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The current 25 issue of Scientific Research in Zoological Parks is dedicated to different aspects of zoos activities. Traditionally we continue publishing articles on marine aquariumistics and problems of husbandry and breeding of venomous snakes. Other articles consider problems of mixed exposition of diurnal birds of prey, breeding and hand rearing some primate and carnivore species, interior decoration and equipment of enclosures for mammals. Behavioral articles are dedicated to introduction of new individuals into *Macaca silenus* group, and manuls' activity dynamics (data were gathered using distant video-recording system). For the first time this issue includes an article in English; it describes the keeping and breeding of the black & white striped possum in captivity. Problem articles consider some veterinary problems, non-invasive monitoring of mammals' reproductive state, and observation methods for lemurs' social behaviour study. Special reviews discuss aetiology and therapy of atypical tuberculosis in reptiles, interspecies hybridization and nest parasitism in Barnacle Geese at the Moscow zoo. Brief reports present data on wild biology of unstudied species of vipers. "Information" part presents data on current Combined Small Mammal and Small Carnivore TAG meeting, and notes on distribution and taxonomy of Caucasus common toad *Bufo verrucosissimus*.

The issue is destined for zoo specialists and keepers.

Summary

Astakhov D.A., Poponov S.Y., Poponova V.R. Some aspects of prolonged maintenance of marine fishes in captivity. Report 24. Genus Premnas (Actinopterygii, Perciformes, Pomacentridae, Amphiprioninae). Data on distribution and biology of spine-cheek anemonefish Premnas biaculeatus (Bloch, 1790) and conditions of prolonged maintenance of this species at Moscow Zoo are described.

Summary

Astakhov D.A., Poponov S.Y., Poponova V.R. Some aspects of prolonged maintenance of marine fishes in captivity. Report 25. Genus Chromis (Actinopterygii, Perciformes, Pomacentridae, Chrominae). Data on distribution and biology of blue-green chromis Chromis viridis (Cuvier, 1830) and conditions of prolonged maintenance of this species at Moscow Zoo are described.

Summary

Astakhov D.A., Poponov S.Y., Poponova V.R. Some aspects of prolonged maintenance of marine fishes in captivity. Report 26. Genus Chrysiptera (Actinopterygii, Perciformes, Pomacentridae, Pomacentrinae). Data on distribution and biology of 3 species of damselfishes of genus Chrysiptera: C. cyanea (Quoy et Gaimard, 1825), C. hemicyanea (Weber, 1913), C. parasema

(Fowler, 1918) and conditions of prolonged maintenance of these species at Moscow Zoo are described.

Summary

Astakhov D.A., Poponov S.Y., Poponova V.R. Some aspects of prolonged maintenance of marine fishes in captivity. Report 27. Genus Pomacentrus (Actinopterygii, Perciformes, Pomacentridae, Pomacentrinae). Data on distribution and biology of 2 species of damselfishes of genus Pomacentrus: Pomacentrus pavo (Bloch, 1787), P. coelestis Jordan et Starks, 1901 and conditions of prolonged maintenance of these species at Moscow Zoo are described.

Summary

*Kudryavtsev S.V., Ganina L.V., Mamet S.V. Some successful results in husbandry and breeding of the rare and hard-to-keep venomous snakes at the Moscow Zoo (part IX: 2008-2009 years). The article deals with some results of a continuous research aimed at developing methods for husbandry and breeding of rare and difficult species of venomous snakes at Moscow Zoo, conducted especially intensively lately. Details of husbandry and captive reproduction of species with restricted areal, such as: rare subspecies of rattle snakes *Crotalus durissus unicolor* Campbell & Lamar, 1989, hard-to-keep Sumatran Pit vipers *Trimeresurus sumatranus* (Raffles, 1822) are given; possibility of physiological sperm conservation in rare red-headed krait *Bungarus flaviceps* Reinhardt, 1843 is discussed.*

Summary

Khismatullina L., Ezhova O. Observations on mixed exposition of diurnal birds of prey in Udmurt zoo during autumn and winter: preliminary results. Two groups of big diurnal birds of prey have been formed in connection with opening of a new Udmurt zoo. Behavioral observations revealed that vultures and sea-eagles were less aggressive towards each other. Sea-eagles and golden eagles demonstrated both inter- and intraspecific aggression. During adaptation to the new enclosure dominants were alternating one another.

