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MORALITY AND NATURE: EVOLUTIONARY CHALLENGES TO CHRISTIAN ETHICS

by *Johan De Tavernier*

Abstract. Christian ethics accentuates in manifold ways the unique character of human nature. Personalists believe that the mind is never reducible to material and physical substance. The human person is presented as the supreme principle, based on arguments referring to free-willed actions, the immateriality of both the divine spirit and the reflexive capacity, intersubjectivity and self-consciousness. But since Darwin, evolutionary biology slowly instructs us that morality roots in dispositions that are programmed by evolution into our nature. Historically, Thomas Huxley, Darwin's bulldog, agreed with Darwin on almost everything, except for his gradualist position on moral behavior. Huxley's "saltationism" has recently been characterized by Frans de Waal as "a vener theory of morality." Does this mark the end of a period of presenting morality as only the fruit of socialization processes (nurture) and as having nothing in common with nature? Does it necessarily imply a corrosion of personalist views on the human being or do Christian ethics have to become familiar again with their ancient roots?

Keywords: *Anthropology; Christianity; emotion; evolutionary biology; morality; personhood; Thomas Aquinas*

We intend to investigate the evolutionary challenges to Christian ethics in order to move the discussion from mutual anathemas to a more nuanced and restrained engagement (Pope 2013). Taking seriously the outcome of evolutionary biology, Christian ethics has to accept its evidence for the underlying material biological conditions of human existence. The acceptance of emergent complexity, reconciling necessity ("law-like regularities") and chance ("contingency"), forms the background against which we will talk about the natural roots of morality. Biological knowledge about the natural roots of morality raises many questions about human agency, free will, and human freedom in respect of moral responsibility.

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The question of the impact of biology on ethics has gradually become urgent since the publication of Darwin's *The Descent of Man* in 1871. Generally, we can distinguish a premodern and a modern position within Christian ethics. Traditionally, Christian ethicists accepted in the wake of Aristotle biological insights as a basis for their virtue ethics against the background of a belief in the *scala naturae*. Since modernity ethicists were assuming that human subjects were able to overcome their biological antecedents (*nature*) by socialization processes (*nurture*). In line with this, most of contemporary Christian ethicists still presuppose a sharp distinction between nature and nurture. While in premodern theologies nature and person are rather presented as two complementary notions, modern theological ethics see often persons as the counterpoint of nature and accentuate in manifold ways the uniqueness of the human species. Personalists believe that the immateriality of both the divine spirit and the reflexive rationality of the human being, underscores the original nature of self-conscious beings.

But is this in the light of Darwin's insights not a misrepresentation of reality? How relevant is the evolutionary thinking for interpreting the human capacity to act, for both the understanding of moral motivation and the justification of moral acting? Moreover, recent biomedical research, in particular molecular genetics, neurobiology, and psychology contributed to a better understanding of human behavior. How to link these new scientific insights about our biological nature to ethical insights in a meaningful way?

DARWIN, ESSENTIALISM, AND EVOLUTION

In traditional representations of the *scala naturae*, also called the *Great Chain of Being*, the biological species diversity is shown as eternally unchangeable, reflecting a fixed hierarchy, ranked higher or lower depending on perfection. The Swedish physician and botanist Carolus Linnaeus (1707–1778) put an end to this essentialist understanding of the *scala naturae*. In early versions of *Systema Naturae* (e.g., 1735) he still defends the classic "*scala naturae*" but in a later edition (1766), the reference is deleted. Linnaeus gathered so much empirical data that he could hardly hold on to speak about a fixed hierarchy. *Systema Naturae* is a reference work for Charles Darwin. He is intrigued by Linnaeus' gradualist view of nature ("*natura non facit saltum*"—"Nature makes no leaps"; Darwin 1871, ch. VI). During his studies at Cambridge (1829–1831) the young Darwin still accepts the idea of a supernatural cause to explain the origin of life forms, including human life. An intelligent designer, a skilled divine engineer is the first cause of everything. In his autobiography he describes how the careful study of William Paley's *Natural Theology; or, Evidences of the Existence and Attributes of the Deity. Collected from the Appearances of Nature* (1802) gives him intellectual pleasure. He appreciates the reading

of it: “The logic of this book and, as I may add, of his ‘Natural Theology,’ gave me as much delight as did Euclid. (. . .) I did not at that time trouble myself about Paley’s promises and taking these on trust, I was charmed and convinced by the long line of argumentation.” (*The Autobiography* [1887] 2010; Desmond and Moore 1991; 3rd ed. 2009, 107–108). Complex life forms do not arise by chance, says Paley. Just as a watch implies a watchmaker, a sense as the eye is created by an intelligent designer. For Paley and many theologians after him, complexity could not arise by chance (Buskes 2006; 4th ed. 2008, 15). His “argument from design” presumes the immutability of species (Buskes 2010, 61). Each species has its specific essence, created by God. After the voyage with the *Beagle* (1831–1836) and the many field observations Darwin realized that evolution is quite able to mimic an intelligent designer. At that time, he is already familiar with the fact that selection of desirable traits in plants and animals involves breeding but seeks for an explanation of the variation in the state of nature. The reading of Robert Malthus’ *Essay on the Principle of Population* (1798) will bring him to the idea of natural selection. He observes that the possessor of more suitable characteristics has a greater adaptability in a specific context and thus can survive more easily. Favorable variation is rewarded by natural selection: “But if variations to any organic being do occur, assuredly individuals thus characterized will have the best chance of being preserved in the struggle for life” (Darwin 1859, 127). The particular type of food explains why one could find insectivorous and nectar drinking finches with a pointed beak on one island, while on the other island finches have a short, thick beak because they have cracked nuts and seeds for centuries. Based on this empirical data, Darwin definitely swore off essentialism (Darwin 1859, 471, 488–489).

What led Darwin to think about evolution? In the first part of *The Descent of Man* Darwin develops three arguments that give support to the idea of a gradual evolution and therefore advocate a common ancestor. He develops this argument in the light of new knowledge about the origin and age of the earth. After reading Charles Lyell’s *Principles of Geology* (1830) during his voyage with the *Beagle*, Darwin get convinced of *uniformitarianism*, invented by the Scottish geologist James Hutton. Hutton defends in his *Theory of the Earth* (1795) that strata were formed by millions of years-long processes of sedimentation and erosion and alternation of glacial periods and sea level rises and falls. The earth is much older than creationists claim. Also new knowledge of the fossil record is important in this respect. The biogeography shows Darwin that the distribution of plant and animal species was not homogenous.

