Why should we value biodiversity?

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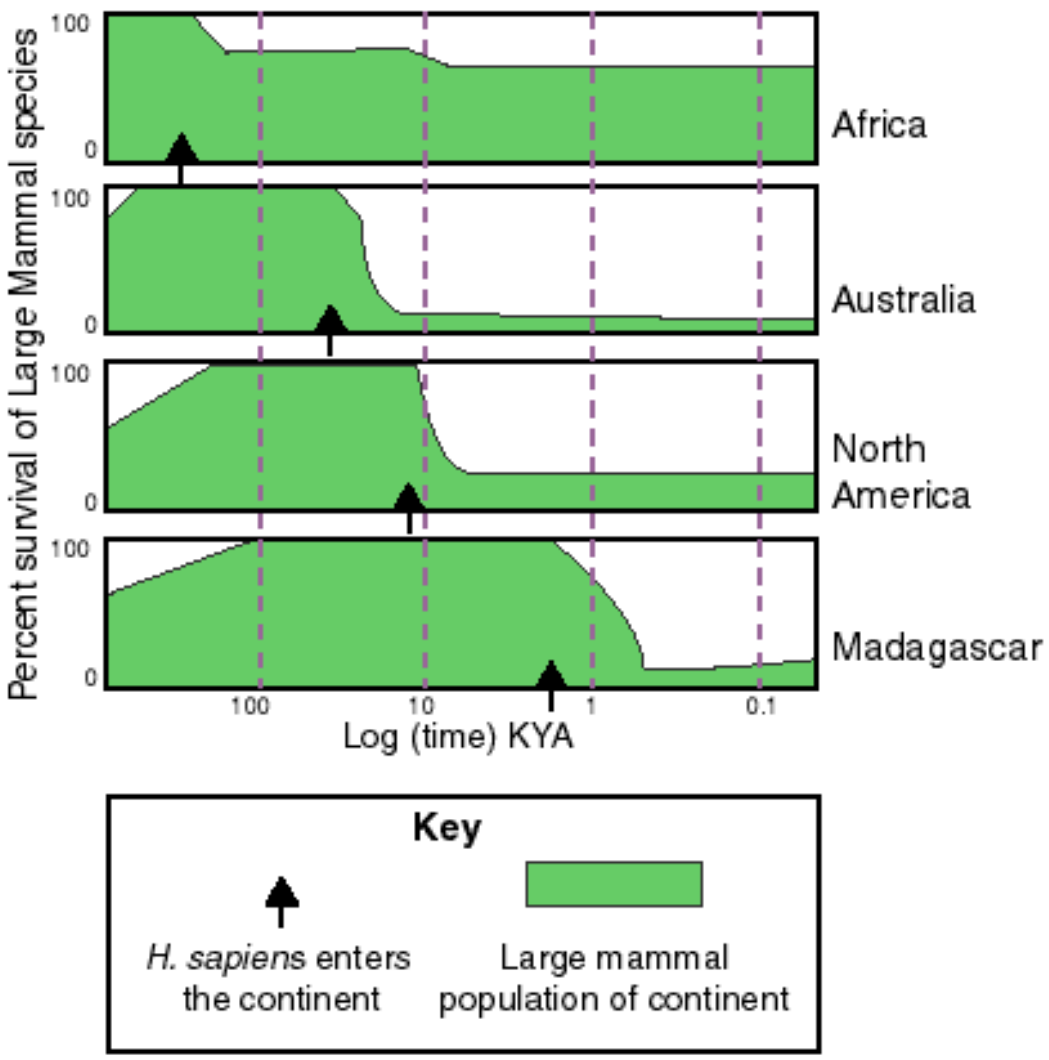
Losing Biodiversity

Direct Human Action



After Martin (1989)

Insect Loss

Our analysis estimates a seasonal decline of 76%, and **mid-summer decline of 82% in flying insect biomass over the 27 years of study.** We show that this decline is apparent regardless of habitat type, while changes in weather, land use, and habitat characteristics cannot explain this overall decline. (Hallmann et al. 2017)

