

The colour of all Irrawaddy Dolphins seen by the author was uniformly very dark grey. In some publications (e. g. FRASER, 1937, 1948 and WEBER, 1923) the colour is given as slate-blue or steel-blue. Whether these differences are due to local variations or to another way of defining colours is not clear yet.

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Observations in flight Reactions of *Tursiops truncatus* (Mont.) with some Suggestions on flight Planning

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The newly established Dolfinarium at Harderwijk, Holland, which incorporates a small research group, recently acquired (summer, 1965) four adult *Tursiops truncatus* from Aquatics International, Berlin, New Jersey, U.S.A.

On July 2, 1965 the authors accompanied the animals by truck from Berlin, New Jersey to Kennedy International Airport, New York, then by K.L.M. DC 8 on their normal freight service from New York to Amsterdam and from Amsterdam by truck to Harderwijk. During the transoceanic flight the authors were assisted by a very able KLM animal attendant. This attendant was placed at their disposal through the good graces of the KLM airline. The first lap of the trip took three hours, the flight seven hours and the last lap one and one half hours. The total time elapsed between the removal of the first dolphin from water until the last was placed into the new pool was sixteen hours.

About two months previously these same animals experienced a 32 hour trip by truck from Florida to Berlin, New Jersey. During both trips each animal was slung in a modified hammock, a method of transport that was found to be least traumatic and distressing. The absence of struggling or any aberrations in heart rate or body temperature attested to this. The animals ate readily when hand fed immediately after they were placed into water after the trip. Nevertheless some observations were made during the flight which we feel were significant.

Breathing Rates *Tursiops truncatus* during a DC 8 flight

Time	Cabin pressure in feet	"Mamalon", female length 245 cm weight 163 kg est. age > 10 years	Mean	"Moby Dick", male length 235 cm weight 147 kg est. age ca. 7 years	Mean	"Peppy", female length 210 cm weight 108 kg est. age 5 years	Mean	"Wiki Wiki", male length 210 cm weight 102 kg est. age 5 years	Mean
20.30	4000	12, 17, 19, 7, 15	14.0	37, 37, 55, 40, 68	47.5	13, 25, 30, 10, 28	21.0	51, 32, 44, 32, 45	21.0
21.30	4600	16, 15, 16, 14, 22	16.5	43, 55, 66, 37, 37	47.5	32, 55, 55, 29, 32	40.5	40, 49, 39, 30, 49	41.5
00.15	4800								
00.30	5900	17, 18, 17, 20, 19	18.0	43, 35, 48, 37, 57	44.0	11, 12, 19, 18, 18	15.5	35, 37, 32, 33, 42	36.0
01.15	4200	17, 17, 25, 23, 22	21.0	46, 55, 63, 57, 56	55.5	28, 28, 35, 31, 30	30.5	41, 37, 39, 31, 40	37.5
02.15	3000	23, 28, 29, 22, 23	25.0	52, 45, 27, 55, 65	49.0	36, 40, 27, 21, 36	32.0	45, 32, 33, 37, 26	34.5
05.45	sea level	16, 19, 14, 25, 22	19.0	47, 50, 57, 42, 62	51.5	55, 25, 51, 29, 19	36.0	45, 47, 34, 34, 36	39.0

The readings at 00.15—00.30 indicate an increased breathing rhythm in "Moby Dick" and "Wiki Wiki" too. Save from increased whistling they did not show any peculiar behaviour.

The second author knew four *Tursiops truncatus* died in midair when the cabin pressure exceeded 6000 ft. (In air language the cabin pressure is normally expressed in the equivalent height in feet and will be used throughout this paper.)

Therefore the second author was watching when two *Tursiops truncatus* were transported to Switzerland a fortnight before the trip being described in this report. When the cabin pressure during this earlier trip was equivalent to 6000 feet both animals became restless, started to groan and flayed around with their heads and flukes. Upon request the flight altitude was immediately lowered and when the cabin pressure reached about 5000 feet the animals became quiet and appeared comfortable. They performed within an hour of completion of the flight.

With the knowledge gained from the previous flight it was decided to monitor the animals respiration rates to determine what, if any, effect altitude had on their breathing. The temperature in the plane was 22° C, which was lowered to 17° C during the last hour as the ground temperature at Schiphol Airport was only 9° C.

We took off from New York on July 2nd at 19.25 hours Amsterdam time and arrived on July 3rd at 02.20 local time. The first respiratory rates were taken after a gentle climb to a flying height of 30 000 feet.

The readings at 20.30 hours and 21.30 hours indicated that each animal had a characteristic breathing rhythm. This rhythm remained constant for three of the animals. When taking the readings between 00.15 and 00.30 hours "Peppy" became restless. She slapped with her flukes and tossed her head, groaned, shrieked, urinated and periodically made shuddering movements. Both authors recognized this as "shock behaviour", which often leads to death. Information from the flight deck indicated that during the time of the peculiar behaviour of the dolphin the plane had started to gain altitude for the Atlantic crossing after passing over Newfoundland.

At 00.30 hours at about the time "Peppy's" recordings were taken the cabin pressure was 5900 feet. This particular behaviour cannot be caused by the climbing in itself as the increase of height to 4800 did not lead to any unrest. An altitude decrease was requested, the captain descended and after some minutes a cabin pressure of 4200 feet was attained. "Peppy" calmed down almost immediately as did her respiratory rate. All the animals whistled far more vigorously than normal during the trip. At 01.15 hours "Peppy's" breathing rate was back to "normal". The last reading was taken after the last lap of the trip by truck when the dolphins were resting quietly in their hammocks beside their new pools surrounded by some 20 onlookers. They were released into the water immediately afterward and fed successfully.

On December 4, 1965, the second author transported three *Tursiops truncatus* from Berlin, U.S.A. to Harderwijk and on February 3, 1966 from Harderwijk to Paris in the same way. On both occasions the cabin pressure was not exceeding 5000 feet, there were no signs of trouble and the animals could be hand fed immediately upon placed in their new tank after the trip.

It is a known fact that some human beings suffer from the effects of a lack of oxygen at the heights at which these animals were flown. Since we feel that the aberrant behaviour of the dolphins at this height was also due to a lack of oxygen we would like to summarize as follows:

1. Four dolphins died during a trip with a cabin pressure exceeding 6000 feet.
2. On a flight previous to the one described here both animals were restless, had increased respiratory rate when the cabin pressure was equivalent to 6000 feet.
3. On the trip described here one dolphin out of four showed signs of "shock behaviour" when the cabin pressure became equivalent to 5900 feet.
4. It is recommended that the captain of the plane be informed in advance in order that a flight schedule can be arranged so that the cabin pressure does not exceed 5000 feet. This may cause some concern as the lowered altitude does affect the duration of the flight as well as fuel consumption.

We wish to acknowledge the wonderful cooperation that we received from all the people who helped to make this trip a success. We personally thank the captains of both KLM planes for their readiness and willingness to cooperate at the slightest signs of distress of the animals. The captain should be commended on his handling of the large plane during landing as the dolphins did not even wince at touchdown.

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Artikel/Article: [Observations in flight Reactions of Tursiops truncatus \(Mont.\) with some Suggestions on flight Planning 370-372](#)