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The Moral Importance of Invertebrates Such as Insects

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Abstract
The thesis is about the moral importance of invertebrates such as insects, spiders, earthworms, and snails. I focus on the sentientist approach to moral importance and investigate the moral importance of such animals on the basis of that they may be able to have morally relevant negative mental states. I argue that, on such an assumption, one can at least say that such animals have a claim to ethical significance *for our character*. At least, it is a requirement of a morally decent (or virtuous) person that she *pays attention* to and is *cautious* regarding such animals in a morally relevant way, that she allows them to affect her moral-psychological life. For the person who does not already consider such animals in this way, this could be a big change in her moral psychology. Such a character trait, or virtue, can plausibly be defended from a variety of ethical theories, including Aristotelian virtue ethics, virtue consequentialism, and the virtue ethically oriented ideas of David Hume.

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1. Introduction

I will be concerned with the moral importance of 'small animals,' by which I mean invertebrates such as insects, spiders, earthworms, and snails, but not micro-organisms, such as amoebas or bacteria. There are at least three possible grounds for assigning moral status to small animals: (1) Ecocentrism ascribes moral value to holistic entities such as species and ecosystems and so would ascribe indirect moral weight to small animals as part of these entities.[1] (2) Biocentrism is the view that all life, including small animals and plants, makes direct moral claims on us.[2] (3) Sentientism says that something has moral status if and only if it is sentient, and so would ascribe moral status to small beings if and only if they are sentient. I will focus on the sentientist approach to the moral importance of small animals. Or, more exactly, I will investigate the moral importance of small animals on the basis of that they may be able to have morally relevant negative mental states. I will argue that, on such an assumption, one can at least say that small animals have a claim to virtue ethical significance. At least, it is a requirement of a morally decent (or virtuous) person that she *pays attention* to and is *cautious* regarding small animals in a morally relevant way, that she allows them to affect her moral-psychological life. For the person who does not already consider small animals in this way, this could plausibly be a big change in her moral psychology, especially given the considerable impact of even the most ordinary of human activities on small animals.

1.1. Previous research

The most common view in society and academia is that we need not be concerned about killing small animals or about their quality of life. But a number of scientists and a few philosophers have suggested that we ought to take some actions to guard against the possibility that they may be sentient.[3] One of them is Sir Vincent Wigglesworth, who was an entomologist and professor of biology. In 1980, he wrote that

> perhaps the most significant result of the 'Molecular Biology' of the past 25 years is the bond it has established between ourselves and the 'lower animals'. They have become so close to us. Indeed, nowadays one has the same feeling of unease in speaking of the 'lower animals' as one would in referring to the 'lower classes'.... I am sure that insects can feel pain if the right stimulus is given. High temperature seems the clearest example,

[1] Leopold, *A Sand County Almanac* and Callicott, *In Defense of the Land Ethic*.

[2] For example Taylor, *Respect for Nature* and Varner, "Biocentric Individualism," 109.

[3] Scientists that recommend that some small animals' welfare should be considered include Crook and Walters, "Nociceptive Behavior and Physiology of Molluscs"; Eisemann et al., "Do Insects Feel Pain?" 167; Sømme, "Sentience and Pain in Invertebrates," 36; Wigglesworth, "Do Insects Feel Pain?" Lockwood, "Not to Harm a Fly" and "The Moral Standing of Insects"; Horvath et al., "Invertebrate Welfare"; and Broom, "The Welfare of Invertebrate Animals," draws the weaker conclusion that "there is a case for some degree of protection for spiders, gastropods and insects" (152). Horta, "Disvalue in Nature,"is one of the works by philosophers that argue for taking actions regarding small animals' because of their (potential) mental life. Tomasik has presented arguments in the same vein as Horta in several online essays, "Do Bugs Feel Pain?" "Humane Insecticides"; "Why I Don't Support Eating Insects"; and "Speculations on Population Dynamics of Bug Suffering."

> and perhaps electric shocks. For practical purposes why not assume that that is so? Most operations on insects are actually facilitated if the insect is narcotized.[4]

Professor of animal welfare Donald Broom writes in 2013 that there is a trend in science towards thinking that some small animals may feel pain.

> A worm or mollusc that is injured, and perhaps writhing, may be feeling pain but could be showing an automatic response. The change in scientific thinking is that the weight of evidence for some of these animals now indicates that they may be feeling pain.... Some aspects of the pain system exist in leeches, insects, snails, and swimming sea-slugs. However, we cannot be sure that these animals feel pain, or that they do not feel pain.... There is a case for some degree of protection for spiders, gastropods and insects.[5]

One can discern five features of this literature on the moral importance of the possibility that invertebrates may be sentient, which I will now look at in five brief sections to further introduce the topic of this essay.

1.1.1. *Uncertainty about sentience*

Many authors address the moral implications of our uncertainty about whether various small animals are sentient. For example, Lauritz Sømme writes in a report to the Norwegian Scientific Committee for Food Safety that

> with our present knowledge, it is usually concluded that insects cannot feel pain. Still, doubts have been raised. Among invertebrates, social insects represent a high level of cognition, and their welfare should be considered during handling.[6]

The scientists' arguments are similar to one another, and can be summarised as follows:

The scientists' argument:

1. If there are good enough reasons to believe that a being can have morally relevant negative mental states, then activities that are likely enough to cause such mental states should not be (or be allowed to be) undertaken when the cost of not undertaking them (or not allowing them to be undertaken) is sufficiently low.
2. There are good enough reasons to believe that certain small animals can have morally relevant negative mental states.
3. Humans currently undertake actions that involve such animals that are likely enough to cause such mental states.

[4] Wigglesworth, "Do Insects Feel Pain?" 8–9.
[5] Broom, "The Welfare of Invertebrate Animals," 150, 152.
[6] Sømme, "Sentience and Pain in Invertebrates," 36.

4. In at least some cases, the cost of not undertaking such actions (or not allowing them to be undertaken) is sufficiently low.
5. Thus, some actions that humans currently undertake that involve certain small animals should not be (or be allowed to be) undertaken.

The argument is valid. I assume that the first normative premise has some degree of plausibility, but as we will see, the premise can become controversial when one gets into how it should be specified. On the whole, it is plausible that the argument supports the suggestion that, in practice, *at least some* actions that humans currently undertake that involve *certain* small animals should not be (or be allowed to be) undertaken. This is a modest and limited claim, and it is unresolved what the moral implications of it are beyond that we should take action in at least some cases.

The scientists and the general content of their arguments as reconstructed above focus on the idea that humans should sometimes *avoid activities that may cause* morally relevant mental states in small animals. Oscar Horta provides a similar argument but with an important difference: he argues for the claim that humans should (sometimes and when we can) *actively intervene in nature to try to benefit* wild animals (including small animals), even though the potential harms have *not* been caused by humans. I would reconstruct the general content of Horta's argument as follows (as it relates to small animals):

Horta's argument:

i. If there are good enough reasons to believe that a being can have morally relevant negative mental states, then activities that are likely enough to alleviate or prevent such mental states should be undertaken when the cost of undertaking them is sufficiently low.
ii. There are good enough reasons to believe that certain small animals can have morally relevant negative mental states.
iii. Wild small animals in nature currently suffer harms that are likely enough to cause such mental states.
iv. In at least some cases, the cost of undertaking actions to alleviate or prevent such mental states is sufficiently low.
v. Thus, some actions should be undertaken that involve certain wild small animals in nature.

This argument is also valid, but its premises are more controversial than the ones in the general content of the scientists' argument. In the remainder of the thesis, I will most often discuss these two arguments as being *one kind* of precautionary argument about small animals, because the two arguments are so similar in structure: both are based on the idea that we currently have good enough reason to believe that small animals can have morally relevant negative mental states, and that we should avoid causing such mental states, or that we should alleviate or prevent such mental states, when the cost of doing so is sufficiently low.

1.1.2. *Potential large moral importance*

Several authors say that small animals are of potentially *large* moral importance if they are sentient. For example, Lockwood says that by taking certain actions regarding small animals, we can prevent "possibly horrendous mistakes in moral judgement"[7] and that "if we don't use anesthetic and it turns out that the insects were in agony, then the moral cost of our mistake is quite high."[8] Horta speaks of the situation for insects in nature as being morally "very significant."[9]

1.1.3. *The scope of the practical implications*

The practical implications that the scientists discuss are typically regulations for small animals used in research and teaching, and they typically argue that one should, or should be required to, inactivate the animals' nervous systems before conducting potentially painful research on them.[10] For example, when teaching insect anatomy and physiology, Lockwood "insisted that the students anesthetized insects before conducting experiments that we would expect to inflict pain on a mouse."[11] Philosophers have suggested a number of other practical implications. Kai M. Chan suggests that animal welfare organisations should be more concerned with the well-being of 'lower' organisms.[12] Horta argues that we should intervene in nature when we can, and since we are already intervening in nature, "it makes sense to figure out ways of doing it which may decrease, rather than increase, animal suffering."[13] He also argues that "we should raise awareness about the harms that wild animals suffer in nature and encourage the scientific community to study these issues."[14] Lockwood says that it is hard to defend limiting the population of insects (e.g. by killing the insects) on crops that are harmful to humans, such as tobacco, or to limit the population of insects to prevent cosmetic damage to food.[15] Although Mary Warren does not defend the moral status of small beings, she says that anyone who requires that we give sentient beings equal consideration of interests (as Peter Singer does) runs into severe practical problems. To do that would preclude "activities essential to human health and survival" such as growing crops.[16] She says,

> Consider, for instance, what happens when a field is ploughed, planted, and harvested. These disruptions are bound to cause death or injury to an enormous number of spiders, insects, mites, snails, slugs, worms, or other small invertebrates.[17]

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[7] Lockwood, "The Moral Standing of Insects," 84.
[8] OUPblog, "Do Bugs Feel Pain?"
[9] Horta, "Disvalue in Nature and Intervention."
[10] For example Eisemann et al., "Do Insects Feel Pain?" Wigglesworth, "Do Insects Feel Pain?" and Lockwood, "The Moral Standing of Insects."
[11] OUPblog, "Do Bugs Feel Pain?"
[12] Chan, "Ethical Extensionism under Uncertainty of Sentience," 339.
[13] Horta, "Disvalue in Nature and Intervention," section "What to Do?"
[14] Ibid.
[15] Lockwood, "The Moral Standing of Insects," 86.
[16] Warren, *Moral Status*, 82.
[17] Ibid., 79.

