

Debate 5: "Are insects the future of food ?"

Videos

Why eating insects makes sense – The economist – 26 september 2014

<https://www.youtube.com/watch?v=euTBQOrpOmM>

Bugs or Burgers? Exploring edible protein | A Big Picture film

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<https://www.forbes.com/sites/eustaciahuen/2017/04/30/why-eating-insects-may-not-be-as-sustainable-as-it-seems/#3579bd0044c1>

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<https://www.theguardian.com/commentisfree/2018/oct/15/edible-insect-save-planet-global-warming-tasty-trendy>

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<https://www.vox.com/2014/4/30/5664782/insects>

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Why Eating Insects May Not Be As Sustainable As It Seems
Eustacia Huen, 30 april 2017

Whether you're an entomophagist or not, you should've come across at least an article or two touting the benefits of insects as a sustainable food source. From online articles to government reports, the general consensus seems to be: Edible insects are sustainable and we should consider eating them to save the planet.

If only it were that simple.

In the following exclusive excerpt from *On Eating Insects: Essays, Stories and Recipes* (Phaidon), a book from Nordic Food Lab, written by Joshua Evans, Roberto Flore, and Michael Bom Frøst due to release on May 1, you can learn more about the complexities of this issue and find out why eating insects may not be as sustainable as it seems.

The idea that every insect species is universally sustainable is deceptive. Firstly, the means of procurement is not always sustainable.

In some cases, wild-harvesting may lead to overexploitation of insects – a threat feared by the Thai villagers quoted above. Secondly, not enough is known about the environmental impact of insect farming, and it appears to be much more complex than suggested by the 'solution narrative'. For instance, farmed insects may be fed on a substrate with its own complicated sustainability status – shown by the example of the giant water bug in Thailand, which requires additional resource use for the farming of its amphibian prey.

The same issue applies to more commonly farmed insects, which tend to be fed with cultivated grain that adds to the insects' environmental footprint, so that scaled-up production may be no more sustainable than conventional protein sources (see Lundy and Parrella 2015). Thirdly, farmed insects for a consumer market require processing for preservation and to meet consumer preference. When this is done on a large scale, common methods include grinding and freeze-drying, which use significant energy.

Overall, the realities of rearing insects on different substrates and on a large scale are yet to be fully understood, and may bring with them hidden or unforeseen environmental costs. The same certainly applies to the environmental costs of processing methods that tend to stay unmentioned in the marketing of insect products.

The arguments outlined above show the complexity regarding the sustainability of edible insects – yet all largely ignore the human dimension of sustainability. An approach such as Chatree Patisol's may provide a more holistic answer to how edible insects can be sustainable. In his position both as a teacher and as an insect farmer, he gives local under-privileged youth the chance to gain income and education. So far not even adequately measurable in the most complex multi-dimensional life-cycle assessments, these social components may be given less recognition, but are highly relevant to implementing insects' full democratic potential as sustainable food.

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Would you eat insects to save the planet from global warming?

Jessica Brown, 15 october 2018

The thought of rising sea levels and more intense heatwaves are enough to keep you up at night. But while we all know the situation is getting more serious, most of us are preoccupied with work, doctor's appointments and paying bills – and these immediate, visceral worries win every time.

There isn't much time left to figure out how to bring global warming closer to the forefront of people's minds and persuade us to reduce our carbon footprints. In fact, we have just 12 years left to keep global warming to 1.5C, according to last week's landmark UN report. Anything beyond this will massively worsen the risks of drought, floods, extreme heat and poverty for hundreds of millions of people.

Reducing our meat intake is crucial to avoiding climate breakdown, since food production accounts for about a quarter of all human-related greenhouse gas emissions, and is predicted to rise. In western countries, this means eating 90% less beef and five times as many beans and pulses.

Edible insects have been hailed as a solution to both global food shortages and reducing emissions from animal agriculture, but despite the industry's best efforts, our response when faced with a cockroach is disgust. Even in London edible insects are seen as nothing more than a gimmick, and there are only a handful of restaurants serving them up.

But new research from Switzerland and Germany may have found out how to persuade people to eat insects – and it could have a huge impact on lowering human-led carbon emissions.

