

Some observations on behaviour of two Orinoco Dolphins (*Inia geoffrensis humboldtiana*, (Pilleri and Gihl 1977), in captivity, at Duisburg Zoo

Jean-Pierre Sylvestre

Summary

The author describes some observations on the behaviour of two male Orinoco dolphins *Inia geoffrensis humboldtiana*, (Pilleri and Gihl 1977), kept in captivity at Duisburg Zoo, Federal Republic of Germany. Some observations on the behaviour of this species are described for the first time such as urination and defecation. The 'toninas' are very cautious and curious and it is impossible to approach them closer than 1.5 metres. During sexual behaviour, the adult male is always engaging in play and during a whole afternoon, the author observed 'Vater' trying to copulate with 'Baby'. In playing, they invent new plays with the objects they find in the basin. The food consists of live fish.

Resumé

L'auteur décrit quelques observations sur le comportement de deux mâles dauphins de l'Orénoque *Inia geoffrensis humboldtiana*, (Pilleri et Gihl 1977), gardés en captivité au Zoo de Duisburg, en République Fédérale d'Allemagne. Certains comportements chez cette espèce comme uriner et excréter, sont décrits pour la première fois. Les toninas sont très curieux et méfiants, il est impossible de les approcher à moins de 1,5 mètre. Durant le comportement sexuel, le mâle adulte est toujours engagé dans les jeux et durant toute une après-midi, l'auteur a observé 'Vater' essayant de 's'accoupler' avec 'Baby'. Dans les jeux, ils inventent de nouveaux jeux avec les objets qu'ils trouvent dans le bassin. La nourriture est constitué de poissons vivants.

Introduction

The present study is a report of some observations and notices on the behaviour of two male Orinoco dolphins *Inia geoffrensis humboldtiana* (Pilleri and Gihl 1977), at Duisburg Zoo in the Federal Republic of Germany. These observations have been made by the author during the first week of June 1982. That study is established with reference to an article of Layne and Caldwell (1964).

Cetaceans, belonging to the Platanistidae family are considered as the most primitive living toothed whales. These are mammals which are only freshwater dwellers and we can find some of them in the mouths of rivers. This interesting family is constituted of 4 genera living in 2 continents. The species interesting us in this study is the Amazon freshwater dolphin *Inia geoffrensis* (De Blainville 1817). This species lives in the Amazon and Orinoco rivers and their tributaries. This species is divided into 2 subspecies:

The Amazon dolphin *I. g. geoffrensis* (De Blainville 1817) living in the Amazon basin.

The Orinoco dolphin *I. g. humboldtiana* (Pilleri and Gihl 1977) from the Orinoco basin.

The latter is the subspecies interesting us.

Materials

Inia, also called 'bouto' or 'tonina', is the genus most studied in the Platanistidae, being the one most often kept in captivity. In Europe, the Duisburg Zoo in Federal Republic of Germany, is the first and only zoological park keeping some *Inia*. An expedition of the Duisburg Zoo, organised by Dr. W. Gewalt, went to San Fernando de Apure, in Venezuela to catch 3 live specimens of Orinoco dolphins in the Rio de Apure. Rio de Apure is a tributary river of the Orinoco. On 12 March 1975, 5 specimens were caught and they arrived on 15 March 1975 in Germany by plane. Of these specimens, 2 were adult males: 'Vater' (1.95 m in length) and 'Halbstarke' (1.36 m in length). The others were an adult female 'Mutter' (1.88 m in length) and an old albino female (1.95 m in length). The old albino female lived 6 months in captivity. The female 'Mutter' was accompanied by its male new-born 'Baby' (80 cm in length). On June 1982, only the 2 males 'Baby' and 'Vater' were still living. The colouration in 1982, was greyish-white. In 1980, when I came at Duisburg Zoo, the colour of these 2 dolphins was grey. As with the other specimens kept alive in other oceanaria, the 2 Duisburger 'toninas' are not trained. Observations were made between

7.00 a.m. to 7.00 p.m. To help him in his investigation, the author filmed some patterns of the behaviour (feeding, opening the jaws, locomotion, breathing, etc. . .) of these 2 cetaceans. That film is a 60 metres Ektachrome film, Super 8, 160 ASA. The film is in the Marine Mammals' file of the author. Some notices have been written from some filmed sequences.

