La mer 35: 1–4, 1997
Société franco-japonaise d'océanographie, Tokyo

Article spécial n° 10

Cryptozoology at the fuzzy edge of ocean discovery

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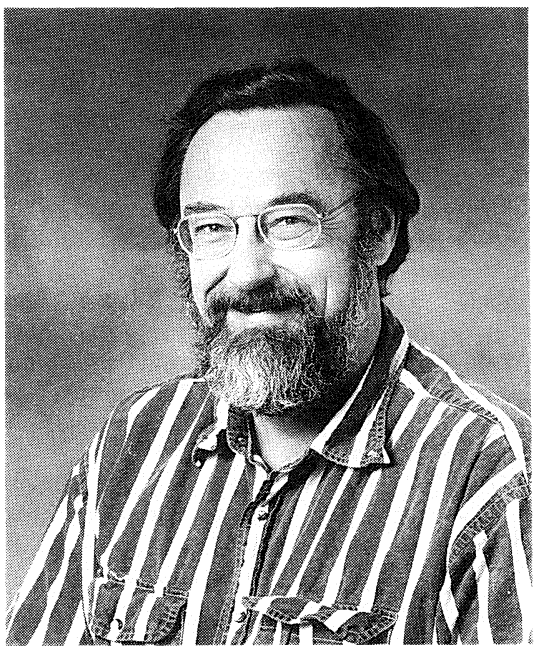
Curiosity is the mainspring of science. The urge to discover and to explain is truly irrepressible. It cannot be satisfied by dogmatic explanations, nor will it be constrained within the narrow disciplines of organized science. Anyone can be curious about anything: it is not rare to find physicists or chemists fascinated by biological questions, or biologists attracted by geological problems. Sometimes these wanderings lead to a major career reorientation; sometimes they remain a part-time amusement, an enriching hobby. So it is with my interest in cryptozoology.

Cryptozoology is the study of animals whose existence remains doubtful because of insufficient material evidence. It is a field which attracts very wide interest. Rumours about a serpentine animal in Loch Ness, or a giant snow ape in the Himalayas, to mention the best known cryptids (hidden animals) have intrigued everyone for decades. It is unfortunately also a field reputed for hoaxes, gullibility and lack of scientific rigour. Most scientists will not waste their time not risk tarnishing their reputation by publicly succumbing to cryptozoological curiosity.

I certainly used to be one of those who laughed at the idea of sea-serpents... dreams of drunken sailors, I thought. My un-informed skepticism was however severely shaken when I read Bernard HEUVELMANS' (1968) serious and meticulously documented tome on the subject. There had clearly been many observations, by reliable and reputable witnesses, over the past centuries, which could not by any means be explained in terms of known marine animals. Some of these had even occured in coastal waters near my home in western Canada. It was tempting to believe that HEUVELMANS, working from Europe, might have missed some local reports and I decided to investigate further. This led me to discover a rich folklore and much earlier work on Cadborosaurus (more familiarly known as Caddy), the large serpentine cryptid spotted by many observers in coastal waters of the eastern Pacific, and to associate with other, similarly minded, scientists and amateurs attracted to the mysteries of the sea. I have had no reason to regret the youthful impulse which suggested this eccentric interest. My professional life has been broadened beyond the bounds of physical oceanography, which has however remained my primary discipline and the basis for the scientific rigour which I have tried to apply to cryptozoology.



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It would be absurd for a marine scientist,

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who devotes his career to exploring the sea, to claim *a priori* that there is nothing new to discover in the oceans. Many marine creatures easily avoid our nets and only a small portion of the deep ocean has been visually inspected. Human exploration has thrown a mere flicker of light in a vast hidden darkness. We have quickly become used to the presence of giant clams and tube-worms living near deep hot vents on spreading ridges, but recent discoveries of other chemotrophic communities near cold seeps in the Gulf of Mexico and the Mediterranean (CORSELLI *et al.*, 1996) or over methane vents off the Oregon margin (WHITICAR *et al.*, 1994) have expanded even further the range of habitats and life forms to be expected in the ocean. New species of pelagic octopus, filmed from submersibles, remain at large (LUTZ and VOIGHT, 1994). Unexpected species of fish, like the coelacanth, or the megamouth shark (TAYLOR *et al.*, 1983), keep turning up. What else might the sea hide? Might there not be some real animal behind these hundreds of observations of sea-serpents?

Previous findings do not of themselves imply future discoveries. To claim that the accidental discovery of the coelecanth must necessarily lead to other similar discoveries is completely absurd. Evidence, rather than expectations must guide interpretation. Those same rules which apply to the interpretation of data in other areas of science should apply to cryptozoology. Being willing to accept that there may still exist undiscovered animals in the sea does not mean that every unexplained shadow counts as evidence of their presence. In many cases, as I quickly realized, it is impossible to be sure and one must remain in doubt, cumulating a growing body of observations which never quite add up to the certainty of a specimen in hand.

Cryptozoology operates within that realm of cognition which lies between suspicion and certainty. Scientific discovery normally takes place over an interval of time, starting with glimpses, un-explained observations, syntheses, insights and explanations culminating into consensual certainty. A new animal may be discovered by science through eye-witness reports, fragments of anatomy, photographs, and eventually a carcass or a live specimen. There are numerous classic examples (the giant squid, the gorilla, the okapi, the platypus) where initial skepticism gradually led to acceptance as evidence accumulated. A recent example is that of the new bovids recently discovered in Vietnamese forests (Vu Van DONG *et al.*, 1993).