The equal consideration of interests view can, as Warren acknowledges, allow for beings to have different strengths of interests. But Warren says that it is implausible that the strength of interests are that different, and concludes that "unless human lives and happiness are worth millions of times more than the lives and happiness of small invertebrates, the principle of equal consideration prohibits the cultivation of crops."[18] Other potential practical implications include the prospect that raising insects for food or material such as silk may be more morally problematic than usually thought.[19]

1.1.4. *The large number of small animals*

Several authors refer to the large number of small animals as a reason for the moral importance of the possibility that they may be able to have morally relevant mental states. The number of small animals is key to Horta's argument.

> Suppose that the odds that insects are sentient were 0.01 measured on a scale between 0 and 1 (this, in my view, is an extremely conservative estimate, I would claim that the odds would be far more closer to 1, but let us just assume it for the sake of the argument). Now, there are an estimated 10^18 to 10^19 insects. This means that concern for insects in the world should count as much as concern for at least 10^16 animals that we knew could suffer. It could be claimed that even if insects were sentient, their interests would not count as much as those of, say, mammals. This may be claimed by assuming that mammals' capacity for wellbeing and suffering would be higher than that of insects. However, this would not change the matter significantly. Suppose that the wellbeing of mammals counted 10,000 times more than that of small animals such as insects. That would mean that concern for the latter should count as concern for 10^12 mammals, which is still a very significant figure.[20]

Chan refers specifically to "large numbers" of 'lower' organisms when he discusses implications of his argument. He says that his argument

> suggests that animal welfare organisations should be concerned not only with actions that undermine the well-being of individual mammals and birds, but also with those that affect large numbers of 'lower' organisms. It suggests that any ethics process – such as animal care ethics certification at universities – ought not to draw firm boundaries at 'higher' organisms such as vertebrates (as is common practice), but rather they ought to place constraints on actions that affect large numbers of 'lower' organisms, including plants.[21]

[18] Ibid., 83.
[19] Mickey Gjerris is writing on ethical issues that arise from including insects in food and feed production (personal communication). See also Tomasik, "Why I Don't Support Eating Insects."
[20] Horta, "Disvalue in Nature and Intervention," section "Disvalue in Nature."
[21] Chan, "Ethical Extensionism under Uncertainty of Sentience," 339–40.

Lockwood says that it seems difficult to justify killing *millions* of insects to prevent cosmetic damage to food.[22] And, as we saw, the number of small animals is a core premise in Warren's argument regarding the practical implications of sentientism for farming.

1.1.5. *Focus on actions vs. character*

Almost all authors cited so far focus on how we should act with respect to small animals rather than what character traits we should have. The exceptions are two articles that discuss both actions and attitudes. Lockwood explains his rationale for why he insisted that his students anesthetized insects as follows:

> My rationale is two-fold.
>
> First, it seems ethically obligatory to guard against the possibility that insects feel pain....
>
> Second, I think that treating insects as if they can experience pain cultivates an attitude of respect toward living organisms. And this seems like a good thing. We learn the methods of dissection through practices—and we also learn virtues such as compassion through practice.[23]

Eisemann and colleagues also discuss both actions and attitudes.

> We consider that the experimental biologist would be advized to follow, whenever feasible, Wigglesworth's recommendation that insects have their nervous systems inactivated prior to traumatizing manipulation. This procedure not only facilitates handling, but also guards against the remaining possibility of pain infliction and, equally important, helps to preserve in the experimenter an appropriately respectful attitude towards living organisms whose physiology, though different, and perhaps simpler than our own, is as yet far from completely understood.[24]

An alternative approach is that of Bernard Rollin, who discusses insects briefly in a response to the question 'where do you draw the line?' (regarding our moral concerns). His position is that all beings with "sufficient awareness that its needs matter to it" have moral status.[25] The ability to feel pain would be sufficient for having this feature and he says that there is no reason to think that plants, bacteria, viruses, and cells in cultures have moral status.[26] Regarding where to draw the line in between these paradigm cases, he says:

> Am I seriously saying that one ought not to swat flies or kill germs? No … What I am suggestion is that harming anything—perhaps even an insect—does involve making a

[22] Lockwood, "The Moral Standing of Insects," 86.
[23] OUPblog, "Do Bugs Feel Pain?"
[24] Eisemann et al., "Do Insects Feel Pain?" 167.
[25] Rollin, *Animal Rights and Human Morality*, 104.
[26] Ibid.

> moral decision and does demand moral justification and the giving of moral reasons. It is not difficult to come up with a moral justification for killing parasitic organisms that make us ill. I would be prepared to argue that harming anything for absolutely no defensible reason is always wrong, even crushing an insect. Most of us who swat flies, for example, would be prepared to argue for that on morally relevant grounds. One swats flies because they carry disease, or bite, or something of the sort.[27]

An approach that focuses on virtues in terms of what sort of attitude of concern a "good person" should have, and that includes the concern that small animals may be sentient, could be similar to that of Nobel Peace Prize laureate Albert Schweitzer, who was a virtue ethically oriented early biocentrist, but my approach would have a focus on sentient beings rather than all life.

1.2. Thesis structure

The research question for my thesis is:

> *What is the moral significance of the uncertainty about small animals' moral status, within a sentientist ethical framework?*

I will focus on two subquestions: (1) In what way should we take small beings into moral consideration (actions vs. virtues)? (2) How much, if at all, should we take them into moral consideration?

My thesis regarding the first question is that one can at least say that we should take small beings into consideration in the sense that we should have character traits that would manifest themselves in some situations that involve consideration of the interests of small animals. That is, one can at least say that a morally decent (or virtuous) person considers small animals in a morally relevant way, *pays attention* to them as morally considerable beings, allows them to affect her moral psychological life, and is *cautious* in the sense that she takes into account that they *may* be sentient, and acts and reacts accordingly.

Regarding the second question, my thesis is that if a person has or develops the character traits just described, there are a *large* number of *practically relevant* cases in which a morally decent (or virtuous) person will consider small animals in these ways, and that the general effect of developing these virtues (if she does not already have them) on her moral psychology would plausibly be *substantial*. I will mostly leave it open how she should act in particular situations, especially in complex situations.

In section 2 I will describe the status of knowledge about small animal sentience. I will discuss both *whether* they are sentient and, if they are, *to what degree*. To do so I will look at both philosophical and scientific arguments. Section 3 is about whether or not the risk that small animals are sentient is a *de minimis* risk. A *de minimis* risk is a risk that is too small to be concerned with. Section 4 goes into the moral importance of the very large numbers of small

[27] Ibid., 130.

animals. Section 5 deals with the claim that being cautious regarding small animals because they *may* be sentient involves the risk that they are *not* sentient, in which case we would have wasted resources paying attention to them and have foregone benefits that we might have gained had we used them without concern for their wellbeing. This section concludes that making general claims about how high costs we should bear to avoid harming (or benefiting) small animals is difficult (except in the most simple cases) because of the uncertainties and complexities dealt with in sections 2 to 5. Another way to say something informative is to focus on our character traits instead of our actions. Section 6 probes the idea of a case for the moral importance of small animals based on what character traits we should have. Finally, section 7 concludes the thesis and outlines some possible wider implications of the argument pursued.

2. The status of knowledge about small animal sentience

Much of the discussion of small animal sentience centers on questions such as "do insects feel pain?" the most common answers to which are framed in a binary manner, of the kind 'yes' or 'no,' 'probably' or 'probably not,' and so on. Moreover, some of the discussion also brings up whether these states are severe enough to have practical moral significance. For example, Lockwood says that the pain that we may cause needs to be "nontrivial" for us to take it into consideration.[28] He also speaks of insects potentially being "in agony," and that what we do to them may be "horrendous" moral mistakes, a claim to moral considerability that plausibly cannot be based only on the possibility of very mild pains. I will start by looking at the state of knowledge about whether or not small animals have morally relevant mental states at all. Then I will turn to the question about how intense or severe those possible mental states are.