Up until now, retailers and restaurants have marketed edible insects as a more sustainable option and a healthy source of protein. But the researchers explain the problem with getting people to switch to environmentally friendly behaviour is that it often requires foregoing immediate pleasure for distant benefits, and edible insects have been wrongly framed in this way.

Before the 180 participants in the study were offered a chocolate truffle filled with mealworms, half of the group were given a flyer saying that eating insects was good for them and the environment, while the other half were told the insects were either delicious or trendy to eat.

About 62% of those given health or environmental incentives chose to eat the truffle, compared with 76% who ate the truffle after being told it would taste good or make them trendy. And the latter group rated the truffle as tastier.

The researchers concluded that we need to switch the message about saving the planet from altruism to pleasure. They back up their argument with previous studies showing that attitudes based on emotions are more malleable than those grounded in rational claims.

'The problem with getting people to switch to environmentally friendly behaviour is that it often requires foregoing immediate pleasure for distant benefits.' Photograph: Voisin/Phanie/REX
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The lead researcher, Sebastian Berger, says now that the technology and scale of edible insect farming is improving and increasing prices will start to fall and free up producers to take the study's findings on board. He cites the food manufacturer Essento Food AG, which he says is leading the way in positioning insects as upmarket, delicious food.

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He calls this the "sushification" of the mealworm, since raw fish was until 20 years ago also seen by westerners as disgusting to eat.

Veganism, until recently, was viewed as a quirky lifestyle choice or protest, but about 3.5 million people in the UK alone now eat a vegan diet.

There are several arguments for swapping meat for plants: health and environmental benefits, and it tastes better. Given the new study, focusing on the taste benefits of plants could be a huge success. Another study found that labelling vegetables with "indulgent" descriptions such as "dynamite chili and tangy lime-seasoned beets" significantly increased the number of people choosing and eating vegetables compared with those given basic or healthy descriptions, such as "lighter-choice beets with no added sugar" or even "high-antioxidant beets".

This is already happening on a small scale, with some vegan restaurants eschewing the "V" word altogether in their marketing and on menus and presenting themselves as equal to meat, not just a healthy alternative, while some are gaining recognition simply for being "tasty", not "tasty for vegan food". The US-based vegan soul food restaurant The Land of Kush was voted best restaurant last year by the Baltimore City Paper.

As the vegan food industry expands to meet burgeoning demand, millions of pounds' worth of investment is going into making plant-based burgers taste just as good or even better than the beef burgers we grew up on. But the less said about how our eating habits could potentially save the planet, perhaps the closer we'll come to actually achieving it.

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6 reasons you should consider eating insects

Joseph Stromberg, 17 february 2015

THERE ARE MANY CHARTS WITH THIS ARTICLE THE BEST IS TO READ IT ONLINE

For your own personal health and for the overall health of the planet, you should be eating more insects.

This isn't meant as a provocative, theoretical idea. It's a serious solution to the increasingly pressing problems of global warming and animal welfare — and a practical way of adding low-fat protein to your diet. The UN has advocated eating insects for these very legitimate reasons, and it's something two billion or so people around the world have done for centuries.

Of course, I'm far from the first to advocate that Western readers should adopt the practice. But it looks like we might be on the verge of a real insectivorous moment in consumer culture. The Brooklyn startup Exo just started selling protein bars made from ground cricket flour (they come in flavors like blueberry vanilla and cacao nut), and they're one of a few companies entering the business.

Here's why you shouldn't be grossed out by the idea — and why you should consider increasing your insect intake.

1) Insects are more sustainable and ethical than chicken, pork, or beef

Put simply, our increasing reliance on factory-farmed meat is killing the planet.

Growing grain and then feeding it to animals so we can eat them — the way the majority of meat is produced nowadays — is incredibly inefficient. Between the carbon dioxide emitted as a result of growing grain and the methane burps emitted by cows as they digest it, it's estimated that raising livestock generates about 18 percent of global greenhouse-gas emissions.

