Newsletter

amphibian ark

In This Issue

Number 14, March 2011

The Amphibian Ark team is pleased to send you the latest edition of our e-newsletter. We hope you enjoy reading it.

The Amphibian Ark

Just shoot me! An Amphibian Ark photography contest

Entries for Amphibian Ark's photography competition have been arriving almost every day, with just over 300 entries received to date. In this article, we introduce you to the judges of this competition.

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Amphibian Ark has a new Facebook page!

AArk now has a new Facebook page, which replaces our old Facebook group page.

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News

Amphibian Disease Laboratory Newsletter

San Diego Zoo Institute for Conservation Research

Sent to you courtesy of:
The AArk Team

Kevin Zippel
Program Director

Ron Gagliardo
Training Officer

Richard Gibson
Taxon Officer

Kevin Johnson
Taxon Officer
Communications & Development

Carlos Martinez-Rivera
Taxon Officer for Latin America

Elizabeth Townsend
Administrative Assistant

Would you like to support AArk's amphibian conservation work? Click here to make a donation!

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San Diego Zoo's latest edition of Amphibian Disease Laboratory contains great news and updates about chytrid in zoos, testing for chytrid and more...

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Green and Golden Bell Frogs at Priam Psittaculture Centre

Daniel Gowland, Facility Manager, Priam Psittaculture Centre, Priam Research and Breeding

Priam Research and Breeding in New South Wales, Australia recently established a new 'Frog Pod', and is currently developing husbandry protocols for establishing and maintaining a sustainable captive population of Green and Golden Bell Frogs.

Read More >>

Tinker Frog program update

Matt Hingley, Program Supervisor, Currumbin Wildlife Sanctuary

Currumbin Sanctuary, in Queensland, Australia, is working with the Critically Endangered Liem's Tinker Frog. They are developing breeding and rearing protocols that will hopefully be transferrable to more threatened species in the same genus.

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Paignton Zoo's amphibian centre

Mike Bungard, Curator of Lower Vertebrates and Invertebrates, Paignton Zoo Environmental Park

Paignton Zoo Environmental Park in the UK opened its new amphibian centre in 2009. Rather than purchasing and installing a shipping container as an amphibian facility, they renovated an under-utilised building, which significantly decreased the environmental waste that would have been generated by demolishing the building.

Read More >>

A new frog breeding facility is underway in the Dominican Republic

Peter J. Tolson, Director of Conservation and Research, The Toledo Zoo

A major initiative for Hispaniolan frog species at risk is taking shape at the Parque Zoológico Nacional - the national zoo of the Dominican Republic.

Read More >>

Geocrinia rear for release program

Kay Bradfield, Supervisor Native Species Breeding Program, Perth Zoo

Over the last few months of 2010, Perth Zoo staff travelled to Margaret River in the south-west of the State on several occasions to collect egg nests of two threatened species: the White-bellied Frog and the Orange-bellied Frog.

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Amphibian Conservation research at Cajas National Park, Ecuador

Carlos C. Martínez Rivera, PhD Amphibian Conservation Biologist, Philadelphia Zoo

Twelve masters students from the Universidad Internacional Méndez Pelayo in Ecuador are working with the Philadelphia Zoo, Zoo Amaru and Cajas National Park on amphibian research projects in the Cajas National Park.

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Unique frog helps amphibian conservation efforts

Andrew R. Gray, Curator of Herpetology, The Manchester Museum

A tropical frog – the only one of its kind in the world – is providing conservationists with exclusive insights into the genetic make-up of its closest endangered relatives.

Read More >>

New amphibian research program to begin at the Horniman Museum

James Robson, Deputy Aquarium Curator, Horniman Museum & Gardens

In 2011 the aquarium at the Horniman Museum in London would like to expand its areas of aquatic research to include work with amphibians, and for this purpose a specially-designed climate controlled room has been constructed.

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An update from the Association of Zoos & Aquariums

Shelly Grow, Conservation Biologist, AZA

The Association of Zoos and Aquariums reports on a number of projects that the Association and its members are involved in.

Read More >>

Just shoot me! An Amphibian Ark photography contest

Entries for Amphibian Ark's photography competition have been arriving almost every day, with just over 300 entries received to date. A few of these entries are featured here. The competition is open until April 30th, so if you haven't got your entries in yet, start shooting!

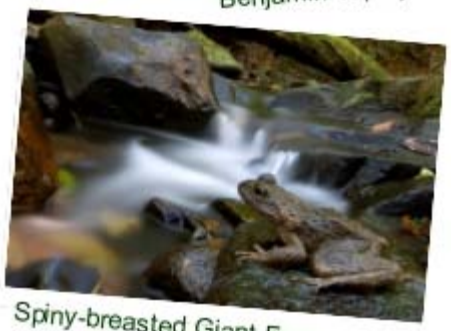
The twelve winning entries will feature in AArk's 2012 amphibian calendar, which will be available for sale in August this year. Proceeds will be used to assist Amphibian Ark conservation programs which are saving threatened amphibians.

The Amphibian Ark photo competition is open to all photographers, anywhere in the world, except for the members of the competition judging panel. You may enter as many different photos as you wish.

The production of our calendars is proudly supported by Fowler Printing & Graphics, Randolph, Massachusetts.


File-eared Treefrog. Bjorn Olesen.


Malabar Gliding Frog. Benjamin Tapley.


Spiny-breasted Giant Frog. Kin Onn Chan.

Submitting your photos

All entries must be submitted using the entry form on the Amphibian Ark web site www.amphibianark.org/photocompetition/ Photos must be submitted electronically, and must be received by Amphibian Ark before April 30, 2011. Printed versions will not be accepted.

Prizes

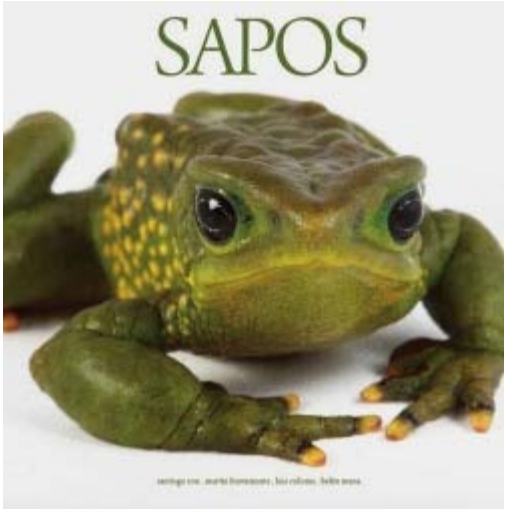
The twelve best photos will be selected for use in the 2012 Amphibian Ark calendar. Additionally, amongst the twelve winning entries, one photo will also be selected as the best images in each of the categories of Youth, In the wild, and In captivity.

The winning photo in each of the three competition categories will receive:

A copy of ***Frogs of Panama*** by Dr. Douglas Woodhams which explores the diversity of amphibians and the impact of disease on Panamanian populations (see www.blurb.com/bookstore/detail/174126).

A copy of ***Sapos***, a beautiful book from Ecuador by Santiago Ron, Martin Bustamante, Luis Coloma and Belén Mena, which uses the surreal patterns and colors of naturally beautiful amphibians in combination with and as inspiration for graphic art

(www.puce.edu.ec/zoologia/sron/sapos/index.html).



In addition, all twelve winning photos will each receive:

A copy of the ***2012 Amphibian Ark calendar***, featuring the winning photos from this competition.

A copy of ***Threatened Amphibians of the World*** published by the IUCN and NatureServe and edited by Simon Stuart et al. (www.lynxeds.com/product/threatened-amphibians-world).

A copy of ***Treefrogs…prehistoric survivors with a global message*** - the latest book from National Geographic photographer Ted Schiffman (see www.imageartisan.com/treefrogs.html).

For more information about the competition, please visit the photo competition page on the AArk web site.

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Sir David Attenborough endorses AArk's photography competition

Amphibian Ark Patron, Sir David Attenborough, recently endorsed AArk's amphibian photo competition. Here's what he has to say:

Frogs, toads and other amphibians are among the most beautiful creatures on the planet. They are instantly recognisable to most people, and to many, they hold a deep fascination. They occupy a wide range of land and water habitats, on every continent except in Antarctica.

