FIELD NOTES

from a

CATASTROPHE

MAN, NATURE, AND CLIMATE CHANGE

Elizabeth Kolbert

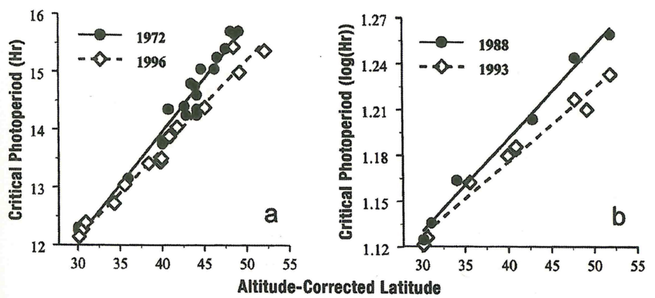
storing the thousands of specimens they would gather. Nowadays, they more often send out their graduate students, who, instead of driving, are likely to fly. (Getting through airport security with a backpack full of mosquito larvae is a process that, the students have learned, can take half a day.)

Each time they collect a new batch of insects, Bradshaw and Holzapfel put the larvae in petri dishes and place the dishes in locker-size light boxes, which are jokingly referred to in the lab as "mosquito Hiltons." They then test the larvae for their critical photoperiod and record the results.

When Bradshaw and Holzapfel went back to their files, they looked for populations that they had tested at least twice. One of these was from a wetland called Horse Cove, in Macon County, North Carolina. In 1972, when the couple had collected mosquitoes for the first time from Horse Cove, their files showed, the larvae's critical photoperiod was fourteen hours and twenty-one minutes. They collected a second batch of mosquitoes from the same spot in 1996. By that point, the insects' critical photoperiod had dropped to thirteen hours and fifty-three minutes. All told, Bradshaw and Holzapfel found that in their files they had comparative data on ten different subpopulations—two in Florida, three in North Carolina, two in New Jersey, and one each in Alabama, Maine, and Ontario. In every single case, the critical photoperiod had declined over time. Also, their data showed that the farther north you went, the stronger the effect; a regression analysis revealed that the

critical photoperiod of mosquitoes living at fifty degrees north latitude had declined by more than thirty-five minutes, corresponding to a delay in diapause of nearly nine days.

In a different mosquito, this shift could be an instance of the kind of plasticity that allows organisms to cope with varying conditions. But in *Wyeomyia smithii*, there is no flexibility when it comes to timing the onset of diapause. Warm or cold, all the insect can do is read light. Bradshaw and Holzapfel knew therefore that the change they were seeing must be genetic. As the climate had warmed, those mosquitoes that had remained active until later in the fall had enjoyed a selective advantage, presumably because they had been able to store a few more days' worth of resources for the winter, and they had passed this advantage on to their offspring, and so on. In December 2001, Bradshaw and Holzapfel published their findings in the



The critical photoperiod for Wyeomyia smithii *has declined markedly over time. Changes are most dramatic at higher latitudes. Credit: After W. Bradshaw and C. Holzapfel,* PNAS, *vol. 98 (2001).*