Against this background, Darwin developed a threefold argument for the gradual evolution to apply to humans. The first argument comes from anatomy, in particular the homologous bone structure, trunk and limbs, blood vessels, tissues, muscles, and the nervous system (Darwin

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1871, chapter 1). The second argument comes from embryology. Young embryos of vertebrate mammals (he compares embryos of man and dogs) are hardly distinguishable, indicating a common ancestor. He describes how he fully agrees with Thomas Huxley's conclusion in *Man's Place in Nature*: "Without question, the mode of origin and the early stages of development of man are identical with those of the animals immediately below him in the scale; without a doubt in these respects, he is far nearer to apes than the apes are to the dog" (Darwin 1871; chapter 1, 17). The third argument comes from a comparison of the vestigial limbs of both humans and animals. In the human body there are numerous remnants of evolution that are no longer necessary, such as hairiness, the worm-like end of the appendix, wisdom tooth, the nipple of men, the coccyx/tailbone, ear muscles, and the muscle *m. plantaris* in the lower leg. Why would the Creator have created superfluous things, asks Darwin.

His "dangerous idea" that the rich and complex diversity of life forms can be fully explained through natural selection mechanisms, works as a corrosive acid vis-à-vis the traditional creationist view. But what about the mental powers of men? Having unbeatable mental faculties is no convincing contra-indication against evolution for Darwin. In chapter 5, he refers to Alfred Russel Wallace who states in a speech for the Anthropological Society at London on March 1, 1864, that we can say that man is a thousand centuries on earth and that we cannot even rule out that maybe man existed already for hundred thousand centuries on earth (Wallace 1864). Moreover, we know that man has known extinct species. On the difference between man and animals, Wallace writes that natural selection has a strong impact on animals. A slight injury or temporary illness can be fatal because individuals in competition with predators are left to their fate. Among most animals, there is no question of a division of labor because each animal should handle everything on its own, while among humans, it is different. Human beings are social and sympathetic. Even in the harshest tribes food is usually provided for those who get sick and old. Less active people fish and gather fruit, the fastest hunt. Food is shared and distributed. In the human world, mental and moral qualities such as sympathy, a sense of justice, self-control, and the possibility at prospecting the future do play a much larger role. Tribes who explore these opportunities have advantage over other ones and are superior to other tribes. Tools, clothing, fire use, shelter, cooking, thinking ahead will ensure that the body does not have to adapt to the changing context. It is different in the animal world. When a carnivore because of scarcity should switch from hunting sheep to hunting buffalo's, only the strongest animals will survive because claws and tooth only gradually adjust to the new challenge (Wallace 1864, clxiii). During winter time, larger animals need more fur and fat or else they die. Only the one who physically adjust, can survive. But men do not need long nails, toes, or a larger body weight. He/she makes sharper spears, constructs a

1
2 trap to get meat and plant seeds of its favorite foods (Wallace 1864, clxiii).
3 People make warmer clothes and build better houses while their natural
4 body remains as naked as before.

5 Darwin endorses the idea that once men has intellectual, mental, and
6 moral skills that distinguish him/her from lower life forms, they make
7 it apparently easier to respond faster and in an original way to new and
8 challenging living conditions. How does the ethical fit in this picture?
9 Unlike mathematics, physics, and other scientific disciplines, evolutionary
10 biology has far-reaching implications for the understanding of ethics, also
11 for Christian ethics. Central to the debate is the fifth chapter of *The Descent*
12 *of Man* wherein Darwin focuses on the evolutionary roots of morality.
13

14 DARWIN ON EVOLUTION AND MORALITY 15

16 Wallace emphasizes that culture compensates for the human deficit in
17 biological terms (see Gehlen 1940, 1956, 1970). Darwin seems more
18 nuanced. He notices that many analogies were found between human and
19 animal behavior. Hesitantly he describes how the same emotions form
20 the basis of moral behavior in animals and humans: fear and courage,
21 affection and disgust, playfulness and seriousness, care for the offspring.
22 Just as humans primates are excited as they can help each other and become
23 stressed in grief. Both internalize group values and are sensitive to good
24 and disapproval of own behavior by supporters. Via the emotions most
25 animals also have a social character, and know forms of cooperation and
26 are concerned about the welfare of their children (e.g., elephants, ants, and
27 buffalo). The capacity for sympathy and empathy is not strange to most
28 mammals. Wolves help each other, dogs have a great empathy and are a
29 paragon of loyalty and obedience (Darwin 1871, 77). In many animals
30 social instincts and group loyalty are rewarded because social behavior
31 contributes to the survival of the group.

32 Darwin observes similar behavior in humans: helpfulness compared to
33 acquaintances, crave sociality, loyalty, and obedience. Humans also react
34 partly instinctively, are most often naturally sympathetic and happy as they
35 can help each other while getting stressed in case of grief. So he mainly
36 sees continuity between animals and humans, even in the moral domain.
37 Contra-indications are however, the lack of care for sick and old animals,
38 and especially conscience, for Darwin the main difference between humans
39 and animals. But if animals should have equivalent intellectual abilities as
40 humans, they would probably also have a conscience (Darwin 1871, 71–
41 72, 78). On the one hand he acknowledges that the difference in mental
42 strength between a highly evolved ape and a primitive man is immense, on
43 the other hand he points out that forms of self-consciousness—including
44 memory capacity—are known to some animals, the nearest to human
45 beings.

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Darwin's conclusion is clear: man is the product of a continuous and gradual evolution and the same goes for moral behavior. He also observes that evolution does not even have to exclude altruism. At that time, he could not explain it but describes already how the evolutionary process alongside ruthlessness also made gentleness visible. The inspiration for linking self-interest and sympathy came from the Scottish moral philosopher Adam Smith. The relationship is not always visible because as often happens in evolution, the immediate impetus for the emergence of behavior became separated from the effects that have been created by evolution. But the expression is still there, even if the pay-offs are no longer relevant.

DARWIN'S GRADUALISM VERSUS HUXLEY'S SALTATIONISM

Originally, the physician and philosopher Thomas Huxley was not convinced about the "development theory" as the theory of evolution is originally called, as he mentioned in a lecture to the Royal Institute in 1855. That changed after contact with Darwin. Darwin has the habit to discuss his ideas in small groups and he once invited Huxley. In 1858, a draft version of a paper on natural selection, meant for a lecture for the Linnean Society, is discussed. After reading the article, Huxley would have said how extraordinarily stupid it was not to have thought of natural selection. Huxley's defense of Darwin starts with an anonymous rave review of *The Origin of Species* in the *Times* (December 26, 1859). Not unjustly, he gets later nicknamed as "Darwin's bulldog." A sharp reaction came from Richard Owen, chair of the *British Association for the Advancement of Science*, who wrote an anonymous scathing review for the *Edinburgh Review* (3 [1860] 487–532) and asked the Oxford bishop Wilberforce to do the same for the *Quarterly Review* (1860, 225–264).

