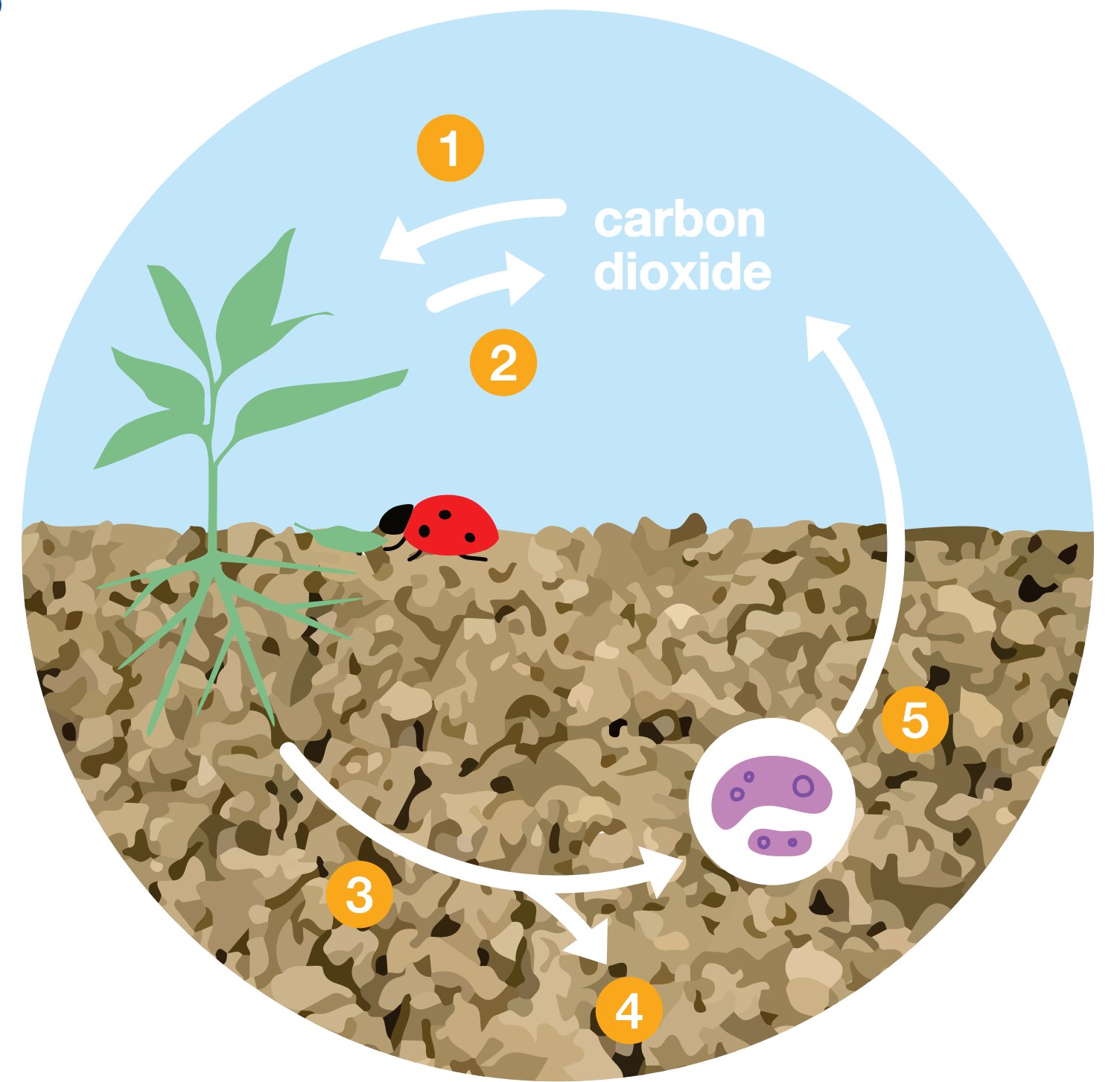


How soils mitigate climate change

Meret Aeppli, Scott Fendorf

How does carbon get in and out of soils?

- 1 Plants grow by converting carbon dioxide into biomass in a process called photosynthesis.
- 2 About half of the carbon in plants is converted back to carbon dioxide as they breathe.
- 3 Organic carbon enters the soil in the form of dead plant material.
- 4 Organic carbon can be stored in the soil or ...
- 5 ... eaten by bacteria and converted back to carbon dioxide.



