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ZOOQUARIA

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NINTH LIFE

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Zooquaria

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FROM THE DIRECTOR'S CHAIR

Wow, has it been a year already? It was with a mix of nervousness, sadness yet extreme pride that I faced the 700+ audience in Wroclaw at our Annual Conference for my first opening plenary since taking over the Executive Director role a year ago. Nervousness, because I'm always a little nervous before any presentation, no matter if it is to a small group of close colleagues, participants on an Academy course or a full auditorium. For me, a little nervousness means the topic I'm talking about means something, it is something I am passionate about, and I want my presentation to engage with the audience so they come away feeling the same way. My feelings of sadness were because moments before the start of the opening plenary we were told the tragic news that Wroclaw Zoo keeper, Ryszard Pakla, was killed by one of the tigers he had spent years caring for. The pride came from how bravely and professionally our host Radoslaw and his team managed this situation, and the fact that I knew without a doubt that our community would fully support him and his staff at this sad time.

There was pride, too, at being able to share a summary of the massive amount we have achieved together over the past 12 months, from agreeing revisions to the EAZA Standards for the Accommodation and Care of Animals in Zoos and Aquaria (2014) and EAZA Culling Statement (2015), to developing new documents such as the EAZA Guidelines on the use of animals in public demonstrations (2014) and EAZA Guidelines on the definition of a direct contribution to conservation (2015). These documents demonstrate we are a progressive association that is able to align the many different motivations and needs of our 389 members to continue to raise values and standards. However, EAZA isn't just about producing documents. A vast amount of work goes on at the heart of our association in the smooth running of all our breeding programmes. Our coordinators, managers and TAGs have been busy running their programmes, taking part in EEP evaluations, Quick Population Assessments and Long Term Management Plans, producing Best Practice Guidelines for species from turacos to toads, and summarising all of this in the recently published 2013-2014 TAG reports. Much of the work of EAZA also comes from our dedicated committees, and you can see a summary of their valuable work in the 2013-2014 Annual Report. I'd like to extend a very big 'thank you' to each and every one involved in these TAG and Annual Reports, both of which are available on the EAZA website.

I was recently privileged to hear the IUCN Director General, Inger Andersen, speak at an IUCN Netherlands meeting. What impressed me was her recognition of the great conservation work carried out by many so far, backed by a very obvious desire to achieve more. She questioned

how best the IUCN and wider conservation community can align their efforts to really 'shift the needle'; how can the IUCN focus on coordinating and maximising opportunities and efforts to make even bigger improvements to conserving wildlife and wild places. The desire to work effectively together to do more was also reflected at the CBSG and WAZA meetings I attended in October, hosted by new EAZA member Al Ain Zoo in the UAE. The release of the third edition of the WAZA conservation strategy 'Committing to Conservation', and the new WAZA animal welfare strategy 'Caring for Wildlife', give clear actions for all zoos and aquariums to follow in order to maximise both our individual and collective opportunities. At these various meetings there were discussions that often our efforts are reactive and centred on managing problems that have happened. What we need to recognise is that we also have many opportunities to be proactive and adopt an agenda of change to address conservation issues before they arise. There is much that EAZA can take from this approach. Our community is one whereby we need to recognise our strengths, reflect on what we are doing well and keep doing it, but also be open to leading change for improving the future.

So, where do we go from here? What is in the future for EAZA, what do you want personally, for your programme, institution, and EAZA as an association? This is something we will be gathering input on over the next few months towards our next EAZA strategy 2017-2020. In summary, EAZA 'works', and works well, because we all work together towards a common goal of conserving wildlife. Personally, I can't wait to work with you all over the next 12 months and proudly present all our achievements at our next Annual Conference in Belfast in September 2015.

PS: for those of you who saw my presentation in Wroclaw and are still wondering which two of my three facts were true; yes I did get excluded from recorder class as a child, and yes I do currently play rugby in the Dutch women's first division (unbeaten this season!).

Myfanwy Griffith
Executive Director, EAZA

NOTICEBOARD

EAZA COUNCIL ELECTIONS

ELECTIONS FOR THE EAZA COUNCIL term of office 2016–2018 will take place towards the end of this year, with proposed new council members to be approved by the Annual General Meeting at Opel Zoo, Kronberg, in April 2016. Our current Chairman, Simon Tonge, has also reached his end-of-office and so there will be the opportunity for a new Chair to be appointed from amongst the agreed new Council Members.

In countries where there is an EAZA Associate Member federation/association (Fed), this organisation will carry out the nomination and election processes for their country representatives. The EAZA Executive Office (EEO) will carry out nomination and election processes for countries where there is not an EAZA Associate Member federation/association. Please see the table below for the proposed timeline.

Date	Action	Responsibility
1 December 2015	Email to countries and zoos with request to get their nominations in. Suggestion for Fed to start their process.	EEO Fed
18 December 2015	Deadline for countries without Fed to get their nominations into the EEO. ('No interest' nominations also required).	Full Members
20 January 2016	Send election options (if required) to countries without Fed.	EEO
5 February 2016	Deadline for country election votes to the EEO.	Full Members
12 February 2016	Deadline for Fed to get their final election results to EEO.	Fed
1 March 2016	Inform about the outcome of the elections (subject to final approval at the spring Annual General Meeting).	EEO
2 March 2016	Email to proposed new council members for expressions of interest in becoming the new EAZA Chair.	EEO
25 March 2016	Deadline for expressions of interest in becoming the new EAZA Chair to the EEO.	New council members
13–15 April 2016	Annual General Meeting and Spring Council meetings.	

EAZA CONSERVATION FORUM, 11 – 13 MAY 2016



EAZA Conservation Forum 2016

PLEASE JOIN US IN SPRING 2016 in Fuengirola (Spain) for three days of exploring conservation case stories, learning from trials and errors, discovering conservation efforts in the Mediterranean and local biodiversity in general and much more. Come a day early and join the pre-conference EAZA Academy workshop 'Funding for *in situ* Conservation Projects' (10 May 2016). It will provide you with valuable insights and advice about how best to secure funding for *in situ* projects.

Registration for both the EAZA Academy

workshop and the Forum will open from November 2015. You can already submit your abstracts for presentations, workshops, documentaries and round-table topics through merel.zimmermann@eaza.net. Keep an eye out for updates on our webpage and EAZA Facebook page on guest speakers and other developments in the programme!

Support the EAZA Conservation Forum Speakers Fund!

Many members are supporting conservation projects in the field all over the world. We would encourage you to sponsor your institution's connections in the field to come with you to the Conservation Forum. You can also choose to support the new EAZA Conservation Forum Speakers Fund and enable more



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people from the field to attend, give them a great chance to promote their projects, and connect with other EAZA colleagues looking for partnerships in conservation.

Please contact the EAZA Executive Office (Mirko.marseille@eaza.net) for more details on the benefits of becoming a Bronze, Silver or Gold level sponsor for this event.



NEWS



RHINO KEEPER WORKSHOP COMES TO EUROPE

WHEN CHESTER ZOO hosted a workshop of the International Rhino Keeper Association (IRKA) from 14–18 June 2015, it was the first time that such a workshop had been held in Europe, writes Jiri Hraby, Curator of ungulates, ZOO Dvůr Králové. This made it a unique opportunity to meet people from the rhino community from around the world.

Presentations delivered during the first day of the workshop showed that the whole programme would be full of useful and important information. During all the sessions we went through the husbandry, nutrition, science and conservation issues related to all rhino species. It was very interesting to compare experiences from different continents. The discussion was enhanced by practical examples from breeding facilities for Indian and black rhino in Chester zoo.

A very important part of this workshop was 'Rhino May Day' in which many people active in rhino conservation, including Cathy Dean of Save the Rhino International, Susie Ellis of the International Rhino Foundation, and others from Kenya and South Africa, showed us how difficult and important the work in the field is, and that modern zoos are one of crucial elements in

conservation projects. In this regard, Friederike Von Houwald from Basel Zoo presented many different ways in which zoos can raise the funds for rhino conservation and at the same time explain to the public how dire the rhino situation is. Jamie Gaymer of the Association of Private Land Rhino Sanctuaries in Kenya presented dog squads, a very useful tool in the fight against the poachers. Another interesting presentation was by Rod Potter who described wildlife crime-scene-investigation methods used in South Africa. Richard Thomas of TRAFFIC explained the principles of the rhino horn black market and potential ways of fighting it.

It was a pleasure to see how zoo people are connected with experts from the field – let's hope this cooperation will bring bright new days for rhinos. Finally, I would like to say thank you to Jane Kennedy for bringing the IRKA workshop to Europe and to Mark Pilgrim with his highly professional staff for all the care they provided us with during the whole workshop and during those beautiful days in Chester.

Proceedings of the workshop can be found at www.rhinokeeperassociation.org/#workshops/c1vud.



EAZA SIGNS MEMORANDUMS OF UNDERSTANDING

EAZA IS PLEASED TO ANNOUNCE the renewal of our Memorandums of Understanding (MoU) with the European Union of Aquarium Curators (EUAC) and Asociación Latinoamericana de Parques Zoológicos y Acuarios (ALPZA), and the signing of a new MoU with the Pan African Association of Zoos and Aquaria (PAAZA). These MoUs align with EAZA strategic priorities and identify the ways in which our associations will be working closely together in areas such as conservation efforts, professional development, and TAGs and breeding programmes.

EAZA CHAIR SIMON TONGE AND PAAZA EXECUTIVE DIRECTOR JOHN WERTH SIGN THE MOU BETWEEN THE TWO ASSOCIATIONS, PAVING THE WAY FOR MORE COOPERATION BETWEEN EUROPEAN AND AFRICAN ZOOS



EAZA REPRESENTATIVES AT UFAW

UFAW, THE UNIVERSITIES FEDERATION OF ANIMAL WELFARE, held a symposium in Zagreb, Croatia on 14–15 July, which was attended by EAZA population biologists Kristine Schad and Kristin Leus. The symposium theme was 'Animal Populations – World Resources and Animal Welfare', including talks and posters presented by scientists, professors, and graduate students from around the world. Kristine and Kristin represented EAZA by presenting: 1) a talk on 'Controlling population growth while ensuring welfare and future reproductive potential in cooperative breeding programmes in

zoos and aquaria' and 2) a poster on 'Population management in zoos and aquaria.'

They also pointed out that there is large potential for increased collaboration between EAZA and UFAW scientists which would be beneficial for both communities. UFAW scientists could work with EAZA institutions to further progress research into the welfare of zoo and aquarium animals. For more information about UFAW, visit www.ufaw.org.uk. If you would like a copy of the talk or poster, please contact Kristine Schad at kristine.schad@eaza.net.

LONG-TERM MOUNTAIN CHICKEN FROG PLANS



BEN TAPLEY, ZSL

ON 27–28 AUGUST, the Mountain chicken frog (*Leptodactylus fallax*) ESB met at Chester Zoo, in the UK, to work on a long-term population management plan. The meeting was productive in clarifying roles for this ESB, assessing the current status of the population, determining management strategies going forward, creating individual breeding recommendations for all frogs, and discussing other programme-specific topics. The Mountain chicken frog ESB has both quarantine and non-quarantine populations. The quarantine population is prioritised for a future reintroduction back into the wild within the frog's indigenous range in the Caribbean. The non-quarantine population is used for education (eg training and increasing capacity for the care of these frogs, raising the profile of amphibian conservation as a model species that links *ex situ* and *in situ* populations, engaging the public

with conservation education messages about habitat loss, invasive species, over-exploitation and chytrid), and research (eg nutrition, lighting, stress, vet diagnostics, chytrid, development and monitoring techniques for the field). The meeting was initiated by Amphibian TAG Chair, Gerardo Garcia who is also the species studbook keeper, representatives from the main holding institutions which are also involved in the *in situ* aspects for this species, an MSc student from Kent University, and EAZA population biologist, Kristine Schad. Thank you to Chester Zoo for hosting the meeting. Please watch for the draft long-term population management plan document to be distributed to the 24 institutions currently holding mountain chicken frogs for a review before being finalised.

Upcoming long-term population management planning meetings will be for the Komodo dragon, lowland tapir, babirusa, and chimpanzee programmes. For further information about long-term population management plans, contact Kristine Schad at kristine.schad@eaza.net.

