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Adam and Eve events: is successful population establishment from small introductions a myth?

Although small populations are at high risk of extinction, there are regular reports in the scientific literature of purported small, isolated, persistent populations. One source of evidence of the viability of small populations comes from the successful introduction of species to areas outside their original range. We evaluated 23 purportedly successful establishments of bird populations from deliberate translocation of very few (<30) individuals that are reported in the scientific and secondary literature. We found that all but 2 of the claims were unsubstantiated, primarily due to a lack of evidence in original sources if the number of birds released and because of supplemental individuals from earlier releases, releases in nearby regions, and natural invasion. Our results support the general theory that small, isolated populations are at high risk of extinction, and they suggest that successful introductions using few individuals is actually rare. Because of the potential misuse of ecological results in land use planning, in particular assuming that small populations of vertebrates are viable, we suggest that a high standard be set for asserting the viability of small, isolated populations.

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Development of sustainable authoritative online species databases

The internet provides great opportunities for making scientific information available to everybody everywhere. However, the range of information available on the internet can be bewildering for users. Unlike conventional print media, the authority behind the information is often unclear and there is no peer-review, when they were created is often not stated, and they may not be permanently maintained. Personal and institutional web pages may suffer from limited expertise in web page design and information management tools. A more ideal situation is where communities of experts collectively create and maintain online content in a database with long-term professional informatics support. The European Register of Marine Species created an online inventory of (almost) all marine species in Europe in which each taxon was edited by a peer-selected taxonomic expert. The editors formed the Society for the Management of Electronic Biodiversity Data (www.smebd.eu) to hold this IPR, and they collaborate with the Flanders Marine Institute (Belgium) which acts as the technical manager and host institution. This model has been expanded to create a World Register of Marine Species, with several associated all-taxon regional (European, Antarctic, North Atlantic) and all-environment (not just marine) global (e.g. Porifera, Cumacea, Isopoda) species databases. All species names are centralised in the common host database called Aphia. Editors are sought and invited by SMEBD, and they can directly control the content by editing it online. As the resource develops more editors are required to expand the content and keep it current.

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Urea Loading Enhances Freezing Survival and Postfreeze Recovery in a Terrestrially-Hibernating Frog

We tested the hypothesis that urea, an osmolyte accumulated early in hibernation, functions as a cryoprotectant in the freeze-tolerant wood frog, *Rana sylvatica*. Relative to saline-treated, normoremic (10 mmol l⁻¹) frogs, individuals rendered hyperuremic (70 mmol l⁻¹) by administration of an aqueous urea solution exhibited significantly higher survival (100% versus 64%) following freezing at -4°C, a near-critical temperature. Hyperuremic frogs also had lower plasma levels of intracellular proteins (lactate dehydrogenase, creatine kinase, hemoglobin), which presumably escaped from damaged cells, and more quickly recovered neurobehavioral functions following thawing. Experimental freezing/thawing did not alter tissue urea concentrations, but did elevate glucose levels in the blood and organs of all frogs. When measured 24 h after thawing commenced, glucose concentrations were markedly higher in urea-loaded frogs as compared to saline-treated ones, possibly because elevated urea retarded glucose clearance. Like other low-molecular-mass cryoprotectants, urea colligatively reduces both the amount of ice forming within the body and the osmotic dehydration of cells. In addition, by virtue of certain special properties, it may bestow additional protection from freeze/thaw damage not afforded by glucose. Supported by NSF grant IAB 0416750.

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Novel splicing variation of a myostatin-like gene in the decapod crustacean, *Gecarcinus lateralis*

Alternative splicing of myostatin transcripts is exceedingly rare. Myostatin-like genes have been identified in over one hundred species, but variation in mRNA splicing is only reported to occur in chicken and trout. We recently reported the identification of a myostatin-like gene in the blackback land crab, *Gecarcinus lateralis*. Sequencing of PCR products generated by rapid amplification of cDNA ends indicates that a single myostatin-like gene in the land crab is the subject of extensive alternative splicing. Clear splicing sites occur within the propeptide domain and 3 untranslated region. Both intron retention and alternative donor/acceptor sites occur alone or in combination to generate unique protein coding sequences that include a complete mature peptide domain. The mature peptide sequence for land crab is greater than 50% identical to that of mammalian myostatins and all nine conserved cysteines are present. At least two splice variants produce frame shifts that introduce premature stop codons in the propeptide domain. Interestingly, alternative splicing in the chicken also produces a transcript that encodes a truncated myostatin protein which lacks the mature peptide. The differential expression of a truncated myostatin-like gene in two disparate species suggests that the expression of a propeptide domain alone could have functional significance. All transcripts exhibit a broad tissue distribution, which suggests that the functional repertoire of the crustacean myostatin is more diverse than that of the mammalian protein. The predominant expression of myostatin-like transcripts in muscle tissue suggests that this TGF- β factor plays a role in regulating muscle physiology in crustaceans. Supported by NSF IBN-0618203.