

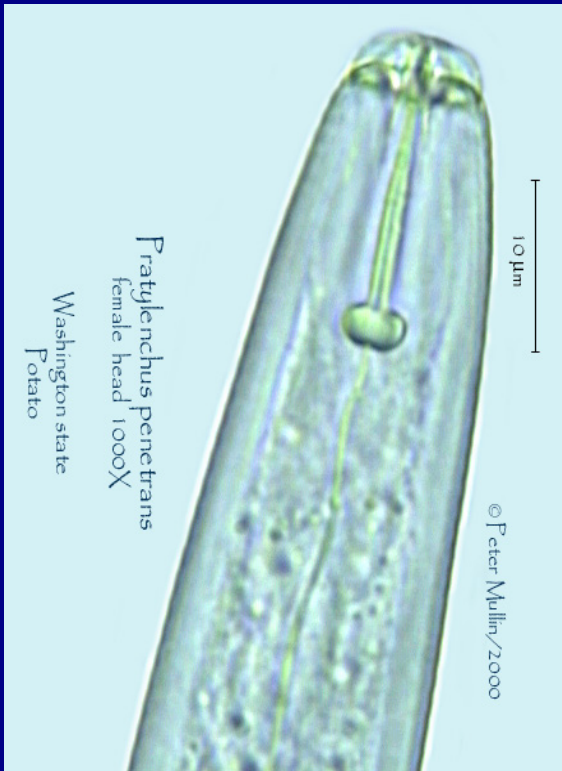
Diana H. Wall  
School of Global Environmental Sustainability  
Dept Biology  
Colorado State University



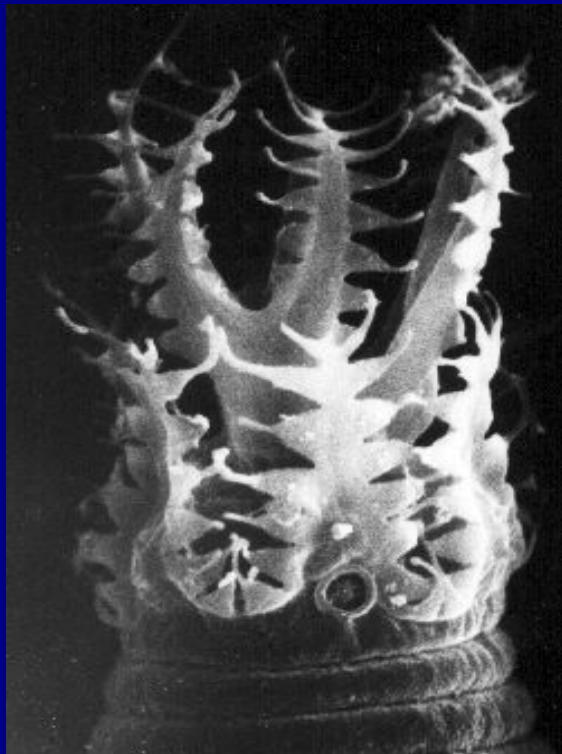
# Soils and soil biodiversity sustain the biodiversity we see



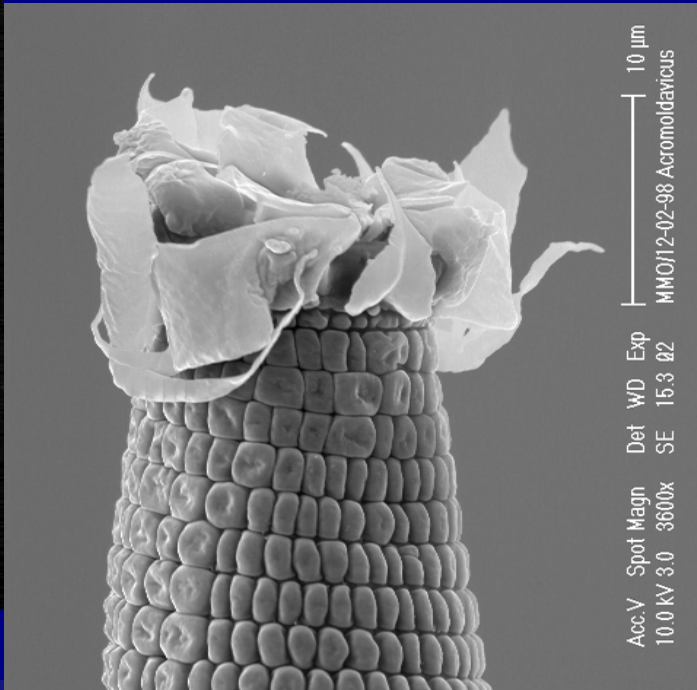
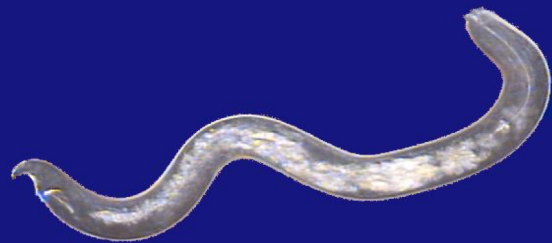
MICHAEL POLE / CORBIS



