

# FROGLOG

Newsletter of the Declining Amphibian  
Populations Task Force

June 2005, Number 69



The Future of the  
DAPTF

*The Mission of the DAPTF is to determine the nature, extent and causes of amphibian declines throughout the world, and to promote the means by which declines can be halted or reversed.*

Last year's Global Amphibian Assessment (GAA) brought to the attention of the wider world what those of us concerned with amphibian declines already knew. We are faced with a major extinction event, in the light of which our current mission statement seems increasingly unrealistic. While the DAPTF can claim considerable credit for initiating and supporting research that has helped us to understand the causes of amphibian declines, real successes in terms of conserving threatened amphibian species are few and far between. Later this year, the DAPTF leadership will meet with our partners, the Global Amphibian Specialist Group (GASC), and many other herpetologists to discuss our future strategy.

How should biologists act in response to mass extinction? I suggest that the first thing we should do is put more effort into alerting the wider world to the significance of amphibian declines. The general public, and its political leaders, seem indifferent to amphibians and are unimpressed by statistics on threatened species, however large the numbers. We need to emphasise that amphibian declines are a symptom of a rapid decline in the capacity of the environment, especially its freshwater component, to support life. We face an uphill struggle in getting this message across. During the recent general election in the UK, every party leader repeated the mantra that climate change is the most serious issue that we face; none presented any policies that address the problem, but several that will make it worse. The recent report of 'exploding toads' in Europe was featured by newspapers, radio and TV, but was typically treated as a 'strange but true' item, relegated to the inside pages or to the filler slot at the end of a bulletin.

A number of commentators have suggested that the public, and its leaders, are in a state of denial about environmental issues. The prospect of environmental collapse is too awesome, and too remote, to think about. I suggest that we biologists engage in our own form of denial by operating within the general area called 'conservation biology'. This is a comforting, feel-good title but the results of the GAA suggest that we're not doing a very good job. I now call myself an 'extinction biologist' and find that this generates much greater interest in what I do than calling myself a conservationist. I have suggested to a number of publishers that they should launch a journal on extinction biology; this idea is politely rejected, on the grounds that the topic is too depressing. This comes from companies that publish innumerable journals focussing on the most gruesome of human medical conditions. We must face up, I suggest, to an extinction agenda. Faced with a very large number of threatened species, which ones should we seriously try to conserve? By what criteria do we choose those species? What information should we gather, for the benefit of future generations, about the much larger number of species that we will probably not be able to conserve? What would we most like to know about dinosaurs had there been eye-witnesses to their demise?

This short editorial is intended to provoke a response. In particular, we welcome your comments on these issues as we plan our discussions on the long-term future of the DAPTF.

**Tim Halliday**

## DAPTF Seed Grants 2005

We have completed our allocation of DAPTF Seed Grants for 2005. We received 48 proposals from 24 countries, and we are funding 14 projects, an outlay of \$25,450. The number of proposals submitted was considerably lower this year than in previous years; so is the number of projects we can support, reflecting a difficult year for the DAPTF in financial terms. This year, for the first time, we are funding a project in Trinidad. Five of the projects we are supporting in the USA are funded by the

Amphibian Research and Monitoring Initiative (ARMI); we are very grateful to them for their continuing support. We are delighted to have a new source of support this year, Chester Zoo UK, which is funding three projects, in Argentina, Nigeria and Trinidad.

Since 1992, the DAPTF has funded 171 projects through its Seed Grant programme, distributing US\$298,401 to researchers in 79 different countries. Our listing of papers that acknowledge the DAPTF as a source of funding, most of them in high-impact journals, now stands at 90.

**Tim Halliday**

Further exploration in search of  
*Atelopus varius* in Costa Rica

**By Mason Ryan, Erick Berlin and Ron Gagliardo**

In December 2003 an expedition funded through a DAPTF Rapid Response Fund Grant led by Gagliardo (2004; Atlanta Botanical Garden) confirmed the existence of an extant population of *Atelopus varius* in Costa Rica, a species presumed extinct and last seen in 1996 (Bolaños *pers. comm.*). This expedition found three individuals in the streambed and, based on current information, there are no other populations. Hence, this small population should be of high conservation priority. Since the first expedition, efforts to establish a viable conservation plan have stalled due to the apparent remoteness of the site, a conflict of interests among some of the parties involved, and the lack of baseline data on the population size.