The exhibit

The tonina pool has a capacity of 75 m² (5.20 m × 7.20 m, completed by another smaller basin of 2.60 m × 2.00 m, the depth of water being 1.80 m). The temperature of the air is 28°C minimum and 31°C maximum. The temperature of the water is between 25 and 28°C. pH is between 7.2 and 7.4. Degrees of specific gravity ranges about 15°d.h. The relative atmospheric humidity ranges from 60 to 70%. There are 3 sand and gravel filters, through which daily pass 12½% of the water volume (10–12 m³) (Gewalt, 1977).

A sterilization system by Wedeco ultraviolet rays (Gewalt, 1977), has been utilised. 20% of the water is renewed daily. The public can see the Orinoco dolphins through 2 large underwater windows.

General behaviour of *Inia*

Inia is the species of Platanistidae which has been most studied, especially for its behaviour. Behaviour of 'toninas' has been studied in the wild (Pilleri, 1969; Layne, 1958) and in captivity (Caldwell *et al.*, 1966; Layne and Caldwell, 1964).

Defran and Pryor (1980) report an investigation concerning the behaviour and training of 11 species of toothed whales kept in captivity (beluga, common dolphin, pilot whale, boto, Pacific white sided dolphin, killer whale, false killer whale, spinner dolphin, rough-toothed dolphin, Pacific and Atlantic bottlenosed dolphins). On the *Inia*, they investigated the behaviour of 9 animals observed during 5 years by 4 respondents and on the training of 3 animals during 3 years by 2 respondents. They divide the behaviour into 3 categories: rare occurrences (never or rarely), moderate number of occurrences (occasionally observed) and frequent occurrences (frequently observed). For affiliative/social/contact behaviours, aggression, care giving, fear/stress/subordination, curiosity/manipulation/play, sexual behaviour, leaping and surface behaviour, the 'tonina' has the lowest rating of the 11 species studied. These results are different from my own observations and from results with other studies in this species. It is important to say that the male 'Halbstarker' was killed on 31 December 1978, by the male 'Vater' at Duisburg Zoo. Concerning trainability and reliability, *Inia* is rated higher on

general than *Tursiops truncatus*. It is also rated as markedly superior to *T. truncatus* in its ability to be controlled by auditory signals. It is more easy to control the freshwater dolphin by sound in air and under water than by touch signals, with more difficulty by stationary visual signals or by moving visual signals.

It is important to know that 'toninas' do not become a socially dependant species.

In Caldwell *et al.* (1966), in captivity, fear in *Inia* is less easily precipitated than in *T. truncatus* and is of shorter duration. Curiosity, playfulness and the early and frequent sexual play are also characteristic of this primitive species.

Locomotion

Generally, the tonina is a slow moving cetacean. In morning, before the zoological park opens, the 2 *Inia* swim together with a slow speed of about 3–4 km/h in an anti-clockwise direction, remaining about 20 to 30 sec underwater. As soon as the zoo opens, when the public are in front of the 2 large windows of the aquarium, the toninas increase their speed. During feeding (at 10.00 a.m.), they rapidly swim. After feeding, they slowly swim. At 6.00 p.m., the 2 animals slowly swim; often resting together on the bottom of the basin, turning the head in different directions, observing the other 'tonina' or anything in the pool. Resting, the 'toninas' spend more time underwater than swimming and when they emerge, they slowly swim to the surface, break the water for a few seconds, submerge and come back to their initial place for resting. Resting has been described in specimens in the Marineland of the Pacific in Pilleri (1969). Nishiwaki (1966) has described the same behaviour in February 1965 with a young 1.5 m male 'boto' at Steinhart Aquarium, 'the baby was extremely soft and formed folds when the head was moved from its abnormal position. This dolphin sat with flippers and tail fluke on the bottom of the tank, moving its head in all directions as if it were watching the outside with its very small eyes'. Caldwell *et al.* (1966) reported a similar behaviour 'resting or sleeping on the bottom of the tank' on the same specimen of Steinhart Aquarium. I observed in summer 1982, the same behaviour with 2 Atlantic bottle-nosed dolphins *T. truncatus* after a 'hard work' at the Marineland of Antibes, France, where the animals went to the bottom of the tank, emitting a quantity of air, and might remain several minutes on the bottom of their tank. A similar behaviour has been noted on wild spotted dolphins *Stenella attenuata* in tuna purse seine nets (Perrin, 1980), sinking to the bottom of the tuna purse seine nets.

