taken in with the food.

There is no information yet on the frequency of shedding, nor on the way fluoride accumulates in the stomach wall. Contamination cannot be the only explanation. How should we continue our observations on our next visit to the Antarctic?

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Whaling in the dark

SIR — As part of a comprehensive assessment of whale stocks being undertaken by the International Whaling Commission, I and others have been investigating the genetics of the minke whale (*Balaenoptera acutorostrata*). Preliminary results suggest that minke whales from separate genetic stocks mix in the areas where they are hunted, which complicates the delineation of static boundaries necessary for management. (See the International Whaling Commission's special issue number 13).

Although only two Antarctic management areas (IV and V) were investigated, analysis of mitochondrial DNA, nuclear DNA and isozymes gave consistent results. Whales in the two areas were genetically indistinguishable, but more variable than lower-latitude populations in the North Pacific and North Atlantic, leaving open the possibility that more than one stock was represented in the Antarctic sample. The genetic distance between populations in the North Pacific, North Atlantic and Antarctic (sometimes recognized as three separate subspecies) was as great as the genetic distance between some species in the same genus. A population-level genetic distance was recognized between minke whales caught in the Korean and Japanese coastal fisheries.

At the 1991 scientific committee meeting of the International Whaling Commission further data were presented by S. Wada indicating that whales from the two genetic stocks on either side of Japan are mixing in summer months on feeding grounds north of Japan. Variation within all Northern Hemisphere populations was low for mitochondrial genetic characters, and in some cases lower than isozyme variation, suggesting the possibility of transient population bottlenecks.

Minke whales are typically hunted in areas where they congregate to feed. So far, the genetic data suggest that populations are highly structured, with recognizable genetic stock distinctions over short geographical distances (from one side of Japan to the other, for example), low levels of variation within some stocks, and that stocks may mix on hunting grounds. However, we do not know how many stocks there are or the degree and pattern of mixing in temporary assemblages. Even though local populations may be large, as in the Antarctic, hunting 'blind' to the pattern of mixing genetic stocks could lead to the selective depletion of genetic variation.

Reduced genetic variation can compromise the viability of a species. Genetic variation in areas of potential breeding (probably in low and middle latitudes) needs to be investigated more extensively and compared with variation in areas where these populations may mix while feeding. Skin biopsies can be collected for these analyses without harming whales or disrupting populations.

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A plasma cloud, not a planet?

SIR — The report two weeks ago (M. Bailes *et al. Nature* **352**, 311–315; 1991) of periodic changes in the arrival times of signals from the pulsar 1829-10, interpreted by its authors as evidence of an orbiting planet, contains two rather striking coincidences which suggest an alternative class of models for this unexpected phenomenon. The more obvious coincidence is the agreement to less than one per cent (well within the observational uncertainties) of the orbit period with one half of an Earth year. The second coincidence, also accurate to one per cent, is between the Earth's orbital phase and that of the putative planet: when the planet and pulsar are at quadrature, corresponding to zero time-delay in the pulsar's signals, the Earth–Sun–pulsar angle is nearly 90°. These two commensurabilities of the Earth and the pulsar planet orbits allow for a local explanation of the timing observations.

The interposition along the line of sight to the pulsar of a dispersive or refractive structure whose parallax is observable from the Earth could naturally explain the six-month period. The results of Bailes *et al.* provide several immediate constraints on this supposed object. Its angular size must be $\leq 1°$ for its effects to be unobservable in PSR 1829-08, which is only 2° away in the sky. In addition, the object's parallax must be great enough to produce the observed variation in signal transit time between the pulsar and the Earth, but its proper motion must be small enough to sustain the same effect for the five years covered by the observations.

The peak-to-peak amplitude of the timing residuals is 15 ms. At an observing frequency of 1,400 MHz, this corresponds to a change in dispersion measure of 0.7 cm^{-3} pc, which amounts to a 0.15 per cent variation in the total dispersion measure to the pulsar. For a spherical blob 1 AU across, the required change in electron density would be 10^5 cm^{-3}. These parameters are similar to those inferred for the structures that produce the extreme focusing event in extragalactic radio sources. Alternatively, the object could be non-dispersive, but have an index of refraction varying on the same scale; this would provide an oscillation in the pulsar's apparent position in the sky which would, on application of the fitting procedure, generate the observed residual.

To produce the observed timing variations, the object must have structure on a scale D, comparable to the distance between extreme positions of the line of sight of the pulsar: $D < 1$ AU × (blob–pulsar distance)/(Earth–pulsar distance). But the proper motion v_p must be small enough that the object has not significantly moved across the pulsar line of sight in 5 years: $v_p < D/(5 \text{ yr})$. If the object is in the solar neighbourhood, these arguments require $D = 1$ AU and $v_p < 1$ km s^{-1}. This is already a low transverse velocity, and would have to be smaller if the object were farther away. The restriction that its angular size must be $\leq 2°$ means that it would have to be at least 30 AU away; an object orbiting the Sun at several hundred AU would have a sufficiently low transverse velocity. There could be up to 10^5 blobs at such distances without violating the constraint that only one pulsar out of 500 shows an effect.

This class of models has the great virtue of being immediately testable. Simultaneous observation at two frequencies could easily identify changes in the signal dispersion. Monitoring by the Very Large Array over a few months could probably detect changes in the pulsar's apparent position caused by a refractive medium. While we do not regard these physical models as inherently compelling, the identification of the pulsar's putative planet with the Earth effects a certain economy of coincidences, avoids substantial revision of our notions of supernova explosions and planet formation, and admits of straightforward tests that could falsify it forthwith.

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