First I will distinguish between different concepts related to negative mental states. *Nociception* is, according to one definition, the ability to sense adverse stimuli, for example heat; or more precisely "the neural processes of encoding and processing noxious stimuli."[29] Nociception is often considered insufficient as a proof of sentientist moral status since this ability may be present as a mere stimulus-response pattern without any central processing or feeling. In contrast, conscious pain is usually considered to be morally relevant and to have a subjective phenomenal feel. Degrazia and Rowan illustrate: "a paraplegic whose foot touches a hot iron will not feel anything, due to his spinal cord's being severed, yet will withdraw the foot from the iron. This is a clear case of nociception without pain."[30] Although pain is usually considered to be conscious, Peter Carruthers argues that there can be unconscious pain.[31] Suffering is commonly considered to be a different concept than pain that can be the result of, or take the form of, a variety of mental states such as pain, anxiety, and fear.[32] Again, Carruthers stands out by arguing that one can actually *suffer* without phenomenal consciousness, without the mental state having

[28] The Moral Standing of Insects, 83.
[29] Elwood, "Pain and Suffering in Invertebrates?" 175.
[30] Degrazia and Rowan, "Pain, Suffering, and Anxiety in Animals and Humans," 195.
[31] Carruthers, "Suffering Without Subjectivity."
[32] Degrazia and Rowan, "Pain, Suffering, and Anxiety in Animals and Humans."

any subjective feel or qualia.[33] One difference between pain and suffering is that a being can be in pain without suffering, for example when the pain is mild, such as if we pinch ourselves. I will leave it open whether the morally relevant issue is whether or not insects can have mental states that also have certain hedonic qualities or whether they have preferences that can be frustrated without this necessarily involving any kind of subjective feeling.

I will now turn to the question of how we can determine whether or not nonhuman animals have or can have morally relevant mental states. Colin Allen distinguishes two approaches to defend the idea that animals have various experiences such as conscious pain: the *inferential* and the *non-inferential*.[34] The non-inferential approach takes it as a given starting point that animals such as dogs are conscious, similarly to how we can assume that other humans are conscious without inferring it from a range of scientific evidence. Even if the non-inferential approach would be plausible in the case of dogs, it is less helpful in the case of insects where it is not obvious whether they can have the relevant mental states. In contrast, the inferential approach usually involves pointing to analogies between humans and animals; that is: "correlating conscious experience in humans with a property (or set of properties) P, and arguing by analogy that other animals possessing P are also conscious in the relevant sense."[35] There are three kinds of such analogies or evidence that are used to infer whether a being can have mental states such as feeling pain.[36] (i) *Physiological*: This includes characteristics of the nervous system and the presence of natural opioids and other analgesics. (ii) *Behavioral*: Including learning to avoid a harmful stimuli, grooming an injured body part, and trading off one motivation against another. (iii) *Evolutionary*: One kind of evolutionary argument is to point to evolutionary continuity; that is, that the closer two beings are to each other on the evolutionary tree, the more likely they are to possess similar mental features. Another kind of evolutionary argument that is used to infer, for example, conscious feelings of pain, is the idea that such feelings have an evolutionary adaptive function. That is, that the ability to feel pain provides an evolutionary adaptive advantage. Being able to sense and react to harmful stimuli is undoubtedly an adaptive advantage in many cases; the challenge is to determine whether and when conscious feelings of pain, or other morally relevant mental states, are needed for the adaptive advantage, as opposed to other neural mechanisms that are not (as) morally relevant.

To illustrate this inferential approach, let me briefly mention some examples of how the approach has been used in the discussion about whether or not fish can have various mental states. A claim of the physiological kind is that fish lack neural structures which, according to the claim, are required for pain and suffering.[37] Colin replies that "to say that these mammalian structures are required for pain is, of course, to beg an important question. Even if neocortical structures are required for mammalian pain experiences, it does not follow that they are required

[33] Carruthers, "Suffering Without Subjectivity."
[34] Allen, "Animal Pain," 621.
[35] Ibid.
[36] My summary is based on Elwood, "Pain and Suffering in Invertebrates;" Animal Ethics, "Criteria for Recognizing Sentience;" and Allen, "Animal Pain."
[37] Rose, "The Neurobehavioral Nature of Fishes," 33.

for fish."[38] Behavioral evidence includes an experiment by Victoria Braithwaite and colleagues which found that trout that had vinegar injected on their mouth rubbed them against their tanks. Braithwaite writes that

> several of the fish treated with vinegar rubbed their snouts on the glass walls or on the gravel at the bottom of the tank. It seemed that the stinging action of the acidic vinegar was irritating in the fish's snout. Rubbing it against the tank walls or the gravel might be their way of trying to relive the irritation. We humans often respond to the nip and sting of vinegar or lemon juice in an open cut by pressing or rubbing the affected area.[39]

Let me leave this illustration that focuses on fish and turn back to the method for inferring mental states in nonhuman animals in general. Allen presents arguments against both the non-inferential and the inferential approach. One objection to the inferential approach is that "for every similarity between the behavior or neurology of humans and other nonhuman animals, there is a dissimilarity that can be used to deny the inference to conscious pain in nonhuman."[40] He concludes that we are currently forced to rely on weak evidence when trying to determine which animals can suffer conscious pain.

> For the very real and practical problem of determining which animals suffer conscious pain, neither the inferential approach thus far articulated, nor the non-inferential approach is adequate. In the absence of a much more advanced neuroscience (and possibly even in its eventual presence) we are forced to make inferences about animal pain on the basis of various similarities and dissimilarities of unknown and unspecified significance, between animal behavior and neurology, on the one hand, and human behavior and neurology on the other.[41]

But Allen also notes (in the context of fish) that the ethical questions related to animals need to be dealt with despite weaknesses in the relevant evidence.

> When it comes to ethical questions concerning fish welfare, standards of evidence may be different for practical philosophy versus theoretical philosophy or science. Practical ethics cannot wait for all the relevant aspects of every species of fish to be scientifically investigated, but must also be wary of the dangers of overreaching... Theoretical philosophers and scientists can afford to be more cautious and skeptical of claims about fish cognition and consciousness.[42]

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[38] Colin, "Fish Cognition and Consciousness," 34.
[39] Braithwaite, *Do Fish Feel Pain?* 63.
[40] Allen, "Animal Pain," 622.
[41] Ibid., 625.
[42] Allen, "Fish Cognition and Consciousness," 36.

When I now turn to the concrete arguments and evidence regarding small animal sentience, I do so from the ethical point of view. I am interested in whether or not and to what extent these findings support the idea that we should assign moral importance to small animals.

2.1. Philosophical arguments

The philosophers Peter Carruthers and Michael Tye have both written on consciousness in small animals and the moral importance of their mental states. Carruthers argues that many insects and spiders possess a psychology that makes them *appropriate* objects of moral concern.[43] As a matter of moral theory, he argues on contractualist grounds that moral concern is not morally *required* (neither for insects nor for vertebrates such as dogs or horses). But he says that preference utilitarians will have difficulties avoiding the conclusion that sympathy is owed to some invertebrates (such as insects and spiders). He writes:

> I have argued that many species of insect and spider possess a kind of belief-desire-planning psychology, realistically construed; and that this psychology is of a sort to make them appropriate (in the sense of ‘‘possible’’) objects of sympathy and moral concern. But does it follow from this that we are *required* to have sympathy for them? No.... That will be something for moral theory to decide....
>
> Those who accept some form of utilitarian theoretical framework, in which the basic moral currency consists of frustrations and satisfactions of desires and preferences, will find it difficult to resist the conclusion that sympathy is owed to at least some invertebrates, just as it is owed to other human beings.[44]

A key question when assessing his argument is whether this belief-desire-planning psychology that Carruthers argues that many insects and spiders possess is enough for moral status within a sentientist framework. For example, and in contrast, R. G. Frey argues that not even animals such as dogs have interests in the sense of wants (encompassing desires) that can be unsatisfied. He believes that animals cannot have desires because he doubts that they can have beliefs, in part because they lack language.[45]

Tye says about phenomenal consciousness that “we are now in a position to determine in general terms where, on the phylogenetic scale, consciousness disappears... Honey bees, I shall argue, are conscious, as are fish; amoeba are not.”[46] But he writes that this has no strong ethical implications because “whether or not simple creatures feel pain, without the power to introspect, they do not suffer.”[47] In his view, “suffering requires the cognitive awareness of pain.”[48] He appears to be saying that pain without suffering matters less morally than suffering does. But it is

[43] Carruthers, “Invertebrate Minds.”
[44] Ibid., 292, 294, 295.
[45] Frey, “Rights, Interests, Desires and Beliefs.”
[46] Tye, “The Problem of Simple Minds,” 289–90.
[47] Ibid., 311.
[48] Ibid., 310.

unclear whether he means that pain without cognitive awareness is completely morally insignificant, which would be a controversial claim. He also leaves open the question of how to assess mental states of pain of which the subject is *aware,* in that they possess hedonic quality, but of which the subject is not *cognitively* aware, or cannot introspect upon. In section 3, I will return to this question: if small animals are able to have morally relevant mental states from a sentientist point of view, how intense or strong are they? [49]

2.2. Scientific arguments

Let us now turn to scientific studies of insects' nervous system, behavior, etc. A large part of the literature on the possible mental states of insects appears to be about whether or not they can feel pain. Some scientific literature addresses insect emotions: Bateson and colleagues suggest that agitated bees harbour a pessimistic cognitive bias of a kind, similar to what has been documented in humans, other mammals, and birds: they show a tendency to respond to negative feelings by behaving as if expecting worse outcomes. The authors say that this finding "suggests that honeybees could be regarded as exhibiting emotions."[50] Such daring hypotheses go beyond what needs to be considered in the present essay, since the absence of emotions is compatible with the presence of sentientist morally relevant mental states.