Summary

*Guseletov O.L., Guseletova T.V. Some cases of successful breeding of Carnivora representatives in the Bolsherechye Zoo. Cases of successful breeding of *Cuon alpinus*, *Felis viverrinus* and *Panthera tigris altaica* in the Bolsherechye Zoo are described with special attention on used milk formula and foster species while hand rearing.*

Summary

Guseletova T.V., Guseletov O.L. Interior decoration and equipment of enclosures for carnivores and primates as environment enrichment and way of improvement of aesthetic perception of captive animals. Use of common natural materials for environmental enrichment for some animals in the Bolsherechye Zoo is described. It was followed by decrease of animals' stereotype and undesirable behaviors and improvement of visitors' perception of captive animals.

Summary

*Makarova E.E., Sviridenko E.V. Hand-rearing *Saguinus Oedipus* with successful introducing into his family.* The successful case of hand-rearing the male of *Saguinus oedipus* with further introducing him in his family is discussed. Although this pair of tamarins was breeding regularly no of newborn babies survived because parents left them and our attempts of hand-rearing failed. It was the first hand-reared baby who was returned to his family at the age of 2 months. Stages of joining the young together with his parents as well as some interactions are described. In 2009 this pair of tamarines gave birth again and now, for the first time, is successfully rearing one of the babies. Young male is taking part in this process almost from the beginning.

Notes on the Keeping and Breeding of the Black & White Striped Possum

Jim Collins

Introduction

The Black & White Striped Possum (*Dactylopsila trivirgata*) remains an infrequently imported species and breeding success in captivity remains a rarity. In total six adult animals – obtained at varying times between 1992 and 1998 – were maintained in our collection (Dr. Jim Collins and Mrs. Amanda Collins). Of these specimens, four were maintained as two pairs. It was noticeable that imported animals were usually very thin and appeared to have been maintained mainly on banana prior to importation into Europe. Furthermore, all the animals had relatively high parasite loads. These six animals were all subject to an immediate round of drug treatment to rid the body of parasitic worms and flagellates (Panacur and Flagyl respectively), repeated after three weeks and, in the case of the

worming treatment again after six weeks. The animals were also provided with electrolyte solution for the first three days post-import.

During the first few weeks in the collection the animals proved to be very conservative in their eating habits but this conservatism was not the same in each case. Whilst four of the individuals would only eat banana, mango and a few other soft-fruits together with a nectar mixture, the other two would feed only on live insects and an insect-based prepared food that we provide to birds such as flycatchers and warblers in our collection.

These food preferences remained with the animals throughout the remainder of their lives but after approximately 6-8 months all six animals took the whole variety of foods but with a preference for the food types they preferred upon importation. It was interesting to see that none of the seven youngsters born in the collection showed any marked food preferences and ate the whole variety of foods offered. The other interesting fact in this regard was that the two animals with a strong preference for eating insects were both brown and white in colouration and not the usual black and white although the markings themselves were the same in shape and distribution in all six animals.

The two surplus males (including one brown and white in colouration) were kept and established in the collection for eight months from early 1998 before being passed to a colleague. By this time their weight had increased considerably (by 53% in one case and by 58% in the other) and they appeared very healthy individuals. The first true pair resided in the collection from 1992 until their deaths (1996 for the male and 1999 for the female) whilst the second true pair remained in the collection from 1996 until their deaths (2003 for the male and 2001 for the female).

