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SCIENTIFIC RESEARCH



Skin bacterial communities are collected by swabbing midwife toad

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## SCIENTIFIC RESEARCH

A key element of conservation is zoological knowledge about the species under protection; conservationists need to know how animals live, their physiological responses to certain conditions, their repertoire of natural behaviours and so on. On top of that, research into the genes of animals and populations can also have a huge impact on the survival chances of their species. With many wild animals, from the smallest invertebrates to the largest mammals, zoos and aquariums are ideally placed to conduct research that has real-world consequences for nature and ecosystems.

EAZA has a dedicated Research Committee that sets out the Standards for research in our institutions and elsewhere, with the aim of producing work that not only pushes forward our knowledge of animals and how to care for them, but also methods to make our institutions more effective in all areas of their operations.

Visitor studies, often conducted with education staff, help us to understand how people behave at the zoo or aquarium, allowing the institution to better communicate its messages of sustainability and conservation engagement when visitors are at their most receptive. They can also help us to improve flows of people in our facilities so that we can reach more people with these

messages. Educational research aims to help us to deliver those messages more effectively as well, and to apply the knowledge we gain to other educational opportunities, such as in the countries where threatened species need direct protection and the support of local communities.

Zoological research covers disciplines such as animal nutrition, welfare, ethology, genetics, veterinary medicine, population management and reproduction, and may be for direct application in the zoo or in the field, or to advance our knowledge of species and ecosystems. Zoos and aquariums are leaders in research into the management of small populations of animals and have developed tools and structures which allow for this work to have a solid scientific basis. This is supported by a dedicated Population Management Centre which puts many of these tools into practice to advise programme Coordinators and TAGs. Researchers working in zoos and aquariums are also working on longer term projects, such as how to effectively manage the demography and genetic variation of animals that live exclusively in groups.

Much zoological research in these areas would not be possible in the original habitats of animals, as it would either be intrusive and disruptive to the local ecosystem, or too difficult to establish the conditions in which findings can be replicated and confirmed. This means that zoos and aquariums are valuable resources for researchers working in these fields. In order to take advantage of the research opportunities inherent in a well-run zoo or aquarium providing positive welfare conditions, EAZA Members either employ research staff or build relationships with partners from academia or conservation. While it might seem that larger zoos and aquariums are more likely to have dedicated staff or strong partnerships, all of our Members are involved with scientific research at an appropriate scale, and can also take advantage of the EAZA network to become involved with larger, multi-site projects.



EAZA's Biobank holds biological samples at four hub facilities, including Planckendaal in Belgium

EAZA believes that zoos and aquariums are considerably more effective at conservation and education if their activities are scientifically based and backed by evidence. Encouraging the research that drives this work is an important factor in determining the ambition and scope of the science undertaken in our institutions, and to do this, EAZA collects and publishes some of the best zoo and aquarium based research in our proprietary peer-reviewed journal. The Journal of Zoo and Aquarium Research (JZAR) is published quarterly with each issue containing a good cross-section of subjects and papers. As a public access journal, JZAR is a strong tool for sharing knowledge across disciplines and acts as a signpost to the latest developments in our community and in the field.

To further the state of our collective scientific knowledge, EAZA also organises a number of scientific events and maintains several permanent structures. The Biobank Working Group is responsible for the collection and storage of biological samples from EAZA Member institutions and is designed to meet the needs of researchers working across a number of disciplines. The Reproductive Management Group monitors the use of contraceptives and other methods of population control over the long term, allowing a long view of effectiveness and consequence for wild animals and the populations to which they belong. The Nutrition Working Group pools knowledge about animal nutrition and its relationship to other parts of the *ex situ* conservation and animal welfare missions, and disseminates that knowledge through a biennial conference. We also organise biennial conferences on animal welfare, and, co-organised with the Leibniz Institute for Zoo and Wildlife Research (IZW), a dedicated conference for zoological research. Open meetings at the EAZA Annual Conference allow for the further spread of scientific advance among our community.

This level of transparency helps show stakeholders including national or regional authorities the depth and breadth of the work being carried out at our institutions, with a view to helping them to make policy that protects the natural environment at home and abroad. With the effects of biodiversity loss now graphically illustrated by the IPBES report into species loss, such policies are more important than ever, and scientists working at or with zoos and aquariums have the knowledge and experience to be able to provide guidance on our relationship with nature and steps to protect it.

In an age where the value of objective science is often called into question on unregulated social media, in a devalued press and in the more populist corridors of power, we believe that science and the presentation of its findings to the public via educational and other zoo-based activities are more important than ever. This is why all our educational programmes are expected to be based on reputable science that presents an accurate picture of the state of nature and species.

There is still much to learn about our planet and our place among the species that inhabit it; EAZA and its Members maintain a constant commitment to work to encourage the advancement of scientific knowledge and its active application to the protection of nature – a struggle that needs, and receives, the attention of some of the best minds in the biological and social sciences as they work with animals and people at our zoos and aquariums to research the best ways to run and develop them in the service of nature.