In slow moving the stroke rate of the fluke is 1 per 2 sec. During fast swimming, they increase the stroke rate of the fluke to 1 or 2 per sec. A pitching

movement of the body is more pronounced than in slow motion. The poor development of the dorsal fin of the Orinoco dolphin is compensated by the large size of the flippers which is formed to maintain equilibrium in this cetacean. During swimming, I notice the great flexibility of the flippers of *Inia*, more important for equilibrium in this family than in the sea dolphins. In slow motion, the fluke has a vertical angle of approximately 20 degrees. The head helped by the flexibility of the neck, has a great mobility. Often, they turn the head 90 degrees or more to the axis of the body in order to examine an object to the side or beneath them. Head was generally swung from side to side through an angle of about 45 degrees, but was moved to a lesser extent in the vertical plane.

Sometimes, they swim upside down or on a side, performing the same movements as in normal swimming and having about equal control over their speed and direction.

From my film, I notice that the adult 'Vater' swam in an anti-clockwise direction and the younger 'Baby' swam in a clockwise direction. They swim in midwater. I never saw them swimming just above the bottom when the level of water was at the maximum. Often, they swim independently each in different circles. Sometimes, they swim by keeping a contact of flipper with the bottom or very often, the side of the body, fluke or flippers in contact with the body of its companion as the pair swim together. The movement of the fluke for the propulsion is the same as in the Delphinidae.

Breathing

I observed them always surfacing by slow swimming (except for feeding but in that case the technique of surfacing did not differ from that of slow motion). When swimming at the normal slow cruising speed, the dolphins rise to breathe with the upper part of the beak and the top of the head (melon and blowhole) breaking the surface first (Figure 1a,b). The upper edge of the back is visible (Fig. 1:c to e). The fluke doesn't break the surface. The body leaves the surface in a low arc (Fig. 1:f-g). I never saw the technique of breathing during rapid swimming. At the surface, the blowhole remains open 1 to 2 seconds. The dolphins expire first (Fig. 1:b) and inspire after (Figure 1c) as other cetaceans. Expiration and inspiration are of equal duration. The sounds of expiration and inspiration are different. I often recorded the time of one blow per animal when surfacing. The intervals between blows are from 20 to 100 sec. During fast swimming, the intervals between the blows decrease. I never noticed the 2 dolphins surface in perfect synchrony. Before

surfacing, the dolphin stops the technique of locomotion or decreases the speed (Figure 1a,b). It breaks the surface for 1 to 2 sec and then returns its head into the water (Figure 1c-e). It increases rapidly the movement just after the inspiration (Figure 1f-i). During this time, I notice that the Orinoco dolphin raises the flippers like a sea turtle, certainly for helping it to go to the bottom (Figure 1f-h).

Hearing, vision and touch

Hearing. Hearing is probably the most important sensory faculty possessed by the Platanistidae (Layne and Caldwell, 1964). As soon as I, together with the keeper, entered the water, the dolphins react quickly to the sound by accelerating their speed. As in Layne and Caldwell (1964), I notice that *Inia* are remarkably able to localize the source of a sound. They are conditioned to the splash of the living fish thrown into the water for feeding and swim directly to the source of sounds.

Vision. In all living species of Platanistidae, the reduction of the eyes is correlated with life in turbid water. When I was together with the keeper near the edge of the tonina pool, standing above the surface, the toninas slowly swam together in an anti-clockwise direction or each in a different direction. They turned the head and observed us during a short time. Sometimes, when we were in the basin, we swam in the middle of the pool. Each tonina examined us during a long time and they remained away from us. They turned the head 90 degrees to the axis of the body when we were behind them. It was impossible, to me, to say if the dolphins sometimes swim with closed eyes during the day, owing to the small size of the eyes and also their greyish colouration in the water. *Inia* has a good eyesight and an excellent acoustic apparatus. The 'bouto' has a binocular vision. Sight is certainly used in same time with hearing.

Touch. The Orinoco dolphins often rub their bodies against an object, floor, the bottom, the side of the basin or the body of the other companion. Rubbing may be a result of irritations of the skin but it is principally a sensual pleasure (for example during sexual behaviour). They frequently keep a contact of a part of body (in particular the flippers) with the body of their companion. When swimming near the bottom (rarely) or on the side, belly in front of the wall, they keep a contact of their flippers with the wall or the bottom.

