Table 1: Behavioural signs of disease or unwellbeing

Observed phenomenon / behaviour / symptom	Occurrence in Loridae	In other species	Situation in which the phenomenon was observed; correlated symptoms	Possible cause, health disturbance diagnosed synchroneously	Further examination, diagnosis	Treatment, prevention
General signs of unwellbeing or weakness (see figure 2.5)						
Animal sitting quietly with narrow eyes for longer periods during activity period [15]	In *Loris* [15]		In sick animals before death, in connection with signs of weakness	Interpreted as an expression of unusual tiredness, unwellbeing or pain.		
Animal quietly hanging under wiremesh or twig in the upper part of the cage, occasionally with signs of unwellbeing (small eyes, tense lips)	In *Loris* [15]		See also table 4, organ disorders, lesions, under "flatulence", table 6, bycterial infections, under "dysbacterioses", and table7, "mycoses" under "*Candida*"	Pain caused by abundant gas production in the intestine by *Clostridium* might be an explanation for this behaviour [15]. In simian primates (n=24), gastric dilatation by gas production was found [39]. Pain caused by gastric bezoar or gall stone?		
Unuauslly energy-saving behaviour			See below, under "unusual sleeping postures": may occur because of high ambient temperature or may be a sign of weakness			
Changes of food consumption						
Permanently shy, retiring behaviour without apparent reason (environmental disturbance)	In *Loris* [15]		Continuously observed in a certain animal	Shyness due to earlier bad experience or individual property of the animal or social stress due to inadequate group composition (shy animal kept together with active and self-confident conspecifics) [15]		Quiet environment, minimizing of environmental distress; behavioural enrichment
	In *Loris* [15]		Shy animal housed together with a vivid conspecific. The animal may regularly hesitate to take food in the presence of conspecifics. Quarreling observed or not; signs of stress may be visible or not. Fur damage due to overgrooming may occur [15]	Social stress due to inadequate group composition (shy animal kept together with active and self-confident conspecific) [15]		Cage furnishing allowing some privacy; changes of group composition, solitary housing for a limited time until the animal has shows a more "courageous" behaviour. Behavioural enrichment.
	In *Loris* [15]		Reduced food consumption		Urine dipstick tests for diabetes and kidney problems	Offering behavioural enrichment, in cases of social stress solitary housing for limited time may encourage the animal to take food without hesitation

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Changes of food consumption						
Reduced food consumption or changed food choice (certain food items rejected which were readily accepted before). Animal may seize food items as usual, but drop them instead of eating them. Appeasing "krik" call while accepting food may occur. [15]	In *Loris* [15]		Loss of weight in spite of good nutrition, increased hunger, quiet hanging under the ceiling of the cage (upside down) during activity period (possibly a sign of abdominal pain) may occur. Patches of liquid or half-chewed food on the floor may indicate vomitinng. Emission of unusual quantities of urine; smell of urine in the cage	See table 4, organ disorders, lesions, under "dysbacteriosis", "diabetes", "kidney disease" [15].	Urine dipstick tests for diabetes and kidney problems; examination of fecal samples	Diet: not too abundant, limited amounts of glucose and protein. Addition of inulin to the food every day for improving intestinal flora [64]
	In *Loris* [15]		In animals housed together with conspecifics. Quarreling, chasing, attacks observed or not, animal(s) may stay in lower parts of the cage, showing a crouched posture, or not; fur damage due to overgrooming may occur or not.	If no physical problem is diagnosed: social stress due to inadequate group composition. The experience that the tame cage mate always gets the desired titbits apparently can lead to learned behaviour as described. Overgrooming in such cases probably indicates social stress [15]		Offering titbits synchroneously to both animals concerned until the shy animal has learned to take its part of titbits. If this does not lead to an improvement, solitary housing at least for a limited time until the animal has learned to be more "courageous". Behavioural enrichment.
Reduced food consumption or changed food choice (continued)	In *Loris* [15]		After transfer to unfamiliar environment, during continuous disturbance, after severe disturbance. Animals may try to hide, show unusually slow movements or motionlessness, but behaviour may also look normal [15]	Environmental stress [15]		Quiet environment, minimizing of environmental distress; food must be offered in a high place close to some cover. Behavioural enrichment
	In *Loris* [15]		No obvious cause [15]	Pain. One case observed: animal suffering from an inflammated basalioma; after surgical removal, food consumption became noormal again. [15]		
Increased food consumption, abnormal hunger in spite of good nutrition; animals may become unusually active and tame, eager to get food or titbits [15]	In *Loris* [15]		In connection with loss of weight. See also table 2, externally visible changes, under "wasting syndrome", table 4, organ disorders, lesions, under "dysbacterioses", and table 7, mycoses, under "*Candida*", "diabetes", "kidney disease" [15].		Urine dipstick tests for diabetes and kidney problems; examination of fecal samples	See table 4, organ disorders, lesions, under "dysbacteriosis", "diabetes", "kidney" disease [15].