Evidence in favour of the more modest notion of insect pain includes findings about their neural systems. A criterion often held to be necessary (but less likely to be sufficient) for experiencing pain is that an animal should have a nociceptive system so that it can detect and respond to aversive stimuli.[51] Elwood puts it thus:

> Because pain experience associated with tissue damage typically depends on nociception, a lack of nociceptors would suggest that the animal was insensitive to noxious stimuli and could not experience pain.... However ... the presence of nociceptors per se does not demonstrate that pain is experienced.[52]

Nociceptors have been found in a number of invertebrates such as fruit flies, sea anemones, segmented worms, and snails.[53] The information registered by the nociceptors would then need to be processed for there to be an actual pain experiences, producing a behavioural response indicative of such an experience. According to Sneddon and colleagues "there is evidence that nociceptive information reaches higher learning centres in the insect brain," referring to studies

[49] Other philosophical works on the minds of small animals include Allen-Hermanson, "Insects and the Problem of Simple Minds;" and Huebner, "Minimal Minds."
[50] Bateson et al., "Agitated Honeybees," 1070. Giurfa, "Cognition With Few Neurons," provides an alternative explanation of the findings that does not involve a pessimistic bias.
[51] Sneddon et al., "Defining and Assessing Animal Pain," 203; and Elwood, "Pain and Suffering in Invertebrates," 175.
[52] Elwood, "Pain and Suffering in Invertebrates," 177.
[53] Ibid.

of fruit flies.[54] Although "how nociceptive information is processed within the insect central nervous system remains almost entirely unknown."[55] Opioids have a pain relieving effect in humans and studies have been conducted on whether they have a similar effect in insects. There is some "evidence that opioids works as analgesics in cockroaches,"[56] as morphine made cockroaches stay longer under a hot camera.[57] Less aversion to heat in response to analgesics have also been found in fruit flies.

> In one ... study, fruit flies placed in a tube at the darker side of a light gradient moved toward the light. If the center of the tube was heated, however, the flies were inhibited from passing this section. The application of specific analgesics … that are effective analgesics in hot plate tests in rats ... reduced this inhibition and the flies passed through the heat to the lighter area."[58]

Evidence from behavior includes apparent learning to avoid aversive stimuli. The idea is that an immediate reaction to aversive stimuli could more easily be explained by "mechanical" nociception without any feeling of pain. In contrast, long-term development of avoidance patterns indicating a learning process may indicate that the being has experienced a motivational affective state that it somehow remembers, accumulating a body of experience which makes it avoid harmful situations in the future. Although observations of such apparent long-term learning patterns *may* indicate that the being has positive or negative feelings, the pattern by itself is compatible with a mechanical system that does *not* involve any feeling of pain,[59] which supports the idea that his kind of evidence is suggestive but not decisive. The evidence includes that fruit flies, bees, and locusts can learn that different stimuli predict different punishments: for instance, fruit flies learned to avoid an odor that preceded or accompanied an electric shock. [60]

Another type of behavioral evidence for small animal sentience is evidence of cognitive ability. The presence of certain cognitive abilities may indicate that an animal has evolutionary use for conscious feelings of pain. For example, if an animal has rudimentary cognitive abilities, it may not notice similarities between harmful situations and so will not learn to avoid them in the future. Evidence of such cognitive abilities in small animals include the finding that "honeybees can learn a complex learning task in which they have to select from previously

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[54] Quote from Sneddon et al., "Defining and Assessing Animal Pain," 208, referring to Waddell, "Reinforcement Signalling in Drosophila."
[55] Sneddon et al., "Defining and Assessing Animal Pain," 208.
[56] Quote from Sneddon et al., "Defining and Assessing Animal Pain," 204, referring to Gritsai et al, "Effects of Peptide and Non-peptide Opioids on Protective Reaction of the Cockroach."
[57] Gritsai et al, "Effects of Peptide and Non-peptide Opioids."
[58] Elwood, "Pain and Suffering in Invertebrates," 178.
[59] Ibid., 202.
[60] For fruit flies, see Yarali et al., "'Pain Relief' Learning in Fruit Flies;" and Tully and Quinn, "Classical Conditioning." Honeybees can learn to extend their sting in response to an odor paired with electric shock, see Vergoz et al. "Aversive Learning in Honeybees." Locust can learn to avoid odors associated with the consequences of eating toxic food, see Simões, Ott, and Niven, "A Long-Latency Aversive Learning Mechanism."

unseen shapes on the basis of whether they are symmetrical or not."[61] Hunting spiders appear to plan routes that at first take them away from their prey.[62]

Despite a growing number of studies of the type just exemplified on insect minds, there is still relatively little information related to the *ethical* issue at hand. For example, Sneddon and colleagues list 17 specific criteria for inferring pain perception and compare how insects and other animal groups fare based on current knowledge.[63] For 8 of the criteria, at least one species of insect satisfy them. For 2, no insect does, and for the remaining 7 current evidence is inconclusive.

My takeaway from this body of literature is similar to that of several others in that the best available evidence supports uncertainty, but that this is compatible with a non-negligible likelihood that small animals have an ability to have morally relevant mental states. But what extent or degree of sentience has thereby been demonstrated to be a possible feature of small animals?[64]

2.3. If small animals are sentient, *to what degree* are they sentient?

If small animals are able to have morally relevant mental states from a sentientist point of view, how intense or strong are they? As a simple example, if small animals suffer, *how much* do they suffer? From a hedonist perspective, we could think of the question as asking about the number of hedons per experience unit. Related to other ideas of sentience it may be understood differently; such as the intensity of desires in terms of how much aversion they imply. There is an ongoing debate about whether animals' sentience-relevant mental states have less magnitude, intensity, or severity than humans'.[65]

Let me start by considering three philosophers— Daniel Dennett, Michael Tye, and Robert Hanna—who have claimed that suffering requires a level of mental sophistication that implies that many animals cannot suffer, or at least that they suffer less than adult humans. Although only Tye speaks explicitly of small animals (and he says that they cannot suffer), my impression is that Dennett and Hanna would also say that small animals cannot suffer. Dennett has claimed that animals probably have a more limited capacity in terms of the possible (types of) mental states they might possess: "the capacity to suffer is a function of the capacity to have articulated, wide-ranging, highly discriminative desires, expectations, and other sophisticated mental states."[66] So although a horse and a dog can suffer, they suffer less and can be in a less variable

[61] Elwood, "Pain and Suffering in Invertebrates," 181.
[62] Ibid.
[63] Sneddon et al., "Defining and Assessing Animal Pain," 204, Table 2. The criteria are: nociceptors; pathways to CNS; central processing in brain; receptors for analgesic drugs; physiological responses; movement away from noxious stimuli; behavioural changes from norm; protective behaviour; responses reduced by analgesic drugs; self-administration of analgesia; responses with high priority over other stimuli; pay cost to access analgesia; altered behavioural choices/preferences; relief learning; rubbing, limping or guarding; paying a cost to avoid stimulus; and trade-offs with other requirements.
[64] Other scientific articles on small animal sentience include Sherwin, "Can Invertebrates Suffer?" and Mason, "Invertebrate Welfare."
[65] See Akhtar, "Animal Pain and Welfare."
[66] Dennett, *Consciousness Explained*, 449.

collection of states of suffering than humans, according to Dennett.[67] I discussed Tye's views in the previous section. To recapitulate, he says that "the evidence strongly suggests that some insects are phenomenally conscious" but that they do not suffer since "suffering requires the cognitive awareness of pain".[68] Similarly, Robert Hanna says that

> *only persons* can suffer. This is because suffering requires an emotional complexity that is characteristic of all and only persons. Briefly put, all and only persons are capable of *higher-order or self-conscious volitional pain, or suffering*--pain that essentially expresses a self-conscious animal's frustrated or despairing sense of the inner or outer limits of its own intentional agency--and a capacity for having higher-order or self-conscious volitional states is at least a necessary condition of personhood and perhaps also a sufficient condition of personhood.[69]

As I understand Hanna, the nonhuman animals that he counts as *persons* include "apes (and possibly other primates, as well as whales and dolphins)" but he says that the "time and energy spent morally worrying about ... bats, cats, dogs, horses, cows, etc. ... are probably wasted time and energy."[70]

I noted in the last section that Tye appears to leave open the question of how to assess pain of which the subject is not *cognitively* aware. It seems that a similar comment can be made about what Dennett and Hanna say. For example, even if Hanna is right that only persons can suffer, it still appears to be an open question whether the mental states of animals who are not persons are of stronger, weaker, or the same magnitude, intensity, or severity as those of animals who are persons. That is, even if an animal cannot suffer, the pain that it feels need not be less intense or severe (or a less bad mental state) for that animal than what severe pain is for an animal that can suffer.

So let me move on to the question of whether or not (and if so to what extent) mental states such as feelings of pain are more severe for humans than for nonhuman animals. Some of the traditional arguments for the lesser significance or insignificance of animal pain is that animals cannot anticipate or remember pain (to the extent that humans can). Bernard Rollin argues at length against such claims.[71] He says, among other things,

> In terms of countering the pernicious moral power of the claim that animals can't anticipate and remember pain and that therefore their pain is insignificant, the most relevant point has little to do with the presence or absence of concepts. It comes rather from the following insight: That if animals are indeed, as the above argument suggests, inexorably locked into what is happening in the here and now, we are all the more

[67] Ibid., 449–50.
[68] Tye, "The Problem of Simple Minds," 309–10.
[69] Hanna, "What Is It Like To Be a Bat in Pain?", section "III. Pain and Suffering."
[70] Ibid., section "IV. Animals, Individuals, and Persons."
[71] Rollin, *The Unheeded Cry*, chap. 6.