Of course, it is only the success stories which eventually enter the zoology textbooks. Unconfirmed rumours remain within the nebulous realm of cryptozoology. In order to enhance the probability of eventual success and avoid misleading reports, rules of evidence have to be introduced. There are too many cases where witnesses have clearly been carried away by their imagination or have been misled by waves, floating objects and already known animals which they failed to recognize.

Two simple rules have been my guide in sifting eye-witness reports of Caddy and other cryptids. First, to be worth attention as a cryptid sighting, an observation must unambiguously pertain to an animal: not to waves, branches, algae or other natural or artificial objects. If there is any doubt in the eyes of the witnesses, or of immediate commentators, the observation is rejected. This first criterion eliminates a large number of unexplained surface phenomena not directly associated with an animal. In particular, it eliminates all those wakes or shadows which have been attributed to a putative animal hidden below the surface, unseen by observers.

The second rule states that the animal observed must clearly not be one which is already known to science. Again, if there is any doubt in the minds of the witnesses, or if their description of the animal which they saw is clearly reminiscent of an animal known to others, if not to the observers themselves, the observation is rejected. In many cases, possible sightings of Cadborosaurus have been excluded because of possible confusion with sea-lions.

Strict observation of the above rules may lead to dismissal of some valid sightings. For example, many of the observations made in Loch Ness consist of unexplained surface wakes, which would not satisfy the above

criteria. An unexplained surface phenomenon need not always have been caused by an animal. The quality of cryptozoological evidence is so often debatable that every effort must be made to exclude doubtful reports right from the beginning. The application of these strict rules still leaves us with a solid body of cryptozoological evidence. HEUVELMANS(1968), and more recently BRIGHT (1989) and ELLIS (1994) have reviewed world-wide reports of marine cryptids.

Observations which I have collected and analyzed off the west coast of Canada have been published in LEBLOND and BOUSFIELD (1995). Our conclusion is that there appears to exist a large deep-water animal, a serpentine, fish-feeding, air breathing, long-necked creature with a mixture of reptilian and mammalian characteristics and puzzling habits. This is the animal referred to as Cadborosaurus. Only an actual specimen, dead or alive will provide definitive proof of Caddy's existence. Cryptozoological interest may help in finding that specimen and recognizing it when it is at hand.

Laboratory analyses may also be helpful when there is some parcel of material evidence at hand. The piece of blubber preserved from the mysterious giant blob discovered near St. Augustine in 1896 has already been subjected to analyses which have helped in determining its nature (VERRILL, 1897; WOOD and GENNARO, 1991; MANGIACOPRA *et al.*, 1994; PIERCE *et al.*, 1995). Similarly, a piece of the carcass collected by a crew member of the Zuiyo Maru off New Zealand in 1977 could be used to perform an immunological analysis which suggested that the animal was indeed a shark (SASAKI, 1978). In the absence of material remains, other analyses may be used, most particularly in the interpretation of photographs. Using simple results about wind waves, I tried to estimate the size of the Loch Ness cryptid from the length of the waves visible in the famous "Surgeon's photograph" (LEBLOND and COLLINS, 1987). Unfortunately, it has since been revealed that this photograph was a hoax and that the actual object was smaller than what we calculated (BOYD and MARTIN, 1994) .

Another issue of interest to oceanographers, and indeed to all scientists, is that of recognition of significant information in noisy data. Physical oceanographers commonly extract signals from images or time series by using filters or spectral methods. These methods also apply to the interpretation of alleged cryptid images. I have had interesting arguments with Nessie and other cryptid enthusiasts attempting to find significance in the grain pattern of enlarged photographs. As in all observations, one must not read more information than is contained in the data.

In a more philosophical vein, cryptozoology brings one face-to-face with the problem of incorporating new knowledge within the body of science. How much information is necessary for new facts to be accepted? Are unconfirmed reports to be entirely dismissed until the day when material proof becomes available, at which point full acceptance is granted? What is the curious seeker to do during the intervening period, while searching for more solid evidence? Speculate, of course. Formulate theories, for discussion and guidance. Astrophysical journals, for example, are replete with logical speculations, based on physics and chemistry, and framed in the language of mathematics, about unexplained cosmic phenomena. These speculations guide and stimulate further observations. Similarly, cryptozoological publications speculate, as logically as possible, and within the laws of science, about how to interpret poorly observed animals. The observations are usually based on eye-witness reports and are thus "fuzzy" in the sense that they are stated in words and in subjectively produced drawings rather than in objective measurements. One sometimes refers to activities which cut away the veil of doubt as being at the "cutting" edge of science. Because cryptozoology deals with fuzzy data, it never quite eliminates all doubt and remains at a "fuzzy" edge of discovery. As soon as proof is achieved, for example through capture of a specimen, zoology replaces cryptozoology and the search is over.

Finally, given the intense public interest in mysterious creatures, I have found cryptozoology to be an excellent way to introduce marine science to people who might not otherwise be interested or might be daunted by a

more traditional approach... a bit like teaching paleontology to children through their interest in dinosaurs. As a teacher, I have found cryptozoology a useful pedagogical support.

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Received August 20, 1996