©Peter Mullin

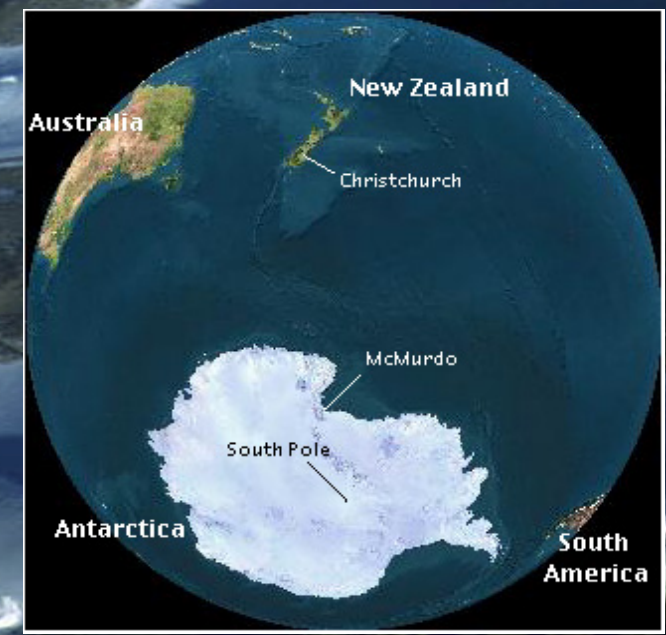
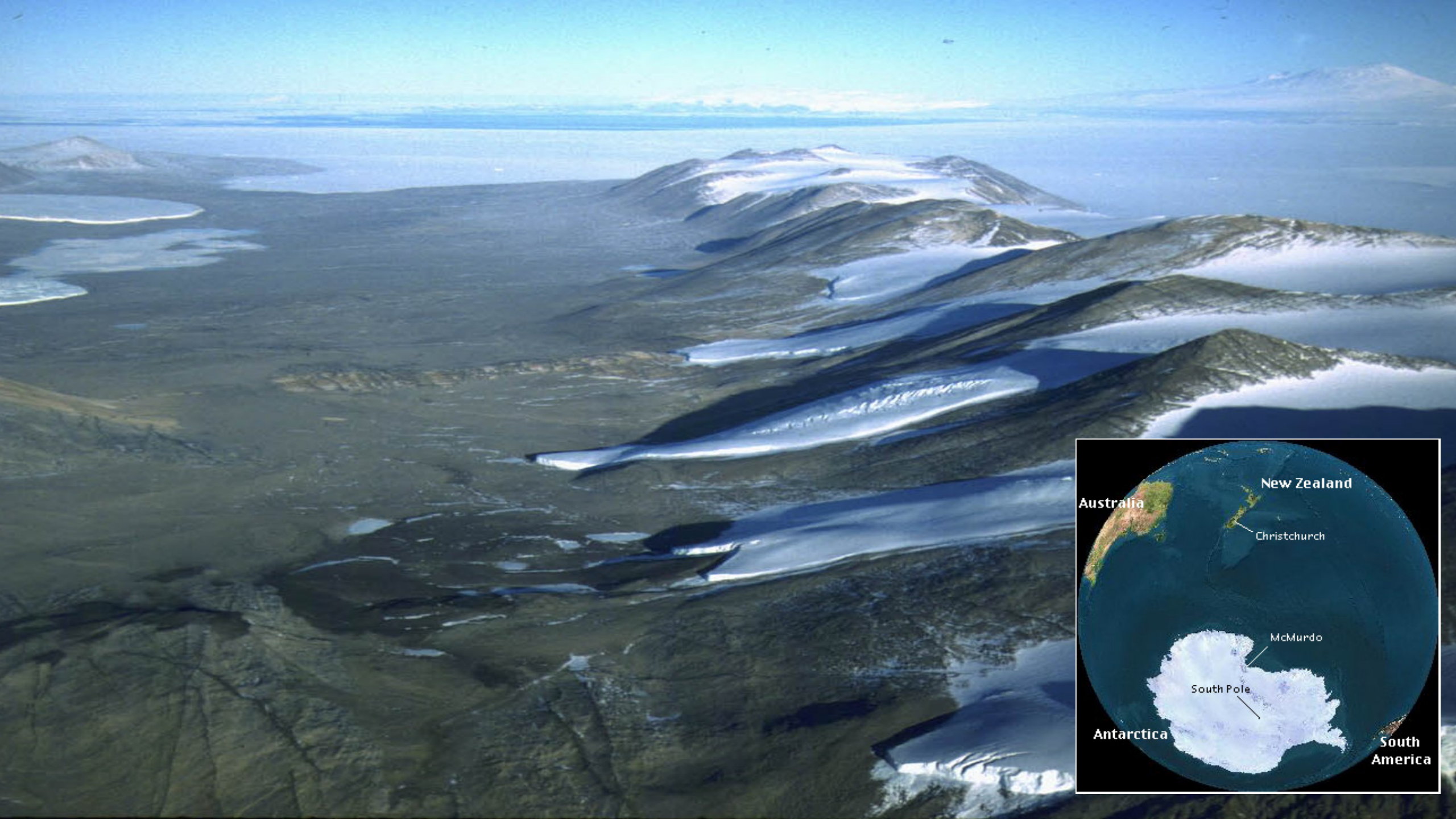