General Husbandry

The enclosures housing either a pair (or the female alone or with her young when the male was being housed separately) measured either 3.5m x 2.8m x 2.4m (high) or 4.2 m x 3.4m x 2.4m (high) whilst those housing separated males were 2.5m x 2.5m x 2.4m (high). Separated males were housed in a room completely separate from the females. The temperature was held at between 22 and 26 degrees centigrade during the day, whilst in the evening temperatures were maintained at around 18-20 degrees centigrade. Misting systems were operated within the enclosures which held the humidity at levels between 65-75%. Full spectrum lighting was provided despite the fact that these animals proved to be almost entirely nocturnal in their habits. Typically the lighting regime was 12 hours on and 12 hours off. This was varied to some extent in the lead-up to mating introductions.

Two wood constructed nest boxes and one rotten tree trunk were always provided – even with only one animal in occupancy – at heights between 1.7 and

2.2 metres. Ropes and fresh tree branches of varying dimensions were positioned throughout the enclosures. The substrate was of peat-based garden compost mixed with dead leaves from beech and oak.

All animals were provided with a widely varied diet although distinct dietary preferences were exhibited in imported animals (see above). The daily diet consisted of a mix of approximately 50% fruits, 40% insects, prepared insect-based mix and animal meat and 10% nectar mix. Once a week the animals also received hard-boiled egg. All insects were sprinkled with a calcium and Vitamin D3 powder. Once a week food was lightly sprinkled with *Spirulina* powder (powdered green algae), food was also sprinkled once a week with a multi-vitamin and trace element supplement.

The daily fruit ration consisted of a minimum of six different fruits and usually around ten. Primary fruit items included banana, mango, papaya, ripe pear, soft apple, kiwi fruit and persimmon. Additional items were varied day by day and week by week. These additional items included sweet orange, blueberries, blackberries, raspberries, tomatoes, grapes, rowan berries, passion fruit and peaches.

The animal protein component was comprised of live and defrosted crickets, mealworms, giant mealworms and locusts together with a small amount of minced turkey or minced chicken and a self-made insect-based mixture. The latter was made from using a proprietary mixture sold for feeding to insect-eating birds – Bogena – to which was added cottage cheese, freshwater shrimps, suet, sweet biscuit and honey. This was mixed until the consistency was moist but not sticking to the finger when rolled in the hand. This was then packed in freezer bags and frozen until required – it was usually very popular with the possums.

The final component of the diet was a self-made nectar mix comprised of fruit yoghurt, Complan powder, honey and powered fruit or rice flavoured human baby foods mixed with warm water to a consistency a little thicker than full fat milk.

Breeding

Mating did not appear seasonal dependent. Females resided in their enclosures throughout the year and males were introduced for periods of 3-4 weeks. Introductions were made no more than three times a year and with a minimum period between introductions of three months. If a mating was successful the female was left without any further introductions until her baby or babies were fully weaned and separated from her. During the lead-up to introductions the lighting period was usually, but not always, increased to 14 hours light and 10 hours dark for both male and female. There was no evidence that the increased lighting regime increased the likelihood of a successful mating.

During an introduction the male was caught-up from his enclosure early in the morning and placed in the female's enclosure. Fighting was rare but there was also very little social interaction between the pair. The males and females invariably chose to sleep in different enclosures and their attitude towards each other was perhaps best described as studied indifference. Actual mating was never witnessed. After the period of 3-4 weeks the male was again removed from the female's enclosure. The female was then closely observed in order to ascertain if any pouch swelling was evident over the next months.

Upon young being evident in the pouch the amount of calcium supplement was increased and the female left as undisturbed as possible. The weaning period was not rushed and we chose to leave the young with their mother – in all cases – for a further period of three months after they had started to venture out from the pouch. The only exception was from a litter of one when the mother commenced attacking her daughter about two months after the youngster had become weaned (the daughter was then removed immediately).

The first successful breeding – of twins – was late in 1993 and both young were reared. The same pair went on to successfully produce a further three young beyond the weaning stage (two singletons and one reared from a birth of two with the sibling having died at approximately two months of age). The other adult pair only reared successfully once (a set of twins both successfully weaned) although the female conceived on at least three other occasions but with the very small young being deserted at a relatively early stage.