Studies have found that raising insects like mealworms and crickets for food, on the other hand, is much more environmentally benign, because we don't need to clear nearly as much land to raise them, they're cold-blooded (so require less feed per unit of body weight to sustain themselves), and we can consume their entire bodies, wasting little flesh.

Because we can grind crickets into flour, exoskeletons and all, we can convert 80% of their weight into food. (Anand Katakam)

As a result, the difference in greenhouse gas emissions between producing insects versus conventional meat is huge. This graph, from the UN report, shows the emissions that result from producing a kilogram of pork and beef, compared to a kilogram of insect meat:

Because demand for meat is rising around the world, livestock production is going to become an increasingly big reason why the planet is warming — unless we find an alternative. Like insects.

2) Insects are a highly nutritious protein source

It turns out that pound for pound, eating insects like crickets and mealworms (larvae that later turn into beetles) provides similar levels of fat and protein to conventional meats like beef, chicken, and fish.

These insects also have much higher levels of nutrients like calcium, iron, and zinc, partly because we can eat them ground into a fine powder, exoskeletons and all:

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These insects are also good sources of vitamin B12, an essential vitamin that's barely found in any plant-based foods (and thus can be difficult for vegans to come by).

Of course, there are other alternate protein sources besides meat, but they each have their own nutritional problems. Most nuts and legumes lack one or more of the nine amino acids our bodies need. Eating excessive amounts of soy — the raw ingredient for tofu, tempeh, and all manner of fake meat products — may cause unfortunate side effects.

3) Eating insects is probably more ethical than eating meat

Lots of smart people disagree about the ethics of eating meat. Some argue that the pleasure we derive from eating meat outweighs the pain and suffering experienced by a cow or pig in captivity, and some say otherwise.

But few argue that these animals experience no suffering at all. Many scientists who've studied the insect nervous system, though, believe that they don't feel pain. And while it is a matter of debate, even though who disagree would be hard-pressed to argue that insects can suffer as profoundly as a cow or pig.

Raising these insects for meat — instead of cows, pigs, and chickens — would reduce the total amount of suffering that results from our appetite for meat.

4) Our objection to eating insects is arbitrary

Your first reaction to this article was probably a sense of revulsion. For many readers, there's something intrinsically gross about the idea of eating insects.

But there's nothing innate about that disgust. For one, billions of people already eat insects in Asia, Africa, and Latin America every day. More generally, the animals considered to be fit for consumption vary widely from culture to culture for arbitrary reasons.

Most Americans consider the idea of eating horses or dogs repugnant, even though there's nothing substantial that differentiates horses from cows. Meanwhile, in India, eating cows is taboo, while eating goat is common.

These random variations are the results of cultural beliefs that crystallize over generations, until it begins to seem like a natural truth that eating insects is gross. (io9 has a fascinating history of how that came to happen in European and American culture.) But luckily, these arbitrary taboos can be defeated over time. There was a time when raw fish — served as sushi — was seen as repugnant in mainstream US culture. Now it's ubiquitous.

With luck, insects — like crickets, for instance, which are closely related to shrimp — may come to seem like elegant hors d'oeuvres.

5) Insects actually taste pretty mild

You'd think that insects would have a pungent, unusual taste. But most of them are surprisingly mild — like tofu, they generally take on the flavor of whatever they're cooked with.

The one time I ate whole, fried insects (crickets and grubs, in Thailand), I was struck by how much they simply tasted like fried food in general. Vox's Zack Beauchamp, who has had sautéed grasshopper tacos at DC's Oyamel restaurant, says "they weren't identifiably cricket-y. More than anything else, the overwhelming flavor sense was saltiness."

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Meanwhile, the cricket bar startup Exo recently sent a box of assorted flavors to Vox's office, and reviews here were similar:

"The taste was identical to something like a Lara bar. Only difference is that I was highly aware of any tiny crunch." - Joss Fong

"I thought it would taste weird, but turns out it was no different from any other protein bar I've ever had."
- Anand Katakam

"Unfortunately, the cricket taste I so eagerly hoped for was masked by an overpowering and unpleasant peanut butter and jelly flavor." - Andrew Prokop

"It was gross because it tasted like peanut butter and jelly...if it were a different flavor, I think it would have been fine." - Susannah Locke

For what it's worth, the blueberry vanilla and cacao flavors were excellent.