Habitat Loss

We applied [an extinction-prediction model] to the Brazilian Amazon, predicting that local extinctions of forest-dependent vertebrate species have thus far been minimal (1% of species by 2008), with **more than 80% of extinctions expected to be incurred from historical habitat loss still to come.** Realistic deforestation scenarios suggest that local regions will lose an average of nine vertebrate species and have a further 16 committed to extinction by 2050. (Wearn et al. 2012)

Extinction Rates

In sum, present extinction rates of 100 E/MSY and the strong suspicion that these rates miss extinctions even for well-known taxa, and certainly for poorer known ones, means present **extinction rates are likely a thousand times higher** than the background rate of 0.1 E/MSY. (Pimm et al. 2014)

Climate Change

Future climatic changes may cause the ranges of 86% of [studied reptile] species to contract, and of these ranges, nearly **12% are predicted to be situated completely outside their currently realized niches.** (Ihlow et al. 2012)

Climate Change Vulnerability				Birds				Amphibians				Corals			
Vulnerability type	**Sensitivity**	**Exposure**	**Low Adaptive Capacity**	**Optimistic**		**Pessimistic**		**Optimistic**		**Pessimistic**		**Optimistic**		**Pessimistic**	
				No.	*%*	**No.**	*%*	**No.**	*%*	**No.**	*%*	**No.**	*%*	**No.**	*%*
Highly vulnerable (1)	√	√	√	2,323	*24*	4,890	*50*	1,368	*22*	2,740	*44*	121	*15*	253	*32*
Potential adapters (2)	√	√	–	1,496	*15*	1,565	*16*	1,068	*17*	115	*2*	150	*19*	109	*14*
Potential persisters (3)	–	√	√	493	*5*	214	*2*	523	*8*	643	*10*	0	*0*	0	*0*
High latent risk (4)	√	–	√	1,511	*15*	1,976	*20*	957	*15*	1,663	*27*	299	*38*	257	*32*
Sensitive only	√	–	–	960	*10*	706	*7*	1,060	*17*	321	*5*	226	*28*	177	*22*
Exposed only		√	–	608	*6*	105	*1*	397	*6*	64	*1*	0	*0*	0	*0*
Low adaptive capacity only		–	√	1,010	*10*	269	*3*	385	*6*	537	*9*	0	*0*	0	*0*
None	–	–	–	1,455	*15*	131	*1*	446	*7*	121	*2*	1	*0*	1	*0*
Total numbers of species				**9,856**				**6,204**				**797**			

This includes the total numbers and percentages of species in the climate change vulnerability categories highlighted in Figure 1, as well as those in each climate change vulnerability dimension alone. To represent the uncertainty resulting from missing biological trait data, vulnerability was calculated assuming optimistic and pessimistic extremes for missing values. It is important to note that scores represent relative measures within each taxonomic groups and comparisons between groups are not meaningful.

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Foden et al. (2013)

Climate Change

Birds: 24–50% of species "highly vulnerable"

Amphibians: 22–44%

Corals: 15–32%

Skepticism?

Douglas J. Erwin, Smithsonian

Skepticism?

Many of those making facile comparisons between the current situation and past mass extinctions **don't have a clue about the difference in the nature of the data, much less how truly awful the mass extinctions recorded in the marine fossil record actually were.** It is absolutely critical to recognize that I am NOT claiming that humans haven't done great damage.... But I do think that as scientists we have a responsibility to be accurate about such comparisons. (Erwin, quoted in *The Atlantic*, 2017)

First Intuition

If we have a responsibility to do something about species extinction (present or future), it's because **biodiversity is valuable.**

What *Is* Biodiversity?

Worry: Biodiversity needs to be broader than just individual species! We're worried about *ecosystems*, which encompass *processes* (or "*services*").

Worry: But it can't just mean *life itself* or *biology*, because then it's too large and complex to do anything about.

Worry: It's measured in different ways in different domains of biology.