The young were passed to other private specialists and the first female born – mated to an imported male – went on to produce at least three successfully weaned offspring in a friend's collection. The Black & White Striped Possum remains a difficult species to breed and numbers in captivity remain low. Nevertheless, with close observation and attention to a widely varied and good nutritional diet it has proven possible to secure success with this species.

Summary

The Black & White Striped Possum (*Dactylopsila trivirgata*) remains an infrequently imported species and breeding success in captivity remains a rarity. In our collection (Dr. Jim Collins and Mrs. Amanda Collins) we successfully bred a total of seven young from two different pairs over a nine year period. The animals all displayed a general lack of social interaction with their partners but full aggression was also a rarity. Individual animals displayed some quite marked differences in their feeding preferences. Husbandry techniques and breeding activity are outlined in these brief notes.

Summary

Meshik V.A., Nemtchenko L.A., Sukhova M.A. Introduction of new individuals into Macaca silenus group. The process of introducing of two new females to the group of *Macaca silenus* is described. Observers appreciated the emotional state of every group member and new females; according to these appreciations the next step of group-formation was made. After six months the new group has been successfully formed.

Summary

Alekseicheva I.A. Activity of captive Pallas' cats (Otocolobus manul manul) and its dependance of season, time of day, sex and physiological state. Annual observations on 6 manuls have been conducted in Moscow zoo to study animals' budget time. Rate of stay in shelters and activity is discussed with special reference to season, time of day and other factors. Behavior of captive and wild animals is compared.

Summary

Vasiliev D.B., Kidov A. Chromomycosis in amphibians. Clyncial cases of chromomycosis in two captive groupe of toads, *Bufo gargarizans* and *Bufo eichwaldi* are discussed. Successful treatment by itraconazole applied topically and orally is presented.

Summary

Tkacheva E.Yu., Alekseicheva I.A., Lifanova O.B. Study on seasonal testosterone excretion in males of Pallas' cat (Otocolobus manul) in Moscow zoo. We studied excretion of testosterone in two manul males which were kept in Moscow zoo (with natural photoperiod). To determine concentration of testosterone in animals' faeces we used EIA-method. Period of reproductive activity caused by testosterone increase was revealed from the end of January till May, may be due to peculiarities of photoperiod in Moscow latitude. Testosterone excretion in the male with diabetes was seasonal though he did not show sexual behavior. Level of blood glucose did not correlated with level of testosterone excretion in that male.

Summary

Tkacheva E.Yu., Ilchenko O.G. Monitoring of striped possum female reproductive state by means of faecal steroids. Analysis of excreted steroid hormones was used for monitoring of reproductive cycles in striped possum (*Dactylopsilia trivirgata*) female. One pair of this species is being kept in Moscow zoo scince 2006, breeding did not take place. Distinct peaks of progesterone

excretion every 26-39 days were revealed testifying to female's cycling. According to received data every 30 days on average ovulation in our female took place, what coincide with single literature facts.

Summary

Meshik V.A., Popov S.V. The assessment of emotional state as observation method for lemurs' social behaviour study. The original method of registration of animals' social behavior based on the appreciating changes in emotional status of individuals during social interactions was proposed. This method gives the possibility for investigating the mechanisms of dynamic balance of group's social structure in details. Besides, this method is very convenient in situations when rapid analysis of animals' behavior is important, for example during new group formation. Such registration gives the possibility of collecting and analyzing keepers' experience in management of group and pair formation.

Summary

Vasiliev D.B., Shved V.S. Atypical tuberculosis in reptiles. Cases of isolation of atypical mycobacteria in reptiles are reviewed. Features of pathogenesis and diagnostics of reptiles' tuberculosis are discussed. Therapy prescriptions are suggested.

Summary

Tarkhanova M.A. Interspecific hybridization and nest parasitism in Barnacle Geese at the Moscow zoo. About 30 Barnacle Geese (*Branta leucopsis*) identifiable through individual marking by colour rings are kept at the pond of the Moscow Zoo together with 15 species of waterfowl including snow geese (*Chen caerulescens*). Their behaviour has been observed since 1998. Records of mixed pairs of Barnacle geese and snow geese increased significantly during the last few years, 4 times mixed pairs produced hybrids. Mixed mating between these species is a result of some mistakes in species recognition which causes the wrong choice during pair formation. Such assortative mating is based on early learning process such as imprinting.

