THE STUDY OF PRIMATES BEHAVIOUR IN A ZOO IN TARGU-MURES

Aurelie Bastide D'Izard[1], Ariane Will[1], Loredana Elena Olar[1]*, Mariana Tătaru[1], Sorin Marian Mârza[1], Emil Vlad Luca[4], Ildiko Halmagyi[2], Viorica Mircean[3], Ionel Papuc[1]

*[1] Department of Semiology, Ethopathology and Medical Imaging, Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca. [2]Biologist, Tirgu-Mures Zoo, Verii Street 57, Tirgu-Mures, Romania; [3]Departament of Parazitology, Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca; [4]Departament of Anesteziology and Propedeutics, Faculty of Veterinary Medicine, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca. *Corresponding author: loredana.olar@usamvcluj.ro*

Abstract. The aim of this study was to determine the normal and pathological behavior of captive primates in a zoo in Tirgu-Mures. The biological material consisted of 59 monkeys belonging to 11 species. The ethological research involved the following instruments: observation, experimentation, ethogram, spectrum analyzer, video, respectively the causal analysis. The obtained results revealed that the captive monkeys sheltered in isolated cages, with a similar development to what is found in their natural environment and placed at a tolerable distance away from visitors' activity show no behavioral changes. On the other hand, in the case of those primates sheltered in cages which are exposed to visitors' noise, we observed the presence of oral and motor stereotypies but also an attitude of lethargic disappointment and preoccupation. The collected data allow to define the investigated primates' needs and also to get an idea of their welfare in zoo in Tirgu-Mures.

Keywords: repetitive stereotyped behavior, captivity, primates, welfare

INTRODUCTION

Zoological parks have the obligation to promote the health and welfare of captive animals. They should try to provide the most natural living conditions in order to assure the specific behaviors of their species (Gusset and Dick, 2011; Pérez-Galicia et al., 2017). In the last years, the number of studies designed to monitor and discuss the abnormal behavior of captive primates in different zoos around the world has significantly increased (Hosey, 2005). The welfare of non-human primates in zoos can be affected by two specific factors. Firstly, we have the confinement- specific stressors represented by the visitors and various characteristics of housing and secondly, the environmental elements such us the artificial lighting or the inadequate temperature control (Hosey, 2005; Smith, 2014; Morgan and Tromborg, 2007). Perhaps one of the major stressors in the populations of captive primates is the presence of unfamiliar human visitors (Pérez-Galicia et al., 2017). Furthermore, the study of interactions between humans and captive primates or the ethnoprimatology represents one of the most debated issues of the 21st century as it can provide many solutions to the existing problems concerning the animal management in a zoological park (Fuentes and Hockings, 2010). All those factors which produce a disturbance in the animals' behavior can produce the apparition of stereotypies such as: repeated circling, head turning or self-harming (Wolfensohn et al., 2018). However, at this moment in Romania, we don't know a lot about the influence of zoo environment on the behavior of captive primates or about the interaction between visitors and zoo-housed primates as this subject has not received enough attention. Therefore, the purpose of our study was to evaluate, monitor and analyze the

normal and pathological behavior of captive monkeys in a zoo in Tirgu-Mures. In order to perform the ethological research, the following instruments were used: observation, experimentation, ethogram, spectrum analyzer, respectively the causal analysis (Lehner, 1998; Quera, 1993).

MATERIALS AND METHODS

Subjects. The biological material consisted of 59 primates belonging to 11 species sheltered in the Tirgu-Mures zoo (Verii Street 57, Tirgu-Mures, Romania). In order to identify the primates' behavioral problems we used a questionnaire (Figure 1). The study of animals' behavior was made during the period between November 10 and November 16, 2017. The animals' behavior was observed daily for three hours, mentioning that the starting point was different each day. Concerning the ethological research, the following instruments were used: observation, experimentation, ethogram, spectrum analyzer, respectively the causal analysis (Lehner, 1998; Quera, 1993). The investigated subjects were observed both in their indoor enclosure and in their outdoor enclosure.