The extant population was found in Fila Chonta, located ~ 10 km NW of the city of Quepos (Gagliardo, 2004). This portion of the coastal mountain range is topographically rugged ranging from 400 – 1700 m elevation, and consists of 4 life zones: tropical wet forest, premontane rainforest, premontane wet forest, and lower montane rainforest (Holdridge, 1967). Due to the size and relief of Fila Chonta, it is probable that additional populations of *A. varius* may exist in streams not yet surveyed. A second population will further augment the species recovery plan, add genetic diversity, and mitigate the susceptibility

to extirpation by a single, stochastic event.

On 17 February – 26 February 2005, a second expedition was organized with the following goals:

- Identify other populations of *A. varius* in Fila Chonta,
- Identify an alternative route to the one known population,
- Revisit the known population to verify its persistence,
- Identify potential threats to the known population,
- Gather information on other species for conservation efforts.

We surveyed Fila Chonta near Quepos Hotsprings (N 09°33.466'; W 084°043'; ~ 255 m) for 10 days during the dry season 17 February – 26 February 2005. Quepos Hotsprings is a 600 ha property surrounded by contiguous forest within a matrix of cattle pastures, that connects the NE and SW edges of the mountain range. Visual encounter surveys (VES) with a time constraint were used for each surveyed stream.

#### Results and Evaluation of Threats

In 10 days a total of 93.5 person-hours were logged and a total of 12 streams were thoroughly surveyed. No new populations of *A. varius* were discovered but, due to limited time, adjacent valleys and watersheds were not surveyed and there remain a large number of unexplored streams in the mountain range. The principal field investigators (MJR and EB) identified several stream valleys that should be priorities for future exploration.

Fila Chonta has a high level of herpetological diversity with 51 species of amphibians and reptiles recorded in 10 days: 20 frogs, 1 salamander, 18 lizards and 12 snakes. Of the 21 species of amphibians, 1 is considered critically endangered (*Atelopus varius*) and 2 are vulnerable, (*Bolitoglossa lignicolor* and *Dendrobates granuliferus*). The *D. granuliferus* found in this area are green and should be of special concern because it comprises a unique race within this species' restricted range to South-west Costa Rica.

We were successful in gaining an easier access route to the existing population and verified the continued persistence of *A. varius*. In an approximately 125 m section of stream, five *A. varius* were observed: three adult males, one adult female, and one sub-adult female. Dorsal and ventral drawings were made of four individuals for future identification. Detailed notes on substrate (type and temperature), behaviour, and size were recorded (MJR unpubl.).

The persistence of this population indicates it may be self-sustaining, considering that it is small and faces numerous threats that include an outbreak of the lethal, pathogenic fungus *Batrachochytrium dendrobatidis*

(*Bd*), catastrophic stochastic events such as landslides, and inbreeding depression.

In 2003, one out of three frogs captured tested positive for *Bd* infection (Gagliardo, 2004), yet this species has persisted with this disease present. This warrants further study as to how this population can persist with *Bd* while so many other populations of *A. varius* have been extirpated (Young *et al.*, 2001; Lips *et al.*, 2004). During the 2005 expedition one dying female *Smilisca phaeota* was recovered from a neighbouring stream valley; the animal was exhibiting sloughing skin and was lethargic and unable to right itself in a manner consistent with *Bd* infection (Lips, 2003). This animal was collected, preserved in formalin, and deposited at the University of Costa Rica for histological examination. *Bd* has been implicated in the decline of numerous amphibian populations throughout Central America (Young *et al.*, 2001; Collins & Storer, 2004; Lips *et al.*, 2004) and its presence in this population makes disease management and mitigation a high priority.

Populations with restricted ranges are more susceptible to local extinction than widespread populations because a stochastic event can alter or destroy one restricted habitat. In this population there is a serious threat of a landslide that could inundate the section of stream inhabited by these frogs. This stream valley is extremely steep and there was evidence that a minor landslide recently occurred, and a major landslide may be imminent due to the high relief and landslide proneness of the hills in this region (Tosi *et al.*, 1993).

Presently this is the only known population of *A. varius* in Costa Rica and until a second population is discovered, we have to assume this is a closed and isolated population with no emigration or immigration among adjacent populations. Such isolation can lead to low genetic diversity and result in the expression of harmful traits and may lead to an extinction vortex. Further DNA kinship analysis would be necessary to evaluate the genetic relationship of the animals in the population.

Finally, because we were able to locate an easier, alternate route to the site, it is possible that people with dubious intentions may also know of the same route. Since this population is already small, any unscrupulous removal of individuals could further exacerbate an extinction vortex for this population.