6) We already eat insects all the time

A jar of peanut butter is permitted to contain dozens of tiny insect fragments. Robin McNicoll
The majority of processed foods you buy have tiny pieces of insect in them. The last jar of peanut butter you bought, for instance, may have had up to 50 insect fragments. A package of frozen broccoli may have up to 60 aphids per 100 grams, and the same volume of chocolate can have about 60 fragments of various insect species.

These figures are limits set by the FDA for food contamination — in their words, "levels of natural or unavoidable defects in foods that present no health hazards for humans."

It might come as a surprise that so many processed foods contain insects, but there's a good reason: bugs inevitably infest virtually all food products we grow at low levels. Some experts estimate that, in total, we eat about one or two pounds of insects each year with our food.

These insects pose no health risks, and even the FDA's limits are simply set for aesthetic reasons — in other words, so you don't actually see the bugs mixed in to your food. That you've been eating them your entire life should tell you how much of a danger they present.

I'm sold — where can I find some bugs to eat?

In the US and Europe, insect-based foods are still a niche product sold by a handful of startups and restaurants.

Apart from the protein bar company Exo, there's the British company Ento (which sells sushi-like bento boxes with cricket-based foods), the Boston-based Six Foods (which just rolled out low-fat chips made from cricket flour), World Ento (which offers recipe-ready crickets, along with cricket-based flour and baking mixes), and All Things Bugs (which sells bulk cricket flour), among others.

If the idea takes off, it's easy to imagine a bigger variety of offerings, especially because because cricket farms — which grow insects intended as lizard food — could offer the insects at lower prices.

Eventually, insects might even become the next hyper-local, self-gathered food source, because many different edible species are available in so many areas of the US. But be careful: because of widespread lawn pesticide use, it's hard to ensure they're safe, so they should be washed and cooked thoroughly.

Will We All Be Eating Insects In 50 Years?

IFLscience

Each year, around 70 million people are added to the world's population. If growth continues at this rate, by 2050 the population is expected to reach a whopping 9 billion. To feed all of those hungry mouths, we will need to produce almost twice as much food as we currently do. But that is going to be no mean feat—we already use 70% of agricultural land to raise livestock, oceans are overfished, environments are becoming polluted and climate change and disease threaten crop production. With almost 1 billion people already chronically hungry, it's evident we need to buck up our ideas in order to reduce food waste and make food production more efficient. One possible solution? Insects.

You might turn your nose up at the idea, but entomophagy (the consumption of insects) is a common practice that's been taking place for tens of thousands of years. Around 2 billion people regularly eat insects as part of their diet, and over 1,900 species are edible. The most commonly eaten bugs are beetles, caterpillars, bees, wasps and ants.

The UN Food and Agriculture Organization recently produced an in-depth report about edible insects which is worth checking out if you're interested in the subject.

You've Been Eating Bugs For Years

If the idea of eating insects disgusts you, you might be surprised to find out that you already regularly eat them. If you check out the FDA's Defect Levels Handbook, you can see just how many buggies you could be eating on an everyday basis. Take beer for example—the acceptable limit of insect infestation in hops is 2,500 aphids per 10 grams. Canned fruit juices are allowed up to 1 maggot per 250 ml, curry powder is allowed up to 100 insect fragments (head, body, legs) per 25 grams and chopped dates are allowed up to 10 whole dead insects. The list goes on and on. Is this churning your stomach? It shouldn't, because you've been eating them for years and it hasn't bothered you.

Why Grubs?

So what's so good about insects? Well, they're a sustainable food source, they're nutritious and insect farming can provide jobs and income to people living in poor areas.

Insects Are Healthy

They might not look like much, but insects actually have a high fat, protein, vitamin, fiber and mineral content that is often comparable to fish or livestock. House crickets, for example, contain on average 205 g/kg protein; beef contains 256 g/kg. Termites are also surprisingly protein rich—one species found in Venezuela is 64% protein (and they taste like mint—trust me, I've eaten them). Some insects are even as much as 80% protein by weight.