BEHAVIORAL EVALUATION QUESTIONNAIRE
1. Describe the primates' enclosures. Are the enclosures well-equipped or not?
2. Are the cages appropriate for primates? Describe the state of investigated primates? Have you observed the grooming behavior in primates?
3. Have you observed some abnormal behaviors in animals?
4. Choose a monkey and do the general examination. Define the personality of the chosen animal. Is the animal calm - excited - player - independent - aggressive - shy?
5. Describe the interaction between tourists and primates? Are the primates calm - excited - playful - independent - aggressive - shy?
6. Do they lick themselves? (Normally, often, a bit)
7. Do they bite themselves? (Normally, often, a bit)
8. Do they like to play? (Participate - refuse - get excited too much)
9. What are the monkeys eating?
10. Where do the monkeys eat?
11. How do the monkeys eat: often, little, slowly, quickly, normally.
12. Do the monkeys eat alone (by day, by night**)?**
13. Do the monkeys eat things or stones?
14. How can you describe the relationship between the monkeys and the zoo staff?
15. What is the monkey behavior in front of a new object?

Figure 1. The questionnaire used for the evaluation of the animals' behavior

Data analysis. The obtained data were analyzed using Excel Software. Behavioral data for the primates have been analyzed separately by calculating the mean percentage of animals engaged in each behavioral category.

RESULTS AND DISCUSSIONS

The obtained results show that both a normal and an abnormal behavior were exposed by the captive primates from Tirgu-Mures zoological park (Figure 2).

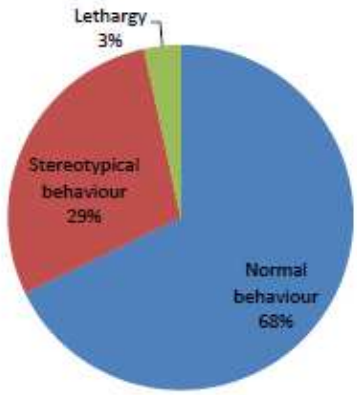

Figure 2. The different behaviors performed by the investigated group of primates. The pie chart reports the mean number of animals (%) with a normal and abnormal behavior

Therefore, in the case of Sykes' monkey (*Cercopithecus albogularis*), the Barbary Macaque (*Macaca sylvanus*) and the Mandrill (*Mandrillus sphinx*) sheltered in isolated cages with a similar development to what is found in their natural environment and located at atolerable distance away from visitors' activity no behavioral changes were observed. On the other hand, in the case of Japanese macaque (*Macaca fuscata*) and Hamadryas Baboon (*Papio hamadryas*) housed in cages which are exposed to visitors' noise, we noticed the presence of oral and motor stereotypies (Figure 3A and 3B). These findings are consistent with other research which assayed the influence of captive environment on primates' lifestyle. Thus, numerous authors have approved that the encouragement of a naturalistic environment in the zoological parks can decrease significantly the apparition of animals' abnormal behaviors (Maple and Finlay, 1989; Hosey, 2005). Also, the interaction between visitors and primates has been for a long time a subject of debate as visitors can contribute to the apparition of both negative and positive responses in monkeys (Pérez-Galicia et al., 2017). Consequently, the interaction between visitors and primates was highlighted by Cook and Hosey (1995) as positive because of its potential of enrichment. Nevertheless, the human presence generally elicits a negative impact on primates as it can determine a decrease of the foraging activity and the apparition of some behavioral changes (Hosey, 2000; McCarthy et al., 2009; Pérez-Galicia et al., 2017). Another behavioral change, more precisely an attitude of lethargic disappointment and preoccupation was noticed in the case of Patas monkey (*Erythrocebus patas*) and golden-bellied mangabey (*Cercocebus chrysogaster*) (Figure 3C and 3D). In this case, the forced cohabitation between different species of monkeys determined the presence of prostration and excessive grooming which subsequently caused the apparition of some hair loss areas on the neck. Recently, there has been an increasing attention to the direct connection between stress and hair loss in the primates from zoological parks. Hence, it was demonstrated by Novak et al. (2016) that the process of primates' hair loss is associated with an increased level of hair cortisol. Therefore, in the case of our investigated primates, those stress-producing situations could be an important element which can influence the hair-loss process.