In *Evidence as to Man's Place in Nature* (1863), Huxley shows anatomical evidence (form of brain, bone structure) to support the relationship between apes and human beings. But Darwin's best friend does differ with him on an important point, namely the origin of moral behavior in humans. Why? Huxley cannot imagine that the rich diversity is due to small, gradual steps as Darwin thinks. Of course, there is, according to Huxley, a physical impact of nature on the human condition, but people are able—if they want—to control nature. In the Romanes Lecture on *Evolution and Ethics* (1893), he compares this task with the weeding of a gardener. Human ethics is a victory over brute evolutionary forces (Ruse 2009, xxi).

Huxley sees morality as a distinctive mark between humans and animals in the sense that only humans are moral beings who are capable of being moral by distinguishing themselves from nature. So morality is not an extension of animal behavior nor part of human nature. Our ancestors acted mentally competent by making explicit choices based on free will, not by evolution. Social behavior is for him a completely cultural phenomenon.

Human beings have transcended their biological roots and were also obliged to do this if they want to make progress (Ruse 2009, 81).

If we look at the debate today, we see that the majority of Christian ethicists follow Huxley's saltationism. Saltationists presume macro-mutations (in Latin: *saltare* which means "to jump"). A mild variant of saltationism is the theory of "*punctuated equilibrium*" from the Harvard evolutionary biologist Stephen Jay Gould and paleontologist Niles Eldredge (Gould and Eldredge 1993, 223; Gould 1999). The followers of Huxley defend the view that humans are moral beings by culture, education, and the social environment in which they dwell (nurture). Moral behavior is the result of socialization processes. In that sense, George C. Williams presents morality as an "accidental capacity, resulting from biological processes, that normally is not appropriate to bring such a capacity to an expression" (Williams 1988, 437–438).

For Darwinists like philosopher and sociologist Edvard Westermarck (Westermarck 1906), biologist Edward O. Wilson and primatologist Frans de Waal, Huxley's "*veneer-theory about morality*" suggests that morality is merely "a cultural overlay, a thin veneer hiding an otherwise selfish and brutish nature" (de Waal 2006, 6; de Waal 2009). In line with Darwin they see morality as the further development of social instincts and emotions such as anger, shame, protest, pity, and grief. De Waal considers them as essential "*building blocks of morality*" which we evolutionary share with other primates. For gradualists, it is not important to know whether animals can be moral but whether they have the capacity to reciprocity and revenge, and whether they have a sufficient capacity for sympathy and empathy to settle disputes and can help if needed, and whether they respect social rules (Flack and de Waal 2000).

In the debate between the two "schools" are the following glaring questions: what could we do with the acquired knowledge of evolutionary biology on morality? Which implications does the knowledge that man is evolutionary evolved have for the understanding of morality? What has evolutionary biology to say about moral action, for example about charity and altruism? If the origin of moral action could be found in nature, can there be question of freedom or is our behavior biologically preprogrammed (genes, inheritance)? Could the origins of morality be found in nature or is morality a cultural phenomenon (education, social environment)? Finally, whether a gradualist conception of evolutionary biology does not necessarily end up in a kind of corrosion of ethics and in an undermining of the (theological)-anthropological views used in ethics?

IS COOPERATION POSSIBLE IN THE STATE OF NATURE?

Many Christian ethicists may fear that to follow a Darwinian view would imply to embrace a Hobbesian view of human nature. Evolutionary

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2 biologists thoroughly disagree with Hobbes' description of the state of
3 nature. For Hobbes the state of nature is characterized by a constant war
4 against all which leaves no room for empathy, compassion, and altruism.
5 Only a sovereign who demands from each a piece of political freedom in
6 exchange for personal safety or a social contract model are able to avoid
7 a state of permanent violence. Evolutionary biologists do not think that
8 this is an adequate description of the state of nature (de Waal 2006, 3–4).
9 What kind of explanation do they offer for the willingness to cooperate in a
10 selfish environment wherein only survival counts? An evolutionary starting
11 point presumes that even in natural environments there is a will to coop-
12 eration, as is the case in the works of E. O. Wilson and de Waal. But how
13 does cooperation arise in the state of nature in the absence of a compelling
14 central authority? Both evolutionary biologists argue that morality is not
15 the result of a cultural process but rather the opposite: culture, included
16 morality, is the end product of a long evolutionary process. Moral systems
17 arise as the result of the need to avoid escalation of conflicts, to ensure
18 personal safety through the maintenance of a social order.

19 But what explains that there are forms of collaboration in an environ-
20 ment where apparently only self-interest counts? And can cooperation also
21 be the result of altruism or is it always the result of enlightened self-interest,
22 related to self-preservation on mid term or long term? In recent decades
23 there has been much research into whether Darwinism can explain the roots
24 of normative ethics. The breakthrough came with the rise of sociobiology
25 that presented reflexively different models of *kin altruism* and *reciprocal*
26 *altruism* by showing that the Darwinian principle of fitness also enhances
27 the willingness to help others (Radcliffe Richards 2000; 5th edn. 2008,
28 162–164). Natural selection mechanisms could play a role in promoting
29 altruism. To explain this, evolutionary biologists refer to game theory. John
30 von Neumann and Oskar Morgenstern describe the interaction between
31 two parties as a strategic game (von Neumann and Morgenstern [1994]
32 2004). Suppose that each participant behaves rationally (i.e., aims at maxi-
33 mizing its own profit), what is the better strategy? Both authors distinguish
34 between *zero-sum* and *nonzero-sum* games. In the latter case, there could
35 be cooperation. It is not unconditional altruism—the risk of exploitation
36 remains high—but a kind of reciprocal altruism is possible. Sociobiologi-
37 st Robert Trivers typifies this strategy as *tit-for-tat* strategy, which means
38 that a temporary sacrifice is considered as acceptable because one expects
39 to be refunded later for it (Trivers 1971). Game theorist Robert Axelrod
40 shows that tit-for-tat strategies are preferable in specific contexts (Axelrod
41 1984, 54). For instance, one can choose to avoid unnecessary conflicts by
42 collaborating in the hope that others will do the same.