Insects are also rich in essential amino acids and omega-3 fatty acids; mealworms contain as much unsaturated omega-3 and six fatty acids as fish and even more than beef and pork. Some are also surprisingly high in iron; locusts contain up to 20 mg/100g iron and mopane caterpillars contain a mighty 31 mg/100g, whereas beef only contains around 6 mg/100g.

Bugs Are Green

Consuming insects as opposed to livestock is more environmentally friendly. Insects are cold-blooded and thus require less energy to maintain their internal body temperature. This means they are very efficient at

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converting feed into edible body mass, unlike cattle. Crickets require around 2 kg of feed to produce 1 kg of meat, and around 80% is edible. Cattle, on the other hand, require 8 kg to produce the same amount of meat, but only 40% of the cow can be consumed. This means that less land needs to be dedicated to growing feed for insects than for livestock, reducing irrigation and pesticide use. Furthermore, the insects could even be used as livestock feed, for example replacing fishmeal. This would have the added advantage of increasing fish supplies available for humans to eat.

Insects also require significantly less land and water than traditionally farmed animals and also reproduce much more quickly. They also have shorter life spans and thus can be grown quickly and farmed in large quantities in small areas.

Additionally, insects produce a fraction of greenhouse gases such as methane and ammonia when compared with other livestock, particularly cattle. Furthermore, they can consume animal waste or plants that people and livestock cannot. This means that they don't compete with the human food supply and can even help reduce environmental contamination. It's also thought that insects are less likely to transmit zoonotic infections to humans when compared with mammals and birds.

Economic And Livelihood Benefits

Gathering, rearing, processing and selling insects can offer important livelihood opportunities for poor individuals living in developing countries. Not only will these activities improve their diets, but they can also offer employment and generate cash income through the sale of the produce. It also doesn't require a lot of experience or sophisticated equipment, meaning many individuals can participate in these activities including women and those living in rural or urban areas that are lacking in available land.

How Do They Taste?

I haven't eaten many insects, but the ones I have tried have been surprisingly tasty. I tried some termites in Africa and was surprised to find that they have a pleasant minty flavor. I also tried grasshoppers in Mexico that had been roasted in garlic and chili. Once I got over the idea, I quite enjoyed them and gobbled down a few on a long bus journey.

According to National Geographic, while stinkbugs may have a foul odor, they actually taste like apples. Red agave worms are meant to be spicy, and tree worms supposedly taste a bit like pork rind.

Yummly have a great article describing some of the unexpected flavors of edible bugs. For example, Sago Grubs that are eaten across Southeast Asia taste like bacon. If you fancy trying them raw, they recommend removing the head as they have sharp pincers that are not afraid to give you a little nip.

This may be a little too far for some people, but if you fancy trying scorpions in China (don't worry, cooking them destroys their venom), they have a slight fishy taste. I'm not sure you could convince me with this one, but apparently tarantulas (which you can find cooked up in Cambodia and Venezuela) sometimes taste like crab or shrimp, but others have reported they taste a little like chicken. Believe it or not, the disgusting looking giant water bug is said to taste like salted banana or melon.

Insects might not be for everyone, but they could be a valuable asset to global food security. They're sustainable, green, nutritious and could help people out of poverty. Plus, if you fancy bagging yourself a cheeky \$4.32 million, the European Commission are offering this very generous prize to the group that comes up with the best idea for developing insects as a popular food.

Chocolate covered caterpillars, anyone?

Eat whales - not insects - if you want to save the planet

Helen R. Brown

After school last Wednesday, I watched my five-year-old daughter pop a dead cricket on to her tongue and proclaim it: 'Like fishy popcorn!' 'MMMm, delicious!' squealed her friend, reaching for more as a third little girl spat hers, discreetly, back into her palm. 'I'm getting pistachio,' said the spitter's mum, picking up the packet for closer scrutiny. I popped one into my own mouth and got stale, mealy, chewy: like a morsel of dusty, old crab-paste sandwich.

