

How do two different populations in a species become two different species?

Prairie sunflowers (*Helianthus petiolaris*) may all look similar, but one type grows on the shifting sand dunes in Colorado, while another prefers more stable, grassy soils. They are considered the same species, but Kate Ostevik is discovering the strategies they are using to become less and less similar.

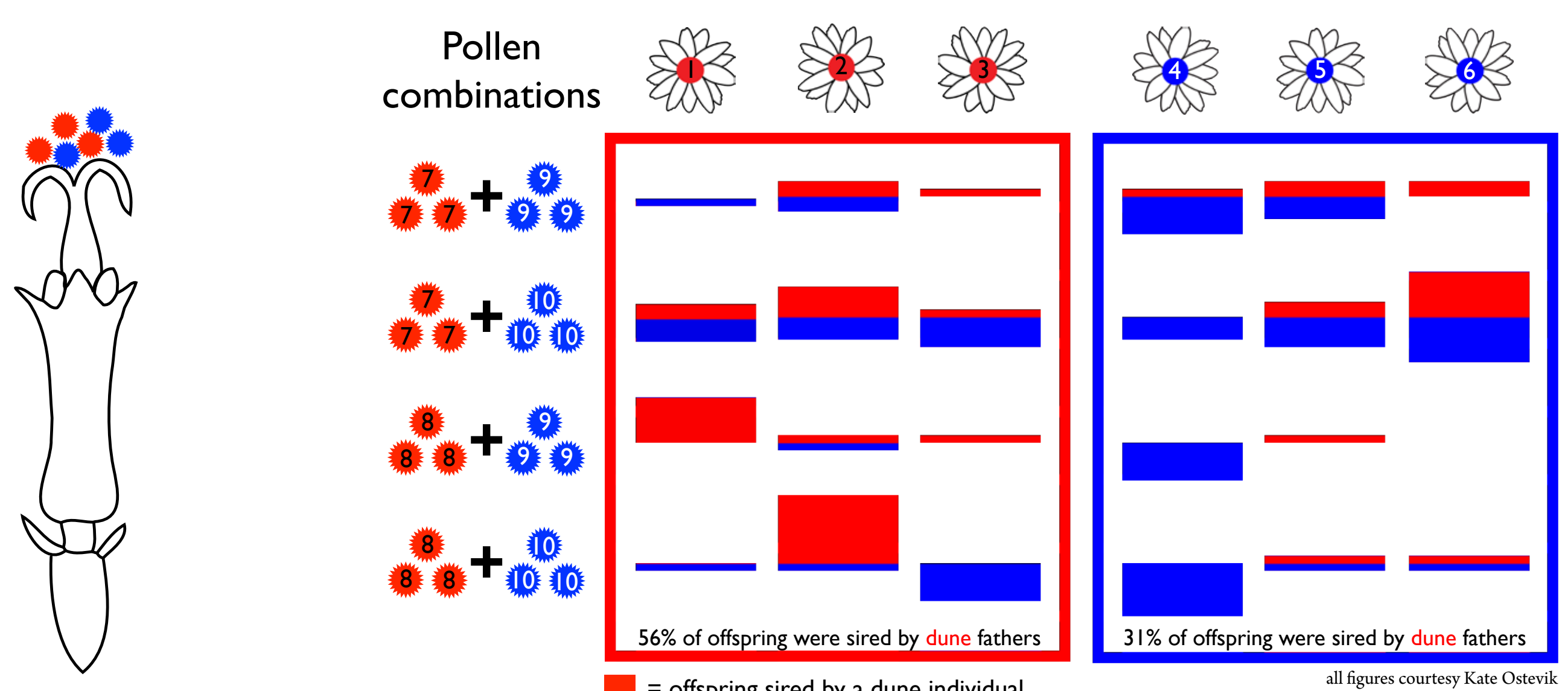
Most flowering plants begin the process of reproduction when the male pollen from one plant comes into contact with compatible female parts of another plant. However, not all pollen has an equal chance of succeeding. When exposed to a mix of dune and non-dune pollen, Kate found that dune plants were more likely to be successfully pollinated by dune pollen. None-dune plants were more likely to be pollinated by non-dune pollen. This means plants are more likely to develop seeds with parents from the same population, keeping their genes distinct. This is known as a *reproductive barrier*.



A dune-type prairie sunflower growing on an active sand dune.