Relative amounts of carbon in:

the atmosphere

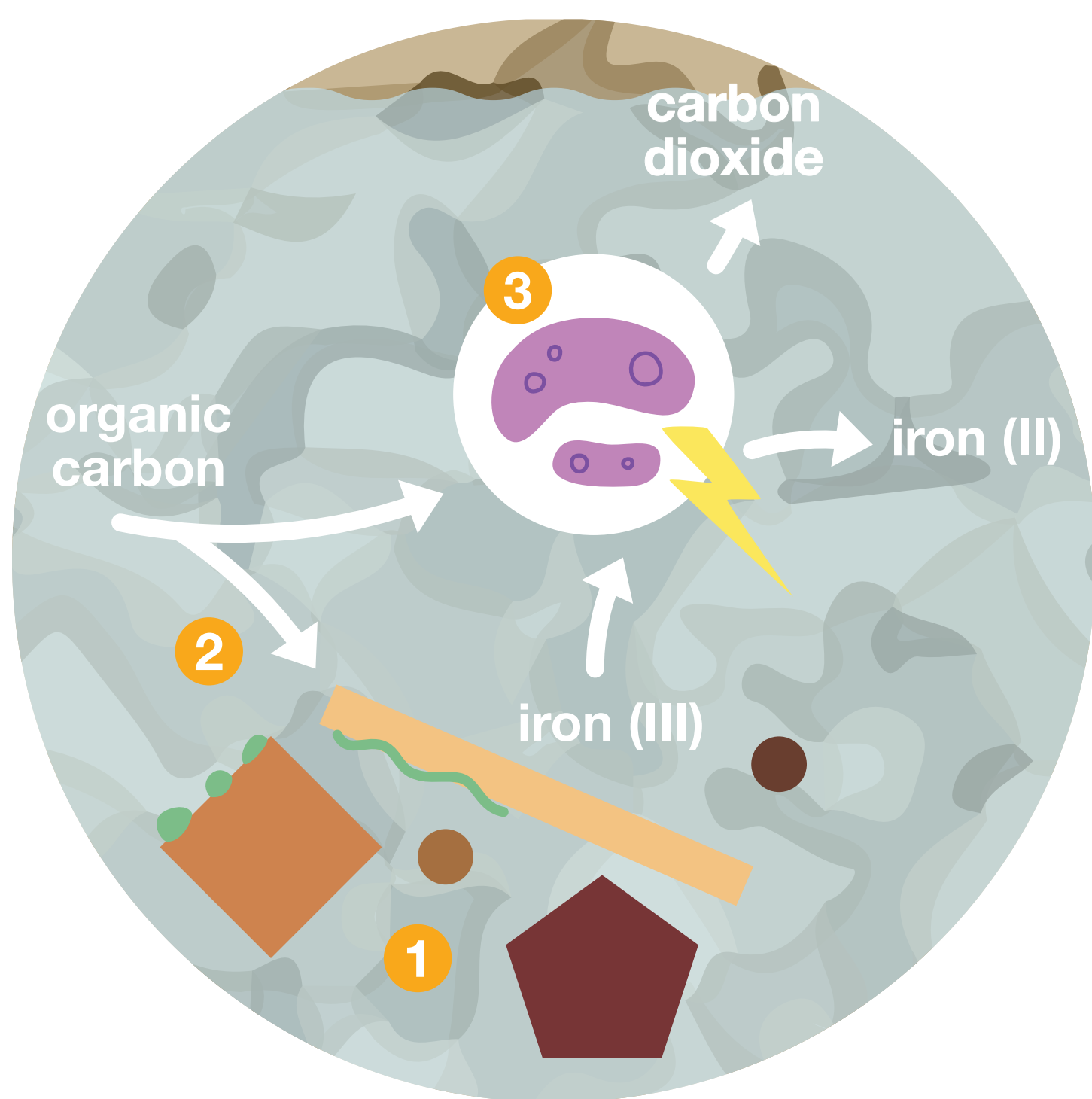
plants & animals

soils



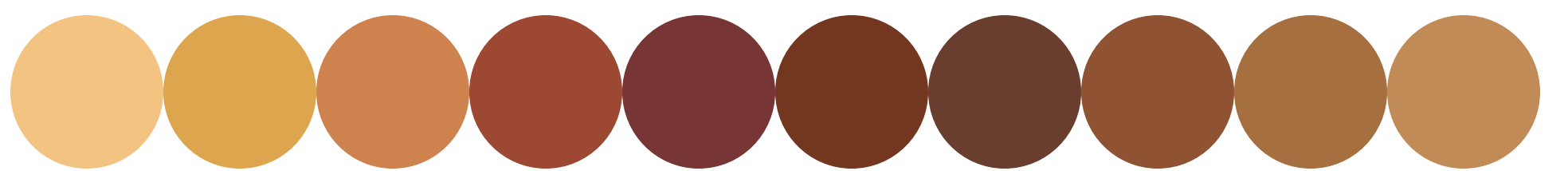
How do iron minerals affect soil carbon?

- 1 Iron minerals are present in most soils and occur in a variety of shapes and colors.
- 2 Organic carbon is stored in mineral associations.
- 3 Some bacteria convert organic carbon to carbon dioxide using iron (III) to breathe when there is no oxygen. In that process, charge is transferred from carbon to iron.



Iron minerals differ widely in their reactivity to take up charge. To find out what will happen to carbon in soils we therefore need to know how reactive the iron minerals are!

Color variety in iron minerals:



Can we quantify mineral reactivity?

We assess mineral reactivity in our laboratory by mimicking bacteria: We quantify how much charge different minerals can take up.

- A Reactive minerals take up a lot of charge; carbon dioxide production by bacteria is **high**.
- B Stable minerals take up little charge; carbon dioxide production by bacteria is **low**.

Large variations in carbon dioxide production occur in:

river floodplains

lake sediments

wetlands

