

“The Sloan Digital Sky Survey has opened up the northern sky to anyone with a computer.” Joss Bland-Hawthorn, page 1044

Medicines Initiative (IMI) — a European public-private partnership to improve pharmaceutical research and development (*Nature* **466**, 306–307; 2010). This partly reflects a misunderstanding about how knowledge sharing is handled in collaborations between academia and industry.

The IMI is dedicated to creating public-private collaborative networks. Its management of the intellectual-property rights helps the translation of new knowledge into efficient, safe drugs and leads to better standards of health care.

Knowledge generated from each IMI project belongs to the participant who generates it, and comes with negotiated access rights. Non-exclusive licences are privileged. Project participants are free to define the background intellectual property that he or she wishes to make accessible to other project participants.

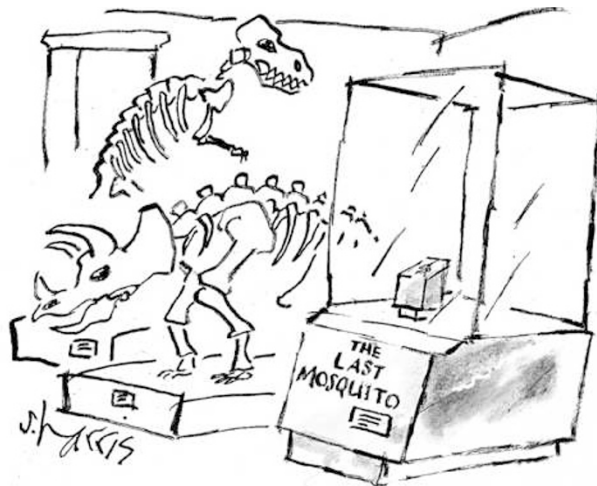
These rules have proved workable for academics, for small- and medium-sized enterprises, and for many major pharmaceutical companies — in which sensitivities about commercialization and competition run high. So far, 24 small- and medium-sized enterprises and 155 universities are participating in 15 ongoing IMI projects.

Participants in these projects may encounter some bumps on the road to innovation but, as every explorer knows, the unbeaten track often leads to the most rewarding discoveries.

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Mosquitoes: schemes to render them extinct are impracticable

I was astonished by the hubris of the mosquito experts you interviewed who believe that the ecological consequences of an extinction would be minor, nil or quickly compensated



(*Nature* **466**, 432–434; 2010). Leaving aside the ethical dilemma and immense technological challenge of extinguishing even one of the many thousands of species of mosquito, our meagre understanding of mosquito biology cannot justify this conclusion.

Information on the population dynamics and community ecology of almost all species of mosquito is scant and based on only a few aspects of their biology. Something is known about the community ecology of some mosquito larvae in microcosms, such as the habitats provided by *Nepenthes* and *Sarracenia* pitcher plants, but for those same species almost nothing is known about the community ecology of the eggs, pupae and adults, or their wider ecological role. Even for mosquitoes in these easily managed habitats, the temporal and geographical scales over which an ‘extinction experiment’ would have to be conducted make it impracticable.

Instead of being diverted to unattainable goals such as extinction, resources should be directed at gaining a fundamental understanding of the population and community ecology of critically important mosquito species.

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Mosquitoes: first evaluate impacts of eradicating them

We may find ways to limit or even eradicate certain groups of mosquitoes, and it is wise to evaluate the consequences in advance (*Nature* **466**, 432–434; 2010). We played God with smallpox. Who regrets it?

The idea that mosquitoes preserve nature by keeping humans in check is repugnant and wrong-headed. In the modern era, mortality factors such as malaria do not effectively limit human populations. Reduced fertility is what works. Relieving the burden of malaria will hasten progress to this end.

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Mosquitoes: retain an *ex situ* population for ecological insurance

You are wrong to dismiss our limited understanding of the consequences of deliberately wiping out 3,500 species of mosquitoes (*Nature* **466**, 432–434; 2010).

I would not object in principle to some mosquito extinctions, but your arguments need better ecological insight. To say that “bats feed mostly on moths, and

less than 2% of their gut content is mosquitoes” is akin to saying that rice is unimportant in the human diet, based on a sample of visitors to a burger joint. Given that there are around 900 species of insect-eating bat, and mosquitoes in abundance, the insects almost certainly form an important component of some bats’ diets.

And how would the mosquitoes be eradicated? The most common control methods — widespread spraying of insecticides, drainage of wetlands and release of alien invasive species — would inflict more than “collateral” damage.

If the risks associated with exterminating some mosquito species turn out to be not too great, then we should keep a small *ex situ* population for 100 years, say, so that any damage caused could still be undone.

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Mosquitoes: just how much biodiversity does humanity need?

If a world without mosquitoes (*Nature* **466**, 432–434; 2010) would be better for humanity and inflict no more than “collateral damage” on ecosystems, then what else might we reasonably eliminate from the face of the planet — deadly snakes, plague locusts?

Never mind that the collateral damage of eradicating mosquitoes might include the loss of a group of pollinators and a primary food source for many species. Perhaps another organism will come along to fill the niche eventually — assuming that organisms are replaceable and interchangeable.

In which case, ecologists have to ask what minimum level of biodiversity is required for functional provision of ecosystem services to sustain humanity.

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