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First evidence of long term and rapid coloration changes of giant Manta rays (genus *Manta*) with implications on reliability of photo identification techniques

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Patterns of pigmentation are extensively used for identification of individuals in large bodied, pelagic marine species, such as giant manta rays, because it is assumed that their coloration is permanent during their lifetime. Manta rays (genus *Manta*) are listed vulnerable on IUCN Red List, mainly based on photo identification technique that is used for estimating their population size, seasonal migration, as well as for taxonomic classification. This study reports the first evidence of long term and rapid coloration changes of manta rays based on observations of captive individuals.

Coloration changes were observed on a *Manta sp. cf. birostris* (Atlantic or Caribbean) on the head, while spot markings appeared on the ventral side at the end of the gill slits over 9 months, most likely during maturation. In addition, the coloration intensity of white markings drastically changed more times during the day. These rapid coloration changes were observed on two *Manta birostris* and three *Manta sp. cf. birostris*, most intensely on the back and head, and were most likely endocrine-based, connected to emotional changes.

Population estimates and species identifications of manta rays based primarily on body coloration should consider these changes in the future in order to avoid overestimating already vulnerable species' populations or misidentifying species. Similar changes described recently in other elasmobranches as well present warning that pigmentation patterns should be used with caution during photo identification studies. These results provide help to develop more accurate methodologies to identify *Manta* individuals and to create photographic databases.

Biography

Csilla Ari has completed her Ph.D. at the age of 29 years from Semmelweis University, Hungary. At present she is a postdoctoral scholar at the University of South Florida, at the Hyperbaric Biomedical Research Laboratory. She is the director of the Foundation for the Oceans of the Future, a not-for-profit organization focusing on research and protection of marine life, especially on manta rays. She has published several scientific papers in reputed journals on the neurobiology and behavior of sharks and rays and a book on their brain organization and structure.

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