43 Axelrod also points out that emotions are the lubricant to obtain coop-
44 eration in the long run. The greater the emotional involvement, the more
45 it allows us to take advantage from social relations. It is not a cold rational

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assessment strategy. On the one hand, if we think of *kin altruism*, we understand that within family relations we do not make a cost-benefit analysis and do not usually ask ourselves whether we have received enough from brothers and sisters on our birthday. Mutual affection is able to justify even asymmetric input (e.g., care of children by parents). On the other hand the calculated reciprocity of *reciprocal altruism* is also rooted in emotions: the honor to fulfill promises, the impending guilt if we would be exposed as impostor, sadness if anyone else around us is dishonest, cheerfulness when we meet an altruist. Not only humans but also apes know these emotions and sentiments. De Waal and Wilson (de Waal 2006) claim that the willingness to cooperate has emotional roots. Instead of pursuing everywhere and in any context potential gain and maximalizing profits, both humans and animals are afraid of loss and betrayal because they know that love can easily turn into revenge, jealousy, and envy. Conscience is therefore described by evolutionary biologists as a functional emotion that helps distinguish between self-interest and group interest. The latter is best served with respect, generosity, altruism, and cooperation.

The fact that murder, rape, and robbery are universally recognized as crimes, indicates that morality is a code of conduct, arising from the biological need for cooperation. It contributes a lot to solidarity with the other group members, creates harmony and team spirit. At first sight a merely cultural product, turns out to be in reality the result of biological necessity, for de Waal. Who shares this vision, is not expecting too much; striving for a universal brotherhood for example, is highly utopian and not very realistic. For gradualists like Wilson, morality is certainly not exclusively a cultural given but the logical consequence of a natural process (Wilson 1975, 562). Who sees morality from an evolutionary viewpoint, renounces the idea of an absolute foundation for morality. This has important consequences and risks to downsize our moral capacities. Wilson's description of the engagement of Mother Theresa for the dying of Calcutta, may illustrate a certain reductionist tendency: he typifies it as a cynical expression of egoism (*self-serving*), purely motivated by "biological imperatives" (Wilson 2004, 166).

NATURALISM, FREE WILL, AND RESPONSIBILITY

Illustrative for the impact of evolutionary psychology in undermining the exclusive character of human phenomena is the distance of Jean-Pierre Changeux vis-à-vis his master Jacques Monod, who considered the transition to speech and the appearance of the neo-cortex as a coincidence which implied that the human is qualitatively different (Monod 1970, 174). Changeux specifies in *L'Homme de vérité* (2004) that the difference between an animal and a human brain is rather quantitatively than qualitatively, an idea which he mentioned already in *L'Homme neuronal*

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2 (Changeux 1983, 87). It all seems a matter of brain size. But what has
3 triggered from an evolutionary viewpoint the larger brain size in humans is
4 still not yet fully elucidated. Neurobiologist and Nobel laureate Gerald M.
5 Edelman points to the speed with which human consciousness, the result
6 from the complex morphology of the brain, has appeared, mainly due to
7 the rapid increase in brain size (Edelman 1992, 17).

8 There is even less consensus about the implications of this naturalist
9 approach. Wolf Singer, for instance, concludes from this scientific fact that
10 the *Homo sapiens sapiens* has no free will (Singer 2002, 175). He cannot
11 imagine that human beings can be free in a deterministic world. That does
12 not involve that ethics becomes an illusion; the moral undertaking can
13 continue to exist as an autonomous discourse but we have to realize that
14 it is fiction, as is defended by the Dutch brain scientist Victor Lamme and
15 the Flemish philosopher and neuroscientist Jan Verplaetse: “The idea that
16 a conscious ‘I’ is at the controls, is an illusion” (Verplaetse 2011, 14). Since
17 we cannot control our actions, we cannot be held responsible for what
18 we are doing, according to Verplaetse, who disagrees with Lamme because
19 he still believes that the disappearance of free will does not necessarily
20 constitute a threat for our thinking about guilt and responsibility. On
21 the contrary, for Verplaetse, the notion of guilt has become irrelevant
22 while for Paul Thagard this does not mean that we would no longer
23 control ourselves or lose our capacity for rational judgment (Thagard
24 2010, 138). In general, determinists believe that deliberately acting is
25 an illusion, presupposing that the existence of free will is incompatible
26 with the causal closeness of the physical universe. On the other hand
27 compatibilists combine a moderately deterministic vision with the freedom
28 to choose. This perspective is, for instance, assumed by psychologist Daniel
29 Kahneman who explains in his dual-process theory how a nonvoluntary,
30 automatically operating model of reasoning (System 1) intertwines with a
31 voluntary, consciously reflexive model of reasoning (System 2) (see Vainio
32 on “Imago Dei and Human Rationality” in this issue). Based on the idea
33 that we could do something else than what we did (the principle of alternate
34 possibilities), compatibilists believe that freedom of choice is possible,
35 therefore stating that indeterminism opens the possibility of robust moral
36 responsibility and “ultimate authorship” (Mawson 2011, 56).

37 What could we learn from scientific interpretations of consciousness
38 for understanding ethics (Boniolo and de Anna 2006, 2)? Do they only
39 explain the human moral capacity by stating that all cognitive capacities
40 have a biological basis? Or do they also justify it (Rottschaefer 1998)?
41 Defenders of weaker forms of naturalism will accept that in addition to
42 scientific explanations also other explanations are conceivable. Stronger
43 forms of naturalism argue that natural sciences could explain ethical be-
44 havior, but not justify. A third position is that science cannot only explain
45 but also justify ethics. Most authors choose a weak form of naturalism

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2 that explains some characteristics of moral behavior. For instance, Boniolo
3 suggests that evolutionary biology can explain the “*enabling conditions*”
4 for the human moral capacity but neither explain moral judgments nor
5 justify ethical systems. De Anna thinks that evolutionary thoughts help
6 understanding the origin of our ethically relevant cognitive ability but only
7 in conjunction with nonbiological considerations. To some extent, moral
8 capacities are an accidental evolutionary outcome made possible by evolved
9 mental properties. Michael Ruse defends a stronger form of naturalism.
10 He believes that some form of normativity successfully can be explained
11 by evolutionary knowledge. Because we know that evolution is rudderless,
12 we need justification. However, for Ruse—also for Wilson—it accounts
13 for a happy illusion (Ruse and Wilson 1985; Ruse 2006, 21). There are
14 no reasons to become pessimistic about this since we also realize that the
15 illusion will not disappear soon because of its firm roots in deeply anchored
16 moral sentiments.
17