EAZA TERRESTRIAL INVERTEBRATE TAG SYMPOSIUM

IN AUGUST, ARTIS ROYAL ZOO hosted a three-day Terrestrial Invertebrate TAG Symposium (TITAG15), featuring representatives from around the globe. The programme had a good variety of topics varying from IUCN field updates to curation of insects, and from exhibit design to population management strategies. Regional working groups, and EEPs and ESBs, also provided updates of their work. A promotional documentary from our Australian colleagues about the discovery of the Lord Howe Island stick insect showed how to raise awareness for highly threatened insect species and showed what we, the zoo and aquarium community, can achieve in the field of invertebrate conservation. Overall, the symposium demonstrated the contrast between the enthusiasm and dedication of all the people involved and the need for more attention in our collections – and how to get the public more excited about these fascinating animals.

The symposium was chaired by the previous chairs of the TAG, Warren Spencer (Amsterdam) and Paul Pearce Kelly (London), and current TAG Chair, Mark Bushell (Bristol). Hopefully, this was the start of a new tradition! Thanks to Artis for hosting and organising this great symposium.



DESERTAS WOLF SPIDER (HOGNA INCENS), PEDRO CARDOSO

BIRTHS AND HATCHINGS

MARABOU FLEDGES AT ROTTERDAM ZOO

BREEDING OF MARABOU STORKS (*Leptoptilos crumenifer*) is still quite rare in zoos, yet Rotterdam Zoo has succeeded with this species for three years in a row. Marabous usually breed in the middle of winter in northwest Europe, and in the past, the zoo has experienced problems with bone deformations in chicks probably because of the lack of UV-light when chicks are born indoors (there is a paper by Dr Willem Schaftenaar DVM available on this subject).

One of the zoo's four pairs that was disturbed during the 2013/2014 breeding season built a nest later that year in the aviary. The chick was successfully raised but never really fledged as it had to be captured to be brought indoors when winter arrived. The pair did not breed the following winter and, as per the zoo's expectations, they started to build a nest again in spring 2015. To the zoo's surprise, a second pair started to build in the same tree, and both nests bore eggs that hatched in June. The zoo thought it had four chicks but a fifth one showed up in the second nest.

The chicks grew rapidly and the sun helped make sure the chicks' development went well. At the end of September the first ever chick fledged to the zoo's great pride. The aviary had been successful with several vulture species but when the aviary was built the zoo never imagined that marabous would rear young during the summer, making the chicks able to fledge outside. The Vulture Rock Aviary is therefore a huge success for both birds and public.



DOUBLE AYE-AYE



ON 17 MAY 2015, aye-aye (*Daubentonia madagascariensis*) twins were born at Bristol Zoo Gardens: as far as the zoo knows, a twin aye-aye birth has not been recorded in captivity before. The births were a result of a global meeting of aye-aye holders, held in San Diego in February 2013, at which it was agreed that several animals from the US and one from Japan should be transferred to Europe, including the female, Sabrina, who was to become the mother of the twins.

Sabrina arrived from San Francisco Zoo on 30 July 2014, and was introduced for the first time to male Noah (a wild-caught animal who had come from Paris Zoo) at the end of October 2014.

Bristol Zoo first kept aye-ayes in October 2001, when a female, Zanvie, arrived from Durrell (Jersey Zoo) with Noah arriving the following month. This pair produced several births, but Zanvie refused to look after her offspring, meaning that two young (one male, one female) had to be successfully hand-reared. The hand-reared female, Kintana, was subsequently transferred to Frankfurt Zoo where she went on to breed and rear her own young.

A camera had been fitted inside Sabrina's birthing box but it was very difficult to see inside because of the large nest that she had built, so it was several weeks before staff actually realised that two young had been born. The youngsters were handled and weighed for the first

time at the beginning of July and their weights were recorded at 315g and 224g. Although Sabrina was an experienced mother, having produced young before her arrival in Bristol, one of the young was considerably lighter than the other so supplementary feeding began using baby food and honey. This plan worked well and the lighter baby's weight has gradually caught up with its sibling. Of course, we expected the twins' weights to be lighter than the known average aye-aye baby weight but they did compare quite favourably with data already held from the records of previously hand-reared Bristol animals.

The twins, named Tahiry and Kambana, are both thought to be female, although aye-aye babies are known to be difficult to sex when they are small. They are making good progress and have started to make use of their enclosure in the zoo's nocturnal house.

This very important birth for the EEP has been made possible following excellent cooperation with the SSP aye-aye programme and especially with colleagues from the Duke Lemur Center and San Francisco Zoo.

AROUND THE WORLD There are currently 51 aye-ayes held in 12 zoos as follows: 18 animals across Europe in five institutions; 24 in the US in six institutions and nine in Japan in one institution.

BREEDING THE GREATER FLAMINGO AT BASEL

IT WAS A PARTICULARLY GOOD 2015 for the flamingo-breeding colony at Zoo Basel, with 28 greater flamingo (*Phoenicopterus ruber roseus*) chicks hatched between April and June. The breeding colony consists of about 110 birds of almost equal sex ratio aged between two and 62 years.

It was in 1932 that Zoo Basel first held this species, with a group of 11 birds. This group was enlarged in 1954/55 by a further 15 individuals and, in 1959, the first two chicks hatched and were successfully raised by their parents. In the following years, breeding continued and two to three chicks hatched and were raised annually. In 1980 and 1982, 26 birds were imported and breeding started to pick up in 1983 with an annual average of 6–15 chicks.

In 1991, the colony totalled 96 and the birds were moved to a new exhibit. This area of about 2,000m² includes a large swamp area, a deep lake, some shallow lakes, resting areas, feeding areas, a breeding island, and a wintering house. With the move of the group to the new exhibit, breeding success increased

again. In 1994, more than 20 chicks hatched and were raised and since then 20–27 chicks are raised almost annually.

Over the years, more than 540 greater flamingos have hatched and been successfully raised by their parents at Zoo Basel. The most important features in breeding this species appear to be the following:

- Provide appropriate space (the birds need to be able to run without being hindered by obstacles) in order to perform their colony courtship behaviour in the spring.
- Allow the birds to find a suitable breeding island upon ground that they can form into a proper nest.
- Have a large group with a balanced sex ratio, and give the birds access to natural feeding areas with a natural ground.

At Basel, the birds start their courtship 'dance' in February. It is a fantastic time when more than 100 birds move across the exhibit, stop together, open their wings, turn their heads, and make plenty of noise. It is usually in March when the keeper prepares the breeding island. The

soil is loosened and – in case it is dry – a sprinkler system is used to keep the soil slightly wet. It seems that this really stimulates the birds to sit and start building their nests. The zoo has never supplied the birds with artificial nests. Experience has shown that egg-loss due to active non-breeding birds that run in and out of the colony can be an issue. Even if the greater part of the group is breeding, eggs will get lost. A balanced sex ratio can be of great help in reducing partner competition and stress levels but it is also important to have experienced and older birds in the colony.

This year, more than 40 pairs were involved in breeding, a lovely sight. A total of 28 chicks hatched, some eggs were infertile, and some disappeared. The zoo does not interfere in the breeding process, nor does it screen or check the offspring until they reach the age of a few weeks. Keepers leave the birds to their own business and it appears that they appreciate it. With so many offspring, Basel is able to provide many other EAZA zoos with these incredible, beautiful birds.



BIRTHS AND HATCHINGS



AARDVARK AT LAST!

FINALLY, ANOTHER SUCCESSFUL AARDVARK BIRTH has taken place in Royal Burgers' Zoo, writes *Willeke Huizinga, Section curator*. It was beautiful in its ugliness: nude, too much skin, long legs and enormous ears. Just after the birth, and at the time of writing, those long ears were still droopy, but we were expecting them soon to protrude. The ears are an important indicator of the youngster's state of wellbeing in the first days of its life.

Breeding aardvarks has been very successful at Burgers' Zoo, except for the fact that in recent years we have suffered a lot of bad luck. The last aardvark to be reared successfully was born in 2011 and is currently living in Chester Zoo. But after four early deaths of newly born aardvarks, the keepers were by 2015 very keen on keeping the next one alive.

Caring for a newly born aardvark and rearing it successfully are not without difficulty. Aardvarks are quite clumsy, certainly in the early stages of life, and as young piglets are not particularly fast to react, it is not uncommon for the mother to simply drop down on her own offspring, with consequences ranging from (severe) injuries to death due to trauma.

This year, Oryc, a female, gave birth to her tenth youngster. Oryc, now 20 years of age, was captive-born at Burgers' Zoo, and only two quarters of her udder function correctly, so we decided in advance that the young aardvark had to be artificially fed. We started with bottle-feeding straight away. This proved to be the right choice and, despite the fact that we artificially fed the youngster, he continued to suckle as well. Credits for this achievement should definitely go to the

keepers, who did everything to raise this animal, not only by feeding it artificially, but also by continuing to stimulate him to suckle at his mother.

The weight – and specifically the increase in weight – of a young aardvark are important indicators for its condition and health. These facts should be measured accurately and monitored carefully. Every time directly before and after feeding, the animal is weighed. A good birth weight is approximately 1.200kg and, after a small dip, the animal should gain weight very quickly.

Directly after the birth, our keepers watched over the newly born aardvark around the clock to prevent the mother from lying down on him. During this time, the young aardvark needs to find its mother's nipples, which can often be quite hard. Certainly, during the first days, it requires a lot of strength from the youngster, which can quickly become exhausted. An additional difficulty is the fact that it can often take a very long time for the mother's milk to start flowing, sometimes up to 20 minutes. The young aardvark can therefore run out of energy before it even gets to the milk. To stimulate milk production, therefore, one recommendation is to massage the udder regularly and to continue to stimulate the young aardvark to suckle. However, the balance between energy and feeding is delicate. An aardvark often needs help in being raised and, therefore, hand-rearing or partial hand-rearing can be needed.

Aardvarks are the largest animal in the Small Mammal TAG, and the aardvark ESB is coordinated by Burgers' Zoo.

The professorial approach

A FRUITFUL COOPERATION BETWEEN OPEL-ZOO AND GOETHE UNIVERSITY FRANKFURT HAS RESULTED IN NEW WAYS OF FUNDING RESEARCH PROJECTS AT ZOOS

Prof Paul Dierkes, Professorship Opel-Zoo/Zoo-Biology, Dept of Zoo-Biology & Bioscience Education, Goethe University Frankfurt, Germany, and Dr Julia Kögler, Deputy Executive Director, Association of Zoological Gardens (VdZ), Germany

It is widely accepted that zoos are an important source for research on animals, biodiversity, conservation and environmental education issues. Despite this great research potential, however, only a small number of zoos are capable of sustainably funding their own research department or long-term research projects. Due to this challenge, the EAZA Research Strategy strongly encourages effective cooperation and communication between zoos and universities in order to fully utilise the research potential of zoos.

Most research projects at universities, however, strongly depend on third-party funding or are subject to research trends which can make long-term collaborations between zoos and universities a rather difficult process. Dr Thomas Kauffels, Director of the Opel-Zoo in Kronberg im Taunus, has therefore come up with the idea of initiating an innovative and lasting professorship in the new field of zoo biology and funding it with the support of an affiliated foundation ('von Opel Hessische Zoostiftung'). As a result, the professorship 'Opel-Zoo/Zoo-Biology' has been established and consigned to Prof Paul Dierkes from the Department of Bioscience Education at the Goethe University Frankfurt at the end of 2014. Dr. Kauffels emphasises that 'the professorship perfectly matches the aims of the Opel-Zoo which are reflected by the zoo's official name: Georg von Opel – sanctuary for animal research'. Volker Homes, Executive Director of the Association of Zoological Gardens (VdZ), welcomes the professorship as an important step towards an increased cooperation between zoos and scientific research institutes: 'We are delighted that one of our member zoos is the founder of this innovative initiative and has successfully introduced new ways of financing long-term research in zoological gardens.'