> obliged to try to relieve their suffering, since themselves cannot look forward to or anticipate its cessation, or even remember, however dimly, its absence. If they are in pain, their whole universe is pain; there is no horizon; they are their pain. So, if the argument is indeed correct, then animal pain is terrible to contemplate, for the dark universe of animals logically cannot tolerate any glimmer of hope within its borders.[72]

Similarly, Peter Singer points out that a lack of understanding can make suffering worse and takes the example that we can explain to war prisoners that they will not be harmed and eventually set free, but when we capture a wild animal it cannot distinguish the capture from an attempt to kill it.[73] On the other hand, as has been pointed out by others, such cognitive abilities can also sometimes make a mental state worse, for example when one anticipates that a situation will become worse. For example, Donald Broom writes,

> For some sentient animals, pain can be especially disturbing on some occasions, because the individual concerned uses its sophisticated brain to appreciate that such pain indicates a major risk. However, more sophisticated brain processing will also provide better opportunities for coping with some problems. For example, humans may have means of dealing with pain that fish do not, and may suffer less from pain because they are able to rationalize that it will not last for long. Therefore, in some circumstances, humans who experience a particular pain might suffer more than fish, while in other circumstances a certain degree of pain may cause worse welfare in fish than in humans.[74]

I conclude tentatively and similarly to Broom that we cannot conclude that experiences such as being too hot are worse in general for a human than for an animal; we can only conclude that it varies depending on the situation.

Peter Vallentyne presents a reason for why mice would have less capacity for pain and pleasure than humans. He says that

> the typical human capacity for pain and pleasure is no less than that of mice, and presumably much greater, since we have, it seems plausible, more of the relevant sorts of neurons, neurotransmitters, receptors, etc.[75]

This is highly relevant to small animals because their brains are so small and contain many times less neurons, neurotransmitters, receptors, etc. than the brains of humans and mice. The following is a (non-decisive) reason to think that if small animals can have negative mental states, then those mental states are more comparable to the severity of human mental states than

[72] Ibid., 144.
[73] Singer, *Practical Ethics*.
[74] Broom, *Sentience and Animal Welfare*, 118.
[75] Vallentyne, "Of Mice and Men," 406.

what is commonly assumed.[76] As I discussed in the previous section, one way to infer feelings of pain in other beings is to assess whether feeling pain would be an evolutionary advantage for that being. Assuming that mental states such as pain have a subjective feel, and that an evolutionary function of such a feel is to motivate the insect to avoid harms, it would then appear plausible that a feeling that is felt very weakly may not motivate the small animal enough to avoid harms. That is, if the feelings are to have a strong motivational force, they would seemingly need to be strongly felt.

My overall conclusion is that there is very high uncertainty about the magnitude and moral importance of small animals' negative mental states, given the assumption that they do have such states. However, this uncertainty is not of a sort that in any serious way undermines the uncertainty described at the end of the previous section (2.2). Thus, the claim that there exists a non-negligible likelihood of small animals having an ability to have morally relevant mental states stands untouched. If anything, it is being further warranted.

3. Is the risk that small animals are sentient a *de minimis* risk?

Does the uncertainty just described support any sort of *practical* moral conclusion? Even if we would grant the idea that mere risks of adverse outcomes may create precautionary responsibilities, it may be claimed that this holds only if the uncertainty is substantial enough, or if the risk meets certain minimal criteria. One classic such objection is the claim that, although there certainly is a *possibility* of small animals being capable of having morally relevant mental states, this is still so *improbable* that that we can ignore the uncertainty in practice. Risks that may thus be overlooked because they are too improbable are called '*de minimis* risks,' and the objection here would be that the risk that small animals are sentient is a *de minimis* risk.[77] The standard argument for *de minimis* limits is that we need to set a limit to how unlikely an event must be for it to be excluded from decision-making, otherwise the cost of making the decisions would become too high.[78] Without some kind of limitation, we would need to consider that *everything* that we do *may* produce an undesirable outcome.[79] There is a debate about the use of *de minimis* limits and a number of objections have been made against it. One objection is that they focus too much on the probability side of risk while ignoring the severity of the potential outcome.[80] This seems to be a decisive objection against any general formulation of *de minimis* that includes only likelihoods and ignores the severity of the outcome. A solution is to broaden the idea of *de minimis* to include the combination of the likelihood and the value of the outcome.[81] That is, the combination of the likelihood and the values at stake needs to be sufficiently great for us to include it in our decision making. A sufficiently low likelihood of an extremely bad

[76] I am grateful to Oscar Horta for pointing out this kind of argument.
[77] Peterson, "What Is a *de Minimis* Risk?"
[78] Munthe, *Price of Precaution*, 25.
[79] Ibid., 24.
[80] Ibid.
[81] Ibid., 24–25.

outcome can be negligible and so can a high likelihood of an outcome of minor importance. So the question becomes, can we in practice ignore that small animals may be sentient on this basis?

I have already said that *de minimis* limits are meant to prevent the cost of making decisions from becoming too high. One thing that needs to be specified is what it means for a decision cost to be 'too high.' According to Christian Munthe, the standard reply in the context of *de minimis* is that "what is to count as unacceptably high decision costs is determined by standard rules of rational decision making, such as the principle of maximizing expected utility."[82] Another reply is to refer to a precautionary principle, similar to the one employed in the outlined argument in section 1.1.1, which is less clearly linked to the idea of maximizing expected utility. Munthe describes how the decision cost would be assessed from the perspective of precautionary reasoning.

> ...from the point of view of the requirement of precaution, what is to count as decision costs and what determines whether or not these are too high in a particular case, would have to be determined by considerations regarding whether or not paying these costs goes against the spirit of the requirement – i.e. the more general idea of the desirability of precaution expressed by it.[83]

To summarize, from the perspective of maximizing expected utility we should ignore the risk that small animals may be sentient when doing so would maximize expected utility. From the perspective of precaution, we should ignore the risk when ignoring it is compatible with the requirement of precaution. Irrespective of which perspective you take, the problem remains that of deciding when certain decision costs become too high to bear. The problem comes back to the general question of *how* high costs we should bear in light of the possibility that small animals may be sentient, including but not limited to decision costs. I will continue this discussion about how high costs we should bear to guard against the possibility that small animals may be sentient in section 5; but first, I will in the next section consider the moral importance of the number of small animals, which could affect the plausibility of the claim that the risk that small animals are sentient is a *de minimis* risk.

4. The importance of the number of small animals

As I mentioned in the introduction, several of the arguments for the moral importance of small beings point to the large number of small beings as a reason for taking the idea of their possible moral importance seriously.[84]

But some say that the number of individuals affected in morally important ways does not matter morally and, on such a view, considerations regarding the number of small animals would be irrelevant for the question addressed in the present thesis. I will briefly describe some such

[82] Ibid., 26.
[83] Ibid.
[84] Lockwood, "The Moral Standing of Insects;" Horta, "Disvalue in Nature and Intervention;" Chan, "Ethical Extensionism under Uncertainty of Sentience;" and Warren, *Moral Status*.

views and then move on and discuss small animals under the assumption that numbers do matter. John Taurek would flip a coin if faced with a choice to save either one or fifty people.[85] Tom Regan discusses a lifeboat case in which "four normal, adult humans and a dog will all die unless one of the humans sacrifices his life, or one of the humans or the dog is thrown overboard."[86] He does not believe that it would be wrong to throw the dog overboard and says that in such a case, "numbers make no difference…. It would not be wrong to cast a million dogs overboard to save the four human survivors."[87] Todd Calder argues that it is a *prima facie* challenge for Kantian moral theories to account for degrees of wrongness, for example because it is not obvious that an act can be more or less prohibited by the categorical imperative.[88] R. G. Frey writes the following about views that do not distinguish among degrees of wrongness.

> Among many deontologists, for example, Catholic moral theologians, the moral difference view has almost always gone hand-in-glove with the view that some acts are intrinsically (or nonconsequentially) wrong. The source of such a list of acts, and why that source should be taken as authoritative, can clearly be matters of controversy; but even more controversial has been the inclusion of certain kinds of acts (idolatry, blasphemy, masturbation, for example) on that list. There cannot be degrees of wrongness with intrinsically wrong acts, so murder and masturbation are equally wrong.[89]

And according to Martin Peterson, "Nozick would claim that violating a right is infinitely worse than not violating a right, and Kantians would make the same point about the moral difference between lying and not lying."[90] If violating one right and lying is infinitely morally bad (or infinitely worse than not doing it), it may not be worse to violate more rights or lie to more individuals. There are thus strong traditions in ethical theory that deny the relevance of the number of affected parties for moral judgement. If some such tradition is taken to be the basis of the kind of argument from precaution set out in section 1.1.1, this seems to somewhat strengthen the case for the idea that the uncertainty regarding the moral status of small animals is *de minimis* and thus a negligible risk (the uncertainty is both substantial and the practical stakes are not very high, since numbers do not count). Or, it might be that the argument becomes immensely strong, since any negative effect on small animals is an infinite moral sin, cancelling the permissibility of any human activity posing risks of such effects.