Tonina has bristles or hairs on the snout but in captivity it doesn't use them frequently because in the clear water, the 2 sufficient organs in captivity are the eye sight and the wonderful acoustic apparatus. Toninas only uses its bristles in very turbid water.

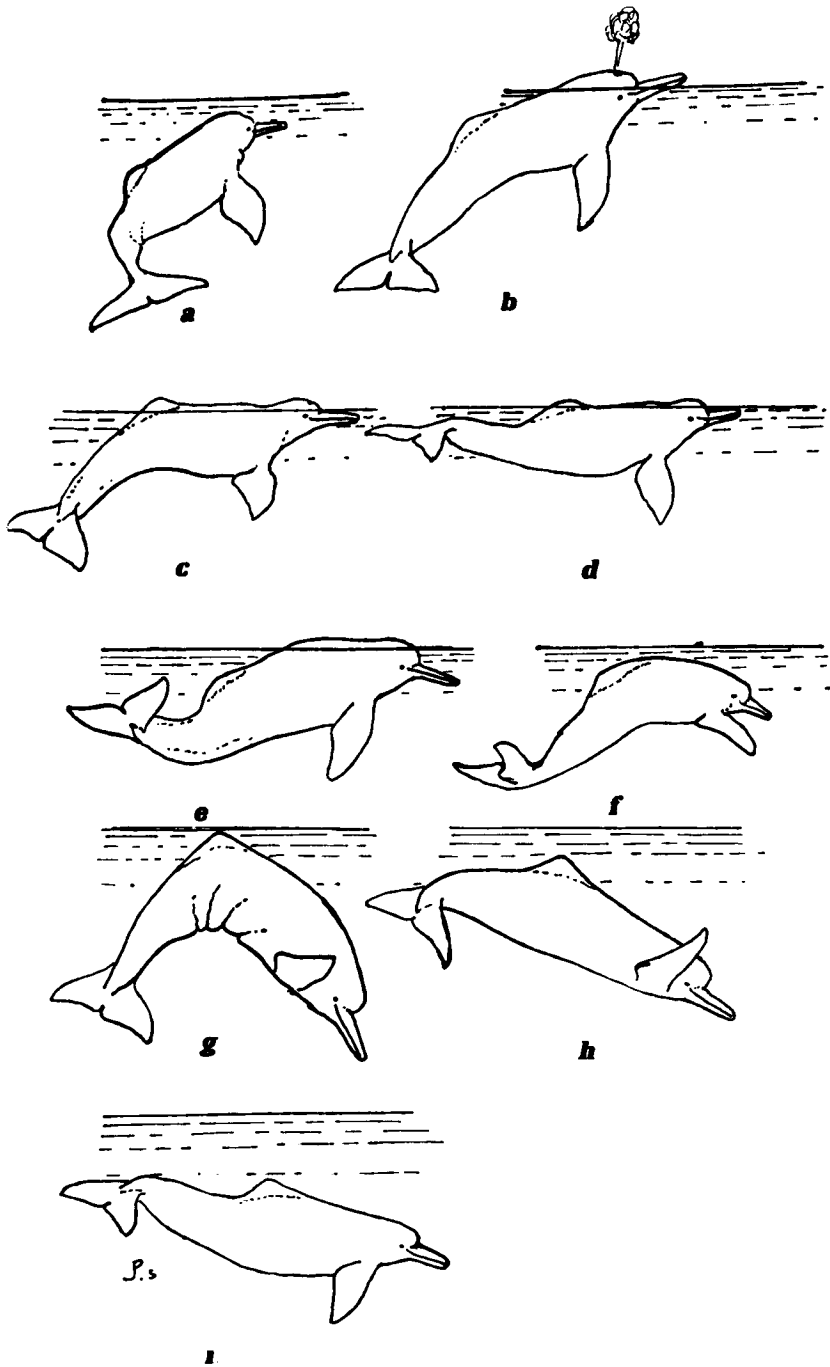


Figure 1. The different movements in the technique of breathing at the Orinoco dolphins *Inia geoffrensis humboldtiana* (Pilleri and Gihl, 1977) in captivity at Duisburg Zoo. Drawn from the sequences filmed.