Worry: It's often not only intended to capture losses of biodiversity that we *know*, but also *unknown* species that we could lose in the future.

The definition and measurement of biodiversity will inherently involve ethical value judgments.

The Value of Biodiversity

Problem: What kind of value do other species have?

Kinds of Value

instrumental value — the value an object has because of its utility for another purpose

intrinsic value — the value an object has in and of itself, without reference to external uses

Instrumental Value

Intrinsic Value

Instrumental Value

- Monetary

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- Material resources (e.g., drugs)

Instrumental Value

- Monetary
- Material resources (e.g., drugs)
- Services (e.g., production of oxygen)

Instrumental Value

- Monetary
- Material resources (e.g., drugs)
- Services (e.g., production of oxygen)
- Spiritual or aesthetic value

Instrumental Value

- Want to preserve species that **don't currently have any use at all**

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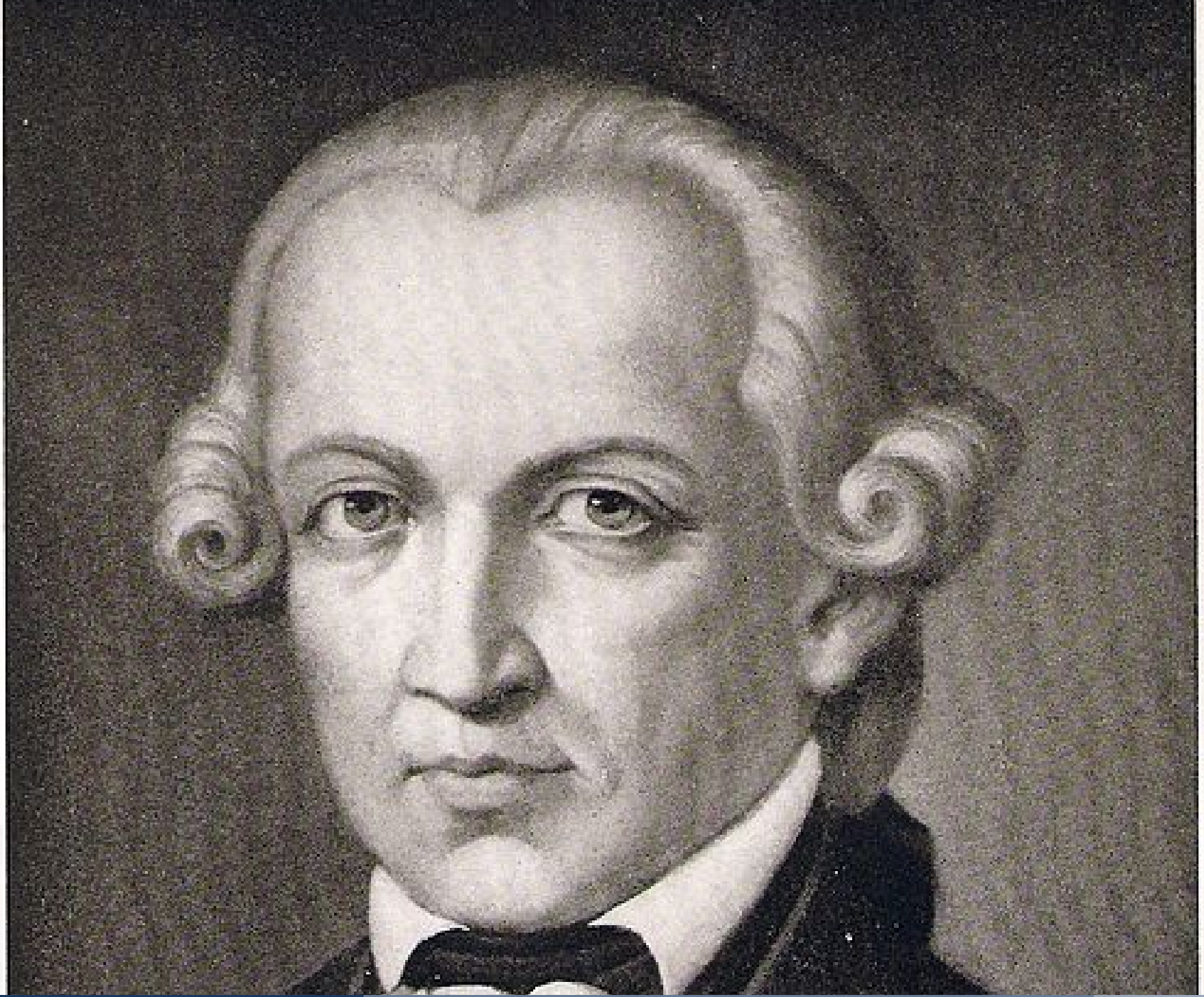
- Want to preserve species that **we haven't even yet identified**