*Acrobeles ciliatus*  
©Sven Boström



*Acromoldavicus*  
©Manuel Mundo-Ocampo



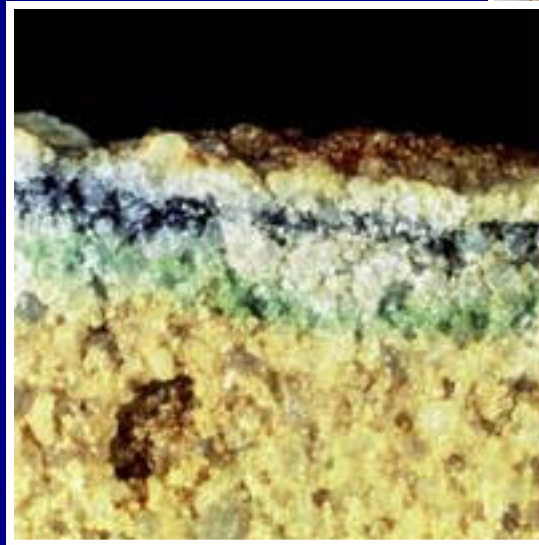




# Primary Productivity

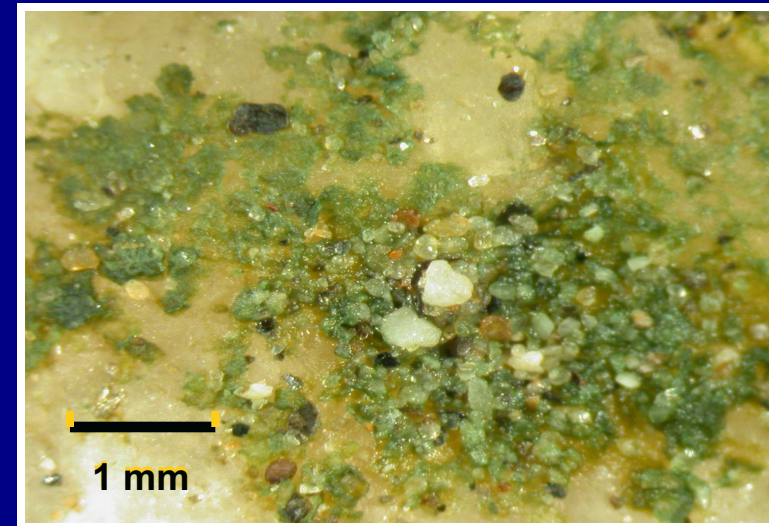


Lake & stream algal mats



de la Torre et al., 2003

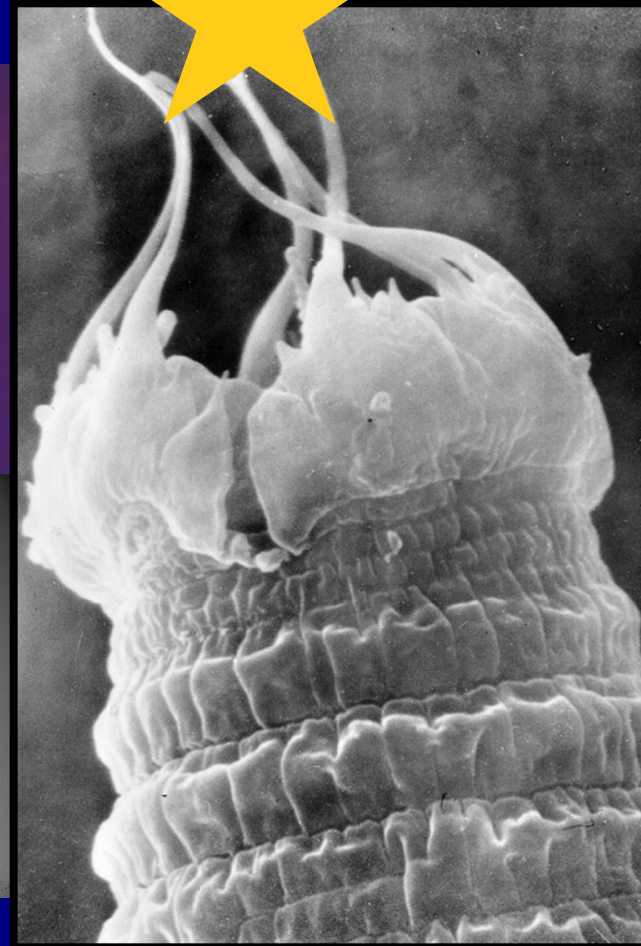
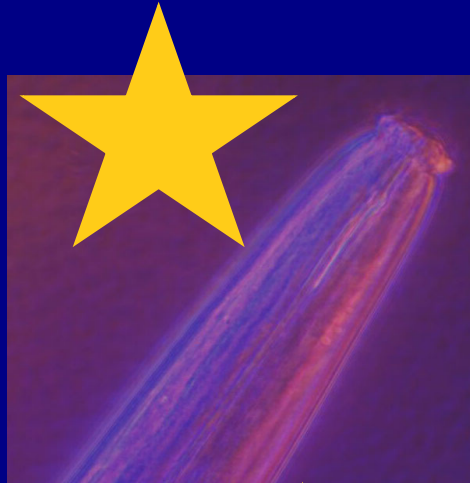
Endolithic communities



