Low Variation in Northern Elephant Seal Fingerprints

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We ran 17 presumably unrelated pup northern elephant seals (Mirounga angustirostris) from one rookery and probed for minisatellite variation using Jeffreys’ 33.15 polymorphic construct (1)(Figure 1). Mean allele (band) frequency for 43 detected bands between 1.8 and 8 kb was 0.5. Using the formulation x (the probability that an allele in one individual is present in another by chance)= 2q-q² (2), x=0.65 for this sample. This is high compared to another large marine species, the killer whale (Orcinus Orca): x=0.30 (3), and compared to the southern elephant seal (Mirounga leonina): x=0.35 (A. R. Hoelzel et al. unpublished data).

Bonnell & Selander (1974) investigated 21 proteins encoded by 24 loci for a total of 159 northern elephant seals from five rookeries, and no polymorphisms were found. An additional 30 enzymes were screened for 12 animals and no polymorphisms were found (T.R. Jacobsen, unpublished data). A similar exercise for the southern elephant seal on 35 loci and 196 seals from two islands gave a heterozygosity level of 0.03 (5). Bonnell & Selander (1974) attribute the uniform homozygosity in the northern species to the fixation of alleles during a recent population bottleneck.

The entire world population of northern elephant seals was about 60,000 in the 1970’s, and less than 50 in the late 19th century. For more than 40 years, beginning around 1810, this species was hunted intensively for its blubber. More than 200 gallons of highly valued oil could be rendered from one large adult bull. By 1879 the northern elephant seal was considered to be virtually extinct. They didn’t begin to recover until the 1920s. It is not known how large the population was prior to exploitation, however they were known to be abundant from Point Reyes California to Cabo San Lazaro in Baja California.


Figure 1: DNA extracted from blood samples with phenol/chloroform, digested with Hinfl and run on a 0.8% agarose gel. The gel was Southern blotted onto a nylon filter, prehybridized and hybridized in 1xSSC, 0.1% SDS, 50mg/ml PEG, 50 ug/ml Heparin and 50 ug/ml tRNA at 58°C, and probed with 33p ATP by primer extention.