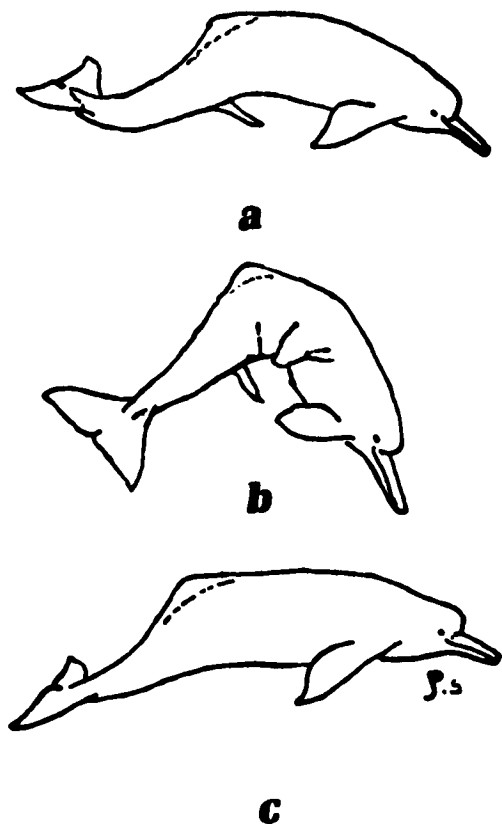


Figure 2. *Inia geoffrensis humboldtiana*. The 3 movements during urination. Behaviour observed in captivity at Duisburg Zoo.

Defecation

During excretion, about 5 hr after feeding, I observed a tonina slowly swimming, stopping its locomotion movements, and releasing a thick yellowish cloud from the anus. During the excretion, the dolphin swam one metre in an anti-clockwise direction. It turned on its left to come back by slowly swimming, at the same area of the basin and lost another thick yellowish cloud, always swimming in an anti-clockwise direction. Another day, at 6:30 hours after feeding, 'Vater' rested on the bottom of the pool and lost his excrements. Vater did not move during defaecation. The other tonina was without reaction during the excretion made by 'Vater'. When the pair swam together with a part of the body touching the body of the other companion, one of them lost his excrements without stopping the locomotion movements, at the same speed. It seems that excretions are always liquid, personally, I never saw a solid excretion.

Urination

During urination, I observed once, slowly swimming, the penis began to protrude out of the genital orifice (Figure 2a). Just after, the cetacean bent itself in two parts, the head and fluke pointed down, during 3 to 4 sec (Figure 2b) and returned to its normal position (Figure 2c). At this time the penis was thrust entirely out and then returned into the genital orifice. I think the tonina were urinating in this special position. I did not notice a micturition of a colouration differing from the water colour. I observed this behaviour only once.

Feeding

Inia is piscivorous. At Duisburg Zoo, the captive Orinoco dolphins are fed on live carp of about 20 to 30 cm in length. One of the toninas (Baby), occasionally eats dead carp with some medicaments inside. 'Baby' eats daily between 2.60 kg to 3.20 kg. 'Vater' eats daily 3.20 kg to 4.30 kg. They feed at 10.30 a.m. Fish are thrown into the water near the dolphins, splashing the surface to make them easy prey for the cetaceans. When the fish swims off before the dolphins, it is often searched by circling the area. For catching, the dolphins seize the fish occasionally with the rear and sometimes with the tip of their jaws. The prey is moved from side to side and chewed. The whole fish is swallowed head first in a longitudinal position. The toninas eat and swallow the prey underwater. I notice dolphins keep fish in the jaws sometimes one or two minutes, chewing it before swallowing. The fish is dead at the first or the second bite. I never noticed any competitive behaviour to obtain the feed. When the keeper was in the tonina pool and gave some live fish by hand to the 2 dolphins, 'Vater' approached the man slowly but 'baby' remained steadily looking at its companion (see the chapter 'Behaviour with man').

Opening the jaw

Sometimes, 'Vater' was motionless with the jaws opened for a long time (10 to 20 sec) and gently shaking his head to left and right, I filmed this behaviour twice. In the film, 'Vater' shaking his head with opened jaws, stopped to join his companion for a short time and swam with 'Baby' in a clockwise direction. Just after, he rested on the bottom, opening the jaw and shaking his head to right and left. I never observed this pattern of behaviour in 'Baby'. Pilleri has photographed an *Inia geoffrensis geoffrensis* at Marineland of the Pacific with the open mouth underwater (Pilleri, 1969). This behaviour may correspond to echolocation movements.

