

Note on sleep in captive giraffes (*Giraffa camelopardalis reticulata*)

M.B. Kristal and M. Noonan

Department of Psychology, State University of New York at Buffalo,
4230 Ridge Lea Road, Buffalo, New York 14226, USA

Accepted 1 November 1978

Continuous observation of two captive female reticulated giraffes (ages nine and three years) was maintained at the Buffalo Zoological Gardens (Buffalo, New York), for three weeks in August. The older giraffe was pregnant and the primary goal of the project was to observe and video-tape parturition. The typical daily routine for these animals involved spending five to six hours outdoors (beginning at about 10h00) in a large enclosure adjoining the giraffe house. The giraffes were returned to adjacent pens in the giraffe house each day at approximately 15h30, where they were provided free access to their daily supply of alfalfa hay. The giraffes then typically devoted most of their time to eating and ruminating until the supply of hay was exhausted (usually at about 01h00-03h00). This schedule may not be unusual, as Moss (1975) indicated that feral giraffes typically browse until after midnight.

Because of large windows in the giraffe house, the overall light-dark cycle was that produced by the sun, and amounted to LD = 14:10 at that time of year. Overhead incandescent lights maintained a minimum illumination of 107-161 lumen/m² at floor level throughout the night. Beginning at dusk, the giraffes typically interrupted their feeding with periods spent lying down. The reclining posture is that typical for ungulates. They lie on their brisket and either abdomen or flank, with their legs folded under them but displaced slightly to the side.

Assuming the reclining position appears to involve considerable effort, and takes about 15 seconds to complete. First, the giraffes spread their hind legs, lower the neck to an almost horizontal position, look at the floor, and place each of the forelegs very carefully until they meet some unknown criterion; then they fall to their front knees, shift their weight to the knees, and reposition the hind legs. They then collapse the hind legs, lowering the pelvis to the floor asymmetrically (one hind leg underneath the abdomen), then rock back shifting most of their weight to the pelvis. When this is done, they lower the brisket to the floor and bring the neck to a vertical position. Upon reaching the ground, they frequently emitted a deep, long sigh, which was the only vocalisation we ever heard from either adult giraffe. The reclining periods lasted from between three and 75 minutes, and tended to be longer later in the night after the food supply ran out. Cud was chewed during most of the time spent lying down. Three to eight reclining episodes occurred each night for each giraffe, except on the night prior to delivery when the pregnant giraffe was observed only to lie down once for a period of about an hour. There appeared to be social facilitation of lying down; it was not unusual for the two giraffes to lie down and arise within two or three minutes of each other.

Most of the reclining time was spent in rest with the neck in a vertical position, cud was chewed, the eyes were open and blinked occasionally, breathing rate was approximately 20 per minute, and pulse rate (as determined by visual inspection of the skin over the carotid artery) was 50 per minute.

Part of the time spent lying down was devoted to what we surmised was S-sleep (slow-wave or light sleep), which occurred in episodes lasting from five to 30 minutes. This was characterized by a breathing rate of about 15 per minute, open but unblinking and apparently unfocusing eyes, and a relaxation of the neck which, while it remained vertical, slackened into a slight S-shaped curve. Cud was not chewed during these periods.

Periods of what appeared to be D-sleep (deep or fast-wave sleep) were brief (lasting from one to 10 minutes) and infrequent (one or two episodes per night). Each episode of apparent D-sleep began only after a long period of reclining rest or S-sleep and began with the giraffe lowering and turning her head until it rested on her hip or thigh, in which position the giraffe resembled a sleeping swan. While in this position, the giraffe slept with her eyes closed. These D-sleep episodes occasionally occurred as early as 22h00 (two hours after sunset), but usually occurred between 02h00 and 05h00 (after the food supply was exhausted). Similar deep-sleep postures in captive and wild giraffes have been reported by Immelmann & Gebbing (1962) and by Mejia (in Moss 1975), respectively.

As indicated above, the pregnant giraffe gave birth at the end of our three-week observation period. The newborn giraffe spent its first hours learning to ambulate. However, four hours after birth, it lay down and immediately assumed the D-sleep (swan) posture. During the first two days of life, the calf was observed to spend approximately 25% of its total time sleeping, and approximately 90% of that sleep time in the D-sleep posture. That the newborn giraffe slept more than the adults (also reported by Langman 1977), fits into the typical, possibly universal, mammalian developmental pattern (Jouvet-Mounier *et al.* 1969).

The relatively small amount of time spent sleeping by giraffes, can be attributed most directly to the need for constant rumination (Balch 1955). This is consonant with the more general ecological notion that sleep patterns in prey species are usually characterized by brief, intermittent periods of sleep (Allison & Cicchetti 1976; Hediger 1965).

References

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