Instrumental Value

- Want to preserve species that **don't currently have any use at all**
- Want to preserve species that **we haven't even yet identified**
- Often **can't estimate quantities** of instrumental values in these cases

We want to find a way in which to ascribe intrinsic value to biodiversity.

Grounding Intrinsic Value



Kant (1724–1804)

Intrinsic value is grounded in the capacity to reason about one's behavior and about the moral law

Kant (1724–1804)

Nope. Animals are immediately out.

Aristotle (384–322 BC)

Intrinsic value is grounded in human flourishing, or *eudaimonia*.

Aristotle (384–322 BC)

Nope. Animals could only have instrumental value.

G. .E. Moore (1873–1958)

Intrinsic value is just a brute fact about objects, and we perceive it just like other basic properties.

G. E. Moore (1873–1958)

Maybe? It depends on whether or not we perceive intrinsic value in biodiversity. But we can't argue about it.

Peter Singer (1946–)

A utilitarian grounding for **animal rights.**

Peter Singer (1946–)

Probably not. *Individual animals* might deserve standing in the moral community, but it's not clear that Singer can ground any particular value for *biodiversity.*

Christian Ethics

Dieu dit: « Faisons l'homme à notre image, à notre ressemblance, et qu'il domine sur les poissons de la mer, sur les oiseaux du ciel, sur le bétail ; enfin sur toute la terre, et sur tous les êtres qui s'y meuvent. » [...] Dieu les bénit en leur disant « Croissez et multipliez ! Remplissez la terre et soumettez-la ! Commandez aux poissons de la mer, aux oiseaux du ciel, à tous les animaux qui se meuvent sur la terre ! » (Genèse 1:26, 28)

Christian Ethics

Maybe? But often, theology excludes non-instrumental value for non-human animals (e.g., having a soul as necessary for inclusion in the moral community).

Plato (428?–348? BC)

Intrinsic value derives from participation in the form of the Good.

Plato (428?–348? BC)

Maybe? You could claim that properties of ecosystems like harmony, beauty, and structure express Platonic ideals.

Plato (428?–348? BC)

But without a Platonic idea that this *should* be the nature of the Good, you have a hard time justifying the importance of these properties.