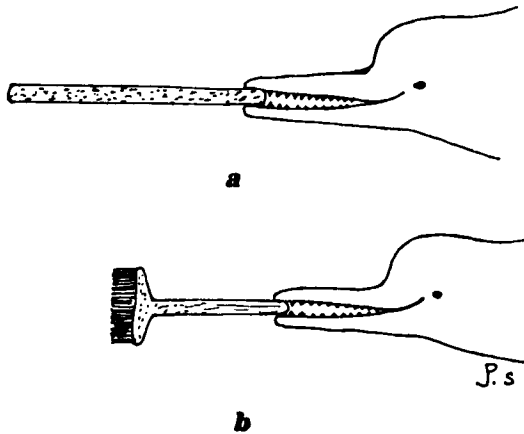


Figure 3. Two accessories play. The adult male holding a long stick in the beak by the extremity (a). During this play it followed 'Baby' and it placed the other extremity of the stick against the side of the subadult male. In 1980, one of them held a little brush by its extremity in the jaws (b). Behaviours observed in captivity at Duisburg Zoo.

Playing

The playing behaviour was studied by Pilleri *et al.* (1980) for the 3 Orinoco dolphins during 7 days in may 1978 at Duisburg Zoo. In their summary, the authors say that Iniidae show far more parallels in terms of play behaviour with primates than with carnivores and they have a similar degree of cephalisation comparable with that of man. With its better eyesight, *Inia* is more extraverted and curious than *Platanista*. The captive Orinoco dolphin has developed an extended repertoire of forms of play. *Inia* is capable of both insight learning and true imitation.

At Duisburg Zoo, the 'toninas' as the other *Inia* which have been kept in captivity in the whole world (USA and Japan), are not trained. They don't receive encouragement in the development of the play. The 'bouto' plays with anything it can find at the surface of the water or on the bottom of the basin. They often play with a stick and a brush in the beak or with a ring slipped over the closed beak, swimming with them along the basin. I observed 'Vater' with a long stick in the beak, holding it by the extremity (Figure 3a), following 'Baby' and placing the other extremity of the stick against the side of the subadult male. In summer 1980, always at Duisburg Zoo, I observed one, travelling during a long time in the pool with a little brush in the beak, held by the extremity of the stick (Figure 3b). I observed the toninas playing with a ring and a ball, throwing them in the air with the beak or with the melon (see the chapter on the behaviour with man).

As in Pilleri *et al.*, (1980), I noticed both solitary and social plays. In the solitary play, the ring is the favourite toy of the Orinoco dolphins and they play with it in different ways. Defran and Pryor (1980), concluded that *Inia geoffrensis* has the lowest rate concerning the approach on a new object. But they say that inventing games, playing with familiar objects, playing chase with cetaceans are rare occurrences. I don't agree with them. Often, when swimming, they rubsides against the tank brush. Sometimes, they enter together in the small basin and play together. When a 'tonina' is alone in the little pool, it is motionless between the large and the small basin, resting on the upper edge of the little wall separating the 2 pools. It observes its companion swimming and follows it by sighting. *Inia* play with the live fish by catching them, shaking and releasing them. The fish are injured.

As Peter Schulz told me, the Orinoco dolphins manipulate the play objects as the bottlenosed dolphins never do.

Behaviour with man

In the week spent at Duisburg Zoo, I entered the 'tonina' pool 3 times. The first time to get underwater photographs. The second time to observe the behaviour in a reduced level of water (to knee high). The third time also to observe their behaviour but at normal level of water (depth of 1.80 m).

The first time I swam in the basin to photograph them. I was accompanied by Peter Schulz, the keeper of the aquarium at Duisburg Zoo. Before we entered the water, the 'boutos' observed us by increasing the speed and swimming together in an anti-clockwise direction. As soon as we were in the water, the toninas swam far away from us, in the other part of the pool. They never approached us and it was in general difficult to approach them. 'Vater', the older one, approached us to 1.50 m, looking at us, moving its head every few seconds and quickly turned about its initial position by keeping its head in a 90 degrees to the axis of the body to examine us. They kept a distance of 2 to 3 meters from us and the pair swam in 2 different directions. They examined us by swimming always in the same part of the basin. When we approached them, the dolphins increased their speed but hesitated to enter the little pool where they might be cornered. I noticed a panic in the pair when we approached them. When we were in the middle of the basin, they swam at a fast speed around us and observed us. Sometimes, we picked up a ring under the surface of the water to throw it near the dolphins. Generally one swam beneath the ring, took it above the tip of the beak and threw it in the air. The other tonina or the same animal came to search for the ring and to throw it in the air. When

the dolphins were in panic, I heard some squeaks and whistling.