#### Recommendations

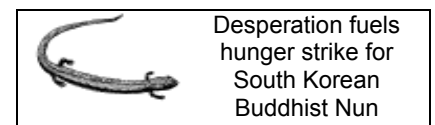
We propose that as a first step, a conservation management plan (CMP) be drafted and presented to all involved parties in North America and Costa Rica identifying each step of the 3-stage process: 1) establishment of a long-term monitoring and population biology study

of the source population; 2) placement of individuals into an *ex situ* captive breeding program at the Atlanta Botanical Garden and other North American institutes; and 3) repatriation of *A. varius* for education and possible reintroduction programs in Costa Rica. Due to the threats stated above, the management plan needs to be written immediately and presented to MINAE, Costa Rican officials, and funding agencies in order to begin the implementation process. Assuming the population subsists, long-term monitoring should be implemented on a 5 to 10 year time scale in order to understand the population dynamics and monitor trends of this enigmatic and tenacious population. Concurrently, more expeditions need to be conducted in the Fila Chonta area in an attempt to locate more populations. Additional funding is being pursued to continue this project.

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For further information please contact:  
Mason Ryan: [barleymoe@yahoo.com](mailto:barleymoe@yahoo.com)  
or Ronald W. Gagliardo:  
[rgagliardo@atlantabotanicalgarden.org](mailto:rgagliardo@atlantabotanicalgarden.org)



Desperation fuels  
hunger strike for  
South Korean  
Buddhist Nun

By Robert Kaplan and Daesik Park  
Korean Working Group Co-Chairs

A recent event in South Korea involving a salamander, a train and a Buddhist nun made international headlines and

prompted us to share the story with DAPTF members and introduce the Korean Working Group of the DAPTF to interested parties. Jiyul, a 48 year-old Buddhist nun from Naewon Temple on Mount Cheonseong, northwest of Pusan, recently fasted for 100 days demanding an immediate halt to the construction of a highway tunnel. She believed that the tunnel would change underground water systems, resulting in drying of swamps and marshes and destroying plants and animals living in the area. In particular, she was concerned about the long-tailed clawed salamander, *Onychodactylus fischeri*. This national crisis soon became more than a story about the plight of the hynobiid clawed salamander. Jiyul's fast focused an entire nation's attention to the issue and provided an important insight into a culture whose values are not well appreciated on an international scale, but whose people have a long and rich tradition of protecting and preserving wildlife in the face of commonly understood setbacks. The problem is both complex (related to economics, religion, politics, and the environment) and compelling.

The story begins in 1992 with the construction of a Korean train express (KTX) system intended to save 3 hours of travel time between Seoul and Pusan, the second largest city in the country. The project had already cost more than 18 billion dollars. The 13th portion of the project required the construction of a 13.2 km long tunnel under Mt. Cheonseong, where a buddhist temple and 22 unusual mountain swamps can be found. Due to the highly developed swamp systems and well-conserved forests, many endangered species live in the Mt. Cheonseong area, including 11 species listed as endangered in the Korean Red Data Book, including two mammals, six birds, one snake, one salamander, two insects, and four plants.

In Korea, the Ministry of the Environment must submit an environmental evaluation to the Court before beginning any major construction project. Researchers are drawn from universities, government agencies and private research institutes. In this case an environmental evaluation conducted in 1994 "indicated" that the tunnel project would not affect any environmentally sensitive locations or animals living in them. Unfortunately, the environmental evaluation is not available for public review. The Ministry of Environment approved the project allowing the Ministry of Construction and Transportation to start the work. The whole rail-line was approved at that time and a 293.7 km segment from Seoul to Taegu began operating in 2004.

It has become standard procedure in Korea for large scale development projects to be planned with little attention to long-term environmental

planning. This is particularly true during election periods. Once a project is approved and started, proponents routinely state that not finishing the project would have serious economic consequences and argue that stopping the project would result in the loss of jobs.

In 2001 when the construction project reached the mountain area, many environmental organizations and a local buddhist group argued that the tunnel would disrupt the watershed and probably result in significant environmental perturbation. In particular, the long-tailed, clawed salamander, *Onychodactylus fischeri*, lives there. As a lungless hynobiid that requires relatively mature forest systems to survive (Kuzmin, 1995) it has been recognized as an environmental indicator species in Korea. The members of the organizations and temple made the salamander the plaintiff against the Ministry of Environment, suing to stop the project until another environmental assessment could be undertaken. This was the first time a non-human animal was a plaintiff in a law suit in Korea and it became known as the "salamander trial." Several thousand people appeared before the court testifying on the salamanders' behalf, some even trying to represent a salamander's "feelings" to the judge. The courts ultimately decided in 2004 that *Onychodactylus* had no legal standing.

