The honey bee is not representative of less social bee species.

PHOTO: MICHAEL DURHAM/MINDEN PICTURES

LETTERS

Edited by **Jennifer Sills**

Holistic environmental risk assessment for bees

In January, the European Food Safety Authority (EFSA) proposed a honey bee (*Apis mellifera*) pesticide risk assessment that uses a systems approach (*1*). The strategy accounts for multiple stressors and sub-lethal effects, unlike current assessments. We support this long-awaited paradigm shift for environmental risk assessment. However, the initial focus on honey bees alone is not enough to protect the majority of pollinators, nor will it help substantively address the plight of biodiversity. Therefore, EFSA should augment the approach to include more relevant species.

Although there are many socio-political, historical, and practical advantages for honey bees as a model, this bee species is an exceptional case in the bee world. Honey bee colonies are superorganisms whose social organization provides a highly resilient buffer against environmental stressors that solitary and less social bees lack. They are nurtured by beekeepers, who provide shelter, supplementary food, and disease control. Honey bees are a good place to start, given how much we know about them and their place in the public eye, but they are simply not representative of most wild bee species that provide the bulk of pollination services. The overall bee–environment interaction would be better represented by extending the EFSA approach to more representative bee species.

Establishing which species are good analogs for modeling other, more vulnerable bee species should be prioritized. Knowledge should then be gathered for such species to allow modeling of other bee species, and ideally other non-target organisms. The environmental and toxicological context should also be modeled and monitored accurately to provide high-quality inputs to the species models. These steps would support a much more rigorous environmental risk assessment and would enhance this already long-awaited and necessary paradigm shift (*2*).

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COMPETING INTERESTS

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U.S. immigration reform for STEM doctorates

In their Policy Forum "Rethinking immigration policies for STEM doctorates" (22 January, p. 350), M. Roach and J. Skrentny suggest that U.S. immigration reform should provide an easier path to permanent residency for those who work in science, technology, engineering, and mathematics (STEM) fields and have Ph.D.s from U.S. universities. Before implementing the strategies they suggest, policy-makers should address such a program's unintended consequences.

Granting permanent residency to STEM doctorates upon graduation may stimulate educational institutions to seek STEM designations for their traditional non-STEM programs, such as business, management, and social sciences, to attract more foreign applicants. To counteract declining international applications (*1*), some business schools have already been working with the U.S. Department of Homeland Security to classify their MBA programs as STEM programs. This designation would make international students with F-1 visas eligible for an extended Optional Practical Training period (*2*), currently an extra benefit granted to STEM students only (*3*).

Indiscriminately expanding the scale of STEM designations could conversely result in chaotic consequences in the immigration system. Each year, there are approximately 140,000 employment-based immigrant visas made available to qualified applicants around the world (*4*). Granting green cards to all STEM doctorates, including those graduating from the nontraditional

STEM-designated programs such as business, management, and social science, could crowd out applicants who majored in science and engineering, potentially leading to unpredictable and long delays for all types of immigration applications. As a result, the U.S. Citizenship and Immigration Services may have to implement new rules to score and prioritize the extremely high volume of applications.

Permanent residency for STEM doctorates may also spur some universities to adopt new strategies. Of the 4034 U.S. postsecondary institutions in 2019, 736 were private for-profit institutions (*5*). These institutions may consider launching "accelerated" doctorate programs as a new revenue stream and lower the admission bar for students applying for these programs for the purposes of immigration. Proper oversight by accreditation agencies could ensure the continued integrity and rigor of the acceptance, supervision, and graduation of STEM doctoral students to prevent abuse of the system.

Scientific, technological, and engineering advancement is a critical foundation of U.S. competitiveness, and the talented, qualified STEM doctorates studying and working in this country are key to maintaining an edge in these fields. Thus, the proposed policy should be designed to primarily benefit those who are contributing to the traditional STEM disciplines after completing rigorous training.

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Brazil's political upset threatens Amazonia

On 1 February, the Centrão coalition of political parties in Brazil, supported by President Jair Bolsonaro, gained control of both houses of Brazil's National Congress (*1*). Bolsonaro has a record of destructive environmental policies (*2*), but some of the pending bills that he supports were blocked by the former president of the Chamber of Deputies, Rodrigo Maia (*3*). Arthur Lira has now taken his position, and the legislature will now likely move to approve the bills that Maia had been blocking. This shift in power has ominous implications for Brazil's environment and Indigenous peoples.

Shortly after the new presidents of the two houses of Congress took office, Bolsonaro sent them a list of 35 bills that he wants passed but that Maia had indicated he would block (*4*). Many of these bills threaten the environment. Among them is a notorious bill that would allow mining in Indigenous lands and in protected areas for biodiversity (PL 191/2020). Also included were bills to reduce environmental-licensing requirements (PL 3729/2004), offer public forest concessions to private initiatives (PL 5518/2020), reward land grabbers by promoting the legalization of illegal land claims (PL 2633/2020), and modify sharing arrangements to promote oil and gas extraction (PL 3178/2019).

Other bills on this list are likely to exacerbate Amazonian land conflicts and attacks on Indigenous and other traditional peoples. For example, PLC 119/2015 would alter the implementation of Indigenous people's constitutional rights. PL 6438/2019 and PL 3723/2019 would further weaken gun-control laws. PL 6125/2019 would effectively give law-enforcement agents a "license to kill" by barring charges for excessive use of force.

These bills are expected to come up for a vote this year (*5*), at which point they are likely to pass. If they become law, they will exacerbate the effects of wood, mineral, meat, soy, natural gas, oil, and biofuel exports on deforestation in the Amazon and its associated loss of biodiversity and violation of Indigenous rights. Major importers of products from the Brazilian Amazon, such as the United States and China (*6*), cannot turn a blind eye to the impact of their trade with Brazil. President Bolsonaro and his supporters in the National Congress do not give much weight to the concerns of scientists and environmentalists, but they are very sensitive to international decisions that affect Brazil's exports. Global partners should consider their trade policies accordingly.

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TECHNICAL COMMENT ABSTRACTS

Comment on "Resolving spatial and energetic distributions of trap states in metal halide perovskite solar cells"

Sandheep Ravishankar, Thomas Unold, Thomas Kirchartz

Ni *et al*. (Research Articles, 20 March 2020, p. 1352) report bulk trap densities of 10^{11} cm^{-3} and an increase in interfacial trap densities by one to four orders of magnitude from drive-level capacitance profiling of lead halide perovskites. From electrostatic arguments, we show that the results are not trap densities but are a consequence of the geometrical capacitance and charge injection into the perovskite layer.

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Response to Comment on "Resolving spatial and energetic distributions of trap states in metal halide perovskite solar cells"

Zhenyi Ni, Shuang Xu, Jinsong Huang

Ravishankar *et al*. claimed that drive-level capacitance profiling (DLCP) cannot resolve trap density in perovskites of given thickness. We point out that the trap densities derived by DLCP are from the differential capacitance at different frequencies; thus, the background charges caused by diffusion and geometry capacitance have been subtracted. Even for the nondifferential doping analysis, the contribution from diffusion capacitance is negligible and that from geometry capacitance is excluded.

Full text: dx.doi.org/10.1126/science.abd8598

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