Lake Algae



“The invertebrates....McMurdo’s equivalent of elephants and tigers” *E.O. Wilson, Future of Life, 2002*





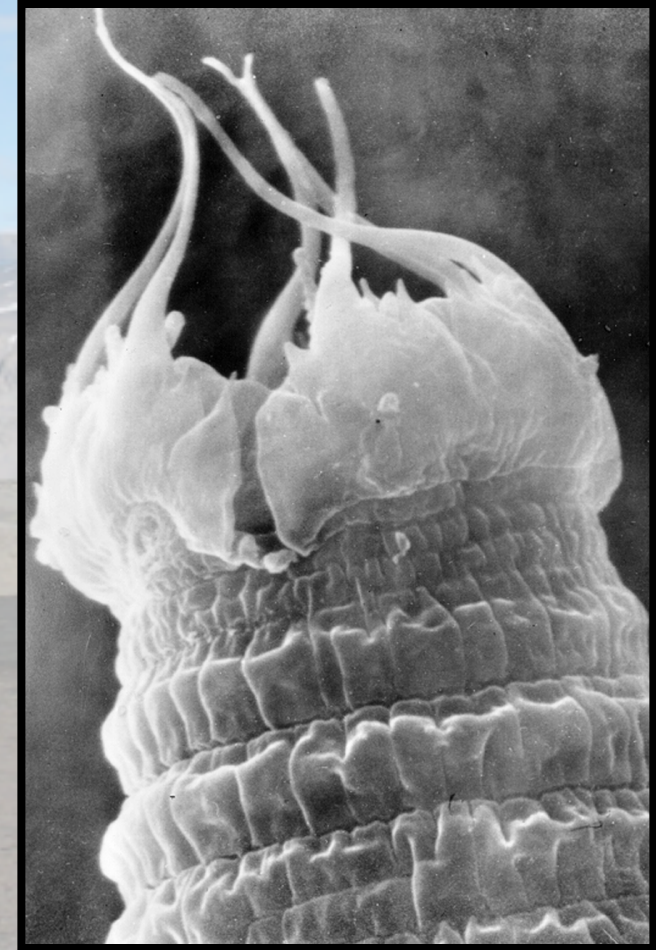
**Does it matter.....**

**if a single species declines in a polar desert?**

With a cooling climate over 12 years (til 2005)

**65% decline in *Scottnema***

**~30% reduction in soil carbon cycling**

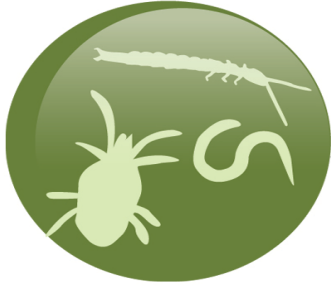


*Hunt et al., 1987, Hunt and Wall, 2002, Barrett et al. 2008, Wall, 2007*









# GLOBAL SOIL BIODIVERSITY

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**JOIN the 4000 soil  
biodiversity scientists!**



<http://www.globalsoilbiodiversity.org>

Secretariat:



SCHOOL OF GLOBAL  
ENVIRONMENTAL SUSTAINABILITY  
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COLORADO STATE  
UNIVERSITY



