

About this collection



This Collection is the work of more than 50 scientists and Young Reviewers from all around the globe. Our role as editors, together with the authors, was to share our love of soil biodiversity with you. In this Collection, you will discover that soils are full of life. We will introduce some of the methods and techniques used by scientists to observe the life below our feet. We will show you that belowground life is essential to have healthy soils and, therefore, for us. However, you will soon realize that belowground life is changing and under multiple threats. The authors will give ideas on how we can protect soil biodiversity and invite you to actively help us in studying and protecting this valuable ecosystem. We have divided this article Collection into four sections, each of which is introduced below.

SOILS ARE ALIVE

Soils are not just rock and dust but are astonishing living systems that are full of life! In this first section, you will read about little creatures that you might already know, like earthworms. You

will also discover many new creatures, like springtails and mites, that live close to you in your garden, in the parks, or in nearby fields. Our authors will even show you an entire world of tiny creatures not visible by the naked eye: tiny bacteria, fungi, and protists. Soil biodiversity is about the diversity of these organisms.

But how many different organisms are there? How different are they from each other? To answer these questions, scientists need tools and methods to observe and understand the biodiversity under our feet.

HOW CAN WE OBSERVE THIS BEAUTIFUL WORLD UNDER OUR FEET?

In the articles in this section, the authors describe the tools and methods they use to observe and understand soil biodiversity. It is not easy to see the creatures in the soil and what they are doing under our feet; therefore, soils are often called the "black box". Some scientists are using the body fat of soil creatures to identify them and monitor what they feed on; others use DNA to identify soil organisms, like forensic investigators in the movies. In addition, our authors will explain how soil organisms are "talking" to each other and how we study these interactions.

What are scientists learning from studying these soil creatures? Is soil biodiversity important to us?

WHY IS SOIL BIODIVERSITY SO ESSENTIAL TO US?

In this section, the authors illustrate that soil biodiversity maintains processes essential for our well-being. For example, you will learn that soil bacteria can keep your food safe by protecting it from diseases. We will highlight that soil biodiversity is essential for nature to work. For example, the authors will demonstrate that soil organisms are vital for recycling dead matter and releasing the nutrients in it. In addition, you will see how soil organisms are directly affecting greenhouse gas emissions such as carbon dioxide and methane by controlling soil processes. Controlling these emissions is critical for keeping our climate stable.

Soil organisms are alive, moving, and interacting, but are all these organisms and their important functions changing with time? Are these communities of soil organisms set in stone?

SOIL COMMUNITIES ARE CHANGING

You probably know that a lot of trees, flowers, and animals can change over the year with the seasons; flowers and fruits appear in spring and summer, leaves drop from the trees in fall. Soil animals are also changing with the seasons. And, like us, soil organisms can move to new places or disappear from others, either permanently or temporarily. These changes can be natural but can also be the result of human activities. Our authors will show you that agricultural practices and the effects of climate change (such as reduced rainfall) are affecting soil organisms, their functions, and the services they provide to us.

As we saw previously, soil biodiversity is essential for us, so any changes could be disastrous. So can we protect the organisms in the soil in the same way we protect other organisms such as tigers and pandas?

PROTECTING SOIL BIODIVERSITY

In the final section of this Collection, our authors will show you how to protect soil biodiversity. We can reduce our impacts and conserve this wonderful belowground life. But we can even go a step further and restore lost soil functions using our knowledge of soil biodiversity; for example by using fungi to restore soils. However, this is only possible if we understand soil biodiversity and its function. This is where you can help, for example by participating in a citizen science project and going outside to help researchers.

CONCLUSION

This Collection is about illuminating the "black box" of soil and showing you some of the fantastic creatures living under our feet. You will learn how scientists are studying soil biodiversity and how this soil biodiversity is essential for us. However, you will also see that soil biodiversity is under threat and

needs to be protected. Many people across the globe will be needed to effectively protect these vital systems below our feet. That's why it is important to spread the word about the beauty and fragility of belowground life. We hope that this Collection will make you a champion of soil biodiversity and that you will pass on this message so that everyone will become more aware of, and be better able to protect soil biodiversity.

Now it is your turn to explore and engage with the content of this Collection. We hope there will be something for all of you! In dieser Artikelsammlung wirst du entdecken, dass Böden voller Leben stecken. Wir werden einige Methoden und Techniken vorstellen, die von Wissenschaftlerinnen und Wissenschaftlern genutzt werden, um die Lebewesen unter unseren Füßen zu beobachten. Wir werden dir zeigen, dass diese Lebewesen für gesunde Böden unverzichtbar und daher für uns lebensnotwendig sind. Du wirst aber feststellen, dass sich das unterirdische Leben verändert und auf unterschiedliche Weise bedroht ist. Doch die Autorinnen und Autoren präsentieren Ansätze, wie wir die Bodenbiodiversität schützen können. Wir laden dich ein, uns aktiv beim Untersuchen und Schützen dieses wertvollen Ökosystems zu helfen. Jeder Artikel in dieser Artikelsammlung gehört in eine der fünf Kategorien, die nun vorgestellt werden.

EDITORS



MALTE JOCHUM

Malte studied biology because, as a teenager, he built a small pond in his parents' garden and realized that this subject would never cease to amaze him. As a community ecologist, he is very interested in how human activities affect plant and animal communities and their functioning. His work has focused on aquatic and terrestrial ecosystems across temperate and tropical areas and mainly involves macroinvertebrates. When not at work, he likes to explore nature with his two daughters, do rock climbing, cycling, or canoeing, and more recently, has discovered an interest in beginner-level triathlon.



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Rémy works as PostDoc at the German Centre for integrative Biodiversity Research (iDiv) and the Centre d'Ecologie Fonctionnelle et Evolutive in Montpellier.



HELEN R. P. PHILLIPS

Helen has always loved animals, but never really enjoyed doing field work. She continued learning about ecology, and eventually realized that using large datasets and doing computer-based work, such as programming, was what she found interesting. Since then, Helen has focused on global datasets of biodiversity, using them to investigate where biodiversity is in the world, and how human activities might be affecting global patterns. Recently, her work has involved earthworms and other soil biodiversity. When not working, Helen likes to play computer and board games, sew, make music, and play with her pet rabbit.

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