Smilisca baudinii by Dave Showler

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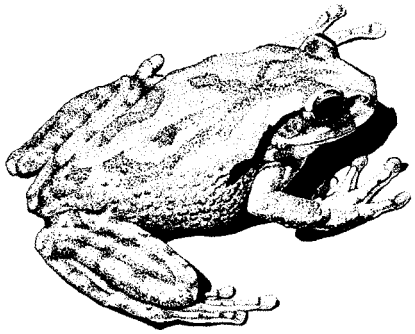

FROGLOG

Newsletter of the Declining Amphibian Populations Task Force

April 2001, Number 44.

Ultraviolet (UV) radiation and the decline of amphibian populations in Central Spain

A report on work carried out under a DAPTF seed grant (1999-2000), by Miguel Lizana & Adolfo Marco

A reduction of ozone in the stratosphere as a consequence of human activity is causing an increase in the ultraviolet radiation (UVR) received by the Earth's surface. Among the negative effects of UVR on living organisms are generalized damage to DNA, blockage of genetic transcription, and alteration in cell division and the development of tissues. The effect of UV-B has been demonstrated on the mortality of amphibian embryos in different parts of the world and its relation to the decline of some species. This effect appears to be greater in mountain zones, where the ozone layer is thinner. The ozone layer appears to have diminished between 10 and 20% in the Iberian Peninsula (Instituto Nacional de Técnica Aeroespacial).

With the objective of evaluating the effect of UVR on the decline of amphibians in Spain, we have performed several field and laboratory studies. Since 1996 several studies have been carried out in the natural spawning habitats of several amphibian species exposed to natural levels of UVR. Furthermore, since 1999 a series of laboratory experiments has been underway to evaluate the sensitivity of different species to controlled doses of artificial UVR. Comparisons have been made of the dose-effect relationship between species and populations of the same species. These studies were partially financed by a seed grant from the DAPTF in 1999 to Miguel Lizana, Adolfo Marco and Emilio Pedraza.

Field experiments

Since 1999 we have carried out field experiments on the effect of UV-B on the presence of malformations and the direct mortality of amphibian embryos in various localities in the centre of the Iberian Peninsula (Lizana and Pedraza, 1998). The methodology proposed by Blaustein et al. (1998) was employed. The following populations have been studied: *Bufo bufo, Bufo calamita* and *Rana perezi* in the Sierra de Gredos (Avila, 1996, 1997, 1999) and Sierra de Sanabria (Zamora, 1998); *Hyla arborea* in the Sierra de Sanabria (1998); *Pelobates cultripes* and *Triturus marmoratus* in the Sierra de Francia (Salamanca, 1998); and *Rana perezi* and *Triturus marmoratus* in Salamanca (1999).

A significant mortality of eggs exposed to natural UVR has been observed (compared to eggs protected with filters that block the UVR) in *Bufo bufo, Bufo calamita, Rana perezi, Pelobates cultripes* and *Triturus marmoratus*. The most sensitive species were *B. bufo* and *T. marmoratus*. Differences have been found in the sensitivity of the same species in the same zone in different years. While in some years the mortality due to UVR was very high, in others it was not significant. This variability could be related to different levels of insolation between different periods of spawning. Both the intensity and the daily accumulated dose of natural UVR can vary notably in accordance with temperature. If, after spawning, the embryos are exposed to several days of intense sunshine, the mortality of the embryos can be total in all the species studied.

Laboratory experiments

The experiments carried out in the laboratory have included the study of the effects of different intensities of UV-B on embryos of various species of Iberian amphibians: *Bufo bufo, Bufo calamita, Pelobates cultripes, Hyla arborea* and *Rana perezi*, from populations of different latitudes and altitudes (sea level to 2000m) during the winter and spring of the year 2000. The results of the laboratory experiments confirm that there is a strong positive relationship between the dose of UV-B radiation received and the mortality rate due to radiation in all the species and populations studied. Therefore, an increase in natural UVR or of the degree of exposure to it can cause the consequent increase of mortality in all the species studied.

Interspecific variability is confirmed in the sensitivity to UV-B. The embryos of *Triturus marmoratus* and *Pelobates cultripes* were the most sensitive to all intensities of radiation received. Three days of exposure to UVR caused a significant mortality of embryos of these two species, while 5 days of exposure were necessary to cause a similar effect in the embryos of the other species. This interspecific variability can vary in relation to the intensity and dose of UVR.

Bufo bufo does not appear to be a very sensitive species in the laboratory. Nonetheless, it normally lays its eggs in very cold, clear waters, which can delay its development and expose its embryos for more time to UVR. This would explain its greater sensitivity to UVR in the field compared to *B. calamita* or *R. perezi*.

There is significant variability in the sensitivity to UVR among populations of the same species. This could be due to local adaptations. In *Bufo bufo*, the embryos of mountain populations are more sensitive than those of low zones. In *Bufo calamita* the resistance to UVR of populations of salt lakes and in mountain zones is very high. The species of newts have eggs that are extraordinarily sensitive to UVR. Nevertheless, their spawning behaviour, consisting of wrapping their eggs in the leaves of aquatic plants, protects the embryos very efficiently from UVR in the field (Marco et al., in press).

In summary, the studies carried out allow us to state that the increase in UVR could be contributing

to the decline of some species of Iberian amphibians. Of the species studied, *Bufo bufo* and *Pelobates cultripes* could be especially affected. The absence or destruction of aquatic and riparian vegetation could expose amphibian eggs to high doses of UVR, contributing to their decline in many altered aquatic habitats.

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The Crested Newt (*Triturus cristatus*): Distribution, Biology, Ecology and Protection: 11-12 November 2000, Rostock, Germany

By Richard A. Griffiths
Chair, DAPTF Monitoring Protocols Working Group

Out of the amphibian species that are afforded protection under European Conventions, the great crested newt (*Triturus cristatus*) is one of the most widespread. Indeed, the listing of this species in Appendix II of the Bern Convention and Annex IIa of the Habitats Directive has precipitated intensive work on the distribution, population status and general ecology of the crested newt within the states where it occurs. It is therefore probably fair to say that *T. cristatus* is one of the best studied amphibian species within Europe. Despite the widespread distribution and the attention it has received, the crested newt may also be one of the fastest declining amphibian species in many parts of Europe. This level of interest and concern was reflected by attendance at this meeting, which comprised well over 100 delegates. The fact that the vast majority of these were from Germany underlines the considerable regional interest in this species. Interestingly, a meeting on the same species organized by the British Herpetological Society in 1