

<https://www.theguardian.com/environment/2017/10/21/insects-giant-ecosystem-collapsing-human-activity-catastrophe>

Insects

A giant insect ecosystem is collapsing due to humans. It's a catastrophe

Insects have triumphed for hundreds of millions of years in every habitat but the ocean. Their success is unparalleled, which makes their disappearance all the more alarming



Smithsonian researcher and entomologist Terry Erwin fogs trees with insecticide to collect insects from a lowland rainforest canopy in Peru. Photograph: Mark Moffett/Minden Pictures/Alamy

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Michael McCarthy

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Thirty-five years ago an American biologist Terry Erwin conducted an experiment to count insect species. Using an insecticide “fog”, he managed to extract all the small living things in the canopies of 19 individuals of one species of tropical tree, *Luehea seemannii*, in the rainforest of Panama. He recorded about 1,200 separate species, nearly all of them coleoptera (beetles) and many new to science; and he estimated that 163 of these would be found on *Luehea seemannii* only.

He calculated that as there are about 50,000 species of tropical tree, if that figure of 163 was typical for all the other trees, there would be more than eight million species, just of beetles, in the tropical rainforest canopy; and as beetles make up about 40% of all the arthropods, the grouping that contains the insects and the other creepy-crawlies from spiders to millipedes, the total number of such species in the canopy might be 20 million; and as he estimated the canopy fauna to be separate from, and twice as rich as, the forest floor, for the tropical forest as a whole the number of species might be 30 million.

Warning of 'ecological Armageddon' after dramatic plunge in insect numbers

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Yes, 30 million. It was one of those extraordinary calculations, like Edwin Hubble's of the true size of the universe, which sometimes stop us in our tracks.

Erwin reported that he was shocked by his conclusions and entomologists have argued over them ever since. But about insects, his findings make two things indisputably clear. One is that there are many, many more types than the million or so hitherto described by science, and probably many more than the 10m species sometimes postulated as an uppermost figure; and the second is that this is far and away the most successful group of creatures the Earth has ever seen.



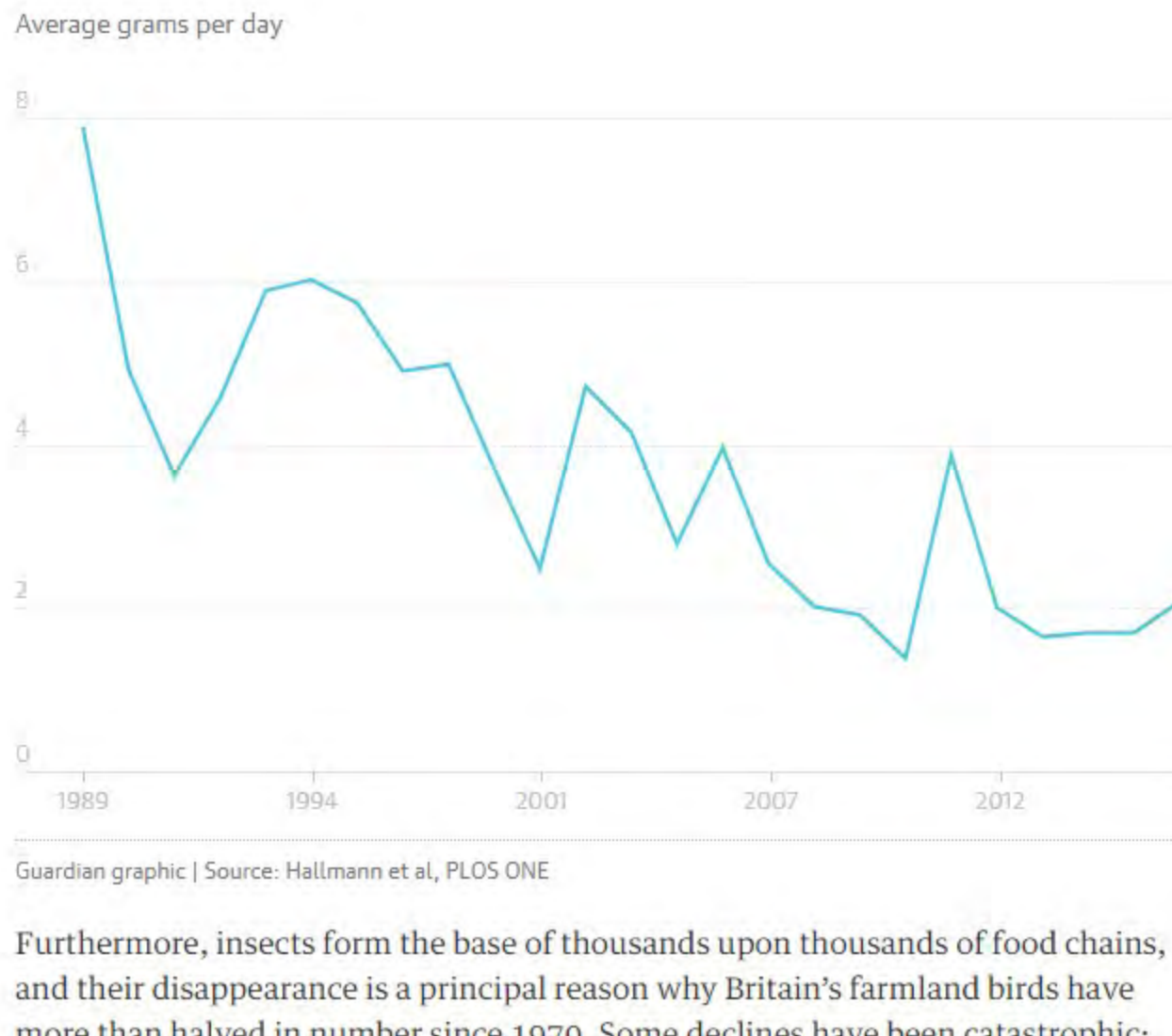
Terry Erwin's beetle collection from rainforest canopies in the Amazon, on display in Washington, DC. Photograph: Frans Lanting/Alamy