For many people who live in ever-expanding large cities, access to wildlife in their surrounding areas is becoming rarer and rarer. Our cities and the increasing encroachment on forests for agriculture are having a huge impact on the decline of our wildlife, including our precious amphibians. Unfortunately, there are more and more of our children who only experience wildlife in zoos, on television, and through photographs in books and magazines. I am a firm believer of the powerful impact of beautiful photographs and images, and that when presented with succinct information about these species they can help to further raise awareness about the plight of amphibians.

I have spent much of my life bringing images of the Earth's astounding wildlife into the homes of many people around the world, I am delighted to endorse the Amphibian Ark's photography competition. As the saying goes "A picture paints a thousand words", and I would urge you to contribute your amphibian photos to this worthy competition. Imagine the impact that your photos, along with messages about saving this threatened class of animals will have, when they feature in Amphibian Ark's 2012 calendar.

By participating in this event, you will help raise awareness of the plight the world's amphibians and play an important role in helping to save them.

Sir David Attenborough
Amphibian Ark Patron

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Introducing the amphibian photo competition judges

Harlequin Treefrog. George Cevera.

Strawberry Poison Dart Frog. Corey Doughty.

Splendid Treefrog. Jose Fabio Araya.

We'd like to take this opportunity to introduce our panel of six international judges for our *Just shoot me!* amphibian photography competition. Each of our judges has many years experience in wildlife photography, amphibian conservation, or both, and we are very grateful to have them judging your inspiring images. A few of the entries are also featured here.

Franco Andreone, Italy

Franco Andreone (Ph.D) is Curator of Zoology at the Museo Regionale di Scienze Naturali, Torino (Italy). He conducts research about amphibians and reptiles, with a particular reference to conservation. Most recently he has carried out herpetological research field surveys in most of Madagascar's rain and dry forests.

He currently acts as chair of the IUCN/SSC Amphibian Specialist Group for Madagascar, and he has described several new species of Malagasy amphibians and reptiles. He coordinated publication of the Global Amphibian Assessment results for Madagascar and is the organizer of "*A Conservation Strategy for the Amphibians of Madagascar*" (ACSAM) Initiative.

Franco's web site, www.francoandreone.it details more of his activities, projects and photos.

Jeff Corwin, USA

Jeff Corwin has worked for the conservation of endangered species and ecosystems around the globe. He is the host of a variety of popular television shows, including Animal Planet's Jeff Corwin Experience, Corwin's Quest, Giant Monsters, Spring Watch, and King of the Jungle; Disney's Going Wild with Jeff Corwin; Investigation Earth with the Discovery Networks; NBC's Jeff Corwin Unleashed, which was nominated four times for an Emmy and won an Emmy for Outstanding Host; and the Travel Channel's Into Alaska and Into the American West.

His popular television series are seen in 120 countries worldwide. He also co-created and co-hosted CNN's Planet in Peril with Anderson Cooper in 2007. On November 20th 2008, Animal Planet premiered The Vanishing Frog. This powerful documentary highlights Jeff's year long, global odyssey exploring the mass extinction of our planet's important amphibian species. Men's Journal recognized Jeff as the world's greatest host of a natural history series. Jeff's book, *Living on the Edge, Amazing Relationships in the Natural World* is now its 5th edition.

Last year, Jeff released his powerful new book, *100 Heartbeats*. Both a Rodale book and an MSNBC documentary, the mission of *100 Heartbeats* is to investigate the plight of our planet's most endangered wildlife species along with the conservation heroes trying to save them. Through Puffin Books, Jeff has also recently published a series of books for younger readers focusing on wildlife, ecology and conservation.

Jeff's wildlife and conservation work has been regularly featured on a variety of television series including Larry King,

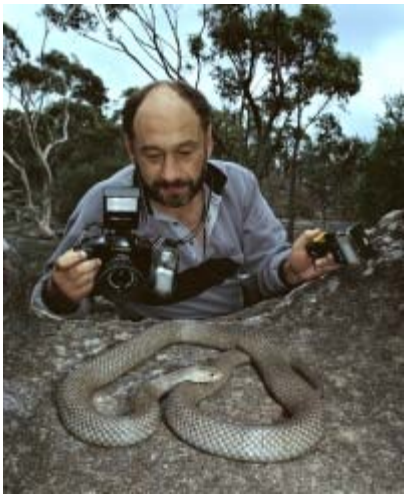
CNN, FOX, Good Morning America, The Today Show, CBS Morning Show, Ellen Degeneres, The Tonight Show with Jay Leno, Late Night with Conan O'Brian, Regis and Kelly and The Oprah Winfrey Show.

Beyond wildlife and conservation, Jeff is a passionate explorer of human culture especially as it connects to regional cuisine that is produced in a sustainable manner. His interests in renewable and sustainable living, along with how food is often the glue that cements together a community and culture, are featured in his latest series on the Food Network called *Extreme Cuisine with Jeff Corwin*.

Jeff is presently working as a correspondent for science and the environment for NBC where he is bringing the tragic impacts of the Gulf oil disaster into our living rooms. His expertise as a biologist makes him the perfect person to bring this story to millions of viewers.
A native of Massachusetts, Jeff has established an interactive museum and environmental education center called the EcoZone. Based in Norwell, Massachusetts, the goal of the EcoZone is to build awareness for the wildlife and ecology unique to the wetlands of southeastern Massachusetts.

In 2008 Jeff was named Ambassador for Global Warming and Climate Change on behalf of Defenders of Wildlife. He has a B.S. in Biology and Anthropology from Bridgewater State College, a M.S. in Wildlife and Fisheries Conservation from the University of Massachusetts-Amherst, and an honorary doctorate in Public Education from Bridgewater State College. When not travelling the world, Jeff can be found at his home off the coast of Massachusetts, where he lives with his wife, Natasha, and two daughters, Maya Rose and Marina Faye.
Jeff is also a keen wildlife photographer, and enjoys photographing animals while on location with his TV show. You can read more about Jeff on Animal Planet's web site, http://animal.discovery.com/fansites/jeffcorwin/jeffcorwin.html and you can also see videos that Jeff has made in support if the Amphibian Ark on the Videos page on our web site, www.amphibianark.org/education/videos/

Pavel German, Australia



Pavel German is an Australian wildlife photographer, particularly known for his close-up and macro-photography. He has published thousands of images in books, magazines, calendars, posters and cards.

Pavel was born in Kazakhstan, then part of the USSR, but grew up in Moscow. Since his childhood he has been fascinated by animals and nature, and dreamed of travelling the world. In 1981 he migrated to Australia, in large part because of the unique and interesting wildlife. Pavel has worked with animals for much of his life, including in New Guinea, islands of the South Pacific and in South-east Asia. He has been a full-time professional wildlife photographer since 1990.

Pavel's web site, www.australiannature.com contains a wonderful selection from his photographic collection, focussing on the wildlife of Australia and the neighbouring countries of the south Pacific and south-east Asia.

Francisco José López López, Colombia

(*Profile not available at time of printing.*)

Bryan Maltais, USA

Bryan Maltais has been making photographs for about fifteen years, but although he won't tell you how long ago it was, he was born with a love of amphibians. The two go quite well together. He formally learned about amphibians at university, where he studied Wildlife Biology with an emphasis on Herpetology.

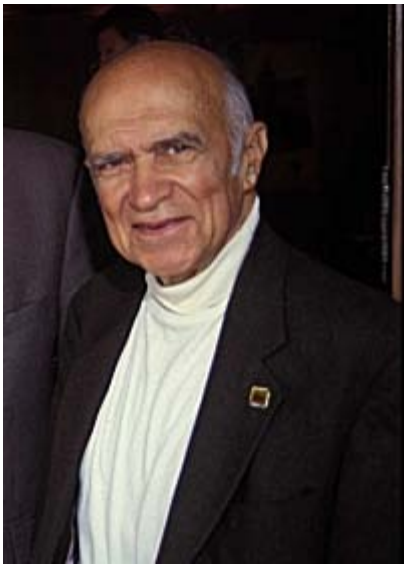
He is a a self-taught nature photographer and produces archive quality fine art prints for various clientele, many of which have won awards. He also produce independent nature documentaries, and has filmed several episodes about amphibians. Bryan loves the mountains, and lives in Fort Collins, Colorado.

Bryan's web site, www.WildernessShots.com features a selection of his nature photos and wildlife documentaries.

