Letters

Navy Marine Mammals

David C. Morrison (News & Comment, 16 Dec., p. 1503) makes a laudable attempt to provide a balanced view of recent reporting on Navy marine mammals. I do not think, however, that he did an adequate job of verifying information from media accounts and other sources. His article consequently contains factual errors. I cannot confirm or deny the speculation about what Navy missions dolphins actually perform, since to do so might provide useful information to potential enemies; therefore such information is classified. I can state that the Navy has never placed marine mammals at risk intentionally and that mistreatment or abuse is not allowed.

Morrison exaggerates the secrecy of the Navy marine mammal program. For example, the Navy operates within the guidelines of the Marine Mammal Protection Act (MMPA) of 1972. In 1973, a public hearing was held on the Navy's first permit (No. 12) under the act, and, since that permit was approved, required reports have been filed with the National Marine Fisheries Service (NMFS). In 1986, Congress modified the law to allow the Navy to take up to 25 animals yearly for operational purposes. This is still done with concurrence of the Secretary of Commerce and after consultation with the Marine Mammal Commission. Rules and guidelines put forth under the MMPA are followed. Morrison says that "Quick Find is not considered a highly classified activity." Quick Find (*1*), the successful object recovery system that employs sea lions (*Zalophus californianus*), is totally unclassified. Although many other applications and missions are classified, a majority of the research has been published. In a cursory review of publications from the Navy marine mammal program, I counted eight in *Science* and five in *Nature*. There are numerous other papers in more than a dozen peer-reviewed journals (*2*); an article and two books were written for a general audience (*3*).

Contrary to Morrison's statement, the autopsy report on the Navy dolphin that died in the Persian Gulf is not classified and has for a year been in the public record of the NMFS. This dolphin, given the name "Skippy" in the press, was one of six *Tursiops truncatus* with a unit from San Diego, California, that went to the Persian Gulf in October 1987. A military veterinarian assigned to my office accompanied the dolphins and did the postmortem examination when the animal died of natural causes 17 days after arrival. Analysis of tissues by the Armed Forces Institute of Pathology in Washington, D.C., and by other pathologists confirmed the diagnosis of pneumonia. In November 1987, I examined the other five dolphins in the Persian Gulf and found them to be in good health, which continued throughout their tour there. I accompanied these same dolphins on the return trip in 1988. They are now back in San Diego and still in good health. I doubt that any marine veterinarian has claimed that the death in 1987 was due to the "stress of being moved to very hot waters of the Persian Gulf." *Tursiops truncatus* occurs in the Persian Gulf. The Navy *T. truncatus* are from the Gulf of Mexico. During the Persian Gulf deployment, the water temperature was within the range of temperatures that are experienced by *T. truncatus* in the Gulf of Mexico.

I agree with Morrison that "an increasingly militant animal rights movement could well spawn more Charly Tunas." However well-intentioned cutting nets to "free" dolphins may be, such acts are nothing more than vandalism: the dolphins invariably stick around. Trained Navy dolphins do their tasks while swimming free. Each working day, the dolphins have the option of simply swimming away. Richard Trout (*4*), the Seaco trainer whose accusations of dolphin mistreatment have received much attention in the media, did not, to my knowledge, train free-swimming dolphins for the Navy. Anyone who trains such dolphins understands that abusive methods like those he imagines would be counterproductive.

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REFERENCES AND NOTES

1. M. E. Conboy, "Project Quick Find: A marine mammal system for object recovery" (TP 268, Naval Undersea Center, San Diego, CA, 1972); *Rapp. P. V. Réun. Cons. Int. Explor. Mer* **169**, 487 (1975).
2. F. G. Wood, *Annotated Bibliography of Publications from the U.S. Navy's Marine Mammal Program* (TD 627, Naval Ocean Systems Center, San Diego, CA, 1987). Morrison was provided with this document. Of about 300 publications, he mentions only one.
3. J. W. Kanwisher and S. H. Ridgway, *Sci. Am.* **248**, 110 (June 1983); F. G. Wood, *Marine Mammals and Man: The Navy's Porpoises and Sea Lions* (Luce, Washington, DC, 1973); S. H. Ridgway, *Dolphin Doctor* (Yankee, Dublin, NH, 1987; Fawcett, New York, 1988).
4. Trout started with Seaco in 1985, working with a group that trained sea lions for the Navy. He later moved on to do training and other animal care tasks with my research dolphins under the supervision of a more senior Seaco dolphin trainer. I was surprised to read that he had 15 years of dolphin training experience. According to his supervisor, Trout's résumé listed only 7 years of dolphin training.

