

Appearance not always enough to identify species

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Emma Vodoti conducts field studies. Credit: Erik Boström

Linnaean taxonomy is still a cornerstone of biology, but modern DNA techniques have erased many of the established boundaries between species. This has made identifying species difficult in practice, which can cause problems, as shown by a researcher from the University of Gothenburg, Sweden.

"If you can't recognise a [species](#) by looking at it, this can have serious consequences," says Emma Vodoti from the Department of Zoology at the University of Gothenburg. "For example, there is a species of leech that is widely used in medical studies, and it was discovered recently that sometimes a leech was being used that looks the same but has a different genetic make-up. This naturally has an effect on the results of the studies

conducted. All work based on having to be able to identify species may have to change."

350 years after Linnaeus created his system for organising and categorising species of [plants](#) and [animals](#), the system is being pulled apart. Newly discovered organisms are still categorised and named in line with his system, but there is a big difference between species described before and after the discovery of DNA. Until the 1980s, scientists had to rely entirely on appearance, anatomy and other characteristics, such as a bird's song. Since then, genetic patterns have also been taken into account when identifying new species.

"Ironically, these [genetic studies](#) have erased many of the established boundaries between species and even disproved the existence of previously described species that have turned out not to be related. Attempts have been made to establish universal boundaries between species by quantifying how much DNA needs to be different between two organisms in order for them to be viewed as separate species, but this doesn't always work."

In her thesis, Vodoti looks at the practical problems with [species identification](#) today, after having studied the relationship between the [genetic relatedness](#) and the appearance and geographical distribution of various sea creatures. The common horse mussel *Modiolus modiolus* found in the Atlantic and on the west coast of Sweden turns out to be totally different genetically from the one found on the Pacific coast of the USA, despite looking identical. Nemertean worms may have similarities in appearance but turn out to consist of a hotchpotch of different species, more or less independent of looks. Nemerteans include worms just a few millimetres in length to one of the world's longest creatures, *Lineus longissimus*, which can grow up to 15 metres.

"It's probably impossible to find a universal way of defining, identifying

and delimiting species," says Vodoti. "My thesis shows that there is a need for individual assessment on a case-by-case basis when identifying species, taking account of both appearance and genes."

Provided by University of Gothenburg

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