However, there are also strong traditions in ethical theory *affirming* the notion of the number of affected parties being relevant for moral judgement. So if the argument scrutinized in this thesis is assumed to be based on any of these, it would seem to gain credibility from a *de minimis*

[85] Taurek, "Should the Numbers Count?"
[86] Regan, "The Dog in the Lifeboat."
[87] Ibid.
[88] Calder, "Kant and Degrees of Wrongness."
[89] Frey, "Intention, Foresight, and Killing," 78n3.
[90] Peterson, "A Royal Road to Consequentialism?" 10.

standpoint. This is in itself an interesting observation, but since my aim here is to develop as strong a version as possible of the argument for the moral significance of small animals, I will proceed on the assumption that numbers do matter morally, at least to some extent.

The number of small animals is staggering. Penny J. Gullan and Peter Cranston write that "some estimates … imply that the species richness of insects is so great that, to a near approximation, all organisms can be considered to be insects."[91] Although colorful, the quote is about species, and it is not the case that nearly all individual animals are insects. But it has still been estimated that the number of insects alive at any point in time is 10^{18} or 10^{19}.[92] Many of these are not as mentally sophisticated as bees, wasps, and ants, but even just the number of ants has been conservatively estimated at 10^{15} to 10^{16}.[93] That is, for each human on Earth there are about one hundred thousand to one million ants. And one could add to the count by including other small animals such as spiders and earthworms. When humans affect small animals negatively, for example through our consumption of animal products or by the agricultural practices mentioned by Warren (see section 1.1.3), we often do so to *very many* small animals at once.[94] If we eat a chicken, we may eat a part of one individual as a meal, but if we eat insects, we would eat many individuals. Another example is the killing of silk worms by heating in silk-production, where roughly 10,000 worms are needed to produce one sari dress.[95] These kinds of facts could greatly bolster the case for the moral importance of small animals for someone who cares about numbers.

A key challenge for pointing to the number of small animals to bolster the case for their moral importance is that there may be limits to how minor harms scale, and it is uncertain whether small animals are capable of suffering only minor harms. Several ethicists who accept that numbers matter have still maintained that no amount of minor harms can be as bad as, or outweigh, one sufficiently severe harm.[96] A supporting intuition is that even if all humans on Earth would, say, accidentally bump their foot into something, which would cause each person

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[91] Gullan and Cranston, *The Insects*, 2.

[92] Hölldobler and Wilson, *The Superorganism*, 5: "The number of insects alive on Earth at any given time has been calculated by ecologist Carrington Bonner Williams to be, to the nearest order of magnitude, 1 billion billion, or 10^{18}; see C.B. Williams, *Patterns in the Balance of Nature and Related Problems in Quantitative Ecology* (New York: Academic Press, 1964)." The Entomological Society of America says that according to Wilson, there are nearly 10^{19} insects: "How many insects are there in the world? And how many different species of insects are there? According to ESA member and Pulitzer Prize winner Dr. E.O. Wilson of Harvard University, there are nearly 10,000,000,000,000,000,000 (10 quintillion) insects in the world." (Entomological Society of America, "Frequently Asked Questions on Entomology.") The numbers 10^{18} and 10^{19} may refer partly to animals that are no longer classified as insects; in particular, springtails are tiny, extremely numerous organisms that used to be considered insects but are no longer. When they were considered insects, they were the most numerous insect (Hopkin, *Biology of the Springtails*, front flap).

[93] Hölldobler and Wilson, *The Superorganism*, 5.

[94] There is a debate on the moral difference between directly causing harm and being part of a harmful practice, such as by purchasing certain products. I assume here that being part of a harmful practice is morally similar to directly causing harm. However, this assumption and distinction is not essential to my thesis since even if one rejects the assumption, there are still many cases in which we as individuals harm small animals directly.

[95] Stancati, "Taking the Violence Out of Silk."

[96] See for example Temkin, "A Continuum Argument for Intransitivity;" Rachels, "Counterexamples to the Transitivity of Better Than;" and Carlson "Aggregating Harms."

temporary mild pain, it would intuitively not amount to a disaster even if it happened to a very large number or humans. Similarly, deliberately stepping on someone's foot and thereby causing temporary mild pain would not be a horrendous moral wrong even if one did it to billions or trillions of people.[97]

There are at least two possible replies to the challenge of scaling harms. The first is to argue that large numbers of minor harms can outweigh smaller numbers of severe harms. Alastair Norcross has argued for this proposal (albeit not in the context of small animals).[98] Another reply is to point to the possibility that small animals may be able to suffer great harms, not only minor harms. Such a reply would build on the philosophical and scientific arguments about the mental lives of small animals that I considered in section 2.

I conclude that there is a possibility that the number of small animals *may not* have that large moral importance. On the other hand, the uncertainty remains and the large number of small animals *may* bolster the case for their moral importance. It appears that the door for a precautionary argument of the kind sketched in section 1.1.1 for the moral importance of small animals is still open.

5. Precaution cuts both ways

A complication for precautionary arguments of the sort sketched in section 1.1.1 is a claim discussed by Sandin and colleagues: "cautiousness in one respect often leads to incautiousness in another."[99] An illustrative example can be taken from André Nollkaemper.

> Risk driven regulation of one industrial sector under one treaty can be a perfect implementation of the precautionary principle, but can also consume resources that cannot be spent on equal or more serious risks in other sectors.[100]

Another example can be taken from the web site of the American Council on Science and Health.

> If we act on all the remote possibilities in identifying causes of human disease, we will have less time, less money and fewer general resources left to deal with the real public health problems which confront us.[101]

According to Sandin and colleagues,

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[97] The example of stepping on a foot is influenced by Dennett's example: "When I step on your toe, causing a brief but definite (and definitely conscious) pain, I do you scant harm—typically none at all. The pain, though intense, is too brief to matter, and I have done no long-term damage to your foot.... The pain itself, as a brief, negatively-signed experience, is of vanishing moral significance." Dennett, *Kinds of Minds*, 166.

[98] Norcross, "Comparing Harms: Headaches and Human Lives."

[99] Sandin et al., "Five Charges," 292–93.

[100] Nollkaemper, "What You Risk Reveals What You Value," 91, quoted in Sandin et al., "Five Charges," 293.

[101] Whelan, "Can Too Much Safety Be Hazardous?" quoted in Sandin et al., "Five Charges," 293.

> the problem [depends] on the limited framing of the decision problem to which it is applied. When delineating a decision problem, one has to draw the line somewhere, and determine a 'horizon' for the decision (Toda, 1976). If the horizon is too narrow, then decisions will be recommended that are suboptimal in a wider perspective, and this applies irrespective of what decision rule is being used. If we apply expected utility maximization to, for instance, crop protection, seen as an isolated issue, then the decision with respect to pesticides may very well be different from what it would have been if we had applied the same decision rule to a more widely defined decision problem in which effects on nutrition and health are included. The same is true if we replace expected utility maximization by the precautionary principle, or, it might be added, any other decision rule.[102]

To avoid framing too narrowly the decision problem of the kind illustrated above, a precautionary argument of the kind sketched in section 1.1.1 would need to consider all (qualified) uncertainties and options in a decision situation. One would *not* need to consider *all* possible scenarios and *all* possible actions that we could take, since that would make the decision problem unmanageable. But one would need to consider *enough* of them. For example, one would need to consider the flipside of the uncertainty in question: what if small animals are not sentient? After all, small animals may not be sentient, in which case we will perhaps have wasted resources and attention on caring about them and may have foregone benefits that we perhaps could have gained by using them without any regard for their lives or for their quality of life.

To illustrate, it is not enough to make the case that the harms that wild small animals suffer in nature are morally important to establish the conclusion that we ought to take (or avoid) certain actions to benefit or avoid causing harm to wild small animals. One would also need to consider the scenario that the small animals are not sentient, and consider what else we could have spent that attention and those resources on instead, and make the case that the action that one is advocating is a superior choice, even considering all (qualified) uncertainties and actions.

In conclusion, while a precautionary argument of the sort sketched in section 1.1.1 may indeed consider the possibility that small animals have morally relevant negative mental states, it also needs to consider the opposite possibility. Thus, just as it is possible to formulate an argument for considering small animals, there seems to be a precautionary argument for ignoring them. This complicates the question of when the 'if the costs are sufficiently low' condition in the original argument is met (if it is ever met).

There still remains the challenge about what costs we should bear to guard against the possibility that small animals may be sentient, and whether any reasons to care remain when these costs have been taken into account. It seems that we can answer these questions well enough when the costs are arguably trivial, such as the costs of avoiding silk or the cost of using anesthesia (in at least some cases) before doing potentially painful research on small animals. For example, Lockwood says the following about why he made his students anesthetize insects

[102] Sandin et al., "Five Charges," 293.

before experimenting on them: "If we use anesthetic and it turns out that insects don't experience pain, the material cost of our mistake is very low (a few extra minutes to apply cold or carbon dioxide)."[103] But applying this type of reasoning becomes more complicated when we move beyond such simple cases. For instance, are we required not to walk about in nature due to the risk of stepping on (a great manifold of) small animals, or at least to choose our means of activities and transportation based partly on how many small animals we expect to harm? Should we avoid food that has been produced using insecticides, or perhaps at least select foods based partly on which insecticide was used and how painful we estimate it was? If Warren is right about the effects on regular agriculture (such as plowing a field), should we abolish most of our present farming practices? Are we required to spend substantial time and effort to advocate for more concern for small animals or rather for something else instead? Should we expend *any* resources to learn more about whether and to what extent small animals are sentient? How much time and resources should we spend making these kinds of decisions? None of the literature on the moral standing of small animals provides any rigorous answers to these questions.[104] And providing a method for assessing such actions appears complicated, given aspects such as the uncertainty of whether small animals are sentient or not, the uncertainty about to what degree they are sentient (if they are sentient), how much weight to give to the number of small animals, and the opportunity costs attached to all the many different ways of impacting them.