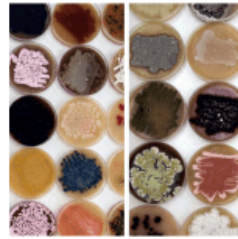
<http://www.globalsoilbiodiversity.org>



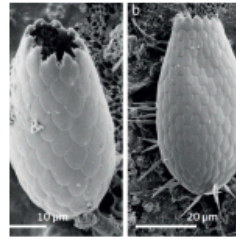
Soil biodiversity



Archaea



Bacteria



Protists



Fungi



Lichens



Plants



Tardigrades



Rotifers



Nematodes



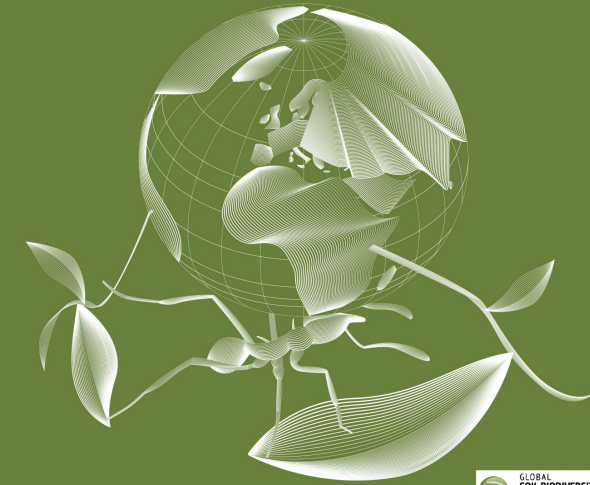
Enchytraeids



Acari (mites)



# GLOBAL SOIL BIODIVERSITY ATLAS



GLOBAL SOIL BIODIVERSITY INITIATIVE

Joint Research Centre



>33K downloads



4.3Million views



>125M social media views



*A global soil biodiversity science report –due 2020*  
global environmental policy (UN CBD, FAO, GSBI



GLOBAL  
**SOIL BIODIVERSITY**  
INITIATIVE


***Atlas.globalsoilbiodiversity.org***


Global Soil Biodiversity Atlas, Orgiazzi et al. 2016

Article | Published: 24 July 2019

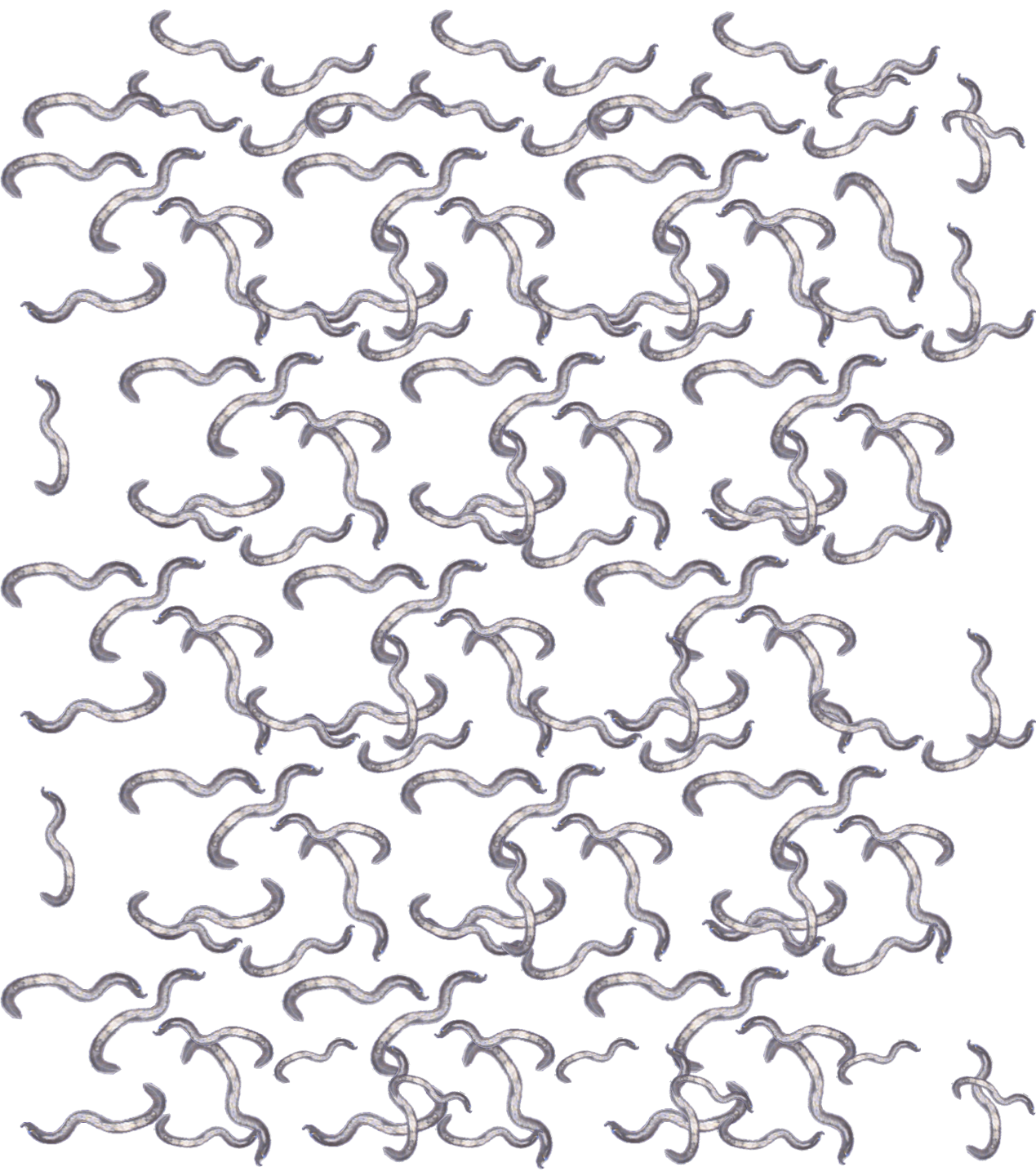
# Soil nematode abundance and functional group composition at a global scale