Under the leadership of Prof Dierkes,



FROM LEFT TO RIGHT: JULIAN AND STEPH FENNESSY (GIRAFFE CONSERVATION FOUNDATION), ANNA LENA BURGER (PHD CANDIDATE, DEPARTMENT ZOO BIOLOGY, GOETHE UNIVERSITY) AND PAUL DIERKES (HEAD OF THE DEPARTMENT ZOO BIOLOGY, GOETHE UNIVERSITY) IN FRONT OF THE SAVANNAH ENCLOSURE AT THE OPEL-ZOO, KRONBERG IM TAUNUS.

zoo biology-specific bachelor and master modules were introduced at Goethe University Frankfurt at the beginning of 2015, and since then a great variety of courses has been offered to students. In addition, he formed a research group comprising four PhD students and several bachelor and master candidates. As the professorship is based in the department of Zoo Biology as well as Bioscience Education it provides great opportunities to integrate interdisciplinary objectives and fields of research. The biological research currently focuses on animal behaviour studies with regards to welfare aspects, enrichment, chronobiology and cognitive abilities of zoo animals. Furthermore, educational research is carried out on the evaluation of teaching concepts in zoos, visitor studies and the efficiency of zoos in knowledge transfer and attitude change regarding conservation learning. New

structures for the education of future teachers are also being implemented as teachers can be important multipliers for the development of positive opinions and attitudes towards the conservation of biodiversity.

Last, but not least, furthering collaborations with zoos and organisations engaged in *in situ* research or conservation projects is of major interest to Prof Dierkes. For example, in accordance with the 'One Plan Approach', the potential of integrated *in situ* and *ex situ* research projects was discussed with Julian and Steph Fennessy (Giraffe Conservation Foundation, see photo). Consequently, an exhibition on giraffe conservation was designed and presented in June 2015 to accompany World Giraffe Day. Simultaneously, a study was conducted on zoo visitors' thematic preferences.

For further information, please visit www.bio.uni-frankfurt.de/54790859/ Zootierbiologie or www.vdz-zoos.org.

Grace under pressure

HOSTS WROCLAW ZOO SET THE TONE AT THE EAZA ANNUAL CONFERENCE 2015 WITH A POWERFUL DEMONSTRATION OF PROFESSIONALISM UNDER EXTREMELY DIFFICULT CIRCUMSTANCES

David Williams-Mitchell, EAZA Communications and Membership Manager

The 2015 EAZA Annual Conference started under a cloud of tragedy; in the early morning of Wednesday 16 September, zookeeper Ryszard Pakla lost his life in an accident at the tiger enclosure of the conference hosts Wroclaw Zoo. At the opening session an hour later, Wroclaw Zoo director Radoslaw Ratajczak summed up the feelings of his staff: 'This was supposed to be the best day of my career,' he said; 'instead, it is the worst day of my career.' It was, however, Dr. Ratajczak's wish and the wish of his staff that the many months of planning that he and his team had dedicated to the conference should not be in vain, and that the conference should continue as scheduled – a brave and commendable decision that was reflected as the gathered delegates stood for a silent tribute to Mr Pakla. Media attention was of course, not far behind, and staff from the zoo and EAZA spent much of the day explaining the accident to the press, who were largely supportive of both the zoo and the decision to continue with the conference.

It was therefore with heavy hearts that the business of the day got under way, with a short welcome from the mayor of the city, and an introduction from Simon Tonge, Chair of the Association. Keynote speaker Paul Smith, Secretary General of Botanical Gardens Conservation International (BGCI), made a strong and at times humorous presentation on the need for EAZA to collaborate with sister organisations in the service of educating the public more holistically on the concept of biodiversity. This is a key aim of the new joint EAZA/BGCI/Ecsite campaign 'Let it Grow', which was launched later in the day.

Wednesday's campaign plenary also featured the closing of the Pole to Pole Campaign, with demonstrations from Zoo de la Barben and their climate change mascot Super Pol. It also included a description by hosts Wroclaw Zoo of their new exhibit, a multi-million euro interactive climate-

change pavilion that will give visitors the chance to see not only the effects of unrestrained global warming, but also to learn how to reduce their own carbon footprint. Campaign Chair José Kok of Ouwehands Zoo also presented certificates to members who had collected the largest number of signatures for the Association's '2 degrees is the limit' petition, which is due to be presented to December's meeting in Paris of the United Nations Framework Convention on Climate Change. Following the official launch of the Let it Grow campaign, which will start in earnest in January 2016, Nina Trontti of Helsinki Zoo outlined an already extant local biodiversity scheme being run by the zoo in the Finnish capital, which aims to raise awareness of the invasive species of Spanish slug (*Arion vulgaris*). This is a useful pointer as to how zoos, aquariums, botanical gardens and science centres can involve the local community in activities aimed at encouraging local species.

The conference featured three additional plenaries: the Conservation plenary on the Friday of the conference outlined the invaluable work being done to protect ecosystems and species worldwide, including presentations by James M Dietz on golden lion tamarin conservation in Brazil, Peter Widmann on the Katala Foundation in the Philippines, Rosamira Guillen on cotton-top tamarin conservation in Colombia, Nigel Collar of BirdLife International on Asian songbird extinction, and Radoslaw Ratajczak on conservation by municipally owned zoos. On Saturday morning EAZA Animal Welfare Training Officer Sally Binding chaired the fourth of the plenaries, dedicated to animal welfare science and its application in our institutions. This plenary featured presentations from Heather Bacon (on psychological welfare), Dr Geoff Hosey (behavioural welfare) and Frances Baines (physiological welfare; see p28 for an in depth look at UV lighting for animal welfare). Finally, on the



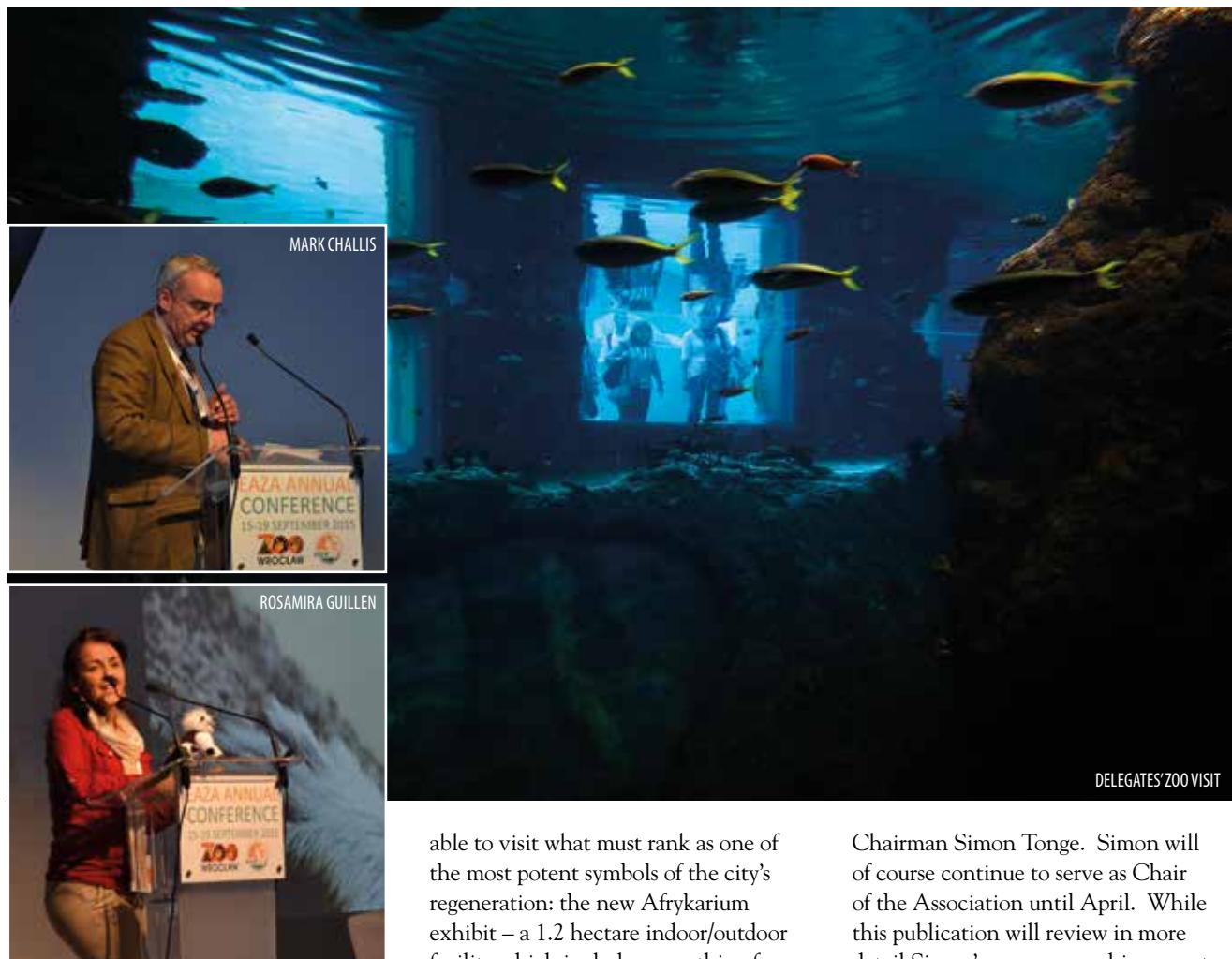
OUTGOING CHAIRMAN
SIMON TONGE

same day, the closing plenary included Radoslaw Ratajczak's handover of the conference flag to Belfast Zoo's Mark Challis, a tribute to Wroclaw Zoo and Mr Pakla from Simon Tonge, and a standing ovation for Simon at the close of his final Annual Conference as Chair of EAZA.

CONFERENCE ACTIVITIES

The majority of the conference timetable, however, was, as usual, dominated by the meetings of Taxon Advisory Groups, the Association Committees, and the representative Council. In addition to the business of collection planning and management, the TAG meetings included much discussion of how each group will continue to contribute to the future structuring of the EAZA breeding programmes.

The Council meeting of Friday evening discussed several areas of significance for the Association: these included approval for EAZA to sign Memoranda of Understanding with regional association partners ALPZA of Latin American and PAAZA of Africa, as well as the European Union of Aquarium Curators. The Council also decided there was no current requirement for an EAZA statement on circuses; while the Council is clear



that no circus or circus-affiliated zoo will be allowed to join the Association, it was felt that such institutions would be identifiable at the screening stage of the membership application. The council accepted the recommendations of the Membership and Ethics Committee regarding the applications for membership and screening of existing members as listed in the news section of this issue.

The social programme for the conference was predictably excellent. Tuesday's icebreaker at the conference venue brought together the majority of the delegates for drinks and food against a backdrop of live music and a water wall projection display on the huge fountain of Centennial Hall, a protected building that has borne witness to all the great upheavals of the city during the 20th century. The projection described much of the 150-year history of the zoo from its origins as a German-run zoo, through the devastation of World War II, the hardships of the Soviet empire and, finally, to our more prosperous era. Indeed, at the zoo visit on Thursday evening, delegates were

able to visit what must rank as one of the most potent symbols of the city's regeneration: the new Afrykarium exhibit – a 1.2 hectare indoor/outdoor facility which includes everything from a manatee exhibit and walk-through shark aquarium to what must be one of the continent's largest penguin enclosures. Other highlights included an expansive brown bear enclosure, and a native species exhibit, the Odrarium, which presents the wildlife of the Oder River which runs through the city and marks much of the border between Germany and Poland. The farewell dinner, held at an arboretum outside the city, also provided a great opportunity to wrap up the proceedings and included entertainments as diverse as fire-eaters and the impromptu performance of Pallas cat mating calls.

AN EMOTIONAL TIME

It was, however, despite the magnificent organisation of the Wroclaw Zoo team and their partners at the Wroclaw Convention Centre, a conference with an air of sadness. Zoo and aquarium staff naturally understand the dangers and rewards of working with wild animals, yet the news of a death is always shocking and distressing. In addition, the EAZA Annual Conference bade an emotional farewell to its current

Chairman Simon Tonge. Simon will of course continue to serve as Chair of the Association until April. While this publication will review in more detail Simon's numerous achievements as Chair, there is no doubt that he has, over his six-year tenure, brought the Association forward immeasurably: uniting the members when obstacles to unity seemed too great to overcome; involving members in the work of the Association despite differences in culture and language; and overseeing the definition of many EAZA positions on some of the most difficult and pressing issues that our community has faced. Elections for Council and a new Chair will take place in April; the Association will trust in its new representatives to continue on the progressive path defined by Simon and the current Council, engaging strongly with stakeholders as diverse as the European Union and our local communities, while defending the role of our institutions in conservation, research and education. As ever, though, Wroclaw Zoo provided a great example for the wider Association during our upcoming changes. Despite the accident and subsequent attention, the zoo and the conference were open as usual, and running with consummate professionalism during the entire week.

