DNA barcoding reveals mislabeled cod and haddock in Dublin

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Ecological scientists in Ireland recently used DNA barcoding to identify species of fish labeled as either "cod" or "haddock" in fish and chip shops, fresh fish counters and supermarkets in 10 postal districts in Dublin. They found that 39 out of 156 (25%) randomly sampled "cod" and "haddock" were genetically entirely different species and, therefore, mislabeled under European Union (EU) regulations.

In addition, as Dana Miller and Stefano Mariani from University College Dublin report in today's *Frontiers in Ecology and the Environment* (e-View), 28 out of 34 (82.4%) smoked fish samples were incorrectly labeled, and 26 out of 28 (92.9%) samples labeled as "smoked cod" were completely different species.

"In light of recent findings from North American scientists using the same approach, it seems mislabeling seafood is pervasive on a global scale," said Miller. "This, coupled with the enormous rise in seafood demand, raises alarm. There is an increasing need for effective and sustainable seafood industry management and especially for transparency within the seafood industry itself on an international level."

Last April, researchers Ron Burton and Phil Hastings from the University of California, San Diego used DNA barcoding to identify fish served in New York restaurants; they found that 25% of the fish were mislabeled.

"Consumers should be able to go to a shop and know they are eating

what they paid for, especially when the product is purchased within the EU, where numerous policies relating to labeling and tracing are already in place," said Mariani. The authors argue that these findings suggest mislabeling could contribute to overfishing—that is, mislabeling cod in Ireland could be creating a false perception of market availability.

"There are many problems associated with mislabeling fish, like in the case of mislabeling the depleted red snapper to enhance perceptions of availability in the U.S.," continued Miller. "Consumers may think that if 'cod' keeps showing up in markets and restaurants across Ireland, the stocks must be healthy."

The fish samples the researchers tested included smoked, fried, battered, fresh and frozen cod and haddock. Approximately 25% of these samples turned out to be cod labeled as haddock or vice versa, or a completely different species of fish altogether, such as pollack, whiting or saithe, mislabeled as cod or haddock or even Pacific cod being labeled as Atlantic cod.

To identify the correct species, the scientists extracted tissue from each sample and entered the gene sequences into the Barcode of Life Data Systems online at www.barcodinglife.org; the researchers also cross-referenced the sequence with other databases. The study includes a complete list of all analyzed fish, as they were labeled and identified.

"With the rapid advances in bioinformatics, the traceability of fish stocks will be more affordable and available," said Mariani. "This will hopefully make enforcing the proper labeling of fish easier and will subsequently encourage transparency in the fishing industry. With a restored trust in retailers and policymakers, the seafood industry can be turned into a sustainable operation on a global scale."