## UNITED FOR SAVING THE BAHIAN LION TAMARINS IN BRAZIL

### CASE STUDY

Project BioBrasil was launched in 2001 by the Royal Zoological Society of Antwerp with the aim of using scientific research to contribute to the long-term survival of golden-headed lion tamarins (*Leontopithecus chrysomelas*) in the Atlantic forest of South Bahia, Brazil. The project's main objective is to use scientific research to contribute to the development and implementation of a science-based conservation action plan for the species in collaboration with all key stakeholders. The main threat to the species' long-term survival is ongoing habitat loss and fragmentation, reducing connectivity between forest fragments. Deforestation and degradation of the remaining forest habitat is associated with selective logging, hunting of seed dispersers, sand and gravel mining, urban expansion, slow implementation of conservation units, and the alteration of natural vegetation on rural properties. Potential threats also include vector-borne diseases such as yellow fever, the transmission of other zoonoses, and predation by dogs.

The BioBrasil research programme was initiated to address specific knowledge gaps identified during the *Leontopithecus* Population & Habitat Viability Analysis workshops in 1997 and 2005. The Antwerp Zoo team set out to fill those gaps by starting a research programme in close cooperation with local Brazilian universities, conservationists and other stakeholders. The main goal of the programme was to gain a greater understanding of the factors impacting the survival and breeding of golden-

headed lion tamarins in fragmented forests, cocoa plantations, and agricultural areas. By closely following and observing a number of family groups year after year, the research team was able to collect critical ecological and behavioural information such as which trees and plants the species need to survive; the size and composition of family groups, how they behave in degraded forests, and whether the co-existence in agricultural areas causes problems, either for golden-headed lion tamarins or for humans.

In addition to studying the ecology and behaviour of golden-headed lion tamarins, the team more recently focused on using climate data to simulate various climate change scenarios for Brazil and to study the consequences of climate change on the future survival chances of the species. An increase in temperature or a decrease in rainfall can have significant consequences on which tree and plant species will grow in the coastal forests of Bahia in the future, which will partly determine whether golden-headed lion tamarins have a future in these forests. Such knowledge will not only enable predictions on how the forest will change, but can also be used to develop specific conservation actions that mitigate the impact of those changes on the survival of the species.

In addition, BioBrasil initiated an environmental education programme with local villagers, to encourage their participation and empower them to become key actors in the elaboration and

implementation of future conservation activities. The project team works with private landowners and local communities to improve awareness on environmental issues and facilitate the development of efficient land management plans that reconcile the survival of golden-headed lion tamarins with the economic interests of local stakeholders. Linked to this, current research activities focus on reconciling local economic demands with biodiversity conservation, by assessing the ecological value of cabruca ecosystems: the traditional shade-cocoa production forest of southern Bahia, in which cocoa (*Theobroma cacao*) is cultivated under a diverse and dense canopy of predominantly native trees species. Cabrucas enable a significant proportion of native fauna and flora to persist in this fragmented landscape and play a key role in the conservation planning for golden-headed lion tamarins because they provide important secondary habitat and ensure connectivity between the remaining forest fragments. This new research project aims to better understand the implications of increased intensification, particularly reduction of shade tree cover on cocoa production, and the relation between the conservation value of cocoa agroforestry and their economic profitability for smallholders in southern Bahia. In an interdisciplinary approach that combines ecological data from field surveys and farm-household surveys from agroforestry farms, the study aims to analyse environmental and economic trade-offs and synergies between biodiversity conservation and cocoa productivity.

In addition, it will look at the persistence of golden-headed lion tamarins and the larger mammal community, as well as the economic profitability for smallholders in cocoa agroforests with different shade-tree management. The ultimate goal is to deliver recommendations for improving the sustainable management of agroforestry systems in cocoa-producing landscapes to promote biodiversity conservation while ensuring cocoa farmers' profits. Recently, the Royal Zoological Society of Antwerp and the Brazilian NGO Bicho do Mato Instituto de Pesquisa, organised a Strategic Conservation Planning Workshop in Ilhéus, Bahia, to advance golden-headed lion tamarin conservation through science-based planning and conservation action. This was the first time key stakeholders (scientists, landowners, local producers, protected area managers, municipal environment officials, educators, and the international zoo community) met face-to-face. Through participatory planning, participants representing 23 key local, national and international institutions developed a ten-year-science-based strategic plan for the conservation of golden-headed lion tamarins.

The workshop was also the official launch of the Bahian Lion Tamarin Conservation Initiative (BaLTCI or ICMLB in Portuguese) which aims to implement the strategic plan, and unites researchers, practitioners and local representatives. Apart from key strategies to safeguard the remaining habitat and cabruca agroforest, the plan also includes a Theory of Change on how to secure financial and political resources to support the conservation action plan for golden-headed lion tamarins.



**Golden lion tamarin**  
*Leontopithecus rosalia*  
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