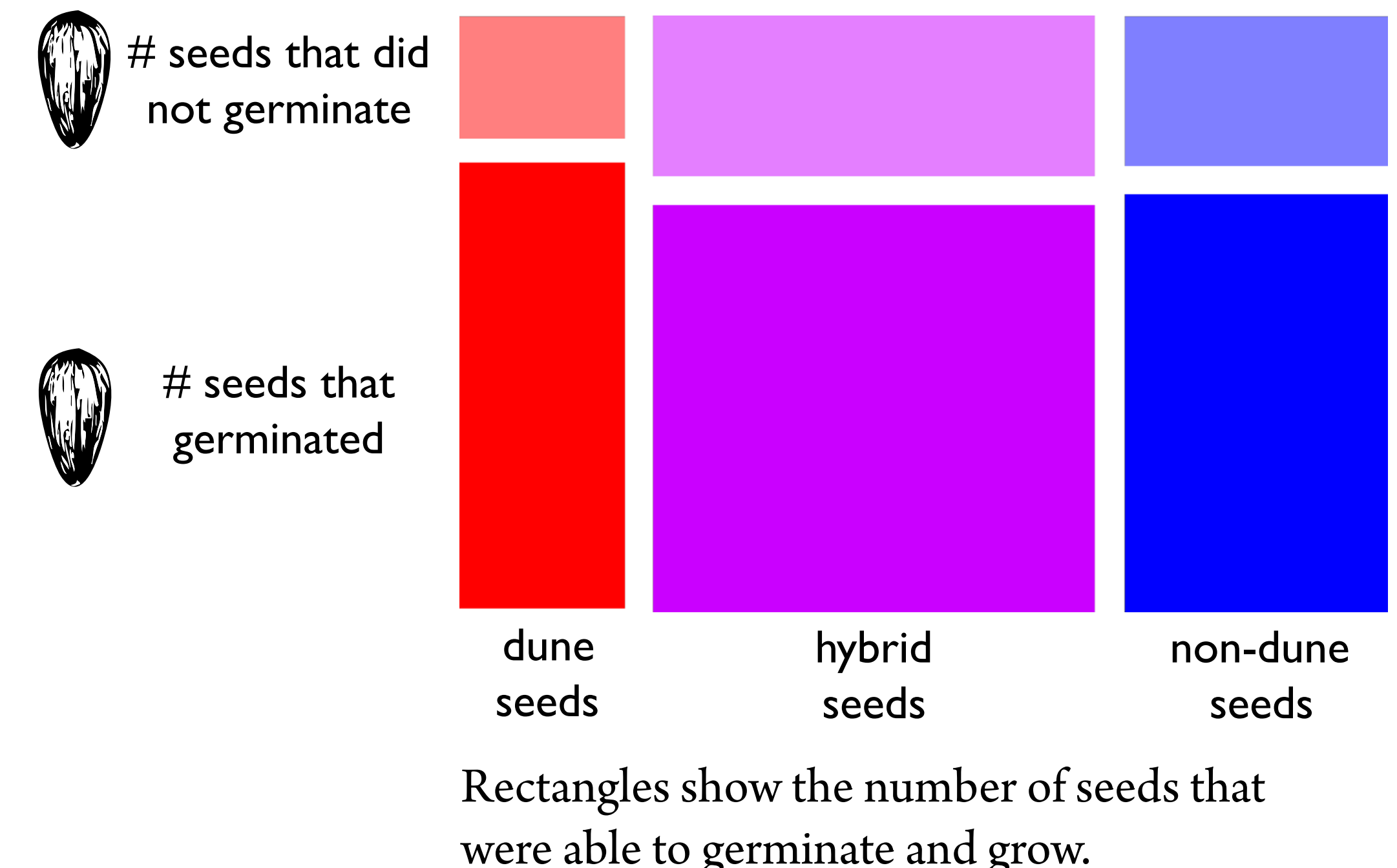
A non-dune prairie sunflower growing on sandy soils with grasses.



A sunflower head is made up of many individual flowers that can receive pollen.

