

Identification of exotic North American crayfish in Europe by DNA barcoding



Several alien crayfish of North American origin have become established in Europe in recent decades, but their identification is often confusing. Our aim was to verify the taxonomic status of their European populations by DNA barcoding. We sequenced the cytochrome c oxidase subunit I (COI) gene fragment of individuals representing all American crayfish known from European waters, and compared the results with reference sequences from North America. Our results confirm the morphological identification of *Orconectes juvenilis* from a population in eastern France, and of the marbled crayfish (*Marmorkrebs*), i.e., a parthenogenetic form of *Procambarus fallax*, from south-western Germany. Sequences of most individuals of presumed *Procambarus acutus* from the Netherlands were similar to American *P. cf. acutus*, but one was divergent, closer to a sequence of a reference individual of *P. cf. zonangulus*. However, divergences among three American *P. cf. zonangulus* samples were also high, comparable to interspecific variation within cambarid species complexes. The divergence between *O. immunis* from Europe and America also reached values corresponding to those observed among distinct *Orconectes* species. Genetic variation in the American

range of these crayfish should therefore be further studied. Our study shows that DNA barcoding is useful for the rapid and accurate identification of exotic crayfish in Europe, and also provides insights into overall variation within these taxa.

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Obtenir le document : EDP Sciences

Mots clés : COI, barcoding, invasive crayfish, Europe, North America, COI, code-barre génétique, écrevisses invasives, Europe, Amérique du Nord

Thème (issu du Text Mining) : SCIENCES EXACTES SCIENCES HUMAINES

Date : 2011-05-18

Format : text/xml

Source : <https://doi.org/10.1051/kmae/2011025>

Langue : Anglais

Télécharger les documents : <https://www.kmae-journal.org/10.1051/kmae/2011025/pdf>

Permalien : <https://www.documentation.eauetbiodiversite.fr/notice/identification-of-exotic-north-american-crayfish-in-europe-by-dna-barcoding0>

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