Opening a can of worms: Serendipitous discovery reveals earthworms more diverse than first thought

October 10 2008

Scientists have found that the UK's common or garden earthworms are far more diverse than previously thought, a discovery with important consequences for agriculture.

BBSRC-funded scientists at Cardiff University, led by Dr Bill Symondson and performed in the laboratory by postdoctoral scientist Dr Andrew King and undergraduate student Ms Amy Tibble, have found that many of the common earthworm species found in gardens and on agricultural land are actually made up of a number of distinct species that may have different roles in food chains and soil structure and ecology.

This discovery was made when efforts to develop better tools to identify earthworm DNA in the guts of slug and worm-eating beetles produced some very unexpected results. The research is published today (10 October 2008) in *Molecular Ecology*.

Dr Symondson said: "When we were working to find new tools to detect earthworm DNA we started getting results that were not really what we expected to see and that indicated the presence of several new earthworm species. After investigating this further we eventually found that there are significant numbers of what we call 'cryptic species'. These different species live in the same environment and have the same outward appearance, but do not interbreed and have clearly distinct

DNA sequences."

"Earthworms play a major role in the agricultural environment because they are involved in many soil processes such as soil turnover, aeration and drainage, and the breakdown and incorporation of organic matter. For this reason, they have often been the subject of research into, for example, ecology and toxicology. It is vitally important that we know exactly which species we are studying, in case they respond differently from one another – to agrochemicals or heavy metals in the soil, for example."

Dr Symondson and his team chose to study nine different species of common earthworm and collected samples from Britain and mainland Europe. They examined the sequence of specific parts of the worms' DNA to establish the evolutionary relationships between individuals from within each species. They began by looking at 71 earthworms representing the nine recognised species and found evidence that four of the nine common earthworm species are actually made up of complexes of multiple species. And furthermore, detailed analysis of one common species – Allolobophora chlorotica – shows that it is made up of at least three species in Britain and one additional species in central Europe.

Dr Symondson continued: "Any further earthworm research will now have to be done with the knowledge that in many cases there are multiple species where we thought there was just one. We need to establish for certain whether the different cryptic species play different roles in the ecology of our agricultural land or have different tolerances to potential environmental stresses such as toxins, parasites, or extremes of temperature."

Steve Visscher, Deputy Chief Executive, BBSRC said: "Maintaining productive agricultural land is an important challenge. It is exciting to see that while investigating one important issue for agriculture Dr

Symondson and his team were able to observe another crucial aspect. These researchers didn't set out to find new species of worms but by following up on an unusual observation in their work they have uncovered several new species already. This knowledge will be important for many people researching ways to get the most out of our agricultural land in the future."

Source: Biotechnology and Biological Sciences Research Council