4. Biodiversity in Cetaceans

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Introduction

In order to talk about cetacean diversity, one must first decide whether it is best measured by a count of species or genera or subspecies or populations? I examined our concept of cetacean diversity at various times in the last 250 years. I decided to use the number of species. It has the drawback of being susceptible to historical changes in the concept of what is a species, which clouds our scholarly statistical comparisons of how many species of cetaceans there are in the oceans. However, all other ways of comparing diversity have comparable drawbacks.

Additions to the list of cetacean species takes place in the recognition of previously named species and the descriptions of new species. At last count there were 556 specific names available for cetaceans. Some of the species that have been recently recognized as valid include Fraser’s dolphin, Lagenodelphis hosei and the clymene dolphin, Stenella clymene. Now that statistically usable samples of museum specimens are being compiled for many species, the recognition of previously named cryptic species or subspecies should be possible.

Refinement of cetacean diversity is taking place slowly. The concept of subspecies and population differences is just beginning to be utilized. Perrin, in his 1990 paper on the subspecies of the spinner dolphin, Stenella longirostris, did an admirable job of defining subspecific variation in at least one ocean basin. The problematic genera that are ready for closer treatments are Tursiops, Delphinus, Lagenorhynchus, Globicephala, Stenella/Stenella and the other species of Stenella.

The most recent new species named was the pygmy beaked whale, Mesoplodon peruvianus, that was described by Julio Reyne, Koem van Waerebeek and myself in 1991 from Peru. It was subsequently documented as occurring on the coast of Mexico. The last valid cetacean species prior to that dated from 1958 when Nishiwaki and Kamiya described Mesoplodon ginkgoedens und Norris and McFarland described Phocoena sinus. That is a 33 year time difference between descriptions of species.


tropical Pacific in 1987. It is just a matter of time until specimens of that species are collected and it is named. I would say that the bulk of the undescribed species are in little known pelagic groups, such as the beaked whales, and are in parts of the world where little collecting has been done, such as the tropics.

History of Knowledge of Cetacean Diversity

When Carl von Linné described the diversity of living organisms in 1758, he listed 12 species of cetaceans, 8 of which we consider valid. Linne was a compiler who did not have first-hand information for many of the species he listed. Naturalists gradually increased the knowledge base until Lägpele treated 34 species in 1804, 17 of which we now consider valid. There was a sudden surge in naming species of all types of animals which saw its peak in the work of J. E. Gray who recognized 158 species of whales in his 1866 catalog of cetacea in the British Museum (Fig. 1). The latter part of the 19th century saw the rise of Darwinism. Scientists began giving thought to the variation within species and the concept of defining species variability. This resulted in an increase of attention to specimens in museums and increase in the size of museum collections.

Hershkovitz did a catalog of the living species of whales in 1966, in which he listed 83 species. Nishiwaki listed 100 in his book on whales 1965. Mead and Brownell, in their 1993 chapter on cetaceans that was published in Mammal Species of the World, listed 78 species. The number of species recognized seems to have stabilized at around 80.

Biogeography of Cetacean Diversity

In researching the biogeography of cetacean diversity I found that our knowledge of the distribution of cetacean species is very tentative. It is expensive to survey
for cetaceans and hence the surveys that have been done are primarily for com-
mercially valuable species. Surveys have also been done in areas where there is
ecological concern that can be translated into funding for surveys.
We know very little about the distribution of seldom seen pelagic species, such
as the ziphids or beaked whales (Mead, 1989). The 13 species of Mesoplodon account
for a significant percentage (17%) of the total diversity of cetaceans. For a few
species, like Mesoplodon pacificus (Longman’s beaked whale), the number of known
occurrences is very small. Mesoplodon pacificus is known from two specimens, a
skull found at Mackay, Queensland, Australia in 1882, and a skull found at a
fertilizer factory in Somalia in 1955. The external appearance of this species is
unknown. It may have been seen on surveys but the data would fall into the
all-too-common category of "unidentified beaked whale".

Mesoplodon grayi (Gray’s beaked whale) is relatively common, if such can be
said for a member of the little known group of beaked whales, in the southern
hemisphere. It is also known from one record in the North Atlantic. A young female
stranded on the coast of the Netherlands in 1927 (Boschma, 1950). This is usually
considered a individual that strayed out of its normal area of distribution.

Between 1975 and 1978, four Mesoplodon Hectori (Hector’s beaked whale), an
adult female, adult male and two calves, stranded on the coast of California (Mead,
1983). This species is rare in the southern hemisphere, there being only 25 known
occurrences. There was a unique sighting of a pair of Mesoplodon off the coast of
California in 1970 that appeared to be this species. Since 1978 it has not been seen
again in the northern hemisphere. I would consider this a case of a small population
straying from their usual habitats.

