ternative to the "exon shuffling theory," in which the mobile element precisely coincides with the limits of existing coding exons, thus restricting the evolutionary game to some sort of "card shuffling." The finding of the RPEs suggests a greater flexibility in the evolution of genes.

First, the insertions of RPEs realize a flow of genetic material across the boundary between noncoding and protein-coding sequences. In addition, we recently noticed that one of the RPEs (rpe22 of *R. conorii*) previously annotated as "intergenic" is located within the gene coding for tmRNA (the transfer/messenger RNA molecule used to rescue stalled ribosomes and to clear the cell of incomplete polypeptides) (*3*). Thus, the RPE appears capable of parasitizing both protein and RNA structures. The generality of such an influx of genetic material from noncoding to coding sequences deserves further study.

Second, the host proteins targeted by the RPE are different among the species in the same genus. This indicates that RPE insertions occurred after the divergence of those *Rickettsia* species and that the RPE proliferation might be continuing.

Third, the insertion of the RPE at sites that code for a part of the protein that is on the surface, but not necessarily in between domains or within the constraints of exon boundaries, argues for the possibility of a significant evolution of preexisting protein domains and/or coding exons. For example, the RPE found in the DNA polymerase I of *R. helvetica* and *R. felis* is located on the surface of the exonuclease domain (*4*). Domain insertions within other domains have been described for other proteins, for example, the cat muscle pyruvate kinase, which consists of four different domains. One of the domains forming a β barrel is located within one of the loops of the other α/β barrel domain (1PKM of Protein Data Bank). The structural and functional consequences of such iterative insertions of domains within domains (a "Russian doll" evolutionary model) remain to be analyzed to better understand the flexibility of genes and genome, as well as the evolutionary modularity of genetic material.

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2. H. Ogata *et al.*, *Science* **290**, 347 (2000).
3. As suggested to us by K. P. Williams [see K. C. Keiler *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* **97**, 7778 (2000)].
4. See the supplemental figure associated with our report (*2*) available at *Science* Online at www.sciencemag.org/feature/data/1051142.shl

Scientific Whaling

THE INFORMATION ABOUT THE HISTORY OF scientific whaling that R. L. Brownell Jr. and coauthors provide in their Letter is incomplete (1 Dec., p. 1696). Their comparison of the numbers of whales killed during the last decade under scientific permits to those taken under such permits in earlier times (thousands compared with hundreds, respectively) does not take into consideration that the tens of thousands of whales taken during the days of commercial whaling generally provided adequate material for whale scientists. Brownell *et al.* also mention the reported take of almost 5000 minke whales during a decade; however, this take is biologically insignificant when measured against a total population estimate of more than 700,000 minke whales for the Southern Hemisphere. The Japanese have provided the data from these scientific whaling operations on a regular and timely basis to the International Whaling Commission (IWC) and its Scientific Committee.

> "Like it or not, the Japanese scientific whaling program is operating legally."

Like it or not, the Japanese scientific whaling program is operating legally. On the other hand, it is doubtful that the Southern Ocean Sanctuary, established by the IWC in 1994, would pass scrutiny if tested in international courts (*1*). As Brownell *et al.* note, Japan voted against establishment of the sanctuary and takes its annual catch of Antarctic minke from within sanctuary boundaries. The issue of scientific whaling is neither scientific or legal. It is a cultural repugnance of some to the operations of others and has been described by an Irish delegate to the IWC as "cultural imperialism" (*2*).

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References and Notes

1. W. Aron, W. Burke, M. M. R. Freeman, *Mar. Policy* **24**, 179 (2000).
2. The Irish Minister of Culture and Tourism, in opening remarks for the 47th meeting of the IWC in 1995.