18 INCLINATIONS AND VIRTUES 19

20 Evolutionary biology instructs us that morality roots in dispositions that
21 are programmed by evolution into our nature. This was not a strange
22 idea to the classics. For Aristotle and Aquinas, animals and human have
23 emotions and passions in common (*Summa* 1a2ae, Q. 40, art. 3). Aquinas
24 describes passions as joy, anger, love, hate, desire, sadness, aggression, hope,
25 and fear. However, human beings are able to control them by reason.
26 Aquinas doubts on Aristotle’s granting animals even cognitive capacities,
27 such as “prudence,” albeit gradually different from humans (see Darwin
28 1872; Deane-Drummond 2004, 83). But modernity gradually developed
29 a dualist perspective on human/culture/reason and animal/nature/body
30 and depreciated the latter. To the degree that the Christian tradition has
31 embraced modernity, a nature-culture dichotomy in combination with a
32 particular theological anthropology has been very influential. For instance,
33 the personalist tradition aligned with this modern dichotomy. However,
34 for the classics it was a mistake to think that behavior was either exclu-
35 sively biological or cultural. Nature and culture are intimately intertwined.
36 Aquinas’ idea that we will better know ourselves if we observe animal be-
37 havior, has been lost. He recognizes that animals are sensitive and possess
38 a certain decision power, though theirs is not comparable to the human
39 free will (Baranzke 2002, 171, 191). And we share with them numerous
40 natural inclinations that are at the basis of social tendencies, such as the
41 desire to know, the desire for companionship, and the desire for food and
42 sex. The good life for humans, partly based on reasonableness, is the result
43 of checks and balances in inclinations, passions, and reflection.

44 Understanding the biology of our nature will make us more alert to the
45 innate urge to lie, even for the better, for the tendency to be blind for

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2 our weaknesses, to cover vices and to justify prejudices. Alisdair MacIntyre
3 concludes his *Dependent Rational Animals: Why Human Beings Need the*
4 *Virtues* (1999): “In *After Virtue* I had attempted to give an account of the
5 place of the virtues, understood as Aristotle has understood them, within
6 social practices, the lives of individuals and the lives of communities, while
7 making that account independent of what I called Aristotle’s ‘metaphysical
8 biology.’ Although there is indeed good reason to repudiate important
9 elements in Aristotle’s biology, I now judge that I was in error in supposing
10 an ethics independent of biology to be possible . . .” (MacIntyre 1999, x).
11 In fact, he accepts that humans are animals too. Our reflexive capacity does
12 not make us so different because we share with animals purposeful action,
13 social needs, and beliefs. Although rationality gives us a “second nature”
14 beyond our physical nature, there is also a lot of continuity that helps us
15 better grasp human needs. We are not born as autonomous moral agents
16 and need to be nurtured in order to become free agents. This process of
17 nurturing has not much to do with learning to solve ethical dilemmas
18 by discussing and arguing value conflicts. Yet, there is still the need to
19 grow in intelligibility through participation in the culture of the smaller
20 and broader communities to which we belong, because we are born in
21 a culture, but not just as Lockean blank slates. He acknowledges that it
22 has no sense to deal with the good, norms, and virtues without paying
23 attention to the biological constitution of humans and explaining how the
24 ethical discourse connects to this and could remain consistent with the
25 biological findings.

26
27
28 CONSCIOUSNESS

29 Antonio Damasio distinguishes the self-as-object that interprets the materi-
30 al “me” (*conscience-noyau*) and the self-as-subject-and-knower (*conscience*
31 *étendue*). The self-as-object is about phenomenal consciousness; for in-
32 stance, what we experience when we taste chocolate or are drunk. We
33 are not self-aware of what is happening but we just experience (Damasio
34 2003). This kind of consciousness we share with animals. The last “I”—
35 the self-as-subject-and-knower—cannot be caught by biological or mental
36 processes. Damasio talks about a turning point in biological evolution.
37 The decisive step in the growth of this type of consciousness is subjectivity,
38 which means that we are able to make representations of ourselves. Put
39 in evolutionary biological perspective: First, there is the “proto self with
40 primordial sentiments” (*proto-soi*) (combining sensory data with control-
41 ling of information processing in fish), then ‘the core self, driven by acting’
42 (*le soi central* or a type of primitive consciousness), and finally “the auto-
43 biographical self,” capable to include rationality, reflection, deliberation,
44 self-awareness, and even spirituality (Ganoczy 2008, 124–126; Damasio
45 2010).

1
2 Subjectivity is an emergent property. It is the result of a progressive
3 awareness that is strongly influenced by basal emotions like pleasure, suf-
4 fering, satisfaction, and anger. A good description of this “core self” can
5 be found in the work of Jane Goodall who describes how a chimpanzee
6 can set up a primitive reasoning. The primitive animal consciousness is
7 the indispensable basis for the autobiographical self. The evolutionary de-
8 veloped mental abilities (language, intelligence, decision power, memory
9 capacity, capacity for abstraction) give human beings a superior conscious-
10 ness (Edelman 1992; Changeux 2004, 294). Edelman uses the notion of
11 “*transcendence*” in the sense that animals are only able to adapt to the
12 real, while humans have the ability to think imaginary. The very imagery
13 (conceptual and abstract thinking, art forms, religious experience) makes
14 humans capable to distance themselves from conditioned reflexes, and to
15 judge about them in a lucid way.

16 Damasio sees human beings as a mix of rationality and emotion. He
17 points out how moments where a well practiced unconscious mind is
18 trained under the supervision of conscious reflection, are interspersed with
19 moments where we let ourselves be guided by unconscious, deeply rooted,
20 ancient biological inclinations, passions, and desires (Damasio 2010). We
21 often play in both registers. However, we think that we always act under
22 conscious control of the self but this is rather an illusion. In that sense, he
23 developed a rather unique understanding of free will, referring to Daniel
24 Wegner who describes the conscious will as the somatic stamp of personal
25 authorship, an emotion that confirms that the self is the authentic owner of
26 the action. By the feeling to perform an act, we get a conscious awareness
27 of the will, which is linked to the act (Damasio 2010). Without the
28 feeling of authorship, we would not be able to record moral responsibility.
29 But the unpredictable human behavior—our “yes” is often a “no” and
30 vice versa—can only be consistent if we are willing to analyze and to
31 evaluate our behavior and to reflect constantly on our less conscious acts
32 (Vincent 1986, 177) . Wisdom is only reserved for those who accept that
33 becoming virtuous needs a long period of training (Cincent 2002, 177;
34 Ganoczy 2008, 131–132) . Less and nonconscious processes that explain
35 why we so often neglect what we really ought to do, are often insufficiently
36 “educated.” We realize that it is better to eat healthier and exercise more,
37 and yet we often do not change our habits. Our biological nature prefers for
38 evolutionary reasons the consumption of sugars and fats. The advertising
39 propaganda machine is conveniently using the “weak” point to promote
40 the consumption of what we’d better not touch (Nelissen 2011, 72–76).
41 But we realize that we will eat only wiser and more responsible when we
42 develop long and ritualized skills (e.g., regular fasting) in order to aptly
43 restrict these natural impulses.
44
45

Q3

Q4

CHRISTIAN ETHICS?