In 1976 I picked up a fragmentary skull of a beaked whale on a beach in Peru.
I was impressed by its small size and other characters which suggested that it was an
unknown species. Over the years some colleagues of mine collated a number of
animals from a fishery in Peru and we finally described it in 1991 as Mesoplodon
peruanus (pygmy beaked whale). While our paper describing the species was in
press, I received a manuscript to review from an editor of another journal. This
manuscript described strandings of two specimens along the coast of Baja California,
Mexico (Urban-Ramirez and Arrioles-Gamboa, 1992). Also in 1991 a specimen of
this beaked whale stranded in New Zealand. It was not recognized as Mesoplodon
peruanus until recently. The species has continued to be taken in the Peruvian
fishery. We do not know what the "normal" distribution of this species is, based
on scattered occurrences all over the world.

The pygmy sperm whale, Kogia breviceps, has been known since it was de-
scribed in 1838. It is the second commonest animal stranded on the Atlantic coast
of the United States. You would expect we would know a fair amount about its
distribution and abundance but this species was only sighted once in an intensive
three year survey of cetaceans and marine turtles.

Based on these examples, and other comparable situations in small oceanic
odontocetes, which constitute 70% of cetacean species, I decided not to attempt
to quantify and compare cetacean biogeographic diversity.
Outlook for Cetacean Diversity

At the peak period of recognition of cetacean diversity during the latter part of the 19th century (1890–1890), there were 54 valid new species described, or one every two years (Fig. 2). During this century the discovery rate has fallen. There were 12 valid species named between 1890 and 1990, or only slightly over one in ten years. It was 33 years between the naming of the last species and the next to the last.

That is not to imply that we have discovered all the species of cetaceans. There has been one un-named species described in the literature based on sightings in the tropical Pacific. I know of two more species of which manuscripts are in progress (Chile, New Zealand).

The extinction of species can be linked to human disturbance of the marine ecosystem. So far there is only one cetacean population that has become extinct: the Atlantic gray whale (Mead and Mitchell, 1984). The gray whale was first known to scientists through subfossil specimens of the Atlantic population. These were described in 1861 by a Swedish scientist. The Pacific gray whale was not described until 1869 and the connection between the two was not recognized until 1937. There is evidence that the gray whale was a preferred species by early Basque whalers in the Atlantic and that it was taken at least by Icelanders and early Yankee whalers. The radiocarbon dates on the most recent remains indicate that it survived up until the early 1700s.

There is a lot of public concern over the fate of the large species of baleen whales, particularly the blue whale, the right whale and the bowhead whale. These are species whose populations have been reduced by human harvesting and who are in potential danger from human disturbances to the marine ecosystem.

The species that are in imminent danger of extinction are those which have limited population sizes and a restricted distribution. The Bajji or Yangtze river dolphin (Lipotes vexillifer), the Indus and Ganges river dolphins (Platanista spp.) and the vaquita or Gulf of California harbor porpoise (Phocoena sinus) are some
of the cetaceans that are in immediate danger of extinction.

Comparison to Fossil Cetacean Diversity

As I tried to formulate a concept of current cetacean diversity for this paper, I wondered how the present cetacean diversity compares with the fossil record, incomplete though it may be. I counted 87 genera of fossil odontocetes and 25 genera of mysticetes that have been recorded in the Miocene (about 20 million years ago) (Romer, 1966). This compares to 33 living genera of odontocetes and 6 living genera of mysticetes (Fig. 3). I am the first to admit that there are problems in comparing fossil genera to living genera, but subjectively speaking there were representatives of every modern adaptive group in the Miocene as well as many groups that have since become extinct. Cetacean diversity appears to be naturally diminishing.

Conclusions

We are just beginning to recognize the diversity of cetaceans. For example, the members of the beaked whale genus Mesoplodon are extremely difficult to recognize externally but those species have vastly different stomach anatomy. One wonders how that effects their ecology and hence their contribution to cetacean diversity. It is difficult to compare the diversity of the 13 species of Mesoplodon with the diversity of the baleen whale genus Balaenoptera. This genus consists of 5 currently recognized species, the blue, fin, sei, Bryde's and minke whales, that differ primarily in size.

It is only going to be through studies of the natural history of whales that we learn to appreciate their diversity. These studies have to be of not only well known animals, like the bigger baleen whales, but also little-known groups of species like
the beaked whale genus *Mesoplodon* and the pygmy sperm whales of the genus *Kogia*. In this way we will achieve a satisfactory understanding of cetacean diversity. The only way to do this at the current time is through studies of stranded animals.

**Literature Cited**