Johan van den Hoogen , Stefan Geisen, Devin Routh, Howard Ferris, Walter Traunspurger, David A. Wardle, Ron G. M. de Goede, Byron J. Adams, Wasim Ahmad, Walter S. Andriuzzi, Richard D. Bardgett, Michael Bonkowski, Raquel Campos-Herrera, Juvenil E. Cares, Tancredi Caruso, Larissa de Brito Caixeta, Xiaoyun Chen, Sofia R. Costa, Rachel Creamer, José Mauro da Cunha Castro, Marie Dam, Djibril Djigal, Miguel Escuer, Bryan S. Griffiths, Carmen Gutiérrez, Karin Hohberg, Daria Kalinkina, Paul Kardol, Alan Kergunteuil, Gerard Korthals, Valentyna Krashevskaya, Alexey A. Kudrin, Qi Li, Wenju Liang, Matthew Magilton, Mariette Marais, José Antonio Rodríguez Martín, Elizaveta Matveeva, El Hassan Mayad, Christian Mulder, Peter Mullin, Roy Neilson, T. A. Duong Nguyen, Uffe N. Nielsen, Hiroaki Okada, Juan Emilio Palomares Rius, Kaiwen Pan, Vlada Peneva, Loïc Pellissier, Julio Carlos Pereira da Silva, Camille Pitteloud, Thomas O. Powers, Kirsten Powers, Casper W. Quist, Sergio Rasmann, Sara Sánchez Moreno, Stefan Scheu, Heikki Setälä, Anna Sushchuk, Alexei V. Tiunov, Jean Trap, Wim van der Putten, Mette Vestergård, Cecile Villenave, Lieven Waeyenberge, Diana H. Wall, Rutger Wilschut, Daniel G. Wright, Jiue-in Yang & Thomas Ward Crowther  - Show fewer authors

*Nature* **572**, 194–198 (2019) | [Download Citation](#) 

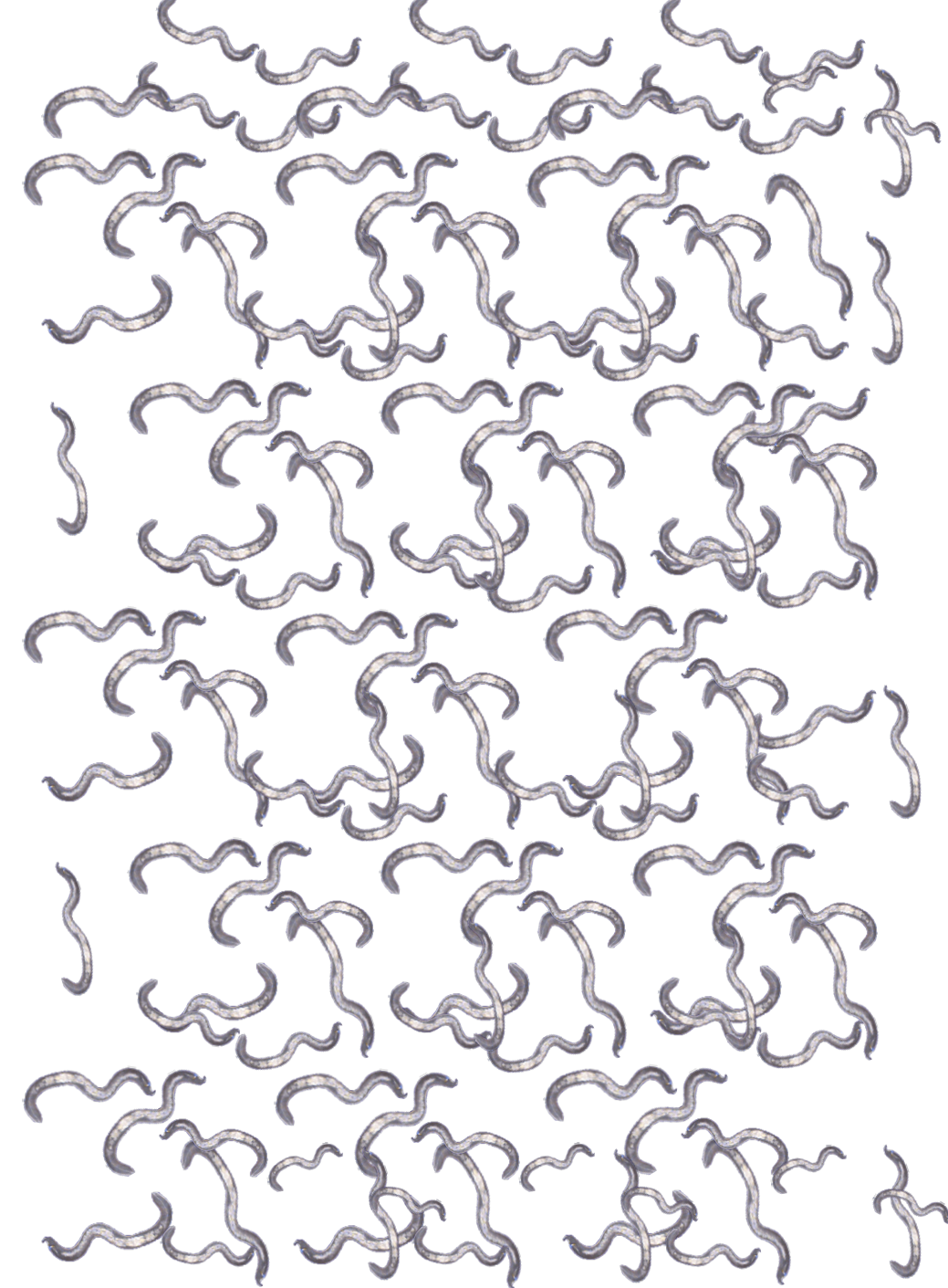
**9362** Accesses | **3** Citations | **562** Altmetric | [Metrics](#) 