Dr. George B. Rabb, USA

President Emeritus of the Chicago Zoological Society, George B. Rabb served as Brookfield Zoo's director from 1976 until 2003. Rabb's pioneering work led the zoo

towards its current position as a conservation centre, a concept Rabb has championed for zoos everywhere. Rabb received both master's and doctoral degrees from the University of Michigan, Ann Arbor, and his bachelor's degree from the College of Charleston, South Carolina. He joined Brookfield Zoo in 1956 as curator of research. Rabb created the zoo's Education Department and was instrumental in the use of naturalistic exhibitry to provide visitors with environmental immersion experiences throughout the zoo. Additionally, under Dr. Rabb's direction, the zoo pioneered a new approach to helping children develop caring attitudes towards nature.



Dr. Rabb has affiliations with conservation organizations worldwide and is a respected spokesman on wildlife conservation issues. Most notably, he is past chairman of the Species Survival Commission of IUCN, the largest species conservation network in the world, and he founded the Declining Amphibian Population Task Force.

On the local scene, Rabb serves as President of Chicago Wilderness Magazine. He is active with the biosphere reserve initiative of Chicago Wilderness, a multi-organizational effort to maintain the exceptional biological diversity of the metropolitan region. He has long been a member of the University of Chicago's Committee on Evolutionary Biology, and a research associate of The Field Museum. Dr. Rabb currently serves as Chairman of the Illinois State Museum Board and is on the board of Defenders of Wildlife.

Dr. Rabb is a published authority on the behaviour of mammals, reptiles, and amphibians, notably on social behaviour of a captive wolf pack, behavioural development in okapi, and breeding behaviour of pipid frogs. His other studies have ranged from the evolutionary relationships of viperid snakes to diabetes in tree shrews.

For more information about the competition, please visit the photo competition page on the AArk web site.

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Call for proposals for AArk Seed Grant

Amphibian Ark is pleased to announce the 3rd annual call for proposals for its Seed Grant program!

This competitive $5,000 grant is intended to fund start-up rescue projects for species that cannot currently be saved in the wild. Successful proposals will reflect AArk values; please pay careful attention to the grant guidelines (at www.amphibianark.org/about-us/aark-activities/aark-seed-grant/) for details on what types of projects are favoured.

Past grantees can be seen at the web link listed above.

We would like to acknowledge the generous support of the Andrew Sabin Family Foundation, Ronna Erickson, Josie Lowman, Wildlife Conservation Society, Woodland Park Zoo, the European Association of Zoos and Aquariums, and the other AArk supporters who helped establish this grant.

Important dates:

- grant application deadline: 1 May 2011
- grant decision date: 15 May 2011
- grant payment date: 1 June 2011
- progress report due 1 June 2012

Inquiries can be directed to Kevin Zippel, Program Officer KevinZ@AmphibianArk.org.

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Conservation needs assessment for Japanese amphibian species

Kevin Johnson, Taxon Officer, Amphibian Ark

In January 2011, Asa Zoo in Hiroshima, Japan, was the host for an amphibian conservation needs assessment workshop, covering 62 native Japanese species. Mr. Daimaru, the Asa Zoo Director and Dr. Kazushi Kuwabara welcomed Japanese field experts, amphibian biologists and researchers, representatives from the Ministry of the Environment, AArk staff and observers to the workshop, and the first day began with a presentation on the Amphibian Ark and the assessment process, followed by one and a half days of species assessments.

During the explanation of the assessment process, workshop participants suggested a number of small modifications to the process to better suit some of the amphibian programs in Japan, and to add additional clarity to the definitions of the questions. These suggestions have now been incorporated into the tool, and future workshops will benefit from them.

The assessment of 62 species resulted in the following recommended conservation actions:

- 1 species recommended for ***In Situ*** Research - This is a species that for one or more reasons requires further *in situ* research to be carried out as part of the conservation action for the species. One or more critical pieces of information is not known at this time.
- 62 species that will benefit from ***In Situ*** Conservation - Species for which mitigation of threats in the wild may still bring about their successful conservation.
- 34 species suitable for ***Ex Situ*** Research - Species undergoing specific applied research that directly contributes to the conservation of the species, or a related species, in the wild (this would include clearly defined ‘model’ or ‘surrogate’ species).
- 60 species that are suitable for Conservation Education - Species that are specifically selected for management, primarily in zoos and aquariums, to inspire and increase knowledge in visitors, in order to promote positive behavioural change. For example, when a species is used to raise financial or other support for field conservation projects (this would include clearly defined ‘flagship’ or ‘ambassador’ species).

The assessment workshop concluded with presentations from a number of the workshop participants on their amphibian conservation work and some of the leading amphibian breeding and research programs.

On the following day, a public amphibian workshop was held, which began with an update on the results of the assessment workshop from Dr. Kuwabara. This was followed by a presentation on the amphibian crisis by AArk’s Kevin Zippel, and then a tour of Asa Zoo’s Giant Salamander breeding facilities – Asa Zoo has the most successful record for breeding this species in the world, and it is one of the oldest managed amphibian breeding programs. In the afternoon all the participants were taken on a field tour to visit a Giant Salamander conservation area in the Shijihara River in Kitahiroshima-cho, Yamagata, Hiroshima Prefecture, that Asa Zoo staff have been working with for many years. This was a great opportunity for us all to see the type of habitat that these fascinating animals live in, and to hear about the dedication of the people living in the village of Shijihara, who educate school children and visitors about the conservation of this iconic threatened species.

We would like to thank Dr. Kuwabara and Dr. Kanako Nishimoto for their many hours of organizing this workshop, the staff of the Asa Zoo for their wonderful hospitality, and Dr. Nishimoto and Dr. Yumiko Kato for their translations during the workshop.

The result of the workshop can be found on the Conservation Needs Assessment Results page on our data portal.

Participants of the recent Amphibian Conservation Needs Assessment workshop for Japanese species, held at Asa Zoo in Hiroshima. Photo: Asa Zoo.

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Amphibian Ark has a new Facebook page!

AArk now has a new Facebook page, which replaces our old Facebook group. You can now find us here: www.facebook.com/pages/Amphibian-Ark/200263336657477

The page provides better options for our friends, partners and colleagues to better communicate about amphibian conservation issues. The page is still open for anyone to post to, and includes new photo and video libraries, discussions and events.

We hope you'll come and join us on our new page!

We're hoping to build our new Facebook community even bigger than it was on the old page, which had 2,286 members. Help us spread the word about amphibian conservation issues by clicking the Like button above and then sharing our new page with your friends and family when you next vist Facebook.

We know that you care about amphibians, and we hope you'll encourage others to care as well.

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SAN DIEGO ZOO INSTITUTE FOR CONSERVATION RESEARCH

AMPHIBIAN DISEASE LABORATORY NEWSLETTER

Vol. II - February 2011

The Amphibian Disease Laboratory (ADL) has been hopping!

Written by: Megan Jones, DVM, DACVP, Amphibian Pathology Fellow

Since beginning operation in February, 2009, we have tested over 7000 samples for the amphibian chytrid fungus *(Batrachochytrium dendrobatis or Bd).* Using information in our diagnostic testing database, we are beginning to shed light on the patterns of *Bd* infection in captive amphibian populations.


Photo by K. Benson

How common is *Bd* in zoo collections?

We partnered with seven zoos or aquariums that performed complete surveillance of their entire amphibian collections. The animals sampled in this survey were healthy and exhibited no symptoms of disease. *Bd* was detected in four of the seven zoos, with a range of 2 to 3% positive. These findings confirm that *Bd* is present at low levels in some zoos, and underscore the critical importance of disease surveillance, quarantine, and other biosecurity measures to identify subclinical carriers and prevent transmission of disease to susceptible species, especially those in survival assurance populations or reintroduction programs.


Photo by K. Benson

Which animals may be more likely to test *Bd*-positive?

On our submission forms, we always ask for your reason for testing. Testing categories include routine surveillance, quarantine screening, sick animal, or pre-shipment/pre-release. Preliminary analysis suggests that samples from amphibians in quarantine and from sick animals test positive for *Bd* more often than those taken for the purpose of routine collection surveillance. Not surprisingly, animals tested because of suspected exposure to other known *Bd*-positive animals are the most likely to test *Bd*-positive.

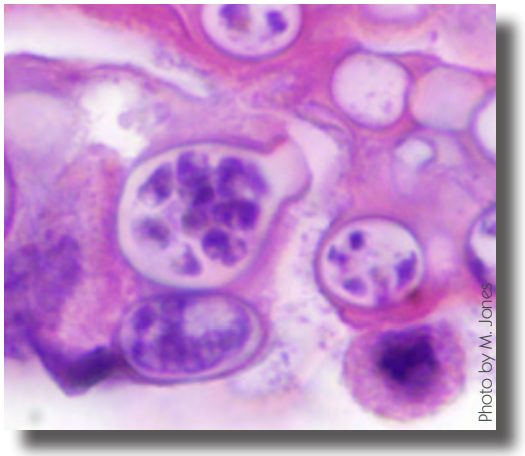


Photo by M. Jones

Continued on page 2....