Figure 3. The depilation of the back (A) and forehead (B) produced by the excessive grooming in the case of *Macaca fuscata*. The presence of lethargy and preoccupation in the case of black Lemur (*Eulemur macaco*) (C) and golden-bellied mangabey (*Cercocebus chrysogaster*) (D)

CONCLUSIONS

Our findings indicate that the implementation of a natural environment for the well-being of animals in Tirgu-Mures Zoo led to the absence of a stereotyped behavior. On the other side, the presence of some factors such as: visitors or the environmental conditions determined the presence of some streotypies. Therefore, the identification of various factors associated with a possible behavioral therapy is mandatory in order to improve the zoo experience for the visitors and also the welfare of primates. In future studies we want to investigate the primates' behavior from Tirgu-Mures Zoo using more variables and for a longer period of time including longer daily observation periods.

Acknowledgments. We would like to thank the Targu-Mures Zoo'director, Horațiu Gorea, as well as the staffs for their incredible hospitality, making us feel so welcomed. Moreover, we would like to mention that the zoo staff is making some great effort to identify and treat the existing stereotypies among the monkeys.

REFERENCES

1. Cook, S., Hosey, G. R. (1995). Interaction sequences between chimpanzees and human visitors at the zoo. Zoo Biology, 14, 431–440.
2. Fuentes, A., Hockings, K.J., (2010). The ethnoprimatological approach in primatology. Am J Primatol., 72, 841-7.
3. Gusset. M., Dick, G. (2011). The global reach of zoos and aquariums in visitor numbers and conservation expenditures. Zoo Biology, 30, 566-9.
4. Hosey, G.R. (2000). Zoo animals and their human audiences: what is the visitor effect? Anim. Welf., 9, 343–357.
5. Hosey, G.R. (2005). How does the zoo environment affect the behaviour of captive primates? Applied Animal Behaviour Science, 90,107–129.
6. Lehner, P.N. **(**1998). Handbook of ethological methods (2nd ed). Cambridge (UK): Cambridge University Press.

7. Maple, T.L., Finlay, T.W. (1989). Applied primatology in the modern zoo. Zoo Biol., 1, 101–116.
8. McCarthy, M. S., Matheson, M. D., Lester, J. D., Sheeran, L. K., Li, J. H., Wagner, R. S. (2009). Sequences of Tibetan Macaque (*Macaca thibetana*) and tourist behaviors at Mt. Huangshan, China. Primate Conservation, 24, 145–151.
9. Morgan, N.K., Tromborg, T.C. (2007). Sources of stress in captivity. Applied Animal Behaviour Science, 102, 262-302.
10. Novak MA, Menard MT, El-Mallah SN, Rosenberg K, Lutz CK, Worlein J, Coleman K, Meyer JS. Assessing significant (>30%) alopecia as a possible biomarker for stress in captive rhesus monkeys (Macaca mulatta). Am J Primatol. 2017 Jan;79(1):1-8.
11. Pérez-Galicia, S., Miranda-Anaya. M., Canales-Espinosa. D., Munoz-Delgado, J. (2017). Visitor effect on the behavior of a group of spider monkeys (*Ateles geoffroyi*) maintained at an island in Lake Catemaco. Veracruz/Mexico. Zoo Biology, 1–7.
12. Quera, V. (1993). Análisis secuencial, Metododología Observacional en la Investigación Psicológica, Vol. 2, pp. 339-586. Barcelona: PPU.
13. Smith. J.J. (2014). Human-animal relationships in zoo-housed orangutans (P. abelii) and gorillas (G. g. gorilla): the effects of familiarity. Am J Primatol., 76, 942-55.
14. Wolfensohn, S., Shotton, J., Bowley, H., Davies, S., Thompson, S., Justice, W.S.M. (2018). Assessment of Welfare in Zoo Animals: Towards Optimum Quality of Life. Animals, 8, 110.