As far as the natural sciences explain the basis conditions for human action and in as far as they do not justify moral behavior, they need to form no threat for Christian ethics. On the contrary, a neurobiological and psychological clarification of the emotions that are relevant to the capacity for moral action (be it by way of hindrance or promotion) contributes to a better understanding of the moral commitment. Human beings always act from certain motives and desires that are biologically rooted (Joyce 2007, 9–10). What concerns the relative role of neurosciences in explaining (im/a)moral behavior, Damasio refers mainly to the contribution of positive and negative feelings as a basis for moral behavior, for example, the sense of outrage which the late Stéphane Hessel as the father of the *indignados*, has made his trademark (Damasio 2003; Hessel 2010).

Those who take feelings seriously can accept that other sentient beings demonstrate “empathy, sympathy, attachment behavior, confusion, dominant pride, and humble submission.” Acts of conspecifics may be intuitionally disapproved or approved by me. This intuition has a form of premoral competence. Long before there have been thought of intelligent constructions (for example theories of justice) to shape normative social behavior, these intuition feelings played a role in the development of cooperation strategies among nonhuman species that use social emotions.

However, the trend toward more complexity is such that cultural elements came more to the fore. The perception of obligations, the degree of responsibility, and the codification of rules are of course quite unique and are therefore called “culture.” But the distant relationship with nature still remains and sometimes the relationship becomes more visible, for example, in the ambiguity of character traits as dominance and docility regarding traditional values. Docility is useful for any organization that strives for a consensus in conflicts but it can also lead to unacceptable forms of resignation, submissive assent, the acceptance of tyranny, and the unreasonable subordination of individuality to group interest. Christian ethics in its traditional form had great attention to biological mechanisms that block or promote ethical behavior. Knowledge of evolution is capable of deepening Christian understanding of the biological factors that influence virtues and sin (Pope 2007, 4). Traditionally moral education was practicing and ritualizing moral skills and asceticism, needed to get a grip on partly unconscious natural processes that always threaten to drive behavior in an arbitrary way.

Christian ethics can certainly live with the idea that evolutionary biology teaches us that morality is a mix of culture and nature, unlike many common cultural determinist views on Christian ethics. In this sense, the argument of Wilson that morality is a combination of nature and culture,

Q5

1
2 inheritance and environment, has to be more scrupulously studied (Wilson
3 1975, 562).
4

5
6 NATURE AND/OR PERSON?

7 The consensus text in *Gaudium et Spes* no. 51 (“ . . . according to objective
8 criteria, based on *the nature of the person . . .*”), so often discussed after
9 the council among the defenders of personalism and those of natural law,
10 could receive a new interpretation (McCormick 2006, 14–16). In official
11 magisterial teachings it is often suggested that an orientation to normative
12 moral choice can be detected in nature. The idea that in nature a kind of
13 moral intelligibility could be discovered which justifies normativity, is radi-
14 cally contested by personalist ethicists. For them, not biological nature but
15 the person is the decisive assessment criterion. Personalists rightly criticize
16 natural law but pay at the same time little attention to issues associated
17 with “nature,” spontaneous emotions and natural tendencies which all were
18 the starting point of a realistic Christian ethics in ancient times. From this
19 perspective, the document of the International Theological Commission
20 “*In Search of a Universal Ethics: A New Look at Natural Law*” (2008) is also
21 a missed opportunity.

22 A better position is taken by Jean Porter. For her natural inclinations
23 and emotions are morally relevant, though not morally determinant. She
24 opposes a conception of natural law that reduces the normative significance
25 of nature to practical rationality. Moreover, she thinks that an abstract, a
26 historical interpretation of the natural law does not correspond to the
27 Christian idea that creation in itself is good. Scholasticism believed that
28 human nature including the prerational, biological roots of behavior, were
29 morally meaningful and would therefore not have a problem in integrating
30 modern scientific insights (Porter 2005, 51). But, although an important
31 biological substrate of human nature is still there, the person is much more
32 than a biological being. A good life for persons can never be claimed, as
33 the Stoa says, to be “life according to nature.” We have to distinguish
34 between natural aspects that must be suppressed and aspects that should
35 be encouraged. The Christian tradition provides relevant criteria for this.

36 For theological ethics anno 2013, it is important to recognize that an
37 appropriate interpretation of the Darwinian theory of evolution matches
38 with a vision of the “nature of the person” which was known by classical
39 Christian authors. Think of the very distinctive relationship between pas-
40 sions, emotions, and virtues, outlined by Thomas Aquinas and how moral
41 education could be considered (Pope 2007, 265–267; Pope 2009, 204).
42 The Christian moral life can thus be interpreted in the classical sense as
43 grace perfecting nature, building on the natural capacities, correcting and
44 improving them where necessary. By doing this, our ethic gains realism and
45 stays into close contact with human experiences. It allows seeing how acts

1 16 *Zygon*

2 of altruism can be interpreted only “natural” within the domestic sphere
3 and within the community of close friends. Asking altruism on a universal
4 level is asking too much from human beings. At the same time it allows us
5 to see that there are also exceptional people who are capable of generosity
6 and self-giving to other people which they do not know and with which
7 no form of reciprocity is involved (Cornwall 2007). That religions—albeit
8 exceptionally—can bring people to such forms of detachment and disinter-
9 restedness is probably from the ethical point of view their main reason
10 of existence.
11

12 CONCLUSION

13
14 Ethics after Darwin is no longer an exclusively theological or philosphi-
15 cal discipline. Biologists and neuroscientists present divergent statements
16 about the biological roots of morality. Orthodox Darwinists are diamet-
17 rically opposed to Huxlians. Whoever sees morality as an evolutionary
18 product, has for de Waal a more livable world in mind than Huxley and
19 followers. But Huxley, who always publicly defended Darwin’s theory of
20 evolution in Victorian England, concluded his Romanes-lecture at Oxford
21 in 1893 with the memorable cautionary statement: “Let us understand,
22 once for all, that the ethical progress of society depends, not on imitating
23 the cosmic process, still less in running away from it, but in fighting it”
24 (Ruse 2009).