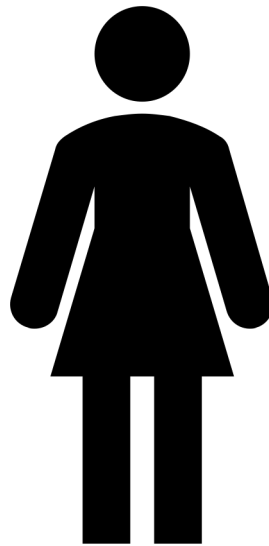
Nematodes are the most abundant animals on earth





Global soil nematode biomass is equivalent to  
**82% total human biomass on Earth**  
( ~0.3 Gt or ~ 0.03 Gt Carbon)

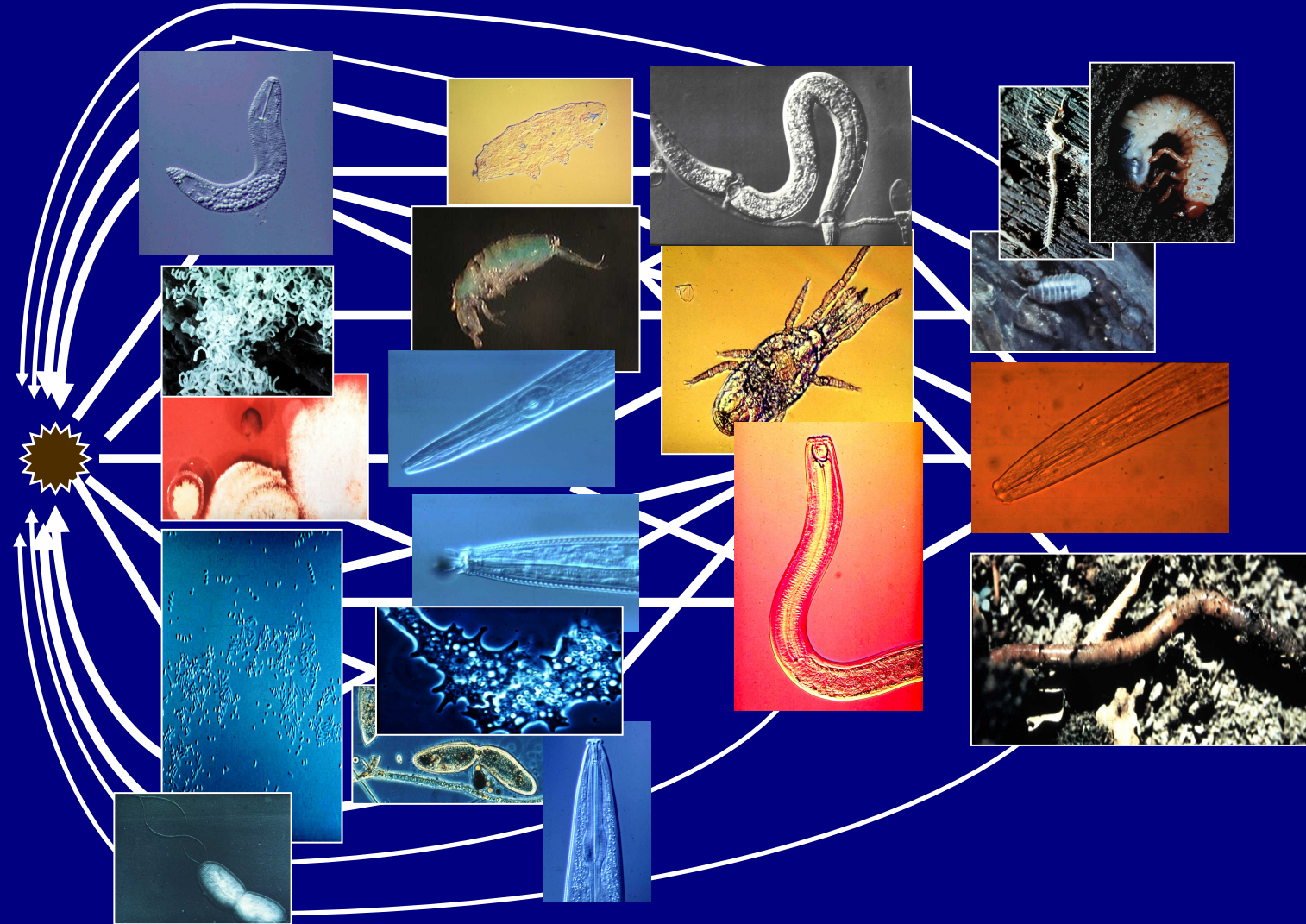
CO<sub>2</sub> respired by nematodes is equivalent to  
~ 15% of carbon emissions from fossil fuels  
~ 2.2% of total carbon emissions from soils