Treatment of *Bd* Infection

Based on follow-up information kindly provided by our clients, the antifungal drug itraconazole has been the most commonly used treatment for *Bd* infection in U.S. zoos. Most facilities report using the drug at the "standard" dose of 0.01% (100 mg/L) administered as five-minute daily baths for ten days (see Pessier and Mendelson, 2010). However, effective treatment has also been achieved using the lower dose of 0.005% (50 mg/L). Low dose treatment success has been confirmed through serial post-treatment PCR testing in two different captive amphibian populations. Please note that itraconazole is known to be potentially toxic to tadpoles and new metamorphs at standard dosages, and occasional adverse effects are reported in adult amphibians. There is still an urgent need for controlled clinical trials for itraconazole and other *Bd* treatments, but it appears that lower doses could be both effective and safe.

Testing Strategies: Serial Samples

Previous experimental data have shown that, in cases of low-level infections, individual animal PCR test results can vary over time (Hyatt et al, 2007). Data we have collected from real-world samples support this finding: a single subclinically infected animal can vary between PCR-positive and PCR-negative over the course of several weeks of infection. This is because in low level infections, it is possible to swab an animal during a phase of the fungal life cycle where most or all of the fungal zoospores have been recently discharged, leaving behind very little or no fungal DNA to detect by PCR. In this case, a skin swab will test negative, though the animal is actually infected (false negative). Thus, we recommend that you consider serial PCR testing in certain cases. While we recognize that this may not be economically feasible for all situations, we suggest a cost/benefit analysis, and consider sampling animals multiple times in higher-risk situations. These situations may include wild caught animals, animals with an uncertain health history, animals with known exposure to *Bd*-positive populations, and in cases of exceptionally valuable animals where a risk of missed infection is unacceptable (such as with survival assurance populations of endangered species).

Conclusions

Preliminary findings from our database suggest that *Bd* may be present and undetected in some zoo collections. This highlights the importance of collection screening and biosecurity. The information you provide on our submission form, and the time you take to provide follow-up information to us, are greatly appreciated, and are helping contribute to our ongoing efforts to improve our understanding of the amphibian chytrid fungus in captive amphibian populations.

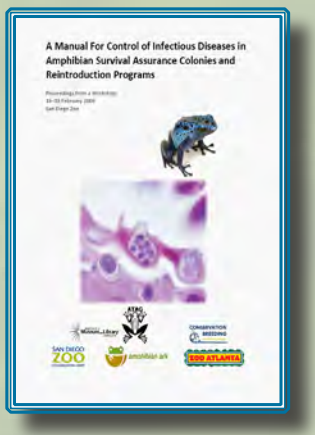
Hyatt, A.D., D. G. Boyle, V. Olsen, D. B. Boyle, L. Berger, D. Obendorf, A. Dalton, K. Kriger, M. Hero, H. Hines, R. Phillott, R. Campbell, G. Marantelli, F. Gleason and A. Colling. 2007. Diagnostic assays and sampling protocols for the detection of Batrachochytrium dendrobatidis. Diseases of Aquatic Organisms 73: 175–192.

Pessier, AP, and JR Mendelson (eds.). 2010. A Manual for Control of Infectious Diseases in Amphibian Survival Assurance Colonies and Reintroduction Programs. IUCN/SSC Conservation Breeding Specialist Group: Apple Valley, MN.

The **AMPHIBIAN DISEASE CONTROL MANUAL**

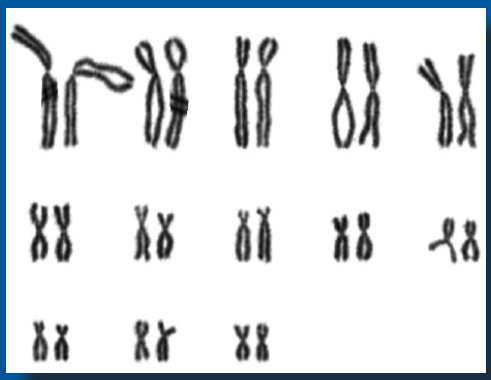
is a new, valuable resource for people who work with captive amphibians.

Click on the image for a complete, free PDF copy of the manual!

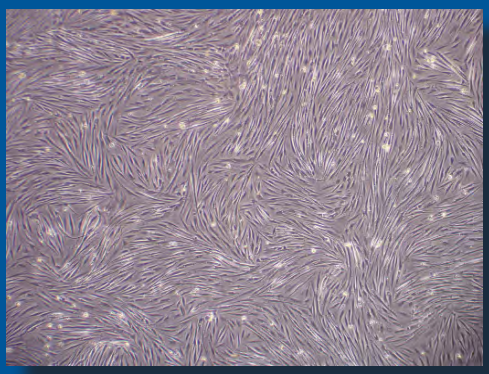


Genetics

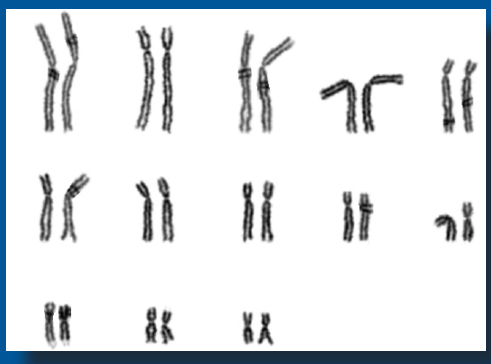
Written by: Andrea Johnson, Research Technician



American Bullfrog Karyotype
Photo by A. Johnson



White's Tree Frog Tongue Cells
Photo by S. Charter



White's Tree Frog Karyotype
Photo by S. Charter

It was a productive year for the Genetics team in our pursuit of frog samples and cell lines. We processed over 250 samples from about 75 individual animals. We made an important discovery when we were able to grow cells from a piece of African bullfrog tongue that had been frozen in liquid nitrogen for four months! This validates our strategy of collecting pieces of frozen tissue from as many species as possible. Important species that we can't grow cells from now can be "tissue pieced" to be thawed and cultured when we have come closer to perfecting amphibian cell culture methods.

Four new amphibian species were added to our tissue piece collection during this last year: axolotl, vermiculated tree frog, Japanese giant salamander, and Chiricahua leopard frog.

We also successfully froze an axolotl cell line, for a total of nine species represented by viable frozen cell lines. That may not sound like many, but considering that tissue culture has never even been attempted on the vast majority of amphibian species, it's something we are proud of.

Fresh samples are still hard to come by so.....

we still need your help!!

We are always grateful to receive pieces of tissue when you have a frog die. Each attempt teaches us a little about what to do (and what not to do!). Thank you for all the help and support you have given so far.

To learn how to collect samples, please contact the

San Diego Zoo's Cytogenetics Lab
at
(760) 747-8702 x5716
or email
Andrea Johnson ajohnson@sandiegozoo.org
or Marlys Houck mhouck@sandiegozoo.org

You can also request a tissue culture sample kit to be included with your chytrid and/or ranavirus testing kit.

We offer free kits containing stardarized tubes and swabs for our clients. Just send us an email at

AmphibianLab@sandiegozoo.org

and let us know how many samples you are planning to submit and we will send you a package.

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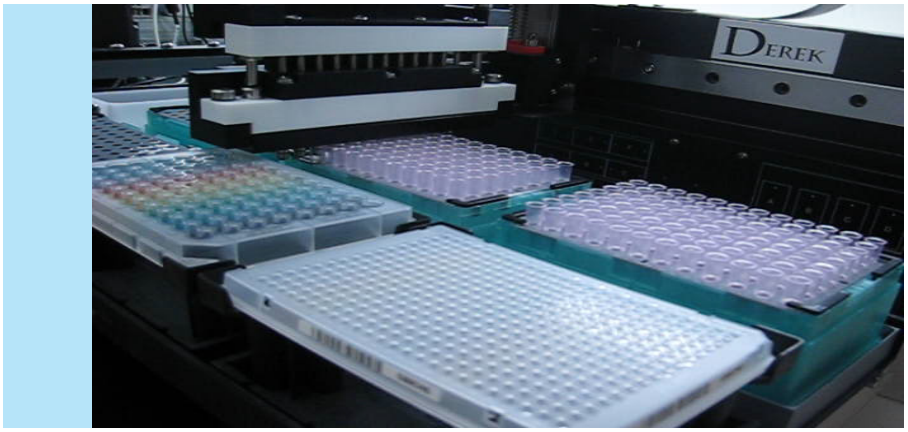
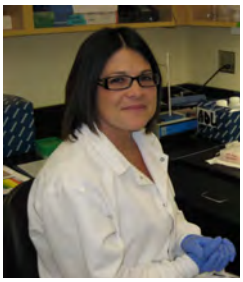


We are sincerely grateful for for the generous donation of the BioTek Precision Liquid Handler and many other contributions that make every day in the lab more efficient and productive, and look forward to their continued support in our efforts to help you maintain a healthy and happy amphibian community!