Forming new associations

KIRSTEN PULLEN IS DIRECTOR OF THE BRITISH AND IRISH ASSOCIATION OF ZOOS AND AQUARIA AND THE CHAIR OF THE EAZA NATIONAL ASSOCIATIONS COMMITTEE, CONVENED IN 2014

Zooquaria: You are the Chair of the recently formed National Associations Committee. Can you tell us more about why the association decided to constitute the committee, and what its role is?

Kirsten Pullen: The Association has recently been through events that have demonstrated the diversity of culture and opinion within our zoo and aquarium community. While this diversity can often be a strength and a source of great opportunities, there are occasions where it can leave us vulnerable as well. The National Association Committee has been established to try to ensure we can achieve greater awareness and to promote greater cohesion between the different national associations. We work to provide a cooperative forum where these issues can be discussed. In addition, we can work alongside the Legislation Committee to strengthen the input of EAZA to the European Commission and Parliament. Much of the work we do and aspire to with the European Commission and Parliament also needs work and input to the national governments of the EU Member States. Our national associations are ideally placed to engage with their national governments, in a way that EAZA itself cannot, and strengthen our political drive within Europe (on both national and European level).

ZQ: The Committee recently helped to redraft the EAZA culling statement taking into account national cultural considerations. With such a diverse set of languages, cultures and so on, is it reasonable to hold common positions on all of the sensitive issues that affect zoos and aquariums? Do we risk watering down those positions by ensuring that all countries are happy with them?

KP: I do believe that we have come together as a community to achieve common goals. As such we can identify common positions that can help us to achieve those goals. We do need to be sensitive to diverse cultures

and languages, but we do need to ensure that we don't fall into the trap of weakening our message and not maintaining our standards and integrity. Not always an easy task. But I would like to point something out. As a region, EAZA achieves an incredible amount, whether it's in terms of animal population moves, best practice guidelines, supportive work through the EAZA committees or simply the fact that when we get together we have a great annual conference. We achieve so much, despite any difficulties with diverse languages, cultures and so on. We manage to do this because we communicate effectively with each other – it's not always easy and it's not always straightforward but it is remarkable!

I am very happy to be part of this European community (and yes, I do consider myself European!) and I do believe we can continue to move forward together as long as we keep communicating well. Next year is going to mark some changes for EAZA, as a new chairman takes up the reins; let's make this transition smooth by continuing to communicate effectively.

ZQ: Given that some members of EAZA are not members of their national association, or do not have a national association to join, what are the benefits of belonging to or establishing a national association in addition to joining EAZA?

KP: This is a question that is often asked by zoos and aquariums. Ultimately we are membership associations, whether EAZA, BIAZA, or any other national or regional association and as such we offer a range of services to our members. Our members decide to join based on what they think they get from us, and sometimes that leads to decisions to join one or other. There are zoos in the UK that are members of EAZA and not BIAZA, and vice versa. There are, however, ways in which a national association can be of value to its members and complement the actions and activities of EAZA.

We have already said that the

engagement with the national governments and their associated civil services is important in assisting the role of EAZA at a European level. It is also important to have that interaction for your own members. The member states of the EU are the implementors of EU legislation, such as directives or regulations. This means there is a level of interpretation of legislation from the EU, and a level of implementation, which may vary from country to country. A national association with strong national government relationships can assist EAZA within the European political framework and provide a strong voice for members at the national government level. This is just one example, but it can just as easily apply to other situations such as the media. It is unfeasible to expect EAZA to be all things to all members, but with the support of the national associations we can provide for our members' needs at all levels.

ZQ: You are also Director of the British and Irish Association of Zoos and Aquaria (BIAZA), which is very active across many different areas of activity. Would you say that BIAZA is a good model for national associations to follow (particularly if they are new or being established)? What advice would you give to zoos and aquariums in the process of setting up or modernising a national association?

KP: BIAZA has been established for quite some time. 2016 is our 50th anniversary and this means that we have had a lot of time to develop how we work with our members, and the capacity of our office. BIAZA is certainly a good model but it may not be one that fits the needs of the zoos and aquariums in all EU/EAZA countries. BIAZA itself continuously evolves and adapts to what is needed, both by our members and to move our members forward. This means that new areas of work are developed as needed, and other areas may drop down and become less of a priority. The National Associations Committee has been gathering information on how the different national associations are



structured and view the community around them to provide examples of how they can work.

Undoubtedly, one of the most important areas of work at the current time is the political agenda, and this is reflected in several of the national associations, including BIAZA, and has become a priority. The best advice I can give to a new or a modernising association is to set your priority areas of work (such as political, animal care standards, media presence) and use that to focus your resources. Also, use the associations around you (including EAZA and the National Associations Committee) to investigate and keep an eye on other priorities and other ways of working.

ZQ: BIAZA has a lot of members, including very large institutions, and very small ones. How do you keep the smaller members involved in the association's work, and do you think that this approach would work for increasing the mutual contribution of EAZA and its smaller members?

KP: This is something that an association, whether regional or national, always needs to bear in mind. Many of our smaller members are just as passionate, if not more so, about the work they do as are our larger

members. In fact, some of our most active contributors to conservation are small members. BIAZA continually looks for strategies to ensure that we can recognise and include our smaller members in the work that we all do. BIAZA leads and supports its members in their objectives and so we aim to work with all our members at whatever level. There is a concept that an association will move forward at the speed of its slowest member. In fact, what we need to achieve is to assist each member moving forward at a pace that they can manage. Smaller members may have a different set of barriers to the larger members (staffing levels, finances) but they are still capable of great work and we hope to assist them in achieving that. Assessing what the members need in the way of assistance to those ends (often simply by talking to them) and helping to provide those resources where we can is vitally important. This is another area where the National Associations Committee can assist the work of EAZA.

ZQ: You work in one of the most challenging media environments, which is also home to some of the zoo community's more implacable opponents. The UK also has a huge number of zoos and aquariums,

suggesting that the public appetite for wild animal encounters is very high. How do you see this contradiction developing over the next few years, and what should zoo and aquarium associations be doing to ensure continued public sympathy?

KP: The UK media certainly provide a challenge, and we increasingly see increased activity from our implacable opponents. We need to revise our communications strategies to meet these demands. There is certainly a good public appetite for wild animal encounters, and some indicators that there is a growing belief in the value of those encounters not simply as a form of entertainment. Increasingly, we need to be able to be seen and trusted as the conservation and welfare experts, and that means open, honest and considered conversations with the press and the public. Some of those conversations may be daunting and challenging, but unless we are prepared to undertake them, and maintain our integrity, we will always be viewed with suspicion.

We have good stories to tell. We have people in our zoos and aquariums who inspire through their work and dedication, and these people are a strength for us (both EAZA and BIAZA) in terms of what we communicate to the public. Sometimes the stories are complex, but we mustn't shy away from them and we cannot just stick to publicity shots of cute births of our animals. We claim to be serious conservation organisations so we need to act that way in terms of our communications.

ZQ: When you are not busy running BIAZA, chairing the Committee and sitting on EAZA's Legislation Committee, what do you like to do?

KP: Spare time? You think I have any? I tend to think of myself as a country girl, despite being based in the BIAZA offices at ZSL, so I like to get out with my dogs as much as possible. In my previous life at Paignton Zoo I used to enjoy sea rowing for a Pilot Gig Rowing Club and had rowed in the World Championships in the Scilly Isles (not quite as grand as it sounds), but there's not much sea around my house these days so I stick to playing tennis at the local club.

Cheer for the chinchilla

FEW ARE AWARE THAT THE WILD RELATIVES OF A POPULAR PET SPECIES ARE CRITICALLY ENDANGERED, YET THIS IS THE PLIGHT OF THE CHINCHILLA. MEET THEIR CHAMPION, AMY DEANE

Dr. Martina Raffel, *In situ* conservation manager, Münster Zoo

The long-tailed chinchilla (*Chinchilla lanigera*) and its short-tailed cousin (*Chinchilla chinchilla*), are nocturnal rodents which once roamed the mountains and foothills of South America through Peru, Bolivia, Chile and Argentina. They were heavily hunted in the 1800s – requiring a hundred animals per coat, their fur is among the most expensive and rarest in the world. By the start of the 20th century, chinchillas were considered endangered, and a few decades later they were thought to be extinct in their original ranges. Fortunately, long-tailed chinchillas were found again in central Chile during the mid 1970s; the short-tailed chinchilla was rediscovered in 2000. Since then, a series of studies on these endangered rodent populations have tried to understand the species and their habitat.

Long-tailed chinchillas live together in small-to-large colonies on different mountain slopes, which are scattered throughout the transverse mountains of north-central Chile. In some locations, stable colonies have been observed for decades while others have gone extinct. Habitat continues to be destroyed by grazing animals, collection of wood and mining. Population estimates vary from fewer than 1,000 to about 5,000 animals. Approximately half of the population today is located inside Reserva Nacional Las Chinchillas in Auco, which was established in 1983 by the Chilean government to protect this species, while the majority live on private, unprotected land.

Amy Deane began wandering the planet in 1969 (i.e. just shortly after the presumed last sighting of a long-tailed chinchilla in the wild) without much direction or focus until 1990, when two chinchillas came to live with her. Upon their arrival, she began to read all available information about caring for them. Popular literature stated that this fascinating little critter was probably extinct in the wild. Her life's focus became clear: she would



spend her time trying to successfully reintroduce this species into the wild.

She turned to the university system for formal training and credentials in applied conservation. In January 1995, she learned of wild chinchillas in a reserve in South America. By June, she had secured funding for a trip to Chile, and the Chilean government granted her permission to spend the winter at the Reserva Nacional Las Chinchillas. By early 1997, she had made friends with Jaime Jimenez, a chinchilla researcher. With others, they started 'Save the Wild Chinchillas, Inc', a not-for-profit organisation for the protection of wild chinchillas and their habitat. They began to educate people in Chile and around the world about chinchillas, their ecosystem and conservation. Since 1996, they have created and distributed educational materials ranging from children's

stories to scientific publications with the help of artists, students, teachers, scientists, and zoos internationally. Working directly with the local people, Amy and her team have raised and transplanted over 10,000 native plants to enhance habitat for chinchillas on communal lands. Seeds are collected from mountains, germinated in a modest nursery, and seedlings transplanted into restoration areas. Creating habitat for chinchillas also aids in the preservation of at least nine flora species and 17 faunal species of conservation concern.

Recent analysis has shown that areas within the national reserve experienced a 2% decrease in the area covered by chinchilla colonies and that these colonies are more fragmented than before. In both restoration areas in which Amy and her team have worked, however, chinchilla colonies have experienced an increase in spatial coverage by 200–300%. Although the restoration work takes place outside the National Chinchilla Reserve, it is nonetheless supported by compiling reports, conducting scientific training for the guards and sharing field supplies. The partnership with the local community has strengthened the knowledge and has led to their growing support for local and global conservation.

Amy definitely is an outstanding conservationist and member of the IUCN Small Mammals Specialist Group, who has dedicated her life to the preservation of the little wild rodents she fell in love with. Current plans include raising funds to document the real life history and behaviour of the wild chinchillas by using camera traps. To this end, she currently lives in the USA, but wants to return to her field station as soon as possible. It is a great pleasure to nominate her as EAZA Species Champion. EAZA members who want to become involved with Amy's work please contact Martina Raffel (raffel@allwetterzoo.de).

Prosimian promise

A LEMUR *EX SITU* MANAGEMENT WORKSHOP IN MADAGASCAR HAS PROVED VERY SUCCESSFUL

Delphine Roulet, Vice-chair of the Prosimian TAG, Parc Zoologique de Paris

The Prosimian TAG has been working with the Ministry of Environment in Madagascar (MEEMF) for the last seven years on the implementation of a global management initiative for populations of lemurs in human care. As a result of this commitment, several collaborative agreements have been signed, including plans for the greater bamboo lemur, the crowned sifaka, and the mongoose lemur, which have led to several exchanges of lemurs between Europe and Madagascar. In addition, a team of French volunteer veterinarians has been created to go regularly to Madagascar to work with local institutions.

The idea of the lemurs' *ex situ* management workshop arose in 2012 during the Prosimian TAG meeting which took place in NaturZoo Rheine. This was the first time that a Malagasy delegation had participated in any EAZA TAG meeting, and the delegation from MEEMF took advantage of the opportunity to ask the Prosimian TAG for advice, training and support to begin cooperative work with zoos in Madagascar.