25 Is there a Darwinian meta-ethics? Hyper-Darwinists believe so (Kitcher
26 2006). Hyper-Darwinism supports a distinct meta-ethical view that neces-
27 sarily puts the truth of moral judgments into question and even argues that
28 moral knowledge is impossible. Moderate Darwinism believes that evolu-
29 tionary biology does contribute to a better understanding of some aspects
30 of the human moral behavior and may explain why people are interested
31 in the development of social systems, but its evolutionary influence is not
32 far-reaching. Finally, there is a third group of interpretations which states
33 that recognition of forms of evolutionary relationship better enables us to
34 understand our obligations to others. Kitcher thinks that natural selection
35 has played an important role in the development of moral consciousness
36 and sees morality as a fitness strategy, just as the development of limbs
37 and senses in the past. But culture has taken the upper hand. He swings
38 between two extremes: between those who believe that everything is truly
39 cultural (*the blank slate hypothesis*) and those who argue that everything
40 is fundamentally biological (*the genetic determinism hypothesis*). However,
41 Kitcher brings in an important nuance. On the basis of the history of
42 codification, starting with Hammurabi, he describes in great detail how
43 the growing interest in legal systems can be regarded as the continuation
44 of efforts to avoid among hominids violence (Kitcher 1985; Kitcher 2006,
45 175–176). However, after a while such pacification strategies live a life of

their own and should not be linked any longer to the idea of “reproductive success.”

One hundred years later, evolutionary biologist George C. Williams still wholeheartedly agrees with Huxley. The title of his article is: “Mother Nature Is a Wicked Old Witch” (Williams 1993). For Christian ethics there is a twofold caution. (1) A too extensive naturalistic view of morality cannot be accepted by Christian ethicists. A morality based purely on nature becomes essentialist and totalizing. Those who views ethics from a deterministic view of human nature, confuses “is” and “ought.” This view certainly leads to aberrations such as Francis Galton, Darwin’s cousin, who refused to help the needy because doing nothing would be more consistent with “nature” and therefore gave support to eugenic experiments simply because they are “natural.” Such forms of legitimation of inequality explain the healthy suspicion of a Christian ethicist vis-à-vis what science has to say about morality. (2) A strong naturalistic view of morality cannot but think that there is only *seemingly* kindness and selflessness. For Dawkins altruism is disguised selfishness: selfish genes try to secure their own survival and allocate therefore an altruistic tactics (Dawkins 1976, 3). Maintaining familial genes, reciprocity (*tit-for-tat*), honor (generosity), and power drive are the true origins of altruism. They also explain the at times strong urge to self-sacrifice. Such a reductionist view of ethics is for Christian ethicists not acceptable because it results in a cynical view of ethical behavior. Without a minimum level of authenticity, the ethical becomes eroded.

REFERENCES

- Aquinas, Thomas. 2013. *Summa Theologiae*, 1a2ae, Q. 40, art. 3 “Whether Hope Is in Dumb Animals?” Available at <http://www.newadvent.org/>
- Axelrod, Robert. 1984 (revised edn. 2006). *The Evolution of Cooperation*. New York: Basic Books.
- Baranzke, Heike. 2002. *Würde der Kreatur? Die Idee der Würde im Horizont der Bioethik*. Würzburg: Königshausen und Neumann Verlag.
- Barlow, Nora, ed. 1958. *The Autobiography of Charles Darwin 1809–1882*. London: Collins. Available at www.darwin-online.org.uk
- Boniolo, Giovanni and Gabriele de Anna. 2006. “Introduction.” In *Evolutionary Ethics and Contemporary Biology* (Cambridge Studies in Philosophy and Biology), ed. Giovanni Boniolo and Gabriele de Anna. Cambridge: Cambridge University Press.
- Buskes, Chris. 2006 (4th edn. 2008). *Evolutionair Denken. De Invloed van Darwin Op Ons Wereldbeeld*. Amsterdam.
- . 2010. “Leven Met Darwin: Cultuur en Religie in Evolutionair Perspectief.” In *Evolutie, Cultuur en Religie. Perspectieven Vanuit Biologie en Theologie*, ed. Palmyre Oomen and Taede Smaedes. Kampen: Klement.
- Changeux, Jean-Pierre. 1983. *L’Homme Neuronal*. Paris: Hachette.
- . 2004. *L’Homme de Vérité*. Paris: Odile Jacob.
- Cornwall, John. 2007. *Darwin’s Angel. An Angelic Riposte to ‘The God Delusion*. London: Profile Books.
- Damasio, Antonio. 2003. *Looking for Spinoza. Joy, Sorrow and the Feeling Brain*. London: Mariner Books.
- . 2010. *Self Comes to Mind. Constructing the Conscious Brain*. New York: Vintage.