Response: After stating that "speculation about what Navy missions the dolphins actually perform" is classified, Ridgway suggests that I have exaggerated the secrecy of the Navy marine mammal program. After stating that project Quick Find is "totally unclassified," he adds that many "applications and missions" of the project are, in fact, classified. The publications listed in the bibliography published by the Naval Oceans Systems Center focus on dolphin sonar, hydrodynamics, behavior, and biology, not on the operational aspects of the program, which are highly classified. Seaco Inc. officials would not discuss Trout's allegations of dolphin abuse. All official Navy comment on the controversy was, perforce, filtered through public affairs officers. Such an officer told me that the autopsy report on Skippy was still classified. I would have welcomed an interview with Ridgway, had he been made available for comment.

—DAVID C. MORRISON

Snowbird II: A Dissenting View

I write to comment on Richard A. Kerr's article about the meeting on Global Catastrophes in Earth History (Snowbird II) held this past fall in Snowbird, Utah (Research News, 11 Nov., p. 865). Although Snowbird II was convened by the impact community, the efforts of Charles Officer secured an attendance of perhaps 30% whose views differed from those of the convenors. This more balanced presentation was rather different from that of the first Snowbird conference in 1981, which came to nearly unanimous agreement that a meteor alone brought about the Cretaceous-Tertiary (K/T) extinctions. While Snowbird I was a celebration of victory, Snowbird II is reported by Kerr to have been a message of hope: victory for meteors "seems to be in sight." There has been some evolution.

The major success of Snowbird II is that the impact and the volcanic camps agreed to cooperate in "sampling, intercalibration, and analyses." This concordance was secured because of an opposition to extraterrestrial causes that has gained considerable strength.

In his comments on Snowbird II, Kerr does not mention the report presented that iridium was found with volcanic ash in the Antarctic blue ice. He also does not mention several reports of diachronism between extinctions and iridium, and he further neglects the geochemistry reports indicating that the iridium is likely to be derived from the core-mantle boundary. Readers are urged to review the entire proceedings of the conference so that they may come to their own conclusions.

Kerr mentions some preliminary reports

of stishovite. Little is known about the effects of impurities and load rate on the formation of this high-pressure polymorph of quartz, but equilibrium-phase relations indicating a transition at 90 kilobars do not rule out volcanic processes. The retrogressive failure of the gravitationally stable north slope at Mount St. Helens is an indication that shock disruption was brought about by a preceding explosion at depth. This was confirmed by the far-field signature of the seismic event some 10 seconds earlier. This earthquake had azimuthal uniformity in P-wave polarity and depressed S-wave amplitude. The fact that P-wave first arrivals were up indicates that decompressive volcanic "explosions" are as mythical as those K/T impact sites whose abundance on the earth exceeds, for some people, that of volcanoes. The throw velocity of the north slope indicates that pressures some 5 kilometers beneath Mount St. Helens were many hundreds of kilobars.

Kerr appears to interpret the steadied progress and cautionary presentation of the work of Neville Carter and his colleagues (who have joined the decade-long debate in just the past couple of years) as an indication of doubt that multiple-shock lamellae will ever be found in association with volcanic activity. He might have reported instead the caution of the volcanic proponents that the annealing temperatures of magmas would mean that they are not a source of shocked minerals: such things must come from the surrounding country rock. Further, he does not not inform the reader that the Manson crater does not coincide with the K/T event (*1*); nor does he reveal that multiple lamellae have been reported in mafic breccia dykes (*2*) and that coesite, another high-pressure polymorph of quartz, has been found in purely tectonic settings, such as the Caledonides, the Urals, and the Alps, indicating endogenous pressures above 30 kilobars (*3*). Finally, Kerr does not discuss the fact that the decline of the dinosaurs took place over millions of years, which would call for a rather slow-landing meteor.

That iridium and shocked minerals may have a connection with mass extinctions is perhaps the most important scientific discovery of the decade, and the initial suggestion of an impact as causal is certainly an educated guess that has been extremely valuable in stimulating much effort in astronomy, astrophysics, and paleontology. But in some quarters this interesting guess has not been allowed the natural scientific evolution that would have at least retained for it some glory as the progenitor of more advanced thinking. Instead, it appears to have been immediately accorded the deity of something that also seems as rare as the unicorns to which Kerr alludes, a "death star." Why so many people have attached their wagons to this star will provide much material for behavioral scientists, historians, and others for decades to come.

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1. S. M. Cisnowski, *Lunar Planet. Sci. Conf.* **19**, 188 (1988).
2. R. P. Sage, *Geol. Soc. Am. Bull.* **89**, 1529 (1978).
3. D. C. Smith, *Nature* **310**, 641 (1984).

Erratum: Leslie Roberts' article "A corrosive fight over California's toxics law" (News & Comment, 20 Jan., p. 306) incorrectly states that chloroform is used to chlorinate drinking water. Chloroform is formed during the chlorination process.

Erratum: Because of a transmission error, the West German government's position on Europe's genome program was incorrectly stated in David Dickson's News & Comment article "Genome project gets rough ride in Europe" (3 Feb., p. 599). The Bundestag has given its qualified approval to the program. It has not endorsed the views of a parliamentary committee that opposes the effort, as the article stated.