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Vomiting observed (occasionally resembling coughing and subsequent chewing) or traces of vomiting (patches of liquid or more or less chewed food) found on the cage floor or on branches. [15]	In *Loris* [15]			In an animal with a large gastric bezoar (n=2 cases; in one case, no symptoms were observed) and in several animals suffering from intestinal dysbacteriosis [15]. In Malagasy lemurs described in cases with hemosiderosis (excess iron storage) and subsequent liver damage (Janssen, quoted in [58]		Trichobezzoars: prevention by regularly adding paraffin oil to the food. Treatment with paraffin oil or for instance *Miturat catlax* (for trichobezoar problems in cats); if this does not help, surgical treatment may be necessary.
Thirst. (Slender lorises usually do not drink water when moist food or milk formula is available; exception: milk).	In *Loris* [15]		In old animals before death, see next column. Regular drinking occurred in cases of diabetes. Thirst was also observed in animals with a protozoan infection. In one case a pregnant female drank with apparent thirst while showing severe prepartum aggressive behaviour, chasing a conspecific [15]	Diabetes; intestinal infections with diarrhoea-like symptoms. Stress may lead to temporary symptoms of diabetes; this might explain thirst in the pregnant female during social stress [15]		

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Abnormal locomotion, movements						
Limping / insufficient use of a limb during locomotion	In *Loris* [15]		Seen immediately after sleeping period; particularly hind limbs concerned [15]	Apparently due to insufficient circulation during sleeping period. Seen in old or emaciated animals (in animals suffering from kidney disease), may be connected with hypothermic problems (see table 5, non-infectious environmental problems) [15]		Increased room temperature or a warm place for sleeping [15]
	In *Loris* [15]		Limping was in one case observed when a *Loris* female with an inflammated basalioma on one toe was persecuted for several hours by a sexually excited male during estrous. At other times this female showed no abnormal movements although reduced food consumption indicated stress (pain) [15]			See table 4, organ lesions, under "basalioma"
Equilibrium problems [15]	In *Loris* [15]		In very old or sick animals	Sign of weakness		Warm room / sleeping place
Equilibrium problems, locomotor disturbance, in severe cases: animal lying, showing little reaction to stimuli [32]	In *Loris* [15]		In cool oor cold rooms, in the first time after sleeping period [15]	Hypothermia (See table 5: non-infectious environmental problems)		
Stereotyped movements	In *Loris* [15]	No abnormal behaviour seen in 20 Lemuridae [53]	In *Loris*, evident stereotyped movements are rare. Two of about 70 observed animals, both very active males, repeatedly showed stereotyped locomotor patterns in certain places in their cages which looked like somersaulting [15]. Both were housed in large, well-furnished cages, were sexually interested in females, but in one case continuously rejected, in the other one separated from the female by wiremesh [53]	Abnormal behaviour in primates is highly correlated with social conditions, but not with cage furniture [53]		