One way to get around this challenge while still being able to say something informative about the moral importance of small animals may be to focus on our character instead of on our actions. This is because a character trait of being disposed to consider the possible moral importance of small animals is fully compatible with that of considering other possibilities. The kind of argument sketched in section 1.1.1 would then have to be restated accordingly, for example, like this:

The character argument:

a) A morally decent (or virtuous) person has character traits that manifest themselves at least in the following way: if there are good enough reasons to believe that certain beings can have morally relevant negative mental states, then the person would pay moral attention to and consider such beings in relevant situations that involve such beings.
b) There are good enough reasons to believe that certain small animals can have morally relevant negative mental states.
c) Humans are sometimes in relevant situations that involve such small animals.
d) Thus, humans are sometimes in situations where a morally decent (or virtuous) person would pay at attention to and consider small animals.

[103] OUPblog, "Do Bugs Feel Pain?"
[104] To my knowledge, the most sophisticated attempt to provide a (partial) answer to a complicated question of this kind can be found in Tomasik, "Humane Insecticides," section "Lower-bound Calculation: Paying Farmers to Use Different Pesticides."

This character-focused restatement of the original kind of argument may capture important parts of what several of the authors in the literature on small animals seem to argue for. As we saw in section 1.1.5, both Lockwood and Eisemann and colleagues believe that an important effect of undertaking actions to guard against the possibility that insects may feel pain is that such actions cultivate or preserve a respectful attitude towards living organisms.

Based on this, then, I will use the next section to probe this idea of a case for the moral importance of small animals based on character rather than actions.

6. Character and small animals

In the previous section, I restated the kind of argument sketched in section 1.1.1 so that it focuses on our character rather than on our actions, and I named the restated argument *the character argument*. In this section, I will look closer at and defend premises (a) and (c) of *the character argument*; that is, the following premises:

a) A morally decent (or virtuous) person has character traits that manifest themselves at least in the following way: if there are good enough reasons to believe that certain beings can have morally relevant negative mental states, then the person would pay moral attention to and consider such beings in relevant situations that involve such beings.

c) Humans are sometimes in relevant situations that involve such small animals.

I will not discuss premise (b) here; that is, the premise that "there are good enough reasons to believe that certain small animals can have morally relevant negative mental states," because I already discussed the case for it in section 2.

Regarding (a), I will argue in this section that there are certain character traits that a morally decent (or virtuous) person has that are relevant to situations involving small animals in the way that premise (a) claims. I will then (later in this section) turn to the issue of 'relevant situations' which is a condition that figures in both premises (a) and (c). Premise (a) roughly says that a virtuous person pays attention to certain beings in 'relevant situations' and (c) roughly says that we are sometimes in such situations. But a key question is: What kinds of situations are *relevant* in this way? Are we ever in such situations in real life, and if so, are we in such situations, for example, 'sometimes but rarely' or 'almost daily?' I will return to these questions later in this section.

6.1 Caution and moral attention

Let me begin with premise (a). A number of potentially good character traits could be pointed to that are relevant to the issue of small animals. Virtue ethicists have pointed to virtues such as compassion and vices such as cruelty in the context of nonhuman animals, and argued that such traits can be manifested in our treatment of animals.[105] Although such virtues and vices may be

[105] Hursthouse, *Ethics, Humans, and Other Animals*, 154–55.

relevant to small animals, I would like to focus on two other character traits that appear especially important for the question of the moral importance of small animals, and premise (a) in particular: *caution* and *moral attention*.

I will start by explaining what I mean by 'caution' and 'moral attention.' To be cautious, as I understand the concept, is to have foresight and to be thoughtful, careful, thorough, meticulous, and considerate. Caution is opposed to traits with negative connotations such as incaution, rashness, and recklessness. To be morally attentive means, in my view, to be perceptive, receptive, open, aware, and alert when dealing with what is morally relevant in various situations. To be morally attentive one must take the serious seriously, one must care about what is worth caring about, and one must pay attention to what is morally relevant.

The suggestion that caution and moral attention are virtues can plausibly be defended from a variety of versions of virtue ethics, including virtue consequentialism. Let us first consider caution and look at an example from the Aristotelian tradition. According to J. O. Urmson, W. D. Ross suggests that Aristotle's account of bravery should be replaced with two dyads, one of which has caution as excellence (or virtue) and rashness as defect (or vice).[106] Urmson agrees with Ross that Aristotle's account of bravery is unsatisfactory but would prefer to replace it with two triads, one of which is over-caution (defect), caution (excellence), and rashness (defect).[107] Another example is that caution is seen as a virtue in Confucianism. According to Jiyun Wu and Richard E. Wokutch, Confucianism can be categorized as a virtue ethics, in which attaining the highest level of virtue involves achieving virtues such as "cautiousness in talking."[108] A final example comes from Per Sandin who said recently that cautiousness is a virtue in the context of the precautionary principle.[109]

Let me turn to moral attention. The importance of moral attention has been defended and discussed extensively by Simone Weil and Iris Murdoch. They use the term somewhat differently than I do, but there are still similarities between their uses and mine.[110] For example, Margaret G. Holland says that Weil's conception of moral attention involves "an effort to see clearly, and on its own terms, what is outside of oneself" and "being open and responsive,"[111] which is a part of how I understand moral attention. There are also similarities between my understanding of moral attention and that of Murdoch; for example, according to Holland, Murdoch believes that

[106] Urmson, "Aristotle's Doctrine of the Mean," 229.
[107] Ibid., 229–30.
[108] Wu and Wokutch, "Confusianism," 404.
[109] Sandin, "A New Virtue-Based Understanding of the Precautionary Principle." For a criticual discussion of (pre)caution as a virtue in the context of the precautionary principle, see Munthe, *Price of Precaution*, chap. 4.2.
[110] See Clarke, "Attention, Moral;" and Holland, "Moral Attention," which both focus on the writings of Weil and Murdoch.
[111] Holland, "Moral Attention," 1115.

> there is a strong tendency in human psychology to have one's vision guided by prejudice, egoistic concerns, conventional notions, and personal fantasy, moral attention requires struggling against these tendencies. [112]

According to Holland, "other philosophers have discussed related ideas" in the context of 'moral perception,' [113] and she says that the concept of moral perception can be traced to Aristotle's ethics. [114] Although I will use the term 'moral attention' I might as well have used the term 'moral perception' to describe the character trait that I have in mind. What I have in mind when I speak of moral attention is similar to how John Hacker-Wright describes moral attention. He ascribes both wider and more specific content to the term than I do, but the following part of his description of moral attention fits well with how I understand moral attention.

> At the depth of our character is our responsiveness to various elements of the world... This responsiveness is crucial to our moral success or failure, as it can lead to the sorts of tragic injustice found in the worst cases of racism and sexism.... Moral attention is a crucial moral component of our character because in order to manifest justice or caring, or appropriate courage, we must attend to the individuality of those around us, properly perceiving their needs and interests.... The struggle of a morally attentive person will not necessarily be a struggle with temptation, but, rather, a struggle against settled dispositions, particularly dispositions that shape what we find morally salient in a given situation…. Since attention may lead to transcending our prior views, a deficit of this trait qualifies our claim to virtue. In fact, the extreme state of the absence of moral attention means that one has no claim to virtue at all. After all, if one is oblivious to the actual needs and interests of others, and puts no effort into working out how properly to describe them, virtuous action is impossible.[115]

To summarize, there appears to be a tradition of agreement that at least the core of my understanding of moral attention, or something similar to it, is a virtue; a tradition including Aristotle, Weil, Murdoch, Hacker-Wright, and probably others such as Martha Nussbaum.[116] At least it is considered virtuous to be morally attentive (or perceptive) instead of morally unaware.

I have so far in this section tried to support the plausibility of premise (a); that is, the following premise:

a) A morally decent (or virtuous) person has character traits that manifest themselves at least in the following way: if there are good enough reasons to believe that certain beings

[112] Ibid., 1116.
[113] Ibid., 1115.
[114] Holland, "Moral Perception," 1137.
[115] Hacker-Wright, "Moral Status in Virtue Ethics."
[116] For an example of Nussbaum's view, see her "Finely Aware and Richly Responsible."

> can have morally relevant negative mental states, then the person would pay moral attention to and consider such beings in relevant situations that involve such beings.

I have tried to support the plausibility of (a) by noting that moral attention and caution can intuitively be seen as virtues, in contrast to vices such as moral obliviousness and recklessness, and by noting that moral attention and caution have been considered to be virtues by a variety of philosophical positions.

Assuming that I am right that caution and moral attention are virtues, the next question regarding (a) is whether or not these virtues would "manifest themselves," as (a) says will, so that "if there are good enough reasons to believe that certain beings can have morally relevant negative mental states, then the person would pay moral attention to and consider such beings in relevant situations that involve such beings?" An almost trivial answer seems to be 'yes, assuming that the (possibly only hypothetical) situation is *indeed relevant*.' To make progress, we need to get more specific about which situations are relevant. Are we ever in a relevant situation, where the virtues that I have discussed would manifest themselves in a way that involves small animals, and if so when are we in such situations and how often?