The second time, the level of the water was at my knees, about 0.60 m deep. The dolphins slowly swam in an anticlockwise direction together, breathing each 20 to 30 sec. The flippers were in a horizontal position above the bottom. As soon as I tried to approach them, they quickly increased their speed. The dolphins were not embarrassed by the low level of the water. In the wild, it is not rare to meet this cetacea, in particularly the youngest, trapped in a low level of water during the dry season (Trebbau and Vanbree, 1973).

The third time I was in the pool, I swam hidden behind the wall of the supplementary pool which separated it from the main basin. The dolphins knew that I was in the water by hearing the underwater sounds I made. They observed me by the opening of the entrance. As I was not in the main pool, the dolphins continued to swim slowly, often looking at me. When I was at the entrance of the supplementary basin, observing them, the 'boutos' were curious and 'Vater' often was in front of me at 1 metre, motionless observing me by moving his head. As soon as I moved myself, the old male slowly swam in an anti-clockwise direction, without letting me out of his sight. 'Baby' observed me but was farther than 'Vater'. When I was hidden by the wall in the supplementary pool, the dolphins knew that I was in the pool and very often, 'Vater' approached near the entrance of the little basin for an investigation. As soon as he saw me, he quickly turned about.

For my film, during feeding, Peter Schulz decided to swim and to give them the feed underwater by hand. I filmed this show. It was principally 'Vater' which came nearer the diver to receive the fish. 'Baby' observed 'Vater' and Peter. When 'Baby' came near the keeper to take a carp, it swam slowly with the jaws closed, turned about by looking at the keeper and without picking up the fish. When 'Vater' slowly swam to the keeper, it took the fish between the 2 jaws, slowly swam backwards by watching the keeper for 1 or 2 metres and swam faster by swallowing the fish, a little farther off the diver. During this moment, 'Baby' was motionless, it looked at 'Vater' coming near Peter and going back as soon as 'Vater' left keeper. 'Baby' swam fast and 'Vater' followed it by swallowing the carp.

Sexual behaviour

It is noted in Pilleri *et al.* (1980) when 3 toninas were kept at Duisburg Zoo in 1978 that the adult male 'Vater' once tried to rub its erect penis against a large brush lying on the tank floor. The same adult male, once more tried briefly to insert its erect penis

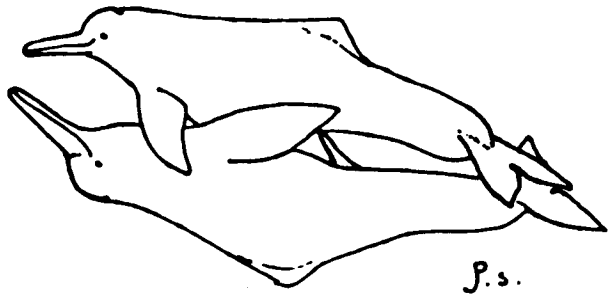


Figure 4. Homosexual behaviour observed in captivity at Duisburg Zoo in Orinoco dolphin *Inia geoffrensis humboldtiana*. The adult male swimming on its back, underneath the subadult male, inserting its penis (in erection) into the genital hole of 'Baby'.

into the blowhole of one of the juvenile male Orinoco dolphins swimming underneath it.

During all my sojourn, I often observed (sometimes during a whole afternoon), the adult male 'Vater' swimming on its back, underneath 'Baby' at a slow speed in a clock-wise direction and inserting its penis (in erection) into the genital hole of 'Baby' (Figure 4). I never noticed any erection from 'Baby'. Sometimes, 'Vater' with its penis erected, followed and touched 'Baby' with a part of its body or with its rostrum. I never read this homosexual behaviour in any article on this species. During relationships between the pair, they swim in close association side by side, with parts of the body in contact. One frequently caresses the other with its beak or flippers or brushes against it with other parts of its body. This is always the adult male 'Vater' which engages in sexual behaviour.

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