The objectives of the workshop, which were defined during the TAG meeting which took place in Paris in 2014, are the following: animal inventory, improving husbandry and animal welfare, developing cooperation between Malagasy institutions and implementing *ex situ* breeding programmes in Madagascar.

The workshop took place from 24 to 28 March 2015 at the Ministry of Higher Education and the Parc Botanique et Zoologique de Tsimbazaza (PBZT) in Antananarivo.

The team of trainers included three veterinarians, two primate head keepers and 1 primate curator. This team was helped by several colleagues from European Zoos, all of them already involved in the Prosimian TAG activities. The workshop was funded by Paris Zoo, NaturZoo Rheine and from funds raised by EAZA during the Madagascar Campaign. Paris,



Besançon and Mulhouse Zoos paid for the trainers' expenses. There were 54 participants in all.

The workshop was opened by the General Directors of two participating ministries (MEEMF and Higher Education) and included activities divided into several theoretical and practical parts. There were 11 theoretical training modules: Introduction (including a presentation of the Prosimian TAG), Ecology & Conservation, Legislation, Zoo design (including enclosures), Collection management, Education, Nutrition, Reproduction, Veterinary care, Health practices (including diseases), and Population management (intra & inter-regional). Several theoretical modules included practical exercises (for instance, how to design a suitable enclosure from available information on the species). There were two half-

days of practical training modules: how to arrange a suitable enclosure, and enrichment. On behalf of the Prosimian TAG, materials were donated to PBZT for enrichment and veterinary care and evaluation of educational panels.

The feedback was very good. Indeed, based upon questionnaires, more than 95% of the participants were fully satisfied/satisfied with the workshop. The more successful topics were enclosures and organisation of a zoo, nutrition and veterinary care. Collection management was the most difficult topic for the participants because the concept was totally new for many. There were also many (unfinished) discussions on Malagasy legislation, especially how to deal with the confiscation of lemurs, which led to some negative feedback on this specific subject.

Finally, many participants stated that they would have liked more practical sessions, a suggestion that will be taken into account if a second workshop can be scheduled.

In practice, as a result of the workshop brainstorming sessions, various steps were taken:

- For the MEEMF: creation of a national (official) register of animals (helpful for the inventory and monitoring/control), developing guidelines for Madagascan institutions, evaluating the contribution of the workshop during the annual visits, facilitating the collaborations between European and Malagasy institutions and connecting European (French) and Madagascan vets.
- For the TAG: continuing support to Madagascan institutions/developing collaborations (the workshop contributed to reinforcement of the existing links between the Prosimian TAG and some Malagasy institutions and to create new ones) and help to set up the first *ex situ* breeding programmes in Madagascar.

Attacking the invaders



THE AVON INVASIVE WEEDS FORUM IS TACKLING THE PROBLEM OF HIMALAYAN BALSAM AND OTHER INVASIVE SPECIES WITHIN THE BRISTOL AREA OF THE UK

Neil Green, Avon Invasive Weeds Project Officer, Bristol Zoological Society, and Jen Nightingale, UK Conservation Manager, Bristol Zoological Society

The Avon Invasive Weeds Forum (AIWF) was established in 2008 to educate, raise awareness of, control and reduce the negative impact of Invasive Non-Native Species (INNS) in the Bristol Avon catchment area. In 2012, a successful funding bid helped bring together major partners: The Department for Environment, Food and Rural Affairs (Defra), The Environment Agency (EA), Bristol Zoological Society (BZS), Bristol City Council (BCC), and community groups to prevent the deterioration of the catchment's natural ecosystems and protect local native biodiversity.

The AIWF project is an extensive river health project utilising the ecological expertise of BZS and harnessing the power of local community groups to breathe life back to the River Avon catchment. The funding provided for an officer to control and maintain the riverbank by utilising existing community action groups and establishing new ones trained in invasive weed control,

identification skills, biosecurity protocols and survey techniques.

In 2014, the project really gained momentum and the AIWF held 33 Himalayan balsam (*Impatiens glandulifera*) management events covering 30km of riverbank and putting in 1,700 volunteer hours, physically pulling up the weed and preventing the plant from reseeding for the next growing season. We have seen a 50% density reduction in areas managed thoroughly, which is a great result. This helps native species re-establish themselves and it also restores the native food webs previously present. In 2015, with help from funding from the SITA Trust, we almost doubled the 2014 tally with 64 INNS management events being carried out. This was made possible by utilising corporate groups, local community groups, volunteers and students. Over the course of the project over 120 management events have taken place and this has really inspired the local community to get involved, learn about their local water courses and

gain more confidence in tackling not only INNS issues but litter problems and pollution response.

Raising awareness of INNS is paramount and more than 40 awareness events were carried out including events such as parish council meetings, the Bristol Festival of Nature and INNS lectures to students studying at Bristol Zoo. In addition to events, we have raised awareness by incorporating a new Japanese knotweed webpage into the Bristol City Council website, which has drawn 3,000 unique views. A radio interview concerning the AIWF project conducted by BBC Radio 4 reached an estimated 500,000 listeners, after which we received a number of queries regarding INNS not only from UK-based members of the public but also from France and Canada too. AIWF has gone global!

TEAMWORK

Local community groups, church groups, university students and volunteer organisations have contributed to



more than 5,000 hours of volunteer time over the past three years. A good proportion of this was derived from the link with the Wild4life project and the BigPull initiative; two local conservation projects. With this help we have surveyed over 100km of riverbank in the area, cleared over 30km of banks of Himalayan balsam and managed 75% of the River Frome. The areas we have been working on have reduced in Himalayan balsam cover from mainly dominant/abundant infestations to occasional/rare infestations, thus making them far more manageable for community groups to manage in the future.

In addition, the training of relevant stakeholders to be able to easily identify and quickly respond to new INNS infestations is of paramount importance. With this in mind, staff from the Environment Agency, Bristol Water, South Gloucestershire and Bristol City Council have been trained with ID skills and biosecurity protocols. This was especially important after the recent quagga mussel (*Dreissena bugensis*) discovery in the Thames region of London late in 2014, which makes

biosecurity when using watercourses more important than ever before on the UK mainland.

Japanese knotweed (*Fallopia japonica*), is one of the most damaging invasive weeds in the UK. It spreads extremely quickly, preventing native vegetation from growing, and is a problem to the construction industry as it is capable of exposing weaknesses in buildings, foundations, concrete and tarmac. Current control methods rely mainly on chemicals, and it has been estimated that the costs of control in the UK would be over £1.5 billion. The Centre for Biosciences and Agriculture International (CABI) has been testing the potential for more sustainable, longer-term control using biological control methods. CABI is carrying out the government-approved release of the specialist psyllid *Aphalaro itadori*, as a control agent for Japanese knotweed. After seven years of research in Japan and in specialist quarantine facilities in the UK, it has been established that this tiny, sap-sucking psyllid is a knotweed specialist and can only complete its development on Japanese knotweed. The risk of damage to native

CLOCKWISE FROM FAR LEFT: CLEARING FLOATING PENNYWORT; HIMALAYAN BALSAM; THE AIWF PROJECT

plant species has been shown to be very low. Along with CABI, the Avon Invasive Weeds Forum has now released approximately 4,000 of these psyllids in Bristol on a secret site infested with Japanese knotweed. So far, there does not seem to be much damage done to the plants in the area, however, we are looking at the lifecycle of the organism and in which conditions they seem to be most effective at procreating.

FLORA AND FAUNA

The invasive species programme has expanded and now encompasses both plant and animal species in its remit. The project is closely tied to the South West Crayfish Project (SWCP), of which Bristol Zoological Society is a lead partner. The SWCP has a four pronged approach to the issue of the invasive signal crayfish (*Pacifastacus leniusculus*), which are not only decimating our native crayfish species, the white-clawed crayfish (*Austropotamobius pallipes*), but also the ecology and morphology of the UK's waterways. In response to the subsequent severe declines of the white-clawed crayfish, the SWCP translocates threatened populations and breeds the crayfish within its zoo hatchery for ark site release and wild supplementation. A complimentary strand of this work is a mitigation strategy for the signal crayfish developed by the Centre for The Environment Fisheries and Aquaculture Science (Cefas), combining physical crayfish removal plus male crayfish sterilisation in an attempt to control and reduce populations of this invasive animal. The AIWF and the SWCP work in tandem, linking their communication and outreach programmes, to the Defra Check, Clean, Dry and Be Plant Wise campaigns, which are a UK Government initiative, to try to prevent the spread of invasive non-native species.

The success of the invasive species programme in the Bristol area is reliant on a dedicated team of volunteers who are managed by strong leadership. What is pivotal to the long-term success of invasive species reduction and control is continuous investment and training of volunteer action groups to ensure that they remain dedicated and passionate in preserving their local biodiversity.

A ROAR FOR HELP

WITH GENETIC DIVERSITY AN INCREASING PROBLEM FOR ASIATIC LIONS, NEW HOLDERS OF THIS CHARISMATIC SUBSPECIES ARE REQUIRED



Ikke Kruse Nielsen, EEP Coordinator for Asiatic lion, Aalborg Zoo. All images: A. Sliwa

Asiatic lions (*Panthera leo persica*) are the only subspecies of lion managed as a European Endangered Species Programme (EEP) within EAZA. In the wild, Asiatic lions are restricted to a single population in India's Gujarat state which makes this a unique subspecies outside of Africa. The captive population has been growing steadily and, on 1 January 2015, the overall captive population within the EAZA region contained a total of 125 Asiatic lions. To maintain growth of this small EEP and ensure a genetically healthy and thriving captive population, new holders are urgently needed.

The Asiatic lion EEP was established in 1994 based on nine founders imported from India. London, Helsinki and Zürich were the recipient institutions of 2.2, 1.2 and 1.1 founders, respectively. Studbook data show that the two London males and one Helsinki male were descendants of wild parents. However, the six remaining individuals originally believed to be founders were actually related to each other at different levels (Srivastav *et al.* 2011; Srivastav 2014). After 21 years of breeding, maintaining 90% gene diversity for 100 years is an unreachable goal for the EEP if nothing changes. To maintain a demographically and genetically sustainable population, the EEP needs to increase in size and, more urgently (and this will be difficult), to import additional founders from India. Hard work and persistence however, can pay off; in November 2015, Prague Zoo succeeded in importing 1.2 Asiatic lions from Sakkarbaugh Zoo, in India.

DRAMATIC DECLINE

The historical habitat for Asiatic lions extended through regions of West, Southwest, South and Central Asia, and the animals were distributed from central India to Greece in Europe. The wild population has decreased dramatically



over time, recovered from the brink of extinction and is now restricted to one single population in Gujarat. Thus, the wild population suffers from genetic and demographic problems as is the case for small populations living in a delineated geographical range. Intensive population management in the wild and in zoos is essential to maintain this magnificent subspecies of lion.

Presently, the wild Asiatic lion population is distributed in seven districts of Gujarat with the Gir National Park and Gir Wildlife Sanctuary occupied by the core population. The wild population has increased gradually from 177 animals in 1968 to 411 animals in 2010. In 2015 the population was estimated to be 523 animals. Previously, Asiatic lions were listed as Critically Endangered by the IUCN Redlist but the IUCN status was changed to Endangered simply on the basis of the



GIR NATIONAL PARK. MALE-FEMALE ASSOCIATIONS ARE DIFFERENT FOR THE ASIATIC LION. SINCE MALES SEEM TO ASSOCIATE ONLY DURING MATING AND ON A LARGE KILL, IT APPEARS THAT MALES DEFEND TERRITORIES RATHER THAN PRIDES.

GIR NATIONAL PARK. MORPHOLOGICALLY, COMPARED TO ITS AFRICAN COUNTERPART, THE MOST STRIKING CHARACTER IS A LONGITUDINAL FOLD OF SKIN RUNNING THE LENGTH OF THE ABDOMEN. ASIATIC LIONS ARE SLIGHTLY SMALLER THAN AFRICAN LIONS AND MALE ASIATIC LIONS ONLY HAVE MODERATE MANE GROWTH SO THAT THEIR EARS ARE ALWAYS VISIBLE.



population size and the fact that the population is stable and extends beyond the boundary of the Gir forest (IUCN 2015).