Van den Hoogen et al. 2019. Nature.



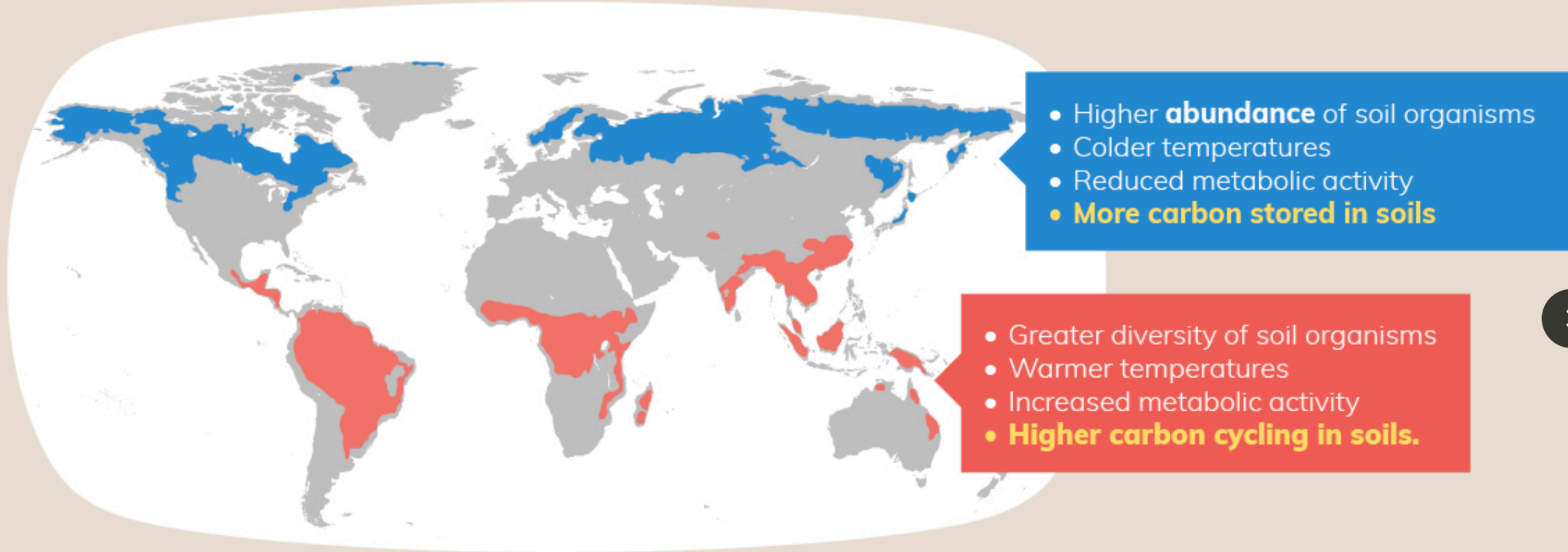
# Complex food webs in soils



Slide courtesy of H. Ferris



# GLOBAL TRENDS: CARBON CYCLING VS CARBON STORAGE



2019 Van den Hoogen et al. Nature. Nematode abundance and functional group composition at a global scale.

Slide from Crowther lab.





## 1,500 BILLION TONNES OF CARBON IS STORED IN SOILS.

These organisms govern this huge carbon pool:



**Fungi**

12 gigatonnes of carbon



**Bacteria**

7 gigatonnes of carbon



**Soil Animals**

2 gigatonnes of carbon



**Archaea**

0.5 gigatonnes of carbon

2019 Van den Hoogen et al. Nature. Nematode abundance and functional group composition at a global scale.

Slide from Crowther lab.



THE 3RD  
**GLOBAL SOIL  
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Dublin, Ireland // 1 - 3 November 2021