches from gravity to human freedom, we grasp some of the mystery of the divine persons in their infinite depth. We have some indications of the mysterious Spirit of God who alone „comprehends the thoughts of God" when we consider the mystery at the heart of every woman and man and compare its profundity to the shallow center of a plant or animal. „For the Spirit searches everything, even the depths of God. For what person knows a man's thoughts except the spirit of the man which is in him? So also no one comprehends the thoughts of God except the Spirit of God"(1 Cor 2:10-11). Personal love does not involve choice among the divine persons, yet it does flow from an infinitely deep well of personal subsistence, the source of an outpouring of love for the other divine persons and a glorifying of them. This mystery of divine personhood as the source of love for the other divine persons belongs to each of the divine persons but in a special way to the Holy Spirit, the bond of love between the Father and Son.

These reflections on the trace of the Trinity in every creature enable us to come to some feeble analogical notions about the divine persons. Reflecting on the increasing unity and firmness in standing in itself of creatures ascending the ladder of nature, one comes to appreciate the absolute primacy of the Father as the principle not from a principle, the fountainhead of the Trinity. Reflecting on the greater amplitude of being in man's form because he can take in the forms of others by his intellect, we come to better understand the Word in whom the Father speaks the forms of all things[83]. Finally, in reflecting on the increasing power of love and freedom in each level of being, we are led to marvel at the Holy Spirit, who is the breath of Love between the Father and his Word. Here is a third meaning to the degrees of being in nature. Reflecting on hierarchy helps us to better understand what has been revealed to us about the divine persons.

[82] *ST* I-II, q. 10, a. 2c ad 3.
[83] *ST* I, q. 34, a. 1 ad 3.

4.5. The hierarchy of processions

St. Thomas, following St. Augustine, reflects on the intellectual operations of the human soul in order to shed light on the processions of the Trinity. Taking as a starting point the gospel of John's prologue, St. Thomas compares the going forth or procession of the Word to the inner word that the human mind forms when it understands. From this, one can grasp some idea of a purely spiritual going forth that remains within the knower; the Father eternally generates the Son without any separation between them. It is by meditating on the increasing interiority of the productions in the hierarchy of being that St. Thomas approaches the processions in God[84].

He notes that in inanimate things like minerals there is no interior production that remains inside. One body must act on another body externally by touching. For example, fire sets a piece of wood on fire or a magnet magnetizes a needle. One external body like the fire or magnet transfers its quality to another external body by an external production.

Plants exhibit some interior productions. The plant takes in external bodies, namely water and minerals from the soil, but by an interior process initiated from its own form transforms them first into its own substance as it grows and then into seeds which break off from the parent plant and grow into new plants. So although the production starts from external nutrients and ends in propagating external progeny, the process itself is from within the plant; its own life principle initiates the movement and reproduces its own form in the seed of its progeny.

Animals exhibit more interior productions in the processes of sensation, imagination, and memory. There is still an external source; the animal perceives sensible bodies. However, the sensible appearance is received within the animal and remains within the animal. First the appearance is received by the external senses like sight and hearing. From there the appearance is transferred to the imagination and from the imagination it is transferred to the memory. The processions from sense to imagination and from

[84] *SCG* IV, 11.

imagination to memory are wholly within the animal; however they are still from one power to another.

Man displays the greatest interiority of procession in the world. His knowledge still begins from an external source, since .ill human knowledge starts from sensation. But the human mind can penetrate the appearances present to it in the imagination to the universal kind and form a mental representation or concept of the nature. Then it can reflect upon its own activity of knowing. Hence man is capable of the purely interior activity of reflecting on his own act of understanding. In knowing itself knowing, the mind forms a concept, which is its own understanding of itself. This forming of the interior concept remains within the mind. However, it cannot take place without the use of sensible appearances or phantasms from the imagination, which require the use of a bodily organ to present them.

In God, there is perfect simplicity and interiority. God not only knows himself through himself, but his act of knowing is the same as his act of being. Thus God is himself the object known, the concept or representation of his nature by which he is known, his own act of understanding and his act of being.

St. Thomas uses the principles acquired from this meditation on the processions in creatures to begin his discussion of the processions in God, the generation of the Son and the spiration of the Holy Spirit. In man, we saw that there was a spiritual, interior production in understanding. When man understands, he forms a representation of the nature (intelligible species) or inner word. This word expresses what he understands in an intelligible image of the thing understood. Guided by John's gospel, which speaks of the Son as the Word, St. Thomas teaches that there is a spiritual procession of a word in God. The Father generates the Son by speaking the Word, the perfect Image of his understanding of himself. Since God is perfectly simple, the Word's being cannot be different from the Father's own being except that he is spoken rather than speaking or generated rather than generating. This certainly does not explain the Trinity, but it provides some means of entry into the divine processions[8585].

[85] Ibid.; *ST* I, q. 34, a. 1.

4.6. Hierarchy of intraspecific relations

This path to understanding the Trinity by an analysis of creaturely processions and, in particular, the processions in the human soul, needs to be filled out by a meditation on the many passages on the personal relations between Father, Son, and Holy Spirit in the gospels, especially the gospel of John. This is the path Richard of St. Victor followed toward deepening his understanding of the Trinity[86].