Due to the increase of the wild population, Asiatic lions are living ever more in a human dominated landscape. Major threats to the population, therefore, include poaching, accidental deaths from falling into and drowning in wells, traffic and train accidents and deaths in electric fences. The future coexistence of humans and Asiatic lions in Gujarat depends upon the adaptability of the local people, management and the development of habitats.

The fact that the Asiatic lions are restricted to a small, isolated population also makes them vulnerable to diseases and natural disasters. It is thus very important that a healthy, growing *ex situ* population is kept in zoos and that the public is made aware of the threats and problems the Asiatic lions are

facing in the wild in order to help them in the future. The EEP therefore focuses on involvement in conservation initiatives and it will define conservation projects in the future which can be supported by zoos.

The EEP has an active veterinary advisor. One issue of concern is the transmission risk of Feline immunodeficiency virus (FIV). The original aim was to protect the Asiatic lion EEP against FIV, which is known to be particularly fatal to this subspecies, whereas African lions are able to tolerate it. FIV transmission risk recommendations have been completed and the EEP has successfully managed to maintain a negative FIV status. This was a key consideration when deciding to relax the ruling and allow collections to hold both Asiatic lions and African lions. Following a review of the FIV transmission risk policy in 2011 by the Species Committee, it is now possible to hold African and Asiatic lions in the same collection on certain biosecurity conditions.

When all is said and done, the Asiatic lion is a highly attractive species with an incredible conservation story behind it. It deserves to be promoted and held more by EAZA members, which use its image on the EAZA logo every day. If you are interested in keeping this unique subspecies of lion, please contact the Asiatic lion EEP Coordinator Rikke Kruse Nielsen at rkn@aalborgzoo.dk.

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Ambassadors for conservation

TWO IBERIAN LYNXES IN LISBON ZOO ARE EXHIBITED TO HIGHLIGHT THE PLIGHT OF THEIR ENTIRE SPECIES

Conservation, Research and Husbandry Committee, Lisbon Zoo

Azahar and Gamma are ambassadors of their highly endangered species, and they have been living in Lisbon Zoo, Portugal, since December 2014. Their prominent black ear tufts, distinctly flared facial ruff, long legs and short, dark-tipped tail are as iconic as their already long and troubled conservation history.

Still considered the most endangered wild cat in the world, the Iberian lynx (*Lynx pardinus*), has been slowly brought back from the brink of extinction thanks to the combined efforts of many conservation organisations, not only in Spain and Portugal – the natural range countries of this Iberian endemic species – but also on a more enlarged regional and international level, including the continued endeavour of the European Union through the LIFE+ projects.

Lisbon Zoo is now joining efforts with other national and international organisations for the preservation of the species and its wild habitat through the housing and maintenance of a couple of non-breeding animals purposed for public exhibition and conservation education.

LONG ROAD TO RECOVERY

This relatively small wild cat was once found across the extensive native oaklands with closed undergrowth of the Iberian Peninsula. The range extended to the Pyrenees and Southern France, where the Iberian lynx rubbed shoulders with its close and larger relative, the Eurasian lynx (*Lynx lynx*), from which it was distinguished by both morphological and genetic studies.

However, a heavy toll was paid by the populations of this Iberian predator during the 20th century, mainly due to human activities such as predator control and habitat modification due to agricultural and silvicultural intensification, combined

with a serious decrease of its main prey, the European rabbit. According to the IUCN Red List the wild populations of these lagomorphs within their natural range – Iberia, Morocco and Algeria – have declined by an estimated 95% since 1950, and 80% in Spain since 1975, primarily due to two diseases brought to Europe during the second half of the 20th century (myxomatosis and the hemorrhagic disease) as well as habitat loss, hunting and trapping.

The outcome of this unfortunate set of events, at the turn of the millennium, was the confirmed disappearance of the Iberian Lynx in the Portuguese territory and the existence of only two isolated wild breeding populations, located in southern Spain, specifically in eastern Sierra Morena and in the coastal plains west of the lower Guadalquivir basin.

The odds were feeble for the already highly esteemed and popular cat, both among the public and the media. Nevertheless, after an extended period of conservation diligence, including the implementation of an *ex situ* conservation breeding programme, in Spain and Portugal, a recent 2014 census has accounted for 327 individuals occurring in the wild. The reintroduction, since the summer of 2014, of around 50 *ex situ* born Iberian lynxes has helped. These have been in the LIFE+ Iberlince project areas: Sierra Morena and Montes de Toledo, at Castilla-La Mancha (Spain), in the Matachel Valley, at Extremadura (Spain), and in the Guadiana Valley Natural Park, in Portugal. Therefore the IUCN Conservation Status of the species was recently updated to Endangered (with a population size estimated to number fewer than 250 mature individuals).

However, the future of the species in the wild is still uncertain and dependent upon a wide array of human and environmental variables. Besides its current survival

hazards, including accidental road kill and illegal hunting and trapping, the Iberian lynx is considered a strict feeding specialist, with the rabbit accounting for 80-99% of its diet, as well as an habitat specialist – it only breeds in Mediterranean scrubland with dense rabbit populations. This makes its future preservation totally dependent on the intensive and adequate management of its specific prey and habitat as well as a continued wild population monitoring and reintroduction effort paired with a very careful genetic and demographic management of the cat population both *in situ* and *ex situ*. Otherwise, extinction will again be a very real and imminent threat.

LISBON'S LYNXES

Azahar is an 11-year-old female. She was captured in Sierra Morena, in 2006, with a broken vertebra, and sent to Jerez Zoo, which is one of the current *ex situ* breeding centres for the Iberian Lynx in Spain. The other current breeding centres in the country are El Acebuche and La Olivilla in Andaluzia, and La Granadilla in Extremadura.

In 2009, Azahar was transferred to the most recently built *ex situ* breeding facilities, the Portuguese National Centre for the Reproduction of the Iberian Lynx, in Silves (Algarve), Portugal. Thus Azahar was the first founding specimen of the *ex situ* conservation breeding programme established in the country. However she has had a history of unsuccessful breeding events with asserted physiological causes and was finally considered unfit for the *ex situ* breeding programme. She was then sterilised and sent to Lisbon Zoo.

Gamma is a 5-year-old male, who was born in the La Olivilla breeding centre, but who suffered from juvenile epilepsy with the indication of a genetic malfunction. Therefore he was considered non-suitable for breeding and was also sent to Lisbon Zoo.

THE LISBON FACILITIES

At the moment there are only two zoological institutions in the world that exhibit Iberian lynx. In order to adequately house and maintain these two important specimens, Lisbon Zoo aimed to accurately mimic its inhabitants' natural habitat and provide them with every opportunity to fulfil their wild behavioural patterns.

The enclosure was fully funded by Lisbon Zoo and it is located in one of the most isolated areas of the park. It has a main outside area of around 850m² placed over a pronounced slope terrain with a maximum depth of 9m and maximum width of 35m. In order to allow greater privacy to the animals, the public view is enabled only from one side of the enclosure through large windows (around 12m²) which are set exclusively over the low side of the slope.

The Mediterranean native flora will be represented by several species of small to medium-sized trees – a few have been recently planted and are still growing. Most of the trees can be freely used by the animals, allowing them to benefit from the volume of the facility up to 8m high. The outside facility will also be presented with a wide array of typical Mediterranean scrubland species including holm oak (*Quercus ilex*), stone pine (*Pinus pinea*), European olive (*Olea europaea* var. *sylvestris*), laurel (*Laurus nobilis*), common gorse (*Ulex europeus*), rosemary (*Rosmarinus officinalis*) and lavender (*Lavandula* sp). Besides the obvious



CARLOS NUNES

scenic recreation, the visitor is therefore surrounded by the characteristic odour of the Mediterranean native chaparral virtually from the start of the 40m-long educational runway which leads from the zoological park main street to the outside enclosure.

This runway includes several still and interactive panels with facts and information regarding the species and its habitat, and also a unique surprise – it is a facility that includes one of the most relevant players in this serious conservation challenge, the European rabbit! These animals aren't destined for consumption, but to highlight the relevance that the preservation of the prey of an endangered species has to the preservation of the predator itself.

In the observation house and main educational area we can find more detailed information regarding Iberian lynx biology and conservation, around a large hall intended for receiving large visitor groups as well as two video surveillance monitors with live camera footage from four different perspectives of the facilities – two from the outside and two from the inside areas. There is also a video monitor on the keepers' area intended to keep the animals under constant recorded monitoring.

EDUCATING FOR THE FUTURE

As already stated, the future of the Iberian lynx in the wild is highly dependent upon habitat preservation combined with an efficient population management of the predator species and its prey. Without cooperation from local residents and tourists, any conservation effort will definitely be diminished through the loss of animals due to several causes.

Therefore, the role of Azahar and Gamma at Lisbon Zoo can be crucial in creating a solid public mindset firmly based upon environmental consciousness and an understanding of this predator and its needs. This is an important step in the enabling these beautiful and charismatic cats to continue to live in the Mediterranean scrublands.

The last cat of Scotland

THE RAPIDLY VANISHING WILDCAT CAN BECOME A SYMBOL OF A NATION'S APPROACH TO CONSERVATION

David Barclay, Cat Conservation Project Officer, Royal Zoological Society of Scotland

Wildcats (*Felis silvestris*), the UK's only surviving native felid, once roamed throughout the country but, by 1800, their distribution was already restricted to northern England, Wales and Scotland. With an increase in habitat loss, the emergence of sporting estates, hunting of wildcats for fur and persecution, and the increase in hybridisation with feral cats the remaining population was, by 1880, only to be found in Scotland.

Since then, the Scottish wildcat has not only become one of Scotland's most iconic species but one that is on the edge of extinction. It is clear that we are at a crossroads: turn left, we do nothing and risk losing one of Scotland's defining species; turn right and we put a plan in place and do everything we can to save the wildcat and the ecosystem it needs. This is, or should be, an easy choice.

To save the Scottish wildcat means not only saving a key species at the top of the food chain but conserving habitats and associated prey species (and, equally importantly, a part of our culture). We want our country not only to be recognised for the diverse wildlife and nature that we have, but for our efforts to ensure its future survival. In the words of the American conservationist Mollie Beattie: 'What a country chooses to save is what a country chooses to say about itself.'

In 2013 the Scottish Wildcat Conservation Action Plan was launched, a collaborative national project backed by the Scottish Government with funding support from the Heritage Lottery Fund. This detailed, ambitious (yet pragmatic) plan uses a 360° approach to facilitate the long-term vision of restoring viable populations of wildcats to the Highlands of Scotland. It is coordinated by Scottish National Heritage, with over 20 partner organisations including experts in the field of ecology, conservation, research, genetics, population management and captive breeding.

The key objectives of the action plan are:

- Identify at least five priority geographical areas for conserving wildcats
- Take forward conservation work within these priority areas
- Take forward work to underpin a wider conservation programme
- Assess the genetic make-up of existing populations and the extent of hybridisation
- Establish a conservation breeding programme for future releases

The delivery phase of the action plan – or Scottish Wildcat Action as it is now called – is well under way with partner organisations being allocated specific objectives that cater to their key skills and abilities, helping maximise the potential contribution of each partner. To carry out practical conservation work, a Scottish Wildcat Action team has been established. Six priority areas spread across Scotland were defined based on historical records, monitoring and habitat quality. Within these priority areas, four specifically



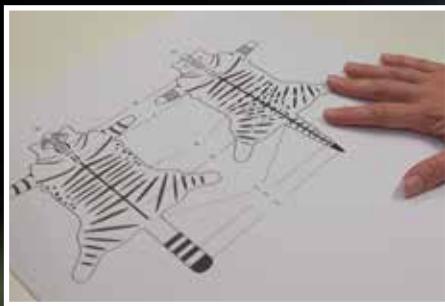
employed project officers aim to reduce the threats from feral and hybrid cats, work closely with local land managers to develop wildcat friendly predator control, and promote responsible cat ownership and land management practices that will benefit wildcat's presence. Accompanying this work will be a wider approach toward education and a programme of research to improve our understanding of the species across Scotland and make this information accessible through engagement with the broader public.