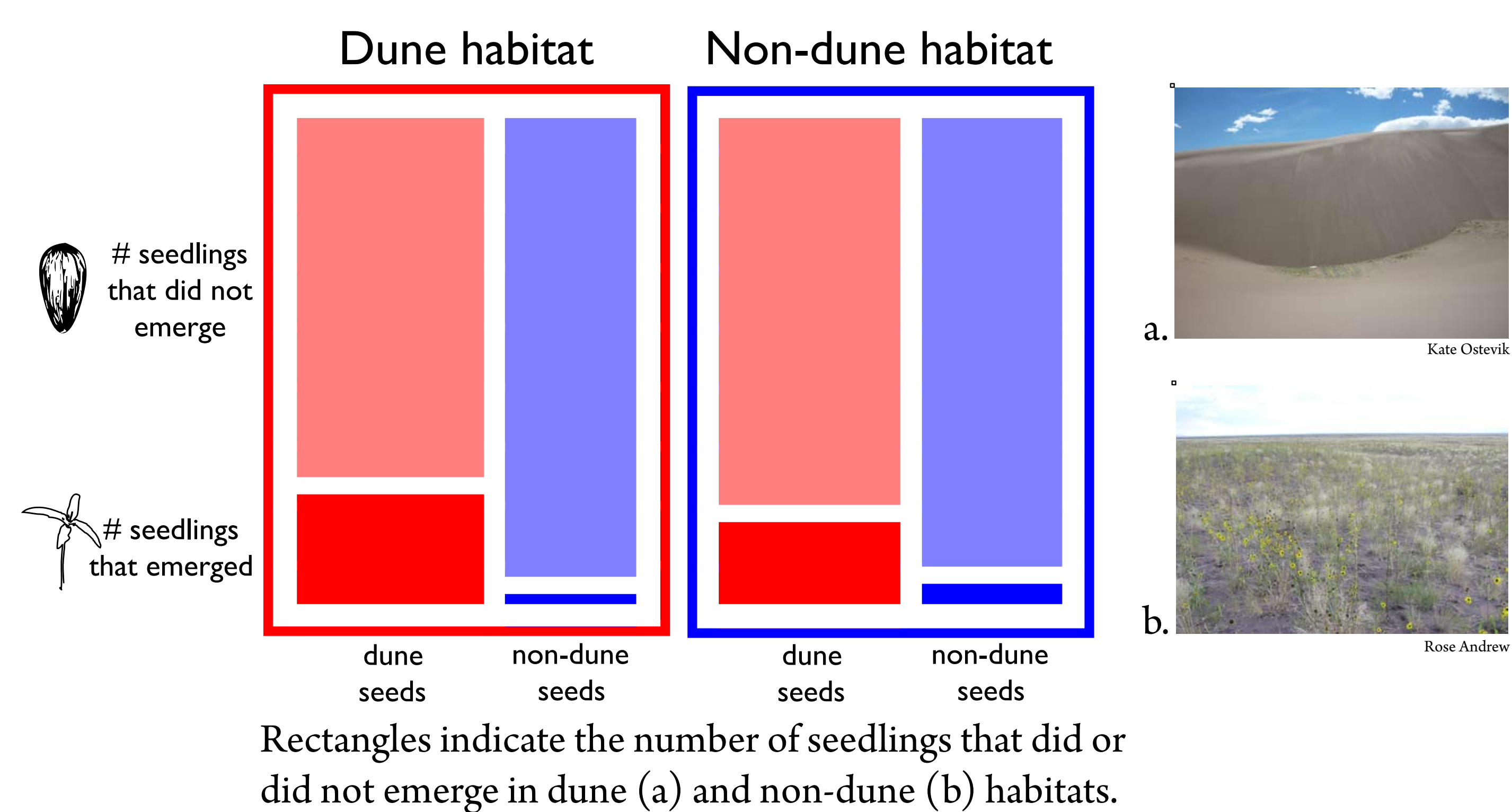
Bars indicate number of offspring produced by crossing dune (red) and non-dune (blue) plants with a mix of pollen.

Hybrid seeds, with one parent from each population, do occur. In an experiment in the lab, Kate discovered that hybrid seeds are slightly less likely than seeds from the dune and non-dune populations to germinate and grow.



Rectangles show the number of seeds that were able to germinate and grow.

Kate also tested if plants from one population were able to grow in the other's habitat. She found that dune seeds do better than non-dune seeds in both places. However, non-dune seeds that manage to get started in the non-dune habitat end up making more seeds than any of the other plants. Together, this means that each plant type has an advantage in its own habitat.



Rectangles indicate the number of seedlings that did or did not emerge in dune (a) and non-dune (b) habitats.

Different reproductive strategies may favour one group or another, depending on the conditions they encounter. Over time, reproductive barriers, some of which are yet to be discovered, may cause the genetic information of the two groups to become different enough to no longer allow hybridization between the groups. If the divide between the groups continues to grow, scientists may consider them two different species.



One of Kate's field test sites in an open grassland.



A sunflower emerges from the soil.