if deficits in the TLE mice can be alleviated by activating MCs during learning.

Thus, Bui et al. provide some answers but also leave us with some questions. For example, how do MCs control only the duration of electrographic seizures? The reason may be similar to the reason MCs control convulsive seizures—in each case they terminate the seizure prematurely. It could be that activating surviving MCs might strengthen the DG inhibitory gate sufficiently to stop a seizure that has begun. However, how could a very small number of MCs stop a seizure that involves so many neurons in different brain regions? A possible explanation is that MCs that survive in the mouse model of TLE begin to grow additional connections (sprouting), which is known to happen in other cell types, such as GCs (2). Indeed, what would occur if all MCs survived in this model? Would MCs still inhibit GCs, or would they activate them? And would seizures be affected?

Other aspects of the DG that affect object location memory and convulsive seizures are also intriguing. For example, the DG is one of the few areas of the brain where GC neurogenesis occurs throughout life. Remarkably, new GCs influence the ability to distinguish novelty (12), which seems related to the functions of MCs to encode new object locations, identified by Bui et al. Reduction of new GCs in an adult mouse also enhances the susceptibility to convulsive seizures induced by systemic kainic acid injection (13). MCs make the first excitatory synapses on new GCs (19), so MC interactions with new GCs could play a role in spatial encoding and seizure susceptibility. Interestingly, GCs release peptides and even GABA, as well as undergoing many manipulations had some different consequences in TLE mice. Further investigation should advance our understanding of how the DG contributes to memory and its role in epilepsy.

REFERENCES
Bee diversity needed for pollination

Pollinating species vary from site to site; numbers of individuals indicate abundances at the site for each species type.

Dominant species contribute most to pollination function at sites 1 and 2, and only one or two species, respectively, are needed to surpass the threshold required for full pollination. Dominant species occur at all sites, but because of their low abundance at sites 3 and 4, most species are needed for pollination function. Species turnover between such sites means that most species in the species pool are needed to supply pollination function across the entire array of sites.

Few dominant species are needed to supply ecosystem functions? A partial answer is that this is the first study to disentangle the contrasting effects of species dominance and turnover.

Equally important is how exactly the service was measured. Previous studies, including those by Winfree and co-workers (6, 10), looked at the relative contributions of functionally dominant and non-dominant species to ecosystem function without considering the actual amount of pollination needed by farmers to reach critical pollination thresholds. In the current study, Winfree et al. instead looked at the magnitude of the service and whether a given threshold (25, 50, or 75%) is achieved at each site on the basis of the bee-community composition. Critically, at sites where the dominant, widespread pollinators are low in abundance, almost all or even all pollinator species may be needed (see the figure). At such sites, relatively rare species provide essential contributions to pollination function. Species turnover among such sites, then, is the reason why so many species are needed, regionally, to provide pollination.

Even though rare species make a small contribution overall across sites, identifying their contributions to reaching a threshold on a farm-by-farm basis shows how important they are. Arguably, understanding how much pollination a farmer would get at any point in the landscape is the relevant metric for assessing ecosystem services to real people in real landscapes (11).

The growing chorus, both from plot-based experimental studies (3) and from a large-scale natural experiment (2), strongly supports the importance of maintaining a large amount of biodiversity to support human well-being sustainably. But maintaining this biodiversity in agricultural landscapes, both for pollination services and for other ecosystem functions and services that support crop production, is likely to require substantial changes in management. Specifically, it will require moving away from monocultures and fencercrof-fencing that rely extensively on external inputs of pesticides and fertilizers, as well as managed honey bees that may compete with wild bee species (12), and toward farms that generate much of the needed pest and disease control, soil fertility, and pollination services through crop and noncrop diversification and “ecological intensification” (increasing crop productivity through management practices that promote the organisms producing ecosystem services, rather than through increased use of pesticides and fertilizers) (13, 14). For example, planting diverse crops, flowering strips, and hedgerows can restore wild pollinator populations, enhance species turnover, and supply pollination services (15).

Winfree et al.’s study helps to show that there may be much more alignment between ecosystem-service arguments for biodiversity conservation and intrinsic-value arguments (conserving biodiversity for its own sake). Given the key role of biodiversity for human well-being and sustainability, it is crucial that human societies better protect and restore biodiversity.

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