Amphibian Disease Lab

Allan Pessier.....Project Director
Megan Jones.....Amphibian Pathology Fellow
Mark Schrenzel...Head of Molecular Diagnostics
Bruce Rideout.....Director Wildlife Disease Labs
Tammy Tucker.....Wildlife Disease Lab
Jennifer Burchell.....Wildlife Disease Lab
Isamara Navarrete.....Wildlife Disease Lab
Kristin Benson.....Data Coordinator
Karen Neely.....Finance
Oliver Ryder.....Director of Genetics
Marlys Houck.....Genetics Lab
Andrea Johnson.....Genetics Lab
Suellen Charter.....Genetics Lab

Meet Our Newest Member



Please welcome our new laboratory technician

Jennifer Burchell!!!

The Amphibian Disease Laboratory is supported by grant LG-25-08-0066 from the Institute of Museum and Library Services. Any views, findings, conclusions or recommendations expressed in this publication do not necessarily represent those of the Institute of Museum and Library Services.

SAN DIEGO ZOO GLOBAL

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Green and Golden Bell Frogs at Priam Psittaculture Centre

Daniel Gowland, Facility Manager, Priam Psittaculture Centre, Priam Research and Breeding

With the assistance of Dick Smith, New South Wales National Parks and the enthusiastic amphibian aficionados of Taronga Zoo's amphibian course and Museum Victoria, Priam Research and Breeding has established the 'Frog Pod'. This is a movable wildlife research laboratory, designed by Dick Smith with Antarctic conditions in mind, that has now laid foundations on the Lake George escarpment just outside Bungendore in the Southern Tablelands of New South Wales, Australia.

The 'Frog Pod', a movable wildlife research laboratory at Priam Research and Breeding Centre, currently houses Green and Golden Bell Frogs. Photo: Daniel Gowland.

Following discussions with National Parks regarding species, the Green and Golden Bell Frog, *Litoria aurea*, was identified as of interest for a captive population managed for research and species insurance. The Green and Golden Bell Frog occurs mainly along coastal lowland areas of eastern New South Wales and Victoria, with the furthest inland record of the species at a recently discovered population near Hoskinstown in the Southern Tablelands (referred to as the 'Molonglo Population' (Osborne et al. 2008). The species was previously known from other places on the Southern Tablelands but is considered to have disappeared from the Australian Capital Territory and central slopes of New South Wales. It is listed federally as Vulnerable, and its conservation status in New South Wales is Endangered. It is listed on the IUCN Red List as Vulnerable.

The team at Priam are developing and fine-tuning husbandry protocols required for establishing and maintaining a sustainable captive population of Green and Golden Bell Frogs in the Southern Tablelands region. It is hoped that the development of this model for amphibian research and breeding using a movable 'Pod' will be able to be used more broadly for other amphibian species and small mammals.

The Green and Golden Bell Frog is listed nationally as Vulnerable, but its conservation status in New South Wales is Endangered. Photo: Daniel Gowland.

Juvenile frogs from Museum Victoria are now in their first breeding season, giving us our first chance at sexing by looking at the forelimb nuptial pads. The first egg laying was recorded in the evening of February 11, 2011, following a week of warm night temperatures and high humidity.

Currently a modified chiller unit has become the breeding room for crickets and mealworms. This has been an interesting lesson in insect husbandry for us, as they are the frogs' main food.

Reference and additional information

Osborne, W., S. Patmore, D. Hunter & R. Pietsch (2008).
Preliminary observations on a highly-restricted tableland population of Green and Golden Bell Frogs on the Upper Molonglo River, NSW. Australian Zoologist. 34(3):271-284.

ARKive: Green and Golden Bell Frog

SPRAT (Species Profile and Threats Database - environment.gov.au)

Wikipedia: Green and Golden Bell Frog

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Tinker Frog program update

Matt Hingley, Program Supervisor, Currumbin Wildlife Sanctuary

There is clearly no question that the arrival of chytrid fungus to a naive ecosystem activates a devastating chain of events throughout the Amphibian communities. Upon its arrival in Australia, the amphibian communities in Queensland, Australia were not exempt. *Taudactylus* is an endemic frog genus to Queensland and one of the most vulnerable targets.

Six species of *Taudactylus* exist: Sharp-snouted Day Frog, *Taudactylus acutirostris*, Mount Glorious Torrent Frog, *T. diurnus*, Eungella Day Frog, *T. eungellensis*, Liem's Tinker Frog, *T. liemi*, Kroombit Tinker Frog, *T. pleione* and Northern Tinker Frog, *T. rheophilus*, all of which are Critically Endangered.

Some possible explanations for the inability of this species to effectively combat the threat are:

- *Taudactylus* are extremely susceptible to chytridiomycosis
- their restricted distribution and (in some cases) a small total population size
- their association with cool mesic environs (upland sub-tropical/tropical rainforest) where amphibian chytrid appears to thrive
- their low fecundity; and the sympatric occurrence of more chytrid-tolerant hosts (e.g. Barred Frogs and Stony Creek Frogs) which serve as a reservoir for the fungus.

A breeding program for Liem's Tinker Frog, *Taudactylus liemi*, has been established at Currumbin Sanctuary in Queensland, Australia. Photo: Dr Ed Meyer.

With the IUCN's suggestion that approximately 400 amphibian safe houses are immediately required globally to arrest the catastrophic extinction rate of amphibian species, it was clear that the fist such facility in Queensland should host representatives of the tinker frogs. The species selected for an *ex situ* program at Currumbin Wildlife Sanctuary was *Taudactylus liemi*. Liem's Tinker frog was named after the Indonesian zoologist responsible for the discovery of the Gastric-brooding Frog, *Reobatrachas silus* in 1973. Liem's Tinker Frog modestly boasts the highest population of the remaining tinker frogs and for this reason it was selected for collection from the wild (Hero et al 2005). Findings in captivity would to some degree be transferrable to their more threatened cousins.

Amphibian disappearance globally appears to occur rapidly, with so few of the tinker frogs currently in existence there is a sense of urgency associated with the discovery of captive management techniques required in order to maintain them in captivity. The accomplishment of successful captive reproduction will certainly contribute toward defending these species against their eminent extinction.

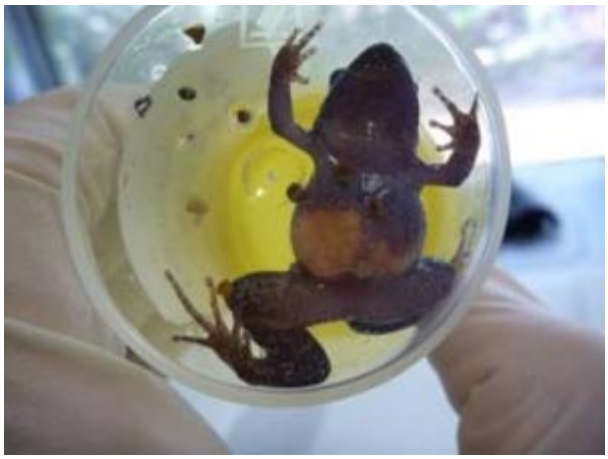
In November 2009 a team including biologists and zoo personnel undertook the task of locating and collecting eight individuals from the Eungella Rainforest. The successful capture and translocation of these tiny frogs to the captive facility at Currumbin Wildlife Sanctuary on Queensland's Gold Coast has delivered considerable progress to date.