The current President Rho, as a candidate in 2002, promised that another fair environmental evaluation would be carried out and the project carefully re-considered if he were elected. The promise was not kept, however, prompting the nun, Jiyul, to get involved. She urged the government to conduct another evaluation to be undertaken by researchers selected by both the government and private environmental organizations.

Several months ago, Jiyul started her third hunger strike in front of the President's house taking only water and salt for 87 days. But when no progress was made she suddenly left the location without a word, leading people to imagine that she went off to an unknown place to die for her beloved salamanders. Huge national debates rapidly ensued arguing both for and against the nun and her salamander. After several days, a Buddhist organization found her and started to take care of her. She still refused to eat and as her condition deteriorated the national debate turned to one of questioning the impact of her death on Korean society as a whole. At the eleventh hour on the 100th day, the government relinquished and agreed to conduct another environmental evaluation within three months.

The plight of the hynobiid clawed salamander has focused an entire

nation's attention and is looming large in the minds of many Koreans. An important challenge facing the country is how to continue the long and rich tradition of protecting and preserving wildlife in the face of unbridled development.

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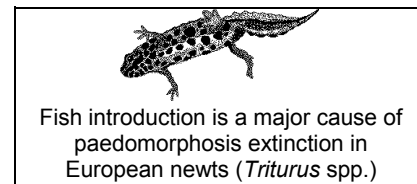
For further information please contact:

Daesik Park: [parkda@kangwon.ac.kr](mailto:parkda@kangwon.ac.kr)

or Robert Kaplan: [taricha@reed.edu](mailto:taricha@reed.edu)

Website in Korean:

[http://academic.reed.edu/biology/korea\\_dapft/](http://academic.reed.edu/biology/korea_dapft/)



By Georg Džukić, Ruža Čirović, Mathieu Denoël and Miloš L. Kalezić

Contrary to the numerous studies on worldwide declines of amphibian diversity at the species level, the loss of intraspecific biodiversity, particularly in species with polyphenism, is much less studied. The adaptive switching (depending on environmental conditions) between two alternative ontogenetic pathways and corresponding highly dissimilar morphs, are of special interest. In some newts and salamanders, mainly from Europe and North America, facultative paedomorphosis occurs when larvae either metamorphose into a terrestrial morph (i.e. the common life history pathway), or attain sexual maturity in retaining an aquatic larval structure (e.g. external gills) to become paedomorphic (Denoël *et al.*, 2001).

Here we report that fish introduction has a negative impact on the European newt (*Triturus* spp.) populations with facultative paedomorphosis. The majority of European paedomorphic populations occur in the Mediterranean area: the palmate newt (*T. helveticus*) in southern France, the alpine newt (*T. alpestris*) in southeastern France, Italy, and in the Balkans, and the smooth newt (*T. vulgaris*) mainly in the Dinaric Alps (e.g. Džukić *et al.*, 1990; Denoël *et al.*, 2001). In particular, we studied 22 populations of alpine newts (France, Italy, Slovenia, Bosnia, Montenegro and Greece) and 17 populations of palmate newts (France) in which fish were originally absent and in which paedomorphs were abundant at the time of their first description (Denoël *et al.*, 2005).

In the paedomorphic alpine newt populations, some introductions were of "native" species (*Salmo trutta*, *Phoxinellus alepidotus*), but most of them contained non-European species

of fish, such as *Oncorhynchus mykiss*, *Salvelinus alpinus*, *S. fontinalis*, and *Carassius auratus*). Fish stocking in palmate newt ponds mainly involved small and ornamental fish species: *Carassius auratus*, *Gambusia affinis*, *Lepomis gibbosus*, and *Phoxinus phoxinus*. The introduction of fish dates back to the second half of the nineteenth century, but reached its peak in the last three decades and continues nowadays (Denoël *et al.*, 2005). All fish species had detrimental effects on the studied paedomorphic newt populations. Salmonids are active predators on adult newts, while smaller fish species consume egg and larval stages of newts.