Utilitarianism

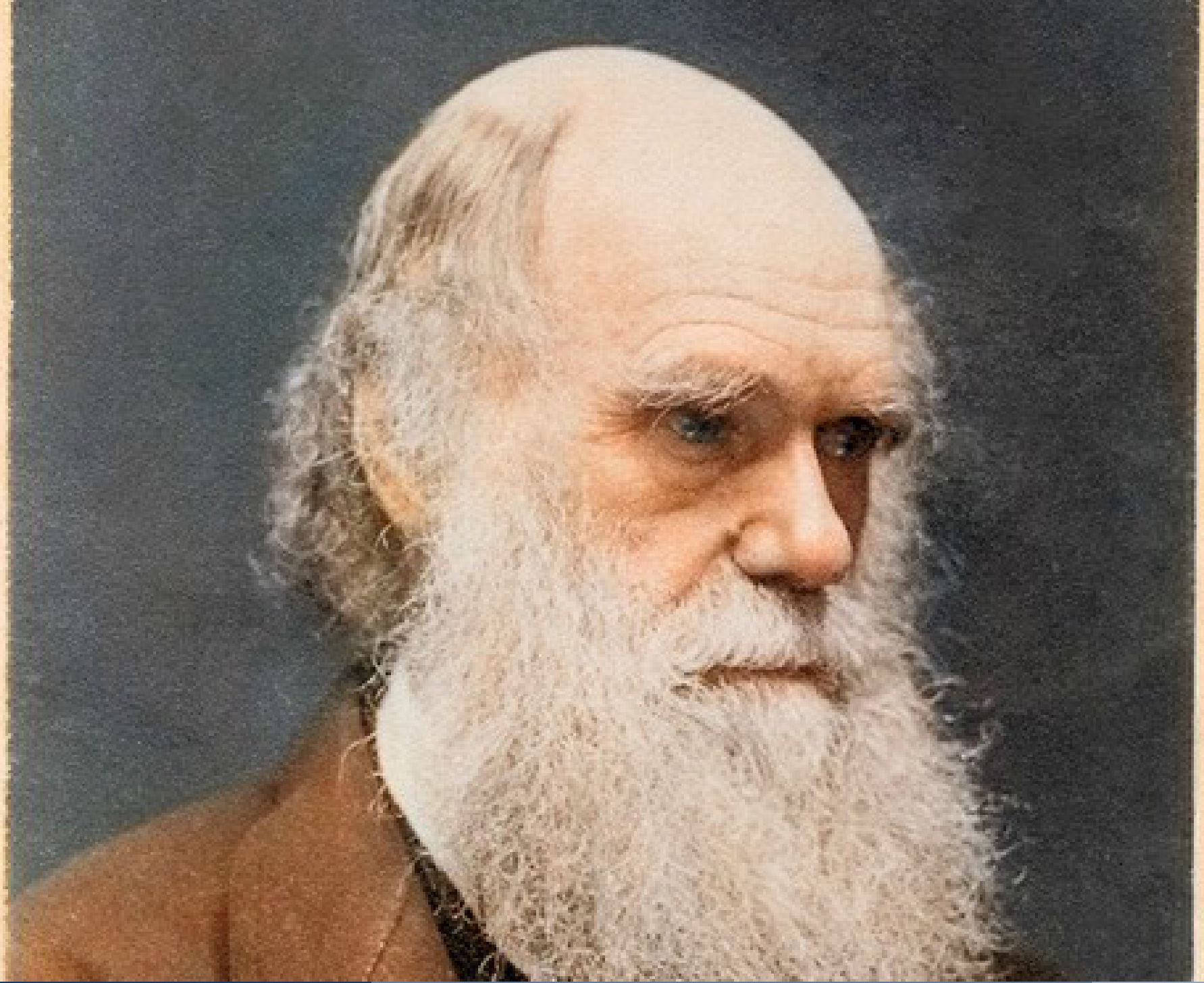
Intrinsic value comes from maximizing pleasure (or fulfillment of desires) and minimizing pain (or frustration of desires).

Utilitarianism

Maybe? What about plants? Does individual animal suffering track biodiversity in the ways that we want it to, or not?

Hume (1711–1776)

Intrinsic value is grounded in our *moral sentiments*, a version of our feelings of empathy with others.



Hume (1711–1776)

Probably! Hume already talks about our feelings being directed toward groups (rather than individuals), and extending them to the natural world is fairly straightforward.

Hume (1711–1776)

But! It's a *really* controversial meta-ethical view. (What makes major moral judgments universally shared?)

What to Do?

It's **really hard** to provide a foundation for intrinsic moral value that could extend to biodiversity!

1. Make arguments from instrumental value when we can (many people find them persuasive!)
2. Develop moral views that are potentially promising (Humean ethics, Christian ethics, some versions of utilitarianism)
3. In general: a **patchwork, pluralistic defense** of biodiversity

Questions?

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