I bought the edible *Acheta domesticus* at my local farm shop. They were stacked, like a drinking bet, above the local gins under a sign reading: 'Sharing for the Daring.' Mealworms with Sesame and Cumin; Grasshoppers with Paprika and Crickets with Sweet Mango. Pretty pricey at £6.50 for 14g. Suburban Essex's answer to TV's Bush-tucker Trials and tabloid splashes about Angelina Jolie frying scorpions with her kids.

More seriously, entomophagy (eating insects) is often pitched to us as the sustainable protein source of the future. If the human population reaches the estimated nine billion by 2050, our current environment trashing rates and methods of meat production won't keep up. Compared to beef and pork, insects are also a healthy choice: low in fat and high in calcium.

But the myth of bugs as 'the new food Messiah' is briskly scotched in the opening pages of Phaidon's beautiful new book *On Eating Insects*. Mark Bomford, Director of the Yale Sustainable Food Project, says the problems we face as 'a moderately successful social animal with a poor feed-conversion ratio' are far too complex to be solved so easily. Although entomophagy would cause far less environmental damage than cattle farming, he thinks we can do better. He goes on to make the surprising claim that we'd be more humane, take far fewer lives and cause much less environmental damage if we could find a sensible way to eat large whales.

Why bother with this book then? Because, says Bomford, 'eating insects is provocative. To eat a novel food — especially one that elicits initial fear or disgust — is the essence of eating mindfully.' The chefs and academics of the non-profit Nordic Food Lab collective have assembled a series of essays, travelogues and recipes designed to take readers on a journey through 'land, life, culture, ecology, meaning and mystery'. With 'open hearts and mouths' they investigate 'where and when specific insects can help cultivate more diverse, resilient local food systems'. Although the prose sometimes feels, like its subject, a little dry and mechanical, I was still gripped.

For most of us, the elegantly illustrated recipe section will only ever make a coffee-table curiosity. It features instructions for assembling bee larvae tacos, chocolate cochineal, grasshopper garum, wax moth-cured egg yolk and hornet highballs. If I end up with one of those this summer, it'll be more by accident than design.

The travel section is fascinating, though, exposing the absurdities of every culture's arbitrary ideas of what's edible (when and for whom) and what's not. We in the west think nothing of slurping shellfish but bat away flies, while others do the reverse. Now we learn that ants can taste of ginger and lemongrass. When Amazonian people first tried ginger they exclaimed: 'It's just like ants!'

In Uganda and Peru the team stew thumb-sized palm weevil larva which taste like 'caramelised bacon'. In Japan lethal liquors are rendered deep and musky by the infusion of giant hornets and a delicate, scented tea is brewed with caterpillar droppings. We discover Australian green tree ants that zing like kaffir lime.

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Witchetty grubs are disappointingly flavourless, but our authors are sent into epicurean ecstasies by the 'ambrosial' honey of the African stingless bee: 'like Sauternes with all the good bits and none of the shit!'

In Kenya competitive young men drum on termite nests to mimic the sound of rain and lure the winged insects out. Some men also blow in smoke, claiming 'it lowers inhibitions, it makes them brave. Tobacco is fine but bang [marijuana] is better'. The fatty, egg-fuller abdomen of the termite queen is hailed as 'god's handmade sausage'. Cricket farming there could solve the serious problem of zinc and calcium deficiency rife among young children, as the critters are high in both and easy to breed in buckets at home. One variety of giant crickets have legs tasting like chicken, heads 'like lambs' brains' and bodies that are 'mild, creamy and slightly sweet'. But the gathering of flying insects by huge lights causes severe photokeratitis (snow blindness) for practitioners. In Thailand, Cambodian children with perma-grazed fingers are paid a pittance to rip wings from popular snacks.

At a Dutch insect farm (originally producing pet food but now serving a growing human market) we are asked consider the ethics of killing the bugs. They're frozen. The company owners think this is painless for the cold-blooded creatures, but how can we know? As the vegan comedian Sarah Pascoe likes to say: 'everybody thinks they empathise exactly the right amount.' We all draw the line somewhere. For me, that line was at the crickets. For now. But next time my daughter proclaims herself so hungry she 'could eat a whale', I might swallow my horror and give Bomford a call.