Careful trial and error has revealed what appears to be a successful treatment regime for *Taudactylus* infected with chytrid fungus. Surprisingly, swabs taken from all except for one of the collected specimens revealed positive chytrid infection. These delicate tiny frogs are extremely heat sensitive, and chytrid treatment is compounded by the fact that they are unable to be restrained by hand during the treatments process. The frogs were expected to be quite sensitive to the drugs trialled, however early mortalities were attributed to advanced effects of the disease rather than the treatment agent employed. The dose rate and treatment agreed upon for the management of chytrid at present in the captive *Taudactylus* population is one twentieth of the recommended dosage (0.1% Itraconozole) as follows: (0.005% Itraconozole), 6 0ml 0.9% NaCI, 30 ml WFI, 0.9 ml Sporanox Oral 10 mg/ml. This regime requires the bathing of frogs in Itraconozole solution for ten minutes on ten consecutive days. A chytrid-free status for frogs was assumed in each case if negative swabs were returned on three consecutive tests.

Fifteen tadpoles were also collected at a range of development stages. The two most advanced successfully metamorphosed into froglets and underwent treatment for chytrid due to the apparent widespread condition of the fungus and the belief that they were at high risk in the first ten days after metamorphosis. These two froglets died soon after treatment and it was assumed that the strength of the drug treatment to body surface area of the froglet was probably too aggressive for this life stage. When an additional two metamorphs transformed they were transferred to a terrestrial holding container and raised without treatment. This option proved to be successful with both growing to one year of age.

One of the original adult frogs collected fortunately proved to be a female. In autumn this female presented signs of egg development, visible through the translucent under surface of the abdomen. The development of this egg mass has been monitored and recorded as the eggs advanced through autumn when there was a plateau in development through the winter months. During this period the captive environmental conditions were altered to reflect those recorded by data loggers in the field by Griffith University, over previous seasons. This initiative was financially supported by Dreamworld's Conservation Funding program delivering the information pertinent to the species and their management in captivity. The temperature/photo-period and rain misting in the Currumbin Wildlife Sanctuary facility were reduced in order to closely mimic that experienced by this species in the natural environment. The arrival of spring activated the opportunity to increase these climatic influences in the hope that the reproductive activity of the frogs would also increase. The additional stimulus of artificial vocalization from recorded males was employed. In the wild the males generally call between 4:00 pm and 7:00 pm when seasonal conditions are appropriate. These background calls have been played intermittently daily with the aim of increasing the reproductive potential of this small group of tinker frogs as summer approaches.

Above: A recently metamorphosed Tinker Frog which was collected from the wild as a tadpole. Below: A gravid female Liem's Tinker Frog, showing signs of egg development. Photos: Natalie Hill.



The project is funded by Currumbin Wildlife Sanctuary and Griffith University however, additional generous supportive funding for the project has been provided along the way. Dreamworld's Conservation Fund delivered the finance required to record and analyze the environmental data, including temperature and humidity throughout the seasons. This important information was collected via data loggers secured carefully in the field. The information gained provides the basis for environmental control throughout the year in the *ex situ* facility. Australian Geographic is also a supporter of the project via Griffith University.

Participants in the project were excited by recognition from a number of organizations, and are very appreciative of the additional funding from: the Chicago Zoological Society, Board of Trade Endangered Species Fund, which provided the project with $5,000; and the Zoo Aquarium Association (Wildlife Conservation Fund) Field Conservation Committee which awarded the project $14,000, raised during the Year of the Frog campaign. Additionally, local support came from the 2010 Queensland Frog Society's Ric Nitrass Grant, of $1,000.

The team is currently planning an additional collection trip with the hope that additional females will be discovered for the program. Significant mortalities occurred throughout the tadpole group in the first collection. This has led to the development of a considerably different approach to the captive management of this life stage for the species and improved protocols will be trialled upon collection of additional specimens.

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Paignton Zoo's amphibian centre

Mike Bungard, Curator of Lower Vertebrates and Invertebrates, Paignton Zoo Environmental Park

Amphibian declines have long been well published by both conservationists through peer reviewed journals and on a wider scale by the media. This increased awareness has prompted a surge of effort from conservation bodies the world over. Amphibians face both proximate (*Batrachochytrium dendrobatidis*) and ultimate (climate change and pollution) causes and the declines require affirmative action on all fronts. There is no single tool in conservation that offers a panacea; instead, it is the interaction of each conservation method applied by merit that produces effective results.

Amphibians offer zoological collections the opportunity to actively prove their conservation credentials. The small footprint in terms of space and time of many species, make amphibians in theory, a potential conservation success story for captive programs. Captive programs can offer refuge and opportunities for conservation action that potentially extend well beyond their physical boundaries. The importance of captive programs should not be overlooked and if executed synergistically with external conservation efforts, captive programs and breeding centres can, and do, form an integral part of the conservation front-line.

The main amphibian exhibit, looking towards the Fantastic Frogs display. Photo: Mike Bungard.

Paignton Zoo Environmental Park in the UK, responded to the call to arms by opening its own amphibian centre in 2009 following the response of many other collections. Typically, those collections with significant amphibian species have invested in self-contained breeding units built from shipping containers and these have proved to be very effective. However, Paignton had on site a large, under-utilised building and therefore the self-contained pods weren't a realistic option; they did not fit with the site logistics nor make sense in an age when decreasing environmental waste – in this case building rubble and waste materials – is critical. Instead, the L-shaped building almost in the centre of the zoo site was selected for refurbishment. Three bio-secure rooms were built into the existing structure, one education space with large viewing windows into each amphibian room and of course improved facilities for keepers. The refurbishment also made the building more environmentally friendly through improved insulation and efficient energy use.

The centre was also blessed in two additional ways: it inherited a lecture theatre at the end of the building and it came with an outside area, which has now been transformed into a wildlife garden for native species. The pond system houses the national Iris collection, which in turn acts as a giant filter in order to maintain water quality. Despite being in the middle of the zoo, the garden, although in its infancy, has attracted a myriad of birds and now in spring the first signs of amphibians can be seen.

The type of facilities matter to an extent, but it is the philosophy of the centre, which underpins the ability to deliver results. The centre has two main goals; the provision of research opportunities and provision of a framework from which *in situ* programs can function. A number of amphibians are kept to offer *ex situ* study opportunities. For example, there are study opportunities investigating diets of tadpoles and colour development in froglets; how behavioural responses change under different light wavelengths; responses to calls under varied environmental conditions. These studies should not only give rise to improvements in husbandry but in some circumstances, be able to give an indication of the degree of interaction between frogs and specific environmental variables which may have uses for *in situ* conservation practitioners and land use managers.

In situ conservation at the centre is in its early stages and still developing, but it is critical to the centre's function. Success has already been achieved in establishing a monitoring project for critically endangered forest toads, *Nectophyrnoides* spp, in the Eastern Arc Mountains, Tanzania. Paignton Zoo Environmental Park, with project partners the Tanzanian Forest Conservation Group, managed to secure c. £7,000 from the European Association of Zoos and Aquaria (EAZA) and utilize local expertise in running and managing the field work. Field work began in

Above: The public corridor in the new amphibian centre showing two windows into the amphibian rooms.
Below: An new outdoor wildlife pond for native species has been included with the amphibian centre, which is already, showing signs of amphibians. Photos: Mike Bungard.

January 2011 and despite facing the driest wet season for years (perhaps an example of climate change) the field team managed to locate and photograph a key species, *Nectophrynoides wendyae*. The project is split into phases, with the first phase designed to establish species range and a few environmental parameters or constraints. The intention of the centre is not to take animals from their native range unless there is absolutely no other option. The priority remains that species should be protected in their home range where possible.

The collection does hold conservation important species but these are retained in order to establish husbandry guidelines, for research, or insurance populations should there be a worst case scenario. Madagascar is a hotspot for amphibian diversity and currently EAZA is responsible for establishing zoo orientated conservation measures for this diverse island. These measures are reflected in the regional collection plans. Paignton currently holds one of the largest groups of Malagasy frogs in the UK and sees this collection playing a critical role in conserving these beautiful animals.

The centre at Paignton Zoo isn't unique; many other collections have amphibian centres and conservation programs which are deservedly respected. But, when faced with a problem in the order of magnitude of the global amphibian crisis, then the centre is extremely important along with every other breeding and research unit in the world. Amphibian Ark offers the coordination the crisis needs, we, in our collections offer the facilities.

