

Don't toss your worms, forward them!

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Approximately one quarter of the world's animals live in the soil ([Anthony et al. 2023](#)), and yet samples taken in even well studied regions can yield new species, particularly in the tropics and subtropics. This is true even for well-known taxa such as earthworms for which around [5,750 species](#) have been discovered, although it is estimated that there are over [30 thousand species](#) of earthworms. This can lead to a deficit in biological information that is worsened by inadequate preservation of soil fauna specimens collected worldwide.

In a paper co-authored by earthworm taxonomists Marie Bartz, Samuel



James, Csaba
Csuzdi, Daniel
Marchán, Carlos
Fragoso, Thembeke
Nxele, and Chih-
Han Chang,
recently published
in the [journal](#)
[Biodiversity](#), we

Periscolex brachycystis, a
native earthworm of
Mexico, with a tissue
sample taken from the
posterior part of the body
and placed in the
Eppendorf vial, for
posterior DNA extraction
and molecular analysis
(Photo: Carlos Fragoso).

make an appeal to researchers who work
with or collect soil fauna to adequately
preserve and forward their samples to
institutions that can store this material
over the long-term. The article includes a
list of specialists and institutions
worldwide that can receive earthworm
specimens, aiming to preserve them for
future research, thus avoiding the loss of
global genetic heritage. It also provides
step-by-step instructions on how to
sacrifice, preserve and forward the
specimens.



A new species of
earthworm in the
genus *Glossoscolex*, in the
Natural History Museum of
the Federal University of
Paraná in Curitiba, Brazil
(Photo: George Brown).

Importantly, after
carrying out the
often-arduous field
work needed to
collect soil fauna
specimens, one
must also
undertake the
equally arduous
subsequent work
of cleaning,

sorting, cataloging, and finally, preserving

and maintaining these samples for future studies. Unfortunately, we have seen many situations where this latter process, a routine in museums and zoological collections, was not adequately conducted. This occurs especially in institutions with limited infrastructure or support for preserving fauna samples. Consequently, many samples often collected in biologically rich locations can dry out or rot, and are subsequently discarded and/or lost, as there is no infrastructure or space available to accommodate the material and maintain it with due curatorial care.

Although focused on earthworms, this appeal can be equally applied to many other taxa of soil or epigeic invertebrates collected using Pitfall traps, Winkler, Berlese, or Tullgren extractors, or by hand sorting of monoliths with the Tropical Soil Biology and Fertility (TSBF) method. However, for non-Annelid taxa different sample preparation techniques may be required, so if you have specimens of other taxa that you wish to forward, please contact



One of the moving cabinets of the earthworm collection (Fritz Müller Oligochaete Collection - COFM) at Embrapa Forestry in Colombo, Brazil. (Photo: George Brown).

regional or state zoological museums, to get advice on the fixing, processing and shipping of your specimens (contact information for some countries can be found in the manuscript). If you have specimens collected using any of these methods, and you believe that you cannot adequately preserve and maintain them over the long-term, please forward them as a donation to appropriate institutions. Besides guaranteeing their conservation, this additionally provides specimens for future studies (especially of taxonomic, genetic and biogeographic nature) and helps avoid the loss of important biological information!

Finally, please remember to adhere to the [Nagoya protocol](#) for signatory countries, which includes obligations on the protection, use and sharing of benefits derived from biodiversity. Furthermore, remember to follow the laws and regulations concerning the shipment of biological specimens within-country or to other countries. If specimens are to be shipped or donated to other countries/institutions, various other official scientific or bureaucratic documentation may be necessary. Please certify that all the necessary permits and documents are in order before mailing your specimens.

We thank you in advance for your efforts and contributions towards the long-term preservation of our world's rich soil

biological heritage!



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.@[FrankAshwood](#) of @[Forest_Research](#)

discusses his experience at [#GSB2023](#) in the latest GSBI "Beneath

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— Charles E. Kellogg, USDA Yearbook of
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