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Abnormal locomotion, movements						
Epileptoform seizures with the shape of a "grand mal" (rhythmical convulsions of the forelimbs while hanging attached to the substrate with at least one hindlimb; saliva dripping from mouth). After the seizures, the animal makes an absent-minded impression for a short period. Low intensity: only increased emission of saliva observed [15]	In *Loris* [15]	In *Microcebus* [33].	In *Loris*: in situations causing psychic stress (during capture, transport, after transfer to unfamiliar environments) or under flickering light of a defect neon tube [15]. In *Microcebus*: frequently observed in disturbed animals [33]	In *Loris*: epileptoform seizures in exciting or stressful situations (see also below, under "stress"), triggered by sudden acoustic or optical stimuli; see below, under "stress" [15]. May under otherwise normal conditios be caused by flickering light (defect neon tube). Increased susceptibility to seizures in some animals; in one young male, epileptoform seizures regularly occurred during playful exploration of unfamiliar objects. In *Microcebus*: possible causes: lack of B factors, hydromineral disturbance (Ca, Na, K)? [33] Epileptoform seizures in primates may also be a consequence of lead poisoning or lack of copper [1] Epileptoform seizures in humans may be caused by epilepsy or may be hysterical disturbance with the outer appearance of epileptic "grand mal" [15].		Susceptibility to epileptic seizures increases with every seizure. A young loris who repeatedly showed seizures in exciting situations when reaching maturity was kept in a quiet, familiar environment and protected from exciting stimuli for some months; the tendency to get seizures then had vanished completely [15]. Disorders due to lack of copper can be diagnosed from copper content in the plasma; lead poisoning by analysis of hair. The source of the problem must be eliminated; additional treatment with Primidon, 12 mg/kg body weight, is recommended [1]
Abnormal neurologic and musculture movements			Observed in a young *Loris* male with a pea-sized gall stone before death from unknown cause [15]	Cause of death unknown; not clear whethet there was a connection between presence of the gall stone and movements [32]. Nutritional deficiencies as a possible cause? [33]		
Episodes of ataxis and tremoring	in a *Nycticebus pygmaeus*, observed twice in one animal[61].			Cause unknown [61].		
Head tilt	in *Nycticebus pygmaeus* [61].			Otitis externa / media [61].		"Responded to treatment" [61].
Paralysis		in *Microcebus murinus* [33].	10 cases of lower-limb paralysis (flaccid paralysis) [33].	Sections made on nervous tissues revealed no anomalies. Possible causes: lack of B factors, hydromineral disturbance (Ca, Na, K)? [33].		

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Unusual sleeping postures (see also figure 2.5)						
Sleeping or resting with legs not held close to the body as usually seen, but knees pointing sideways	In *Loris* [15]		Posture observed during periods with unusually high room temperature [15]	Attempt to emit heat by exposing body surface to the air [15]		Lower temperature
			In females with infants [15]	Normal behaviour: infant at times lying on the mother´s legs during sleeping time, held by the mother, not clinging to her fur [15]		
			In old or sick animals [15]	Sign of weakness [15]		Offering comfortable sleeping places with a possibility to sleep leaning against a lateral support. Weak animals may need a warm sleeping place [15]
Resting or sleeping in lying posture	In *Loris* [15]		In young animals [15]	Apparently a behaviour related to sleeping posture on the mother´s legs [15]		Lower temperature
			In adults [15]	Observed as a normal behaviour (individual habit) of certain healthy animals, but also as a sign of weakness in old animals before death [15]		Comfortable sleeping places with a possibility to sleep leaning against a lateral support.
EExcitement, environmental stress, protective behaviour (see also figure 2.3 and table 5, environmental problems)						
Urinewashing (raising hand and foot on one side, urinating into palm of hand, then distributing urine under the foot with washing movements)	In *Loris* [15]		In *Loris* [15] usually a normal behaviour; Observed in connection with behaviour indicating excitement, for instance in males following a female during estrous or in cases of excitement because of perception of unfamiliar stimuli [15]	May be a sign of excitement (displacement behaviour) [15]		
Flinging of the hand [15]	In *Loris* [15]		Behaviour observed when food was examined and then rejected; seen when larger, struggling insects were seized and then thrown away with signs of anxiousness; occasionally seen without any connection to food, caused by strongly smelling substances and in a sick animal before death (no visible cause). In one case, an animal repeatedly showed flinging of a hand when suffering from a toe lesion with considerable loss of blood. [15]	Sign of disgust or excitement [15].		