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A new frog breeding facility is underway in the Dominican Republic

Peter J. Tolson, Director of Conservation and Research, The Toledo Zoo

A major initiative for Hispaniolan frog species at risk is taking shape as the Parque Zoológico Nacional - the national zoo of the Dominican Republic, the Pueblo Viejo Dominicana Corporation, Rescan Environmental Services Ltd., and the Toledo Zoo combine forces to work on development and construction of an endangered frog breeding facility at the Parque Zoológico Nacional.

The facility will serve as a breeding and rescue center for endangered species of frogs in the Dominican Republic. Anchored by the Republic of Haiti on the west and the Dominican Republic on the east, Hispaniola is a topographically diverse island and has incredible anuran biodiversity. Unfortunately, more than fifty species of Hispaniolan frogs are currently considered at risk by the International Union for Conservation of Nature (IUCN).

Our initial efforts will focus on husbandry and breeding of two species of beautiful endemic tree frogs: the Hispaniolan Giant Tree Frog, *Osteopilus vastus*, and the Hispaniolan Yellow Tree Frog, *O. pulchrilineatus*. In the future the center has plans to expand into propagation and conservation of some of the island's many *Eleutherodactylus*- a speciose group of attractive little terrestrial frogs whose eggs hatch directly into live froglets and bypass an aquatic tadpole stage.

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Geocrinia rear for release program

Kay Bradfield, Supervisor Native Species Breeding Program, Perth Zoo

Over the last few months of 2010, Perth Zoo staff travelled to Margaret River in the south-west of the State on several occasions to collect egg nests of two threatened species: the White-bellied Frog, *Geocrinia alba*, and the Orange-bellied Frog, *G. vitellina*. A total of fifteen nests were collected, nine *G. alba* and six *G. vitellina*. The nests were transported back to the Native Species Breeding Program at Perth Zoo as part of a rear-for-release program.

Both species have small clutch sizes with an average of 10-12 eggs per clutch. Once the eggs have hatched, the tadpoles remain in the nest for the entire larval period, relying on their yolk sacs for nutrition (i.e. they do not have a free-swimming or feeding tadpole stage).

Tadpoles in the nests brought back to the Zoo metamorphosed between early December 2010 and early January 2011 and weighed between 0.02 and 0.03 grams each. Initially, they are fed exclusively on springtails; once they are large enough, we begin including vestigial Drosophila and hatchling crickets in their diet. We currently have around fifty individuals of each species, housed either individually or in pairs, and they are growing rapidly. The largest individuals already weigh 0.12 grams – four to six times what they weighed at metamorphosis.

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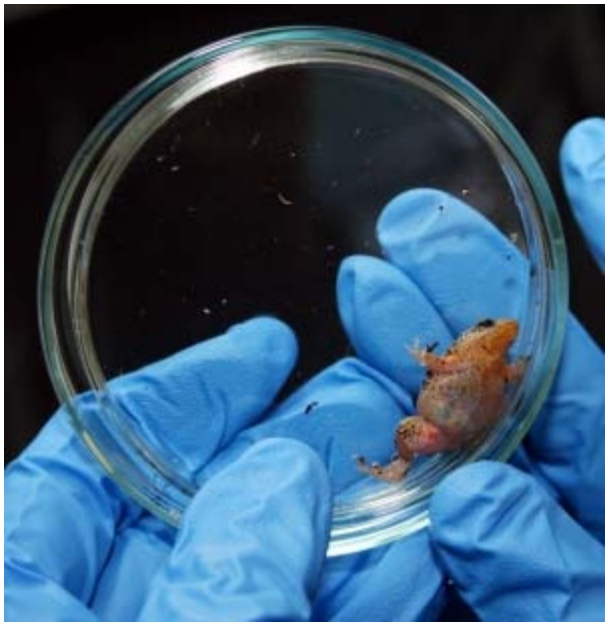

One of the White-bellied Frogs that is being raised at Perth Zoo in Western Australia. Photo: Perth Zoo.

Amphibian Conservation research at Cajas National Park, Ecuador

Carlos C. Martínez Rivera, PhD Amphibian Conservation Biologist, Philadelphia Zoo

On January 15-16 2011, twelve masters students from the Universidad Internacional Méndez Pelayo (UIMP) took a thirteen-hour bus ride from Quito to the city of Cuenca, in Ecuador. The bus trip is usually not that long, but this time road conditions, weather and various construction sites along the way, made it just a bit more excruciating. The students came down to visit Zoo Amaru's team and visit Dr. Carlos Martínez Rivera, at the Amphibian Conservation Center – Mazán Forest (CCA-Mazán, in Spanish) to explore options for research at Mazán forest and Cajas National Park and help us find out where amphibians reman here, why so many amphibians have reduced populations or have gone all but extinct, and how to revert those conditions in order for us to be able to repopulate ancestral habitat with individuals from the assurance populations being kept at CCA-Mazán.

Cajas National Park, Mazán forest, and its surrounding areas are home to at least seventeen recognized species of amphibians, including some critically endangered species, endemic to the region. The group of unfortunate fellows include three harlequin toads endemic to the region, *Atelopus exiguus*, *A. nanay* and *A. onorei*, two Andean poison frogs that seem to have been completely extirpated from the Park. *Colostethus anthracinus* and *Hyloxalus vertebralis*, and the aquatic frog *Telmatobius niger*, which might be extinct. Of the other eleven species, one glass frog, *Centrolene buckley*, and the Nelson's narrow mouth toad, *Nelsonophryne aequatorialis*, also seem to have disappeared from within the park boundaries. The two marsupial frogs, *Gastrotheca litonedis* and *G. pseustes*, and the seven land frogs, *Terrarana*; *Pristimantis cryophilus*, *P. phillipi*, *P. riveti*, *P. ruidus*, *P. vidua*, *P. w-nigrum* and *Strabomantis* sp1, reported from the park, seem to be in slightly better shape, but are not doing well at all. On top of this, we believe there are still some additional species present in the park that have not been reported and might even be new to science. Seventeen species of amphibians in the list is quite impressive, for a high elevation Andean site, but the problem is that most of these frogs are just not there any more! That is why the Philadelphia Zoo joined Zoo Amaru and Cajas National Park in their efforts to save these endangered species, and that is why the students from UIMP are collaborating with us to help us find the answers and the missing frogs.

The San Lucas Marsupial frog, *Gastrotheca pseustes*, is one of the amphibians maintained in our *ex situ* assurance colonies; it was once very a abundant at Cajas National Park, however it is now steadily declining. We are testing all of the known amphibian species in the park for the presence of the fungal pathogen *Bd* as a possible cause of amphibian decline. In this case, we are testing a *Pristimantis cryophilus*. Photos by Mauricio Akmentins.

We met the weary-eyed students on Saturday morning at the local bus terminal in Cuenca and then headed straight up to the mountain in field vehicles from Zoo Amaru staff and from Cajas National Park. We spent one whole day at Mazán forest, where the students had a taste of the Andean Cloud forest that is characteristic to the region and also visited the CCA-Mazán breeding facility. We then had various discussion sessions, where we talked about the issues that amphibians face around the world and about the specific questions that we need to answer at Mazán Forest and Cajas National Park, namely:

- Where are the frogs now?

- Why are they still found on certain sites?
- Why are they not found at their ancestral sites anymore?
- What role have exotic species such as trout, played in their demise, if any?
- Is *Bd* present here at all? And if so, where and why are some populations still holding on?
- Is there any other disease present?
- What has changed in the environment that might have made these animals more susceptible to disease or might have left them unable to cope with new changes in the environment?
- Is there any hope left for these species (both for the amphibians and the students)?

Then we headed out for a frog walk and found only three individuals from a single species.

Next morning we headed straight for the páramo at 4,000 meters elevation and met with José Cáceres, head of the Biodiversity Division of Cajas National Park. He gave the students a brief history of the research carried out in the park and talked about ways in which the park can help the students by providing information, staff, vehicles and other forms of in-kind support. After the talk, we visited Laguna Toreadora, one of the most iconic lagoons in the park, and where the black Cajas harlequin toad was first found. Of course, there are no harlequin toads left at this site.

The students from Universidad Internacional Méndez Pelayo and Dr. Carlos C Martinez Rivera (top right), from the Philadelphia Zoo on an evening hike near the Mazán River inside Bosque de Mazán forest reserve (3,100 m) at the foothills of Cajas National Park. Students: Top three: Laura Martín, Joaquina García, Gisela Bragado. Five standing on left side: Angela Parody, Edgar Ignacio Gomez Lora, Jorge Bresciano, Ana Alaminos, Karen Alejandra Fuentes. Front row left: Janeth Lessman, Maria Jesús Piñero Rodriguez. Front row right: Daniel Ramos, Laura Carquijero.