If we turn again to the hierarchy of cosmic beings, we can reflect on the ladder of relations between male and female and parents and progeny in cosmic beings that peaks in the personal communion among humans. This can be another path to understanding the trinitarian processions. There is the faintest gift of self in plants who pass on their life through giving part of themselves, their pollen and ovum, to become the seed of their progeny. However, there is certainly no conscious relationship between male and female even when they are separate plants, and some plants self-fertilize. Nor is there any conscious relation between parent plants and offspring. In lower animals, there is a similar lack of relationship. The sperm and eggs may be cast into the sea and united outside the female. The parents never see the progeny. Spiders and insects die before their eggs hatch. Higher animals physically couple to reproduce; but some do not stay together afterwards and some abandon their eggs or babies. However, many species of the highest animals like birds and mammals have elaborate rituals that precede or accompany mating. The couples remain together to take care of their young for a season and may even stay together for life. Higher animals exercise more and more elaborate parental care. Both the relationship between the parents and that between the parents and offspring reach their summit in humans. In marriage, husband and wife give themselves to each other for life. They share a common life that involves making a home, caring for and educating their children, as well as sharing many other interests. Since Son is the most frequent name for the second divine person in the gospels,

[86] Richard of St. Victor, „The Trinity", in *The Book of the Patriarchs, The Mystical Ark, Book Three of the Trinity,* trans. Grover A. Zinn (New York: Paulist Press, 1979), 373-98.

studying the relationship of generators and offspring in cosmic beings and especially that of father and son in humans should shed light on this relation. But studying all human friendships, especially the greatest one of husband and wife, should shed the most light on the communion of love between the divine persons[87].

Gaudium et spes speaks of a likeness between the unity of affection among humans and the union of the divine persons when it comments on the line from John's gospel, „that they may be one; even as we are one" (Jn 17:11).

> Indeed, the Lord Jesus, when he prayed to the Father, „that all may be one... as we are one" opened up vistas closed to human reason, for he implied a certain likeness between the union of the divine persons, and the unity of God's sons in truth and charity. This likeness reveals that man, who is the only creature on earth which God willed for itself, cannot fully find himself except through a sincere gift of himself[88].

John Paul II often returns to this passage in his works. It is foundational for his Theology of the Body, in which he argues that man and woman mirror the trinitarian communion in marriage.

> In virtue of God's salvific will and action, man and woman, uniting with each other in such a way as to become „one flesh (Gn 2:24), were at the same time destined to be united „in truth and love" as sons of God (see *Gaudium et spes,* 24:3), adoptive sons in the firstborn Son, beloved from eternity. To such unity and such a communion of persons, according to likeness with the union of divine Persons (see *Gaudium et spes,* 24:3), are dedicated Christ's words referring to marriage as the primordial sacrament and confirming that sacrament at the same time on the basis of the mystery of redemption[89]

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[87] *SCG III, 123 n. 6: „Inter virum autem et uxorem maxima amicitia esse videtur"*

[88] *Gaudium et spes, 24:3.*

[89] John Paul II, *Man and Woman He Created Them: A Theology of the Body,* trans. Michael Waldstein (Boston: Pauline Books & Media, 2006), 100:1.

Thus a fourth significance for the degrees of natural being is to provide paths to understanding the trinitarian processions and relations. One path is through a meditation on processions ending with the processions of knowledge and love in humans. The second path is through a meditation on relations between male and female and parent and progeny ending with the relationship between human parents and children and the spousal relationship between husband and wife.

CONCLUSION

We have investigated the significance of hierarchy in nature. First we examined the world of plants and animals around us to see if we could discover an ascending ladder of being. We found essential differences between nonliving and living beings, between plants and animals, between lower animals and higher, and last between animals and man. Second we showed that these differences come from the substantial forms of creatures, which are their interior formal causes. They are modeled on the divine ideas that are the exemplars or external formal causes through which God creates.

Then we drew theological conclusions from our discoveries about natural hierarchy. We found that the first reason for different grades of being in nature is to reflect different aspects of God's goodness and to make possible the beauty of the cosmos, an ordered whole in which creatures depend on each other, where the lower serves the higher and each serves the whole. The cosmos is what is most beautiful and best in creation and reflects God the most. The second meaning to hierarchy is to provide a ladder to human understanding by which man can rise by contemplating creatures from lower to higher in order to grasp that there must be a highest Being who is most noble, most good, most beautiful, and most true. Unless one can understand qualitative and essential differences among created natures, one cannot rise to any understanding of the Creator.

The third meaning we found in the natural hierarchy was its significance in manifesting the divine persons. From the faint traces of the Trinity that we found in rocks and plants, we found

deeper and deeper resemblances to the persons of the Father, Son, and Holy Spirit as we contemplated higher creatures. The fourth and final meaning we found in natural hierarchy was the help it gave in understanding the trinitarian processions and relations. If indeed the world pours forth from the Trinity, it is no surprise that the Trinity is a key that unlocks the many meanings hidden in the hierarchy of nature.

Nota o Autorze: *Susan Waldstein* – urodziła się w Tucson w Arizonie, matka ośmiorga dzieci, *profesor teologii Uniwersytetu Ave Maria* w Stanach Zjednoczonych. Swoje badania naukowe koncentruje na teologii, filozofii i naukach przyrodniczych. Była członkiem Papieskiej rady do spraw Rodziny i członkiem komisji watykańskiej do spraw dialogu żydowsko-chrześcijańskiego.

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