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1 18 Zygon

- 2 Darwin, Charles. 1859. *On the Origin of Species by Means of Natural Selection, or the Preservation*
3 *of Favoured Races in the Struggle for Life*. London. Available at www.darwin-online.org.uk Q12
- 4 ———. 1871. *The Descent of Man*. London. Available at www.darwin-online.org.uk
- 5 ———. 1872. *The Expression of the Emotions in Man and Animals*. London. Available at
6 www.darwin-online.org.uk
- 7 Darwin, Francis, ed. [1878] 2010. *The Autobiography of Charles Darwin*. London: Bibliolis. Q13
- 8 Dawkins, Richard. 1976. *The Selfish Gene*. Oxford: Oxford University Press.
- 9 Deane-Drummond, Celia. 2004. *The Ethics of Nature* (New Dimensions to Religious Ethics 4).
10 Oxford: Wiley-Blackwell.
- 11 Desmond, Adrian J. and James Richard Moore. 1991. *Darwin*. London: Penguin Books.
- 12 De Waal, Frans. 2006. "Morally Evolved. Primate Social Instincts, Human Morality, and the
13 Rise and Fall of 'Veneer Theory'." In *Primates and Philosophers. How Morality Evolved*,
14 ed. Stephen Macedo and Josiah Ober. Princeton, NJ: Princeton University Press.
- 15 ———. 2009. *The Age of Empathy. Nature's Lessons for a Kinder Society*. New York: Harmony
16 Books.
- 17 Edelman, G.M. 1992. *Bright Air, Brilliant Fire*. New York: Basic Books. Q14
- 18 Flack, Jessica C. and Frans de Waal. 2000. "Any Animal Whatever: Darwinian Building Blocks
19 of Morality in Monkeys and Apes." *Journal of Consciousness Studies* 7:1–29.
- 20 Ganoczy, Alexandre. 2008. *Christianisme et Neurosciences*. Paris: Odile Jacob.
- 21 Gehlen, Arnold. 1940. *Der Mensch: seine Natur und seine Stellung in der Welt*. Berlin: Junker und
22 Dünnhaupt.
- 23 ———. 1956. *Urmensch und Spätkultur: Philosophische Ergebnisse und Aussagen*. Bonn:
24 Athenäum.
- 25 ———. 1970. *Moral und Hypermoral: Eine Pluralistische Ethik*. Frankfurt-am-Main, Germany:
26 Athenäum Fischer.
- 27 Gould, Stephen Jay and Niles Eldridge. 1993. "Punctuated Equilibrium Comes of Age." *Nature*
28 366:223. Q15
- 29 Gould, Stephen Jay. 1999. *Rocks of Ages: Science and Religion and the Fullness of Life*. New York:
30 Random House.
- 31 Hessel, Stéphane. 2010. *Indignez-vous!* Montpellier, France: Scribe Publications.
- 32 Huxley, Thomas Henry. [1893] 2009. *Evolution and Ethics*, ed. Michael Ruse. Princeton, NJ:
33 Princeton University Press.
- 34 ———. 2008. In *Search of A Universal Ethics: A New Look at Natural Law*. Available at
35 [http://www.vatican.va/roman_curia/congregations/cfaith/cti_documents/rc_cti_index-](http://www.vatican.va/roman_curia/congregations/cfaith/cti_documents/rc_cti_index-doc-pubbl_en.html)
36 [doc-pubbl_en.html](http://www.vatican.va/roman_curia/congregations/cfaith/cti_documents/rc_cti_index-doc-pubbl_en.html)
- 37 Joyce, Richard. 2007. *The Evolution of Morality*. Cambridge MA & London: The MIT Press.
- 38 Kitcher, Philip. 1985. *Vaulting Ambition: Sociobiology and the Quest for Human Nature*, Cam-
39 bridge MA and London: The MIT Press.
- 40 ———. 2006. "Between Fragile Altruism and Morality: Evolution and the Emergence of Nor-
41 mative Guidance." In *Evolutionary Ethics and Contemporary Biology* (Cambridge Studies
42 in Philosophy and Biology), ed. Giovanni Boniolo and Gabriele de Anna, 159–77. Cam-
43 bridge: Cambridge University Press
- 44 MacIntyre, Alisdair. 1999. *Dependent Rational Animals: Why Human Beings Need the Virtues*,
45 Chicago and La Salle, IL: Open Court.
- 46 Mawson, Tim J. 2011. *Free Will. A Guide for the Perplexed*, London & New York: Continuum.
- 47 McCormick, Richard. 2006. "Moral Theology since Vatican II: Clarity or Chaos?" In *The Critical*
48 *Calling. Reflections on Moral Dilemmas Since Vatican II* (Moral Traditions Series), ed. Lisa
49 Sowle Cahill. Washington, DC: Georgetown University Press. Q16
- 50 Monod, Jacques. 1970. *Le Hazard et la Nécessité. Essai sur la Philosophie Naturelle de la Biologie*
51 *Moderne*. Paris: Editions du Seuil.
- 52 Nelissen, Mark. 2011. *Darwin in de Supermarkt of Hoe de Evolutie ons Gedrag Dagelijks Beïnvloedt*.
53 Tiel: Lannoo.
- 54 Pope Stephen. 2007. *Human Evolution and Christian Ethics*. (New Studies in Christian Ethics
55 28), Cambridge, MA: Cambridge University Press.
- 56 ———. 2009. "Darwinism and Moral Theology." In *Darwin and Catholicism. The Past and*
57 *Present Dynamics of a Cultural Encounter*, ed. Louis Caruana, 190–206. London, New
58 York: T & T Clark.

- 1
2
3 ———. 2013. "Scientific and Religious Approaches to Morality: An Alternative to Mutual
4 Anathemas." *Zygon: Journal of Religion and Science* 48:20–34.
- 5 Porter, Jean. 2005. *Nature as Reason: A Thomistic Theory of the Natural Law*. Grand Rapids, MI:
6 Eerdmans.
- 7 Radcliffe Richards, Janet. 2000 (5th edn. 2008). *Human Nature after Darwin. A Philosophical
8 Introduction*. London, New York: Routledge.
- 9 Rottschaefter, William Andrew. 1998. *The Biology and Psychology of Moral Agency*. Cambridge:
10 Cambridge University Press.
- 11 Ruse, Michael. 2006. "Is Darwinian Metaethics Possible?" In *Evolutionary Ethics and Contem-
12 porary Biology* (Cambridge Studies in Philosophy and Biology), ed. Giovanni Boniolo and
13 Gabriele de Anna. Cambridge: Cambridge University Press. Q17
- 14 ———. 2009. "Introduction." In *Thomas Henry Huxley [1893]. Evolution and Ethics*, ed. Michael
15 Ruse. Princeton, NJ: Princeton University Press. Q18
- 16 Ruse, Michael and Edward Osborne Wilson. 1985. "The Evolution of Morality." *New Scientist*
17 1478:108–28.
- 18 Singer, Wolf. 2002. *Der Beobachter im Gehirn. Essays zur Hirnforschung*, Frankfurt-am-Main,
19 Germany: Suhrkamp.
- 20 Thagard, Paul. 2010. *The Brain and the Meaning of Life*. Princeton, NJ: Princeton University
21 Press.
- 22 Trivers, Robert. 1971. "The Evolution of Reciprocal Altruism." *Quarterly Review of Biology*
23 46:35–57.
- 24 Verplaetse, Jan. 2011. *Zonder Vrije Wil. Een Filosofisch Essay over Verantwoordelijkheid*, Amster-
25 dam: Nieuwezijds.
- 26 Vincent, Jean-Didier. 1986. *La Biologie des Passions*. Paris: Odile Jacob.
- 27 Von Neumann, John and Oskar Morgenstern. [1944] 2004. *Theory of Games and Economic
28 Behavior*. Princeton, NJ: Princeton University Press.
- 29 Wallace, Alfred Russel. 1864. "The Origin of Human Races and the Antiquity of Man Deduced
30 from the Theory of 'Natural Selection.'" *Journal of the Anthropological Society of London*. Q19
- 31 Westermarck, Edward. 1906. *The Origin and Development of Moral Ideas*, Vol. 2. London:
32 Macmillan. Q20
- 33 Williams, George C. 1988. "Reply to Comments on 'Huxley's Evolution and Ethics in Sociobi-
34 ological Perspective.'" *Zygon: Journal of Religion and Science* 23:437–38.
- 35 ———. 1993. "Mother Nature Is a Wicked Old Witch!" In *Evolutionary Ethics*, ed. Mathew H.
36 Nitecki and Doris V. Nitecki, 217–31. New York: SUNY Press.
- 37 Wilson, Edward Osborne. 1975. *Sociobiology: The New Synthesis*. Cambridge MA: The MIT
38 Press.
- 39 ———. 2004. *On Human Nature*. Cambridge MA: The MIT Press.
- 40
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