Students returned to Quito very motivated and invigorated with ideas for project proposals and started to work. Currently, six of the students will collaborate with us, helping us find ways to study: (1) Reproductive biology of the San Lucas marsupial frog *Gastrotheca pseustes*; (2) Current conservation status of Boulenger's Andean rocket frog *Hyloxalus vertebralis*; (3) The impact of fungal disease on endangered amphibians; and to (4) Establish population dynamic and habitat use of endangered amphibians (5) Determine ideal habitat for the reintroduction of four critically endangered amphibians at Cajas National Park and (6) Assess the effect of introduced rainbow trout and brown trout on aquatic fauna at Cajas National Park.

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Unique frog helps amphibian conservation efforts

Andrew R. Gray, Curator of Herpetology, The Manchester Museum

A tropical frog – the only one of its kind in the world – is providing conservationists with exclusive insights into the genetic make-up of its closest endangered relatives. University of Manchester scientists have allowed two critically endangered species of Central American leaf frogs to interbreed, producing the unique frog – a hybrid of the two species. DNA tests using a harmless mouth swab revealed that the two parent frogs were actually very closely related despite being different species. The findings are important because DNA tests on frogs of the same species but from different geographical areas have revealed considerable genetic differences. The scientists therefore suggest that conservation efforts should not only focus on each endangered species of frog but also on different populations of the same frog species.

"It is imperative that we identify distinct populations of critically endangered species before they are lost forever," said Andrew Gray, Curator of Herpetology at the University's Manchester Museum. "Through allowing interbreeding, and using DNA samples taken from the frogs' mouth, this work investigates the amount of variation both between and within species. More importantly, it is helping determine where conservation efforts should be concentrated and highlighting that some populations of critically endangered amphibians are in desperate need of further protection."

A unique leaf frog, produced at the Manchester Museum by breeding *Agalychnis annae*, from Costa Rica and Panama, with *Agalychnis moreletii*, which is found from southern Mexico to central Guatemala, El Salvador, Honduras and Belize. Photo: Andrew Gray©.

In the past, an animal's appearance, including its colouration, defined it. But phylogenetics – the study of evolutionary relatedness of species through genetics – is becoming increasingly important in helping biologists identify separate species in need of conservation. The unique leaf frog, which is maintained at the Manchester Museum, was bred from the two species *Agalychnis annae*, from Costa Rica and Panama, and *Agalychnis moreletii*, which is found in humid highland tropical forests ranging from southern Mexico to central Guatemala, El Salvador, Honduras and Belize.

"Allowing the interbreeding has proven particularly useful in providing evidence for the inheritance of genes, including certain colour pattern traits," said Andrew. "The study has shown that the two species used to produce the hybrid frog are extremely closely related. However, they should continue to be considered as separate, both for classification and conservation purposes. It is also important to recognise the levels of variation in distinct populations of other closely related species. If conservation is our prime objective, it follows that separate populations of the same species should also be conserved for the future as distinct entities and future studies should focus on assessing the levels of variation in the different populations of these wonderful creatures."

The study, 'Gray, A. R (2011). Notes on Hybridization in Leaf frogs of the genus *Agalychnis* (Anura, Hylidae, Phyllomedusinae),' is published in the Cornell University and the National Science Institutes' online ArXiv, and viewable at: http://arxiv.org/pdf/1102.4039v1

[*Editor's note: More information about the importance of determining conservation management units and genetic variation can be found on the Amphibian Ark web site.*]

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New amphibian research program to begin at the Horniman Museum

James Robson, Deputy Aquarium Curator, Horniman Museum & Gardens

The Horniman Museum's aquarium is one of London's oldest surviving aquaria, having been founded in 1903 under the supervision of eminent zoologist and ethnographer Alfred Cort Haddon (1855-1940). Haddon was a correspondent of Phillip Henry Gosse (1810-1888), the Victorian naturalist consulted by Charles Darwin. Gosse set up the first marine aquaria in Britain and also wrote the first descriptive catalogue of British marine invertebrates.

In July 2006 a new modernised aquarium opened at the Museum. Located in the basement, it contains fifteen vibrant displays including among others, a UK rock-pool, Fijian Reef, Mangrove, and panoramic Rainforest exhibit (pictured). The Museum's collection has always included live amphibian exhibits, and the new development reflects this with two of its three South American displays dedicated solely to amphibians.

The panoramic Rainforest exhibit in the aquarium at the Horniman Museum in London. Photo: James Robson.

The curator Jamie Craggs and deputy curator James Robson have extensive knowledge in all aspects of aquarium husbandry, from culturing techniques to species-specific feeding regimes and water chemistry. The aquarium has actively sought partnerships with other institutions to develop new techniques and use our husbandry experience to assist research. Through this process there are now active collaborations with multiple institutions looking at a range of subjects including the *ex situ* reproduction of corals (University of Essex), the impact of climate change of coral settlement (University of Essex), disease recognition in coral species (University of Newcastle) and jellyfish research including reproduction and predatory behavior (University of Southampton, Queen Mary University of London). We have also made our facilities available to host students to carry out their own research, from Degree level to PhD.

In 2011 the aquarium would like to expand its areas of aquatic research to include work with amphibians, and for this purpose a specially-designed climate controlled room with a racking system has been constructed. Initial discussions with Andrew Gray from the University of Manchester have led to plans for collaborative work with The Manchester Museum and projects to assess the effects of a variety of environmental conditions on the development of captive leaf frogs. The aim of the research is that the findings can be directly translated for developing husbandry practices and used to support conservation efforts for Critically Endangered species.

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An update from the Association of Zoos & Aquariums

Shelly Grow, Conservation Biologist, AZA

2010 amphibian conservation – highlights and accomplishments

AZA made a long-term commitment to global amphibian conservation that focused on increasing the capacity of AZA-accredited zoos and aquariums to respond to threats facing amphibians, to create and sustain assurance populations of threatened amphibians, and to increase public awareness of and engagement in amphibian conservation.

With the support and hard work of directors, curators, keepers, and partners, AZA-accredited zoos and aquariums not only maintained their commitment, but also saw conservation progress and successes both locally and around the world.

2010 conservation activities included:

- Citizen Science
- SSP conservation
- Assurance populations and conservation breeding
- Field surveys and research
- Reintroduction and head-starting

AZA congratulates all members for their on-going efforts and dedication. Download the 2010 Amphibian Conservation – Highlights and Accomplishments at: www.aza.org/amphibian-news/

First AZA web-based training courses dedicated to FrogWatch USA chapter coordinators

With spring just weeks away, AZA launched its new, online training programs for future chapter coordinators and volunteers of FrogWatch USA, AZA's flagship citizen science program.

The self-paced, interactive online training courses, designed by NP Training Works, teach coordinators how to start a chapter and certify members of the public as citizen scientists for FrogWatch USA. The training courses are available online at: www.aza.org/web-based-training.aspx

This is the first in a series of online training courses AZA will launch over the next year. Learn more about FrogWatch USA, become a volunteer, or find a local AZA-accredited zoo or aquarium chapter at: www.aza.org/frogwatch/

2011 Herp TAG meetings

The Zoological Society of San Diego is hosting the 2011 AZA Herp Taxon Advisory Group (TAG) meetings, March 12-17. The AZA Amphibian TAG (ATAG) meeting will be on Saturday, March 12. Agenda items include an announcement of the 2011 ATAG Conservation Grant Recipient, new information and tools for amphibian population management, updates on managed animal programs in AZA facilities, and news about on-going conservation and research. Learn more about the ATAG meeting by contacting the ATAG Chair, Diane Barber at: dbarber@fortworthzoo.org

U.S. Fish and Wildlife Service's "Wildlife without Borders – Amphibians in Decline" program

The Wildlife Without Borders-Amphibians in Decline program aims to conserve the world's rapidly declining amphibian species, supporting activities that address threats to frogs, toads, salamanders, newts, and caecilians that face an unprecedented threat of extinction. This program is a global funding opportunity developed by International Affairs as part of its Wildlife Without Borders-Global grant programs.

In 2010, the program awarded $358,482 in grants for thirteen projects aimed at protecting critically endangered species in ten countries in Asia, and Central and South America, leveraging $783,792 in matching funds. These projects target more than fifteen endangered amphibian species. Learn about the program and the projects funded in 2010 at: www.fws.gov/international/DIC/global/amphibians.html

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