Our research on alpine and palmate newts confirmed that fish introductions were always followed by the extirpation of paedomorphic individuals. The abundance of metamorphs decreased after fish introduction, but this morph remained present in some of the fished ponds and lakes (Denoël *et al.*, 2005). Thus, our research showed that fish introductions have altered both paedomorphic and metamorphic newt populations. However, because paedomorphs are present in a considerably smaller number of places than their metamorphic counterparts, they are more vulnerable to extinction. Moreover, paedomorphs cannot escape fish predation by hibernating in terrestrial habitats as metamorphs can do.

Beside the loss of variability in developmental pathways, fish introduction can be attributed to the reduction of taxonomic diversity. For example, in the Balkans, all the local "subspecies" of the alpine newt (*Iacustris*, *reiseri*, *montenegrinus*, *piperianus* and *serdarus*), disappeared or are critically endangered due to the detrimental effect of fish (Denoël *et al.*, 2005).

Regarding conservation matters, paedomorphosis is recognized as a vulnerable source of variation in life history and morphological traits, as well as a bioindicator of population and ecosystem health (Whiteman & Howard, 1997). If we take into consideration Europe only, conservation concerns should also be devoted to newt species which exhibit facultative paedomorphosis. This is not only the case of *T. helveticus* and *T. alpestris*, but also for other dimorphic species such as *T. vulgaris* and *T. carnifex* which are found in the Montenegrin holokarst region. Indeed, recent research shows that paedomorphic *T. vulgaris* risks disappearance because of fish introductions, notably *Leuciscus cephalus* and *Ictalurus nebulosus* (R. Čirović, *unpubl. data*). Paedomorphic *T. carnifex* populations are also highly threatened because they are extremely rare (Kalezic *et al.*, 1994). If urgent measures are not taken soon, an

important kind of intraspecific biodiversity will disappear. Some sites in Europe still contain large paedomorphic populations and should be closely protected and surveyed to assure their persistence. Legislation should take into account paedomorphic populations as conservation units (see Fraser & Bernatchez, 2001) and consider stopping fish introductions, especially non-native ones. Management measures should also be taken to restore disturbed habitats by removing introduced fish.

#### Acknowledgements

This text is based on a recently published paper in Conservation Biology (Denoël *et al.*, 2005). This research was supported by the Belgian FNRS (chargé de recherches, credits aux chercheurs), Serbian Ministry of Science, Nature Protection (grant 1623) and the DAPTF. Collection permits were given by the Ministère de l'Ecologie et du Développement durable (France), the Ministry of Environment (Greece) and the Institute for Protection of Nature of Montenegro.

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- For further information please contact: Mathieu Denoël, Behavioural Biology Unit, University of Liège, 22 Quai van Beneden, 4020 Liège, Belgium. [Mathieu.Denoel@ulg.ac.be](mailto:Mathieu.Denoel@ulg.ac.be)
- Reports on DAPTF Seed Grants**  
Recipients of DAPTF Seed Grants are generally expected to publish the results of their projects in refereed journals, or as articles in *Froglog*. They are also

required to send us reports, so that their results can be made available to DAPTF members. Below is a list of reports that we have received recently. Anyone wanting a copy of a report should contact the author in the first instance; we can supply copies if you cannot reach the author.

#### Rapid Response Fund:

Ron Gagliardo (2003) Further exploration in search of *Atelopus varius* in Costa Rica. (Mason Ryan, Erick Berlin & Ron Gagliardo) [rgagliardo@atiantabotanicalgarden.org](mailto:rgagliardo@atiantabotanicalgarden.org)

#### Books received

- Craig Guyer & Maureen A. Donnelly. (2005) *Amphibians and Reptiles of La Selva, Costa Rica, and the Caribbean Slope*. University of California Press, Berkeley. (299 pp.)

This is truly intended as a field guide, being pocket-sized and with a font size to challenge senior herpetologists. Lavishly illustrated, it contains numerous identification keys and is fully referenced. Based on the authors' first-hand experience of Costa Rica over more than 25 years, this is an essential book for any herpetologist visiting the tropical forest of Central America.

#### Tim Halliday



#### DONATIONS:

##### Special thanks to Jim Murphy

For many years, Jim has been our most reliable and active supporter. Thanks to him, we have received a generous donation that will keep us going for another year.

**We also gratefully acknowledge receipt of the following donations received prior to May 13, 2005:** Mrs. Moira Hope, Richard Bruce and Danna Schok.

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Tel: +44 (0) 1908 - 652274.  
Fax: +44 (0) 1908 - 654167  
E-mail: [daptf@open.ac.uk](mailto:daptf@open.ac.uk)

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