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Excitement, environmental stress, protective behaviour (see also figure 2.3 and table 5, environmental problems)						
Unusually slow movements, movement interrupted by freezing to motionlessness	In all Loridae; particularly in *Loris* [15], *Arctocebus*. Seems to be less evident in slow lorises and pygmy slow lorises [15]	Extreme susceptibility to environmental stress in *Galagoides demidoff* [10]	During or after disturbance, after perception of unfamiliar stimuli [15]	Normal protective behaviour; indicates environmentas stress [15]		When observed over longer periods: cause must be removed; housing in more quiet environment [15]
Longer-lasting motionlessness in unnatural-looking postures			After transfer to unfamiliar environments, in shy animals after handling; connected with reduced food consumption [15]	Severe environmental stress which may lead to development of fatty liver, liver necroses and death within several weeks if the cause is not removed [15]		Protection against disturbance, particularly against noise and visibly moving large objects (covering of cage front with a blanket); cover (genuine or artificial plants) in the cage. Food should be offered in a high place in the cage close to some cover; when food is rejected over longer periods, release of live insects may help [15]
Epileptoform seizures with increased salivation	In *Loris* [15]	In *Microcebus* [33].	In a period of severe environmental stress certain, particularly acoustic stimuli may trigger seizures. See also above, under "abnormal locomotion, movements"			
"Feigning death"; falling down and lying motionless, looking dead [15]	In *Loris* [15]		Observed during capture and transport [15]	Sign of psychic stress; possibly related to epileptoform seizures?		
One or several of the following behaviours: getting up bipedally, turn towards enemy hissing, growling sham attacks open mouth threat putting up back like a cat biting *Angstgeruch* (fear scent), easily recognizable by humans, Crying with fear (loud, cat-like) Apathy / feigning death (during capture or in similar circumstances)	In *Loris* [15]		During capture, handling, when facing a predator	Defensive behaviour, sign of severe environmental stress (present situation, reaction caused by some actual stimulus, limited duration). Bipedal posture with hissing and sham attacks has been interpreted as a cobra mimicry [66]		Handling / catching for transfer to another cage for instance can be avoided by use of a cage trap for catching or by passages connecting cages. Cautious handling for short periods usually causes no problems, but in animals already suffering from stress (after transfer to unfamiliar environment) it is better to avoid any additional stress [15]

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Excitement, environmental stress, protective behaviour (see also figure 2.3 and table 5, environmental problems)						
One or several of the following behaviours: Short flight away from source of irritation, usually upwards; then looking back. Flight to the highest part of cage, hiding behind some cover, if possible Unusually slow movements of body and limbs, freezing to motionlessness (short; head may still be turned with normal speed) Fur gaps at the corners of the mouth reminiscent of human cheeks Hiding of face (probably a camouflage behaviour)	In *Loris* [15]	[15]	Animal disturbed by perception of some unfamiliar stimulus	Protective (flight, camouflage) behaviour		Short periods of environmental stress usually cause no problems if there are recovery periods. Animals continuously kept in very quiet, non-stimulating environments may become very susceptible to stress problems [15]
Rejecting food, partially or completely, for more than one dayFreezing in unnatural posture over longer periods Hanging under the ceiling, upside down, for longer time or sleeping in this posture	In *Loris* [15]		After transfer to an unfamiliar environment; in very shy animals after severe disturbance	Signs of severe environmental stress of longer duration. Death due to fatty liver, liver necroses and other health problems may occur within 3-6 weeks if stress is not minimized		To avoid losses, at least initially a very quiet and silent environment is necessary (covering of cage fronts with blankets, silence) until behaviour looks normal again. Food must be offered in high places close to some cover, otherwise shy animals may be afraid to approach the food and may starve. Live insects released in the cage may help if animals continuously refuse to eat [15]

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Excitement, social stress, protective behaviour (see also figure 2.4)						
One or several of the following behaviours: Quarreling (wrestling with rythmic vocalization, biting attack) Running about, fast and nervous (flight intention), partly in lower parts of the cage Flight / pursuit with bite attacks (no vocalization) Fast locomotion with abrupt movements and audible rattling of twigs Crouched posture, ears drawn down to the sides of the head Animal staying in the lower parts of cage without obvious reason, trying to hide or quietly staring at the opponent	In *Loris* [15]		In a group of conspecifics	Social stress		If crouched posture and stay or hiding in lower parts of the cage are observed, separation at least for a limited time is necessary. Otherwise inferior animals may be chased and attacked to complete exhaustion, may be hurt and possibly killed
Overgrooming, self-mutilation: see table 2, externally visible changes						