There is not enough place for the rearing of goslings with their parents in the Moscow Zoo, so the eggs are often taken from the nest boxes and put into the incubator. After hatching the goslings of different species are kept together. Mate choice is correlated with family colour, both parental and sibling colour may influence it. So young geese who has never seen their parents can choose a bird of different species as a sexual partner. Mixed pairing can lead to hybridization

In 2006 3 hybrids between Barnacle geese and Snow geese were raised by a pair of Barnacle geese together with their own goslings. One of these hybrids (male) formed a pair with the female of Barnacle goose, another (female) – with snow goose male and the third – with two mallard males. The behaviour of hybrids differed from the behaviour of the young Barnacle geese. They began to demonstrate their sexual behaviour much earlier and were more independent from their foster parents. When hybrids formed their own pairs in 2008 they became very aggressive and there was direct evidence of their superiority as they won most agonistic encounters not only with Barnacle geese but with Snow geese as well.

Inter- and intraspecific nest parasitism is a widespread alternative reproductive tactic in geese. Many cases of both types were observed in the Moscow Zoo. Conspecific nest parasitism was recorded by direct observations of a female trying to lay her eggs in the nest of another female. Her male was seen nearby but didn't help her in anyway. The host female is usually aggressive to the parasitic female but the male is often tolerant. Sometimes the male may have a secondary female, who lay her eggs in the nest of the primary female. Nest parasitism is considered to be facultative as parasitic females were observed to have nests of their own before or after the year they behaved parasitically, but never in that particular year. We've observed a female who laid eggs in the nest of other females and then had her own clutch the same year.

Summary

*Kidov A.A., Pikhov S.G., Tishina G.V. On biology of Lotiev's Viper *Vipera lotievi* Nilson et al., 1995 (Reptilia, Serpentes, Viperidae) in the Northern Ossetia.* The paper presents some data on ecology and reproduction of Lotiev's Viper in the wild habitats of northern Ossetia and in captivity. Births were timed to the end of August - beginning of September. In captivity all females with body length more than 43 cm gave birth, so we may conclude that they have reached reproductive size and that reproductive cycle in this species is one year long. Size number corresponded to females' length. Females prevailed among young, with their Lcd statistically larger than in males.

Summary

*Kidov A.A. Renard's Viper *Vipera (Pelias) renardi* Christoph, 1861 (Reptilia, Serpentes: Viperidae) from northwestern foothills of the Caucasus.*

Some data on distribution of Renard's Viper at the northern foothills of the Caucasus are given. Possible zones of areal contact of this species with that of Lotiev's Viper are discussed. Some peculiarities of biology, morphology and pholidosis of Renard's Viper from the new locality (situated near common boundary of Krasnodar Territory and Karachai-cherkessia) are cited.

Summary

Vakhrusheva G.V. The latest EAZA Combined Small Mammal and Small Carnivore TAG meeting. This spring more than 40 specialists from different European institutions took part in Combined Small Mammal and Small Carnivore EAZA TAG meeting which was held in Plzen Zoo (the Czech Republic). 18 reports were made considering various aspects of captive keeping and breeding rare and endangered animals. The article presents a brief survey of these reports including those having been conducted in Moscow zoo.

Summary

*Kidov A.A. Caucasus common toad *Bufo verrucosissimus* (Pallas, [1814])(Amphibia, Anura, Bufonidae) in Western and Central pre-Caucasia: notes on distribution and taxonomy.* The latest findings of Caucasus common toad in Western and Central pre-Caucasia showed that this species is occurred much wider than it was supposed before. In this paper some problems of interspecific taxonomy of common toads are reviewed; independent subspecies status of Caucasus common toads from Krasnodar and Stavropol Territories is supposed. A new subspecies - *Bufo verrucosissimus tertyschnikovi* subsp. nov.- is described; its coloration of back, belly and parotides differ from that of other described forms.

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