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IS THE BLIND RIVER DOLPHIN SIGHTLESS ?

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Summary

The behaviour of Indus river *Platanista* in its natural habitat was studied by direct observation. Behaviour that may be related to visual location of aerial objects by this cetacean was observed and similarities to the visual behaviour of wild dolphins at sea were evident. The results do not substantiate the idea of blindness in *Platanista* and suggest that a visual image may be formed by the eye in air.

Visual sensitivity to light direction is not considered to be an important function of the eye due to the physical characteristics of the aquatic habitat of *Platanista.* Side swimming is thought to be related to visual orientation in depth limited areas of its habitat.

Introduction

Although platanistids of the genus *Platanista* inhabiting the rivers of the Indian subcontinent have long been thought blind (FLOWER and LYDEKKER, 1981), recent studies suggest that the eye of *Platanista* may be adapted for light gathering (HERALD *et. al.,* 1969) and the anatomical basis of a mechanism for image formation has been described (PURVES and PILLERI, 1974). Light microscope studies have shown that although a functional lens is not present in the eye, the retina contains numerous photoreceptor cells and there is a clearly demonstrable optic nerve (PURVES and PILLERI, 1974; DRAL and BEUMER, 1974).

Studies were made on *Platanista* living in the Indus river, Sind Province, Pakistan in 1982 to ascertain whether their behaviour is or is not consistent with blindness. The results suggest that *Platanista* may use vision in air and do not substantiate claims that the eye of this cetacean is visually functionless.

Material and methods

Wild *Platanista* living in the Indus river upstream of the Sukkur barrage were studied. The present results are based on observations of *Platanista* made between late afternoon and dusk on 29th June though water turbidity limited these to periods when platanistids became visible above water.

Observations on *Platanista* were made from a jetty on the West Bank and a boat equipped with a powerful outboard motor facilitated studies on the river itself. The boat enabled certain characteristics of the habitat of *Platanista* in this region of the river to be examined.

Results

The habitat of Platanista. The river in the study area was reported to reach a maximum depth of about 30m. The major flow input to the barrage occurs during July and August extending into September in some years. The current was found to be fast with large eddies forming around the vegetated sand-bars and islands common in this region of the river. A surface sample of river water collected from the boat had a light yellowish brown colour in sunlight

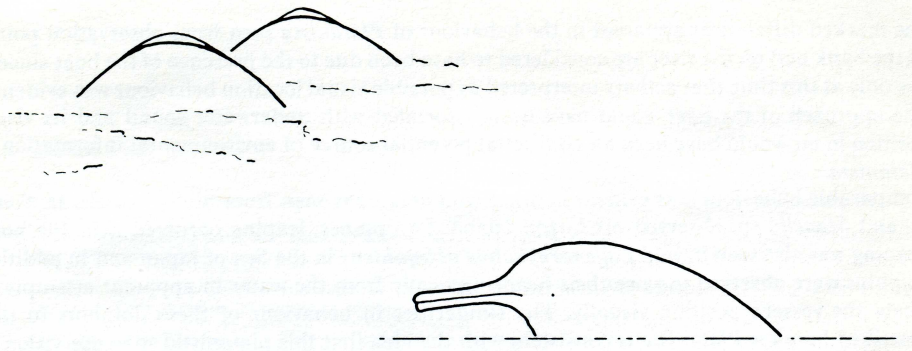

Fig. 1. Sketches prepared from field observations of Platanista made on the river Indus. Top, Synchronous surfacing by a pair of platanistids on breathing. Bottom, Platanistid surfacing in a position from which monocular viewing of the boat may have occurred.

due to the presence of silt particles in suspension and the sample was visually opaque to the human eye.
After standing for 45 minutes, a layer of sediment had formed and the water above it was clear. No further change in water clarity was evident to the human eye in the sample after a further period of 14 hours. This suggests that in slow flowing parts of this river, aquatic visibility may be greater than in fast current areas.

Observations from the Jetty. Platanistids were seen as they surfaced to breathe. The dorsum was evident above the water (Fig. 1) and the rapid surfacing movements were accompanied by a clearly audible exhalation.

Observations from the Boat. Platanistids were initially located in an area where the main current was divided by the upstream tip of a large island north of the barrage in the late afternoon. As the boat approached at high speed, a large *Platanista* was observed to leap clear of the water about 40m in front of the bows. The platanistid's behaviour may have been related to monocular visual location of the boat's position in air. The size and stoutness of body form of this platanistid indicated that it may have been an adult. On nearing the area at a slower speed, more platanistids were briefly observed surfacing to breathe close to the boat though no further leaping took place.
In another area downstream of the island, a platanistid was seen surfacing to breathe near a sand-bar. As the boat approached at low speed, it surfaced several times near the vessel enabling closer observations to be made. This platanistid was seen to emerge sufficiently from the water for the anterior portion of its body to become visible in air and the head and snout to be seen in side profile view (Fig. 1). A clearly marked orifice could also be distinguished on the visible side of the head, though the distance was too large to avoid confusion between the ear and eye openings. This was probably a young *Platanista* as the anterior teeth of the snout were not visible above the gums. Whilst observing the activity of this platanistid, a distinct impression was gained that its behaviour was of an inquisitive type, probably related to the presence of the boat.

Discussion

The marked differences apparent in the behaviour of *Platanista* seen from observation points on the bank and on the river are considered to have been due to the presence of the boat since it was only at this time that activity interpreted as possible visual location behaviour was evident. The approach of the boat would have been associated with underwater sound and its visual position in air would have been an additional potential source of environmental information to *Platanista.*

Comparable behaviour was evident in other wild cetaceans seen from motor vessels. In *Sousa* sp. and *Stenella* sp. observed off Luzon Island, Philippines, leaping occurred near the boat. Leaping was also seen in wild *Lagenorhynchus obliquidens* in the Sea of Japan and in addition dolphins were observed to raise their heads vertically from the water in apparent attempts to locate the vessel's position visually. The similarities in behaviour of these dolphins to that described here for *Platanista* is consistent with the idea that this platanistid may use vision in air. Although HERALD *et. al.* (1969) stated that *Platanista* has no utility for vision in its muddy habitat, there is indirect evidence indicating that aquatic visual information can be utilised by animals inhabiting these rivers. Many of the fish species described and figured by DAY (1889) from rivers also frequented by *Platanista* have well developed eyes in relation to body length. In siluroids (catfish) some species have small or minute eyes (DAY, 1889) though no details of the internal structure of these eyes are given.

Little is known of the underwater behaviour of wild *Platanista* due to the difficulty of making observations in water of high turbidity. Captive *Platanista* maintained in clear water tanks in Europe, Japan and the United States swam on their sides though this activity may be a behavioural response to this type of captive environment. HERALD et al (1969) described side swimming behaviour and considered the *Platanista* eye and adnexa to be adapted to sensing light direction. However since suspended particulate matter causes light scattering in water, the high silt load in deeper fast flowing areas of rivers inhabitated by *Platanista* probably results in an even angular distribution of light at any given depth. In the absence of a visually bright surface interface, light direction sensitivity may not be a major function of this eye. A side swimming-type posture may be effective in the utilisation of visual and other sensory information from the river bed and may be an adaptation for orientation in confined areas such as shallow turbid tributaries.

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