They are multitudinous almost beyond our imagining. They thrive in soil, water, and air; they have triumphed for hundreds of millions of years in every continent bar Antarctica, in every habitat but the ocean. And it is their success – staggering, unparalleled and seemingly endless – which makes all the more alarming the great truth now dawning upon us: insects as a group are in terrible trouble and the remorselessly expanding human enterprise has become too much, even for them.

The astonishing report highlighted in the Guardian, that the biomass of flying insects in Germany has dropped by three quarters since 1989, threatening an “ecological Armageddon”, is the starkest warning yet; but it is only the latest in a series of studies which in the last five years have finally brought to public attention the real scale of the problem.

Does it matter? Even if bugs make you shudder? Oh yes. Insects are vital plant-pollinators and although most of our grain crops are pollinated by the wind, most of our fruit crops are insect-pollinated, as are the vast majority of our wild plants, from daisies to our most splendid wild flower, the rare and beautiful lady's slipper orchid.

Insect abundance has fallen by 75% over the last 27 years



Furthermore, insects form the base of thousands upon thousands of food chains, and their disappearance is a principal reason why Britain's farmland birds have more than halved in number since 1970. Some declines have been catastrophic: the grey partridge, whose chicks fed on the insects once abundant in cornfields, and the charming spotted flycatcher, a specialist predator of aerial insects, have both declined by more than 95%, while the red-backed shrike, which feeds on big beetles, became extinct in Britain in the 1990s.

Ecologically, catastrophe is the word for it.

It has taken us a lot of time to understand this for two reasons: one cultural, one scientific. Firstly, we generally do not care for insects (bees and butterflies excepted). Even wildlife lovers are fixated on vertebrates, on creatures of fur and feather and especially the “charismatic megafauna”, and in the population as a whole there is even less sympathy for the fate of the chitin-skeletoned little things that creep and crawl; our default reaction is a shudder. Fewer bugs in the world? Many would cheer.

Secondly, for the overwhelming majority of insect species, there is no monitoring or measurement of numbers taking place. It is a practical impossibility: in the UK alone there are about 24,500 insect species – about 1,800 species of bugs, 4,000 species of beetles, 7,000 species of flies and another 7,000 species of bees, wasps and ants – and most are unknown to all but a few specialists. So their vast and catastrophic decline, at last perceptible, has crept up on us; and when first we began to perceive it, it was not through statistics, but through anecdote.

Where have all the insects gone?