6.2 Relevant situations

To recapitulate, (c) says that "humans are sometimes in relevant situations that involve such small animals." One way to determine which situations are *relevant* is to discuss different concrete kinds of situations and to argue about which character traits are relevant to them and how they would manifest themselves given the aspects of the situation. One advantage of focusing on character (rather than actions) as I have done in this section is that one can make weaker claims that remain interesting and practically relevant but which avoid some of the challenging complexity of decision costs and opportunity costs that we ran into in earlier sections when we focused on actions. For example, it seems that we can make weaker claims of the kind that a person who is morally attentive and cautious would to some extent pay attention to small animals when walking outside. For example, when walking with my stroller in the street, I find it easy to pay attention to small animals so that if I see a worm or a snail, I make a small adjustment to the direction of the stroller to avoid running it over. We can leave it open whether a virtuous person would, for example, abstain completely from walking in the forest due to the higher risk of stepping on small animals. But we can at least say that a virtuous person would notice that her walks may cause small animals morally relevant negative mental states, and that she would consider this at least at some point in her life. But she may not, for example, be required to pay attention to small animals all the time during all of her forest walks, if she has previously concluded that walking in the forest is permissible despite the harm that it may cause.

Similarly, I would claim that a person who works with insecticides who possesses the virtues of moral attention and caution would *be attentive to* how the insecticides may affect the morally relevant mental states of small animals, and to be attentive to whether or not one type of insecticide is expected to be substantially less painful than others. Again, I need not make claims about the severity of the costs someone is required to bear to select an insecticide that is expected

to be less painful; I need only claim that a decent person would have the small animals' potential mental states on her moral radar in such situations.

It also seems that a virtuous person would be *attentive to* and *consider* causal chains of events, such as that which might begin with someone leaving crumbs on the floor and end with an exterminator killing hungry bugs, even though the person may in the end have good reasons not to act differently because of such chains. Another example of a what is plausibly a relevant kind of situation is that a decent person who is faced with the option of whether or not to eat small animals, would arguably notice and consider that the food would consist of beings that may be (or maybe were) sentient, and think of the choice as a moral one.

Regarding the issue of wild small animals suffering harms in nature not caused by humans, we may wonder whether a virtuous person would consider such harms in nature, and if so when and how? I believe that if one thinks (as I do) that a virtuous person would pay attention to and consider similar events that happen to humans, such as starvation, diseases, hurricanes, and tsunamis that are due to natural causes, there is a case for considering small animals in a comparable way (given that there are good enough reasons to believe that they can have morally relevant negative mental states). For example, assuming that a virtuous person would pay attention to and consider the fact that a tsunami has harmed thousands of humans, then there may or may not be actions that the person would take in light of attending to the tsunami victims. For example, the virtuous person may donate money to disaster relief work or decide that there is nothing that she can or should do for the victims. My point is that before deciding on whether or not to do anything for the tsunami victims, she would need to *register* that the tsunami victims are in a *serious* situation, and that *maybe* she ought to do something for them. Without *paying attention* to the tsunami victims, she would not even consider the situation as potentially serious or as involving a moral choice. Similarly, one could make the case that a virtuous person should pay attention to and take seriously the fact that similar events (diseases, starvation, etc.) happen to wild small animals in nature, which may cause them morally relevant negative mental states, even if the result is that the virtuous person decides to do nothing for them.

To wrap up and tie these examples to premises (a) and (c): Based on the just mentioned examples, I conclude that many humans are often in 'relevant situations' that involve small animals where the virtues of moral attention and caution should manifest themselves, at least in such a way that the person *takes in* and *considers* that small animals are morally relevant aspects of the situation (assuming that she has good enough reasons to believe that they can have morally relevant negative mental states). For example, I am almost daily in such relevant situations when I walk outside and when I consider how thoroughly I should clean my kitchen. Some people are more often in relevant situations than others. For example, someone whose work involves small animals would probably be in relevant situations more often than the ordinary person. Finally, for the person who does not already consider small animals in the way discussed in this section, it seems that doing so could cause a big change in her moral psychology.

In the next and last section of this thesis, I will conclude and be more speculative about what the implications of my arguments may be, and I will compare these implications with the views and life of Albert Schweitzer.

7. Concluding discussion

My thesis has investigated the moral importance of small animals based on the observation that they might have morally relevant negative mental states from a sentientist ethical standpoint. I have argued that we have good enough reasons to believe that there is a non-negligible likelihood that many small animals can have morally relevant negative mental states. I have also argued that this likelihood cannot be considered a *de minimis* risk. Most of the literature that discuss the moral importance of small animals based on the claim that that they might have morally relevant mental states focuses on our actions rather than our character. It is plausible that one can make a convincing argument for the suggestion that we should *at least sometimes* guard against the possibility that small animals may have morally relevant negative mental states. This argument would be most convincing when the cost of acting in such a way appears trivial, such as the costs of not buying silk or the cost of using anesthesia (in at least some cases) before doing potentially painful research on small animals. But the argument for taking actions to avoid causing harm or benefit to small animals appears less strong in more complicated situations and in situations where the cost seems higher. The main reason is that precaution cuts both ways; that is, that taking precautions against the possibility that small animals may be sentient has costs, for example that we could have spent the attention and resources on reducing some other risk instead.

To get around this challenge and say something informative and general about the moral importance of small animals (based on the possibility that they may be sentient), I have shifted the focus to our character rather than our actions. I have claimed that it is at least a requirement of a morally decent (or virtuous) person that she *considers* small animals in a morally relevant way, that she allows them to affect her moral psychological life. I have argued for the idea that some character traits that are plausibly considered virtues would manifest themselves in relevant situations that involve small animals. In particular, I have argued that *caution* and *moral attention* are virtues that are especially important regarding small animals. I have argued that there are a *large* number of *practically relevant* situations in which a person with these virtues will consider small animals. Finally, I have argued that the general effect of developing these virtues (if she does not already have them) on her moral psychology would plausibly be *substantial*.

Next, I will close by sketching some wider implications of the argument pursued. Developing the character traits of caution and moral attention, and internalizing how they relate to the evidence of small animal sentience, may result in a character that has several similarities to the character of Albert Schweitzer, the famed pioneer of the "reverence for life" view. There would also be differences though; for example, he advocated a *reverence* for *all life* (including plants), which is different from my argument for *caution* and *moral attention* regarding *life that we have good enough reasons to believe is sentient*. Schweitzer appears to have had an admirable

attentiveness to and caution towards what he considered to be the interests of *all* other beings. According to him, a "truly ethical" person...

> ...takes care to crush no insect. If in the summer he is working by lamplight, he prefers to keep his windows shut and breathe a stuffy atmosphere rather than see one insect after another fall with singed wings upon his table.[117]

Schweitzer was also concerned with harms that are not caused by humans.

> If he [the truly ethical person] comes across an insect that has fallen into a puddle, he stops a moment in order to hold out a leaf or a stalk on which it can save itself.[118]

I do not mean that Schweitzer was correct that these are the actions that an ethical person would undertake; what I mean is that Schweitzer seems to display and advocate an admirable degree of attentiveness and caution.

To become (more) attentive may carry substantial costs, in that it may reduce light-heartedness, joy, and similar positive mental states. At least if one is as attentive as Schweitzer was, and as attentive as I believe my arguments suggest we should be (although more arguments would be needed to establish this). To illustrate, Schweitzer wrote:

> Only at rare moments have I felt really glad to be alive. I cannot help but feel the suffering all around me, not only of humanity but of the whole creation.
>
> I have never tried to withdraw myself from this community of suffering. It seemed to me a matter of course that we should all take our share of the burden of pain that lies upon the world. [119]

Another effect could be that experiences such as enjoying nature may get a darker flavor. For example, Schweitzer was also not only concerned with individual small animals that one may come across; he was also attentive to the harms that animals suffer in the wild.

> the great struggle for survival by which nature is maintained is a strange contradiction within itself. Creatures live at the expense of other creatures. Nature permits the most horrible cruelties.… Nature looks beautiful and marvelous when you view it from the outside. But when you read its pages like a book, it is horrible.[120]

On the other hand, he was also optimistic:

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[117] Cicovacki, *Albert Schweitzer's Ethical Vision*, 138.
[118] Ibid., 138.
[119] Ibid., 241.
[120] Schweitzer, *Reverence for Life*, 120.

> My willing and hoping are optimistic.... however concerned I was with the suffering in the world, I never let myself become lost in brooding over it. I always held firmly to the thought that each one of us can do a little to bring some portion of it to an end.[121]

Lastly, let us return to the question of the moral importance of the number of individuals. There is to my knowledge no literature on whether or not a virtuous person should place moral weight on the number of individuals, and I have not had the space to deal with this topic in my thesis. But it would be an interesting topic for future research. Perhaps one could argue on Aristotelian grounds that ignoring numbers would be a failure of *phronesis*. But setting this potential future research aside, one can say now that *if* a virtuous person would pay *more* attention to, say, harms that happen to *more* individuals, the case for the moral importance of small animals from a virtue or character perspective can potentially be bolstered by the huge numbers of such individuals that exist. And such caring about numbers may lead to a shift from the great attention that Schweitzer paid to individual small animals towards a focus on areas in which very large numbers of small animals may have morally relevant negative mental states, such as in nature and in agriculture.[122]

[121] Cicovacki, *Albert Schweitzer's Ethical Vision*, 241.

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