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New molecular approaches suitable for the identification of counterfeit products in the caviar market, affected by intense illegal trade

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The development of genetic tools for species identification to stem illegal trade represents a priority for sturgeon species, well known for the delicacy of their eggs, the caviar, one of the most valuable products in the food market worldwide. The increasing demand for caviar resulted in an overexploitation of wild populations, today on the brink of extinction, and its ever higher price on the food market has driven to an increase of illegal trade where low-value farmed products are counterfeit and sold with impunity as top-quality caviar, in spite of the strict trade limitations imposed by the CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). Presently, the identification of sturgeon species mostly relies on the analyses of mitochondrial markers that ensure a fast, cheap and standardized identification of almost all pure species. However, the high and increasing amount of caviar obtained by interspecific hybrids fueled the needs of complementing the identification power of the maternally inherited mitochondrial tools with nuclear markers, suitable for the identification of both parental species. The isolation of these markers is often complicated by the complexity of sturgeon genomes, including different ploidy levels and high degrees of duplicated regions. Moreover, the real possibility to distinguish some species is sometimes hampered by different degrees of natural introgression or artificial hybridization. In this context, the most complete available panel of diagnostic nuclear markers, isolated with different experimental approaches, is here resumed. Among the species and their hybrids now detectable, the complete identification power for the commercially higher relevant species and the proved efficacy on caviar samples represent the main progress towards a standardized panel of nuclear identification markers. These genetic tools are essential for the control of illegal poaching, smuggling and mislabeling of sturgeons and their products and for the consumers' protection at different stages of the fish supply chain.

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