Charlie Hart

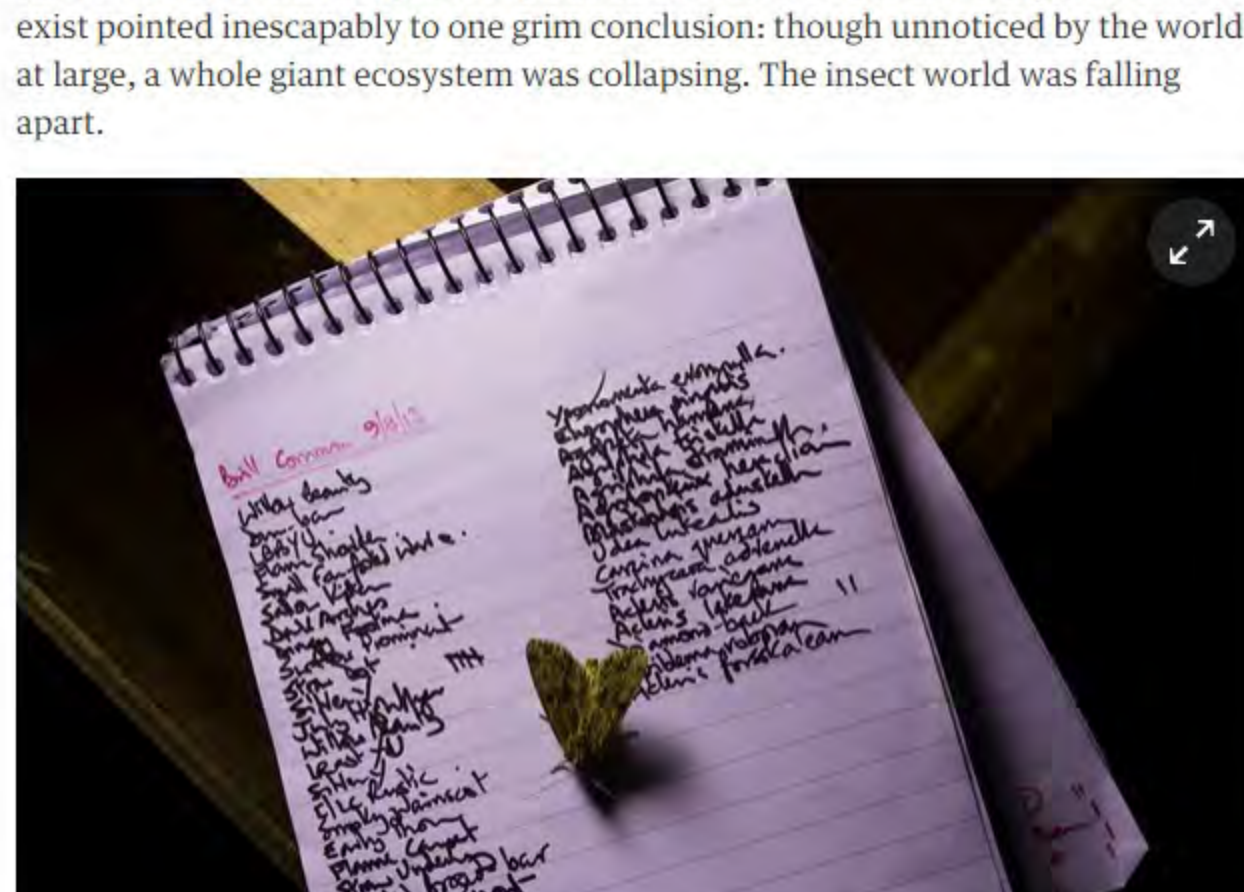
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The earliest anecdotal impression of decline was through what is sometimes termed the **windscreen phenomenon** (or windshield if you live in the US): time was, especially in the summer, when any long automobile journey would result in a car windscreen that was insect-spattered. But then, not so much. Two years ago I wrote a book

focusing on this curious happening, but I gave it a different name: I

called it the moth snowstorm, referring to the moths which on summer nights in my childhood might cluster in such numbers that they would pack a speeding car's headlight beams like snowflakes in a blizzard.

But the point about the moth snowstorm was this: it had gone. I personally realised it had disappeared, and began writing about it as a journalist, in the year 2000; but it became obvious from talking to people who had also observed it that its disappearance dated further back, probably to about the 1970s and 1980s. And the fact that an entire large-scale phenomenon such as this had simply ceased to exist pointed inescapably to one grim conclusion: though unnoticed by the world at large, a whole giant ecosystem was collapsing. The insect world was falling apart.



Moths are in steep decline. Photograph: Dan Kitwood/Getty Images

Today we know beyond doubt, and with scientific statistics rather than just anecdote, that this is true, and the question immediately arises: what caused it?

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It seems indisputable: it is us. It is human activity – more specifically, three generations of industrialised farming with a vast tide of poisons pouring over the land year after year after year, since the end of the second world war. This is the true price of pesticide-based agriculture, which society has for so long blithely accepted.

So what is the future for 21st-century insects? It will be worse still, as we struggle to feed the nine billion people expected to be inhabiting the world by 2050, and the possible 12 billion by 2100, and agriculture intensifies even further to let us do so. You think there will be fewer insecticides sprayed on farmlands around the globe in the years to come? Think again. It is the most uncomfortable of truths, but one which stares us in the face: that even the most successful organisms that have ever existed on earth are now being overwhelmed by the titanic scale of the human enterprise, as indeed, is the whole natural world.

Michael McCarthy is a writer, naturalist, and author of *The Moth Snowstorm: Nature and Joy*

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