BREEDING PROGRAMME

As a key partner in Scottish Wildcat Action, the Royal Zoological Society of Scotland (RZSS) has been tasked with establishing a new conservation breeding programme for future releases across Scotland, as well as undertaking vital genetic research to improve our understanding of the degree of hybridisation. The cross-breeding of wildcats and feral/domestic cats is currently the greatest threat to wildcat populations. Genetic testing will be used both *in situ* and *ex situ*; however, it will be the latter where cats, depending on results, can be incorporated into the breeding programme.

The historical management of Scottish wildcats in captivity has not only provided a platform for education and awareness programmes, but has also maintained a population through the Scottish wildcat studbook that now has the ability to boost current conservation efforts. Despite there being a number of genetically important cats already within UK zoological collections, there is a high level of relatedness which reduces the ability to use this population for further breeding and release. Sourcing unrelated, wild-caught cats will both provide the genetic structure for a breeding population and boost key natural, wild behaviours.

RZSS staff will be working closely with land managers across Scotland to enable the collection of a sample of wild-living cats that will act as a new founder base in order to build up a robust and viable captive population suitable for release. Relationships that are currently being established with land-owners across Scotland will be fundamental if this approach is to succeed. Communication, collaboration



WILDCAT KITTEN AT THE HIGHLAND WILDLIFE PARK; INSET: WILDCAT PELAGE SCORING CHART DEVELOPED BY DR ANDREW KITCHENER, NATIONAL MUSEUMS SCOTLAND

and trust are essential in securing a future for wildcats and to ensure that, as a nation, we incorporate species restoration and conservation objectives as part of a long-term land-use programme. Together with land managers, wildcat sightings will be recorded, assessed and acted upon for targeted capture. Cats that meet the requirements from both genetic testing and pelage scoring (based on the animals' appearance) will be incorporated into the conservation breeding population. This will be the first time that large-scale breeding for release has been carried out for a cat species within the UK and it looks to follow in the footsteps of the most recent, proven method of breeding for release with the Iberian lynx (*Lynx pardinus*) in Spain and Portugal (see page 22).

NEW GUIDELINES

In order to establish the conservation breeding population, we are not only screening wild-caught cats genetically and phenotypically, but also designing new husbandry and management guidelines to ensure welfare, management practices and animal behaviour is prioritised to aid the success of future releases. Along with other zoological collections and private estates in Scotland, RZSS will be building large, open-topped, natural, off-show enclosures that will encourage retention of wild behaviours, non-habituation towards humans, remote monitoring and the ability for prey species to naturally exist within the enclosures.

Given the challenging issues surrounding Scottish wildcat conservation and the fragmented and decreasing population of the species, it is unlikely that one conservation method alone will be enough to save the species. A multi-functional approach as detailed in the action plan is as much intentional as it is direct. Having a range of strategies covering *in situ* and *ex situ* conservation, monitoring and research, threat reduction, public engagement and land management practices for different locations is an essential part of Scottish Wildcat Action and it is this approach that provides the greatest chance for a successful future.

It is a critical point for Scottish wildcats but it is not too late. Evidence suggests that we still have wild-living wildcats in Scotland and this simply highlights the need to conserve what we have left. Scottish Wildcat Action is a comprehensive package that aims to conserve wild-living wildcats, and take advantage of conservation breeding to allow the augmentation of vulnerable wild populations with healthy new stock.

It is clear that we all have a part to play in the protection of nature and, if we are indeed custodians of the land (as many of us would like to claim), then it is imperative that we ensure it is a healthy and diverse land that we leave to future generations.

To find out more about the Scottish Wildcat Action project, visit www.scottishwildcataction.org.

A piece of Africa in the middle of Europe

KIWARA KOPJE IS AN EXCITING NEW ENCLOSURE FOR RHINOS, PATAS MONKEYS AND CHEETAHS AT LEIPZIG ZOO

Prof Jörg Junhold, Director, Leipzig Zoo

Two female rhinos are enjoying the sun while antelopes and gazelles are grazing alongside them. Just a few metres away, a male rhino and two cheetahs are exploring their enclosure that they share in the mornings whilst three patas monkeys and the rhino are kept together in the afternoons. The view across the vast and open area is outstanding and makes everybody feel as if they're actually in Africa. These are impressions of the Kiwara Kopje at Leipzig Zoo, opened in April 2015.

It's the latest project to come out of the ambitious and innovative masterplan *Zoo of the Future* which includes a natural environment for the animals, a global commitment to endangered species, educational activities and an unforgettable experience for visitors. By implementing this innovative concept, Leipzig Zoo, home to around 850 species and sub-species, is restructuring its enclosures in accordance with the latest findings on keeping animals in their natural surroundings and is reconstructing the environment as closely as possible to the original habitat.

The masterplan has had a positive dual effect so far; it has increased the attractiveness of the zoo for animals as well as for visitors. On the one hand, animals feel at home in their surroundings, which are close to the conditions they would enjoy in the wild. On the other, the zoo's visitors enjoy a natural experience for the senses during their stroll through the zoo. In the coming years we will have created a *Zoo of the Future* which will, as far as possible, provide a natural habitat without bars.

The recently opened Kiwara Kopje is part of the Kiwara Savannah that spreads across more than 23,000m² and is designed to resemble an African savannah landscape with 70 trees, 2,770 grasses, 3,200 shrubs and many artificial rocks. A long wooden boardwalk (466m) leads through the area from which visitors can observe the animals from above – a new perspective for people and animals alike. Edutainment stations and a climbing house complete the experience for the zoo's visitors.

Kiwara Kopje offers perfect conditions for the animals as well. In order to be prepared for cold temperatures, a heating umbrella for the rhinos and heating places for the cheetahs and monkeys were installed. While the rhinos have been part of Leipzig Zoo for decades with outstanding breeding successes in recent years, the other species only arrived earlier this year.

Creating their new home involved mastering several challenges. First, the rather heavy rhino females Sarafine and Nandi, weighing up to a tonne each, had to be moved from their old enclosure and get introduced to their new home. In addition, the various species had to be trained to live happily together in the kopje. Each species has to discover the area for itself. Only when they feel safe and sound, can the rest of the group start cohabitating. That remains the biggest challenge;

it is the first attempt ever to cohabit rhinos, cheetahs and monkeys. It will take time and it remains to be seen how the project will develop.

So far, the rhino bull Ndugu takes turns in having cheetahs and patas monkeys as his flatmates in the large outside enclosure. After some initially sceptical moments, these combinations are working out just fine. Introducing the three species to each other bears enormous challenges as the lively patas monkeys and the cheetahs who are always ready to hunt and chase are only separated by the natural layout of the enclosure featuring areas of retreat, plateaux and differences in terrain altitudes.

CAREFUL INTRODUCTIONS

The varying needs and requirements of the different species had to be taken into account right from the start. During the first stages of the planning process of the new enclosure, the animals needed to be offered their own areas to retreat to, to prevent these very different species bothering each other. For the rhinos a safe and secure fencing system was of utmost importance, while adequate barriers had to be created both for the speedy cheetahs and for the very skillful, climbing patas monkeys. Throughout, very high safety standards had to be met for both animals and visitors. The complexity of this creative process was challenging and stimulating at the same time. After all, the vision of *Zoo of the Future* is that enclosures allow observations of the animal kingdom supported by almost invisible barriers, rather than structures that resemble fortresses. The Kiwara Kopje is also equipped with a walk-through enclosure for rock hyrax that gives visitors the impression of being in direct contact with the animals.

Since the beginning of 2015, the vast savannah landscape in the *Zoo of the Future* has been complete: that is, from a construction point of view. The fascinating project of cohabitation between the species is continuing but, already, the opening of the kopje to the neighbouring Kiwara Savannah and some of its inhabitants is working really well. The two female rhinos in their new outside enclosures, for example, are often visited by Thomson gazelles and scimitar-horned oryx, turning the enclosures into an authentic African panorama right in the middle of Europe.

The enclosures also set new standards behind the scenes, too. The state-of-the-art stables building features four cages for the cheetahs, two for the monkeys and seven boxes for the rhinos. Members of staff are able to check the enclosures and stables via CCTV from the keepers' area and keep track of everything. A small fodder kitchen and a hay stock complete the enclosure that was built within just 14 months. It all adds up to a series of great achievements in the implementation of the overall masterplan.



Indoor sunshine

THE AUTHOR CONSIDERS THE VALUE OF UV LIGHTING FOR ZOO ANIMALS

Frances Baines MA VetMB MRCVS

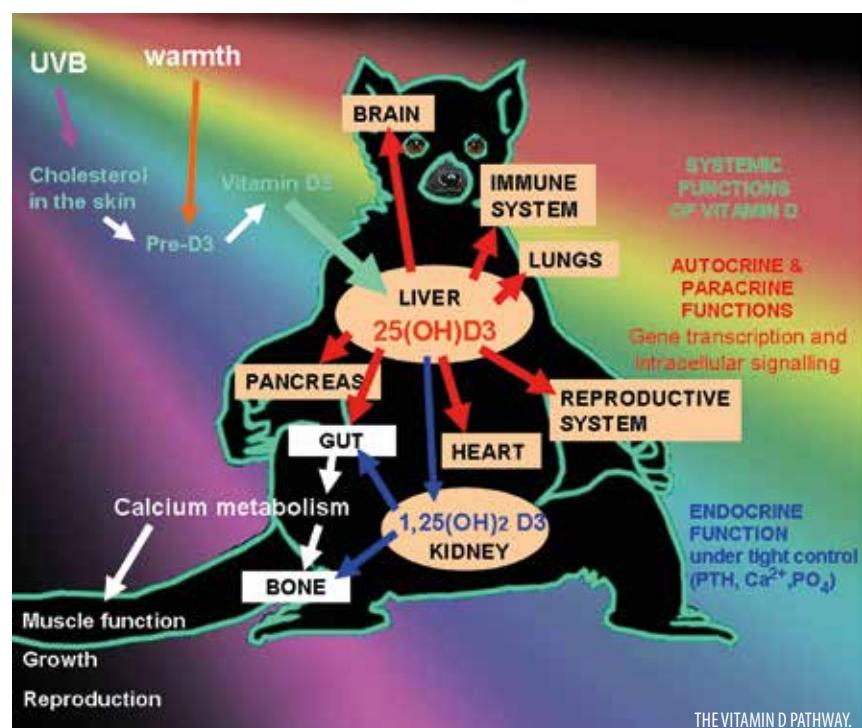
Our understanding of the value of natural levels of full spectrum lighting, including ultraviolet, has increased exponentially in recent years, yet the severest form of vitamin D deficiency, metabolic bone disorder (MBD), still haunts zoo collections worldwide. I believe that provision of appropriate species-specific lighting might not only eliminate MBD but also improve health across a wide range of other parameters.

Life on earth is solar-powered. Sunlight is a major, free resource; very few resources are free. Life has therefore evolved to make use of the entire solar spectrum, from UVB to infrared, and each species will therefore have an optimal photo-microclimate – the one it inhabits in the wild.

Visible light has powerful effects upon the brain. A neuro-endocrine network responds to visible light (specifically its blue component) by setting circadian and circannual rhythms governing the secretion of powerful pituitary hormones which affect most physiological processes, including growth, reproduction and responses to stress. It is therefore important to consider not just the quality of visible light (its spectrum) but also its intensity. Typical indoor artificial lighting using traditional incandescent lamps or fluorescent tubes has a spectrum very unlike natural sunlight, and is woefully dim. Ideally, animals should have access to natural sunlight, at levels appropriate for the species and its microhabitat. If this is not possible, high quality 'daylight' metal halide floodlamps are probably the best indoor substitute for the visible part of the solar spectrum. These also emit broad spectrum UVA, which is of great benefit to the many species which perceive it as a 'colour in their rainbow'.

VITAMIN D

Specialist lighting, however, is required indoors to provide UVB – the short-wavelength UV that is present in small but very significant amounts



in sunlight, and enables vitamin D synthesis in the skin. Synthesis has been demonstrated in almost every vertebrate studied so far; the few exceptions including polar bears and, curiously, domestic dogs and cats, which presumably obtain all they need from the bodies of their prey.

The vitamin D pathway is outlined in the picture above. Until very recently, it was thought that Vitamin D was simply an endocrine hormone. Small amounts of vitamin D are metabolized, first by enzymes in the liver to 25(OH)D3 and then by enzymes in the kidney, into the active hormone 1,25(OH)D3. This controls calcium metabolism, enabling absorption of calcium from the gut and maintaining its levels in the bloodstream, as necessary for life: muscle function, bone strength, growth and reproduction.

It is now known that Vitamin D also has autocrine and paracrine functions – actions that occur inside almost every cell in the body. If there is sufficient circulating vitamin D remaining after endocrine needs have been met, this is taken into the cells of other organ

systems and activated within these cells. Here, it modulates the activity of over 2,000 genes, controlling a vast range of processes including cell division, immune responses, neural development, insulin production and cardiac function. New scientific papers are appearing almost daily on the effects of vitamin D deficiency on human health, including increased risks of cancers and auto-immune diseases resulting from weakened and defective immune responses.

METABOLIC BONE DISORDER

Metabolic bone disorder (MBD) was first described in zoo animals in 1884; it is very sad that it still occurs in many collections today. One of the commonest causes of MBD is vitamin D deficiency so severe that there is not even enough vitamin D to maintain blood calcium levels, despite adequate calcium in the diet. Such potentially lethal deficiency is never seen in wild animals in their native habitat; it is a disease of 'indoor' animals. Even humans are prone to this completely preventable disease. Modern human indoor lifestyles and sun avoidance

Zone	Characteristics	UVI Zone range (all-day average)	Max UVI recorded (one-off maximum)	Species in original study	Species typical of Zone commonly held in captivity
1	Crepuscular or shade dweller	0 - 0.7	0.6 - 1.4	Cottonmouth water moccasin Texas rat snake Jamaican brown anole Broad-banded water snake	Leopard gecko Crested gecko Corn snake Burmese python
2	Partial sun or occasional basker	0.7 - 1.0	* 1.1 - 3.0	Western ribbon snake Green anole Jamaican blue-pants anole Yellow-bellied water snake	Redfooted tortoise Monkey-tailed skink Chinese water dragon Boa constrictor
3	Open or partial sun basker	1.0 - 2.6	2.9 - 7.4	Desert side-blotched lizard Eastern fence lizard Cuban brown anole Texas spiny lizard	Bearded dragon Spur-thighed tortoise Red-eared slider Day gecko
4	'Mid-day' open sun baskers	2.6 - 3.5	4.5 - 9.5	Lesser Earless Lizard Sagebrush Lizard Northern Prairie Lizard	Uromastyx Chuckwalla Rhinoceros iguana (NB: shade is vital even for these)
	UV-Tool 'Shade method'	UV-Tool 'Sunbeam method'			

UV INDEX ESTIMATES BASED UPON THE FERGUSON ZONES. COLUMNS 1 TO 5 OF THE TABLE IDENTIFY THE CHARACTERISTICS OF EACH ZONE AS PRESENTED BY FERGUSON ET AL. (2010). THE ORIGINAL 15 SPECIES OF REPTILES STUDIED IN THEIR NATURAL HABITAT ARE SHOWN IN COLUMN 5. IN THE SIXTH COLUMN ARE EXAMPLES OF SPECIES ASSIGNED TO FERGUSON ZONES BASED UPON THEIR BASKING BEHAVIOUR. ARROWS LINK ANIMALS FROM EACH ZONE TO 'SHADE' OR 'SUNBEAM' METHODS OF UV PROVISION AS PROPOSED IN THE BIAZA UV-TOOL AND INDICATE TYPICAL LAMP TYPES SUGGESTED FOR EACH METHOD.

have led to a huge increase in vitamin D deficiency worldwide, with concurrent increases in associated diseases, cancers and even MBD – 'rickets'.

UV-TOOL

I have been working with a focus group within the British and Irish Association of Zoos and Aquaria's Reptile and Amphibian Working Group (BIAZA RAWG) to develop a guide to UVB lighting for zoos. Our working document, the UV-Tool, contains basic information on basking behaviour, natural microhabitat, photoperiod and thermal requirements for reptiles and amphibians. It includes suggestions on the creation of suitable UVB gradients, and links to test reports for currently available UVB-emitting lamps.

The UV-Tool includes 252 species of reptiles and amphibians, thanks to data from a total of 13 zoos across the UK and from eight species-specialist contributors. It is now available to any zoo on request, and is currently under review for publication in JZAR. The basic concept of the UV-Tool is that the range of heat, light and UV experienced in an animal's natural microhabitat will be optimal for that species. Therefore, providing a similar heat, light and UV gradient in captivity, trusting the animal to self-regulate its exposure, should prove beneficial.

THE 'FERGUSON ZONES'

Ferguson et al. (2010) measured the UV exposure of 15 species of reptile in the field, and showed that a reasonable estimate of their UV exposures could be made just by knowing their basking and/or daylight exposure habits. They used a UV Index meter (Solarmeter 6.5, Solartech Inc., USA) since this meter has a sensitivity response similar to the action spectrum for vitamin D synthesis. They allocated species into four sun exposure groups or 'zones', which have therefore been named 'Ferguson Zones'. For each zone, they reported the maximum UVI in which the animals were encountered, and also the average UVI exposures, calculated from all the readings taken for those species, at any location in which they were found (see image above). Our hypothesis is that any species of reptile or amphibian may be assigned to one of the four zones based upon its observed behaviour. We also see no reason why other taxa should not be grouped in the same way, since they occupy the same types of photo-micro-habitats, worldwide. A suitable UV gradient may then be provided in the captive animal's environment using these figures as a guide.

CARE MUST BE TAKEN

It is vital to understand that all UV guidelines to date are just estimates. The exact UV requirements of

reptiles and amphibians are still largely unknown, and the use of UV with mammals and birds is still experimental. It is vital to monitor the levels of UV and the animals' responses, and also to record results. Blood tests for serum 25(OH)D3 levels are needed to assess vitamin D status. The concept is to create wide, safe UV gradients alongside heat and light gradients. Shade is vital; the UV gradient must always fall to zero in shelters away from the light.

Lamps should always be positioned above the animal, so the shape of the head and eyelids shade the eyes from the direct light. All bulbs should be inaccessible to the animals to prevent burns and UV damage from close exposure.

There will be individual differences, as well as species differences, in response to UV. Albino and hypomelanistic specimens of any species are likely to need much reduced exposure levels as their skin and eyes are often more sensitive to UV and visible light.

Reference

- Ferguson, G.W., Brinker, A.M., Gehrmann, W.H., Bucklin, S.E., Baines, F.M., Mackin, S.J. (2010). Voluntary exposure of some Western-hemisphere snake and lizard species to ultraviolet-B radiation in the field: How much ultraviolet-B should a lizard or snake receive in captivity? *Zoo Biology* 29(3): 317-334.

Louis Gay, 1928–2015

THE BIOPARC TEAM PAY HOMAGE TO THE FOUNDER OF FRANCE'S DOUÉ LA FONTAINE

Beautiful stories, those which vibrate through our entire lives, often come to life themselves with a 'love-at-first-sight' experience. The history of the Doué la Fontaine zoo is just such a family adventure, and it has continued through the generations having been started in 1961 by Louis Gay.

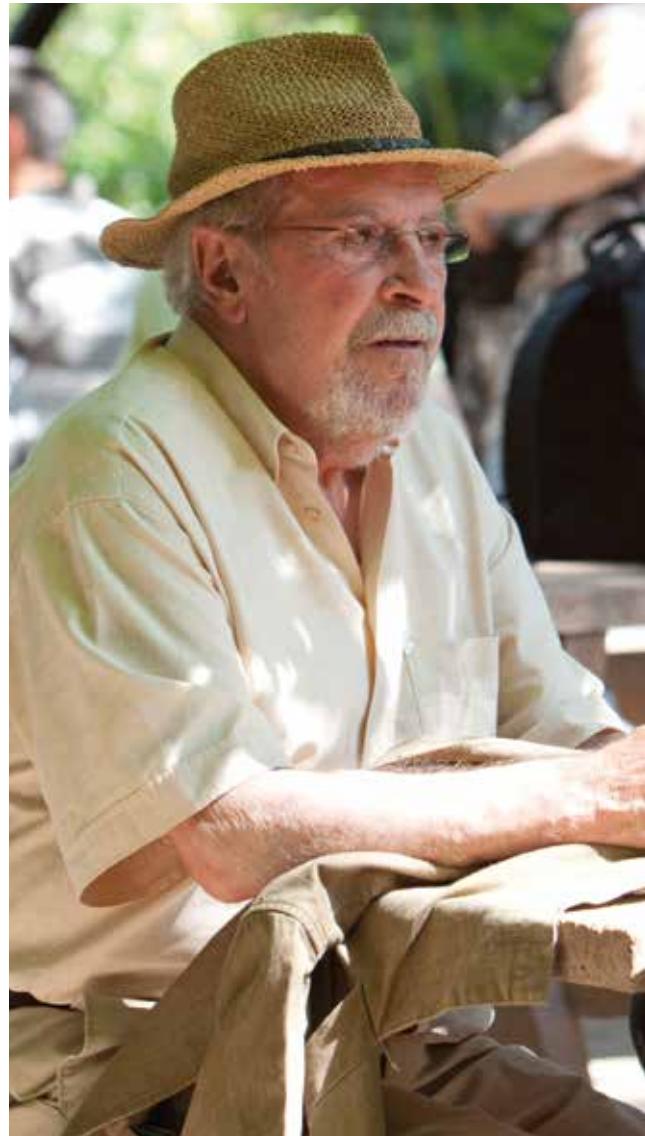
Louis' life changed in 1960 when he discovered a former long-abandoned stone quarry in Doué la Fontaine. While working in the family catering business, Louis had come to dream about nature, of a place filled with wildlife where he could indulge his passion for animals which he had had since childhood. The discovery of this place allowed him to make his dream come true. The site was exceptional: a jungle of brambles and wild clematis with overhanging old oak trees and a few chalk cliffs. The very next day, he appealed to local youngsters to help him clear the place and reveal its full potential. The outcome was impressive: huge, open-sky clearings, a cathedral-shaped cave at water level, hidden grottos, giant bamboos, and more. An exceptional setting, both mineral and vegetal, had offered itself to Louis and guided him towards what would become his life and the richness of the park.

He bought the land and, in less than a year, the zoo was inaugurated on 14 July 1961. The first inhabitants were representatives of the local fauna: deer, badgers, wild boar, owls, pheasants. The first main attractions, however, were Asma, a young lioness that Louis had found in a circus, and Chita, a female chimpanzee. This was, of course, another era when people related to animals differently: Louis would take the animals to fairgrounds and talk about his zoo.

In the early years, there were constant surprises, namely with the discovery of new quarries. All avenues were explored in the implementation of new ideas and Louis knew how to generate collective enthusiasm. Little by little, he gave life to the site, and was very hands-on: he ran the guided tours, watched over the works, looked after the animals, linked with tourism professionals and learnt how to promote his park.

His idea was to offer his visitors a tour of the animals of the world as well as to surprise them. He rushed to fairgrounds and animal stores to buy animals, and people provided him with exotic specimens. When he bought Kaa, a 6m-long python, he opened a snake safari in which visitors were confronted with the free-roaming impressive reptiles. He continued crossing borders and each trip enabled him to live his passion to the full and acquire essential experience. Kenya, Tanzania, Madagascar, Brazil... watching animals in the wild was essential because breeding wild animals at the time was often a matter of improvisation. These encounters gave him essential information about behaviour and eco-friendly requirements which avoided making certain mistakes in his park.

When his son Pierre Gay joined him, Louis started to become concerned about the morality of zoos and the conservation of biodiversity. Both father and son went to various Belgian, Dutch and English zoos to pool inspirational ideas. Aware of the need of a quality charter, Louis was a pioneer in the creation of the National Association of Private



Zoological Parks and Gardens. Twenty years later, the zoo was acknowledged for its audacious policy favouring endangered species, its successful facilities and constant educational care.

Louis retired in the summer following a tragic accident that occurred in his zoo. Very afflicted by the incident, he emotionally had to leave the place which had been his life during 40 years of passion. He left it to his son Pierre, who was joined by his own son François and they both brought new dynamic approaches – a strong commitment to nature, immersion areas, and a desire to enlarge the zoo, which has now become Bioparc de Doué la Fontaine.

Louis may have left his post but not his presence in the Bioparc. Right up until last year, the staff would meet him daily in the alleyways. He continued to have an unconditional love for this place and what it had become. He kindly stopped people here and there to tell them about his times and to learn what had become of each animal and each person in the Bioparc. Louis just loved the place; he built a close intimacy with this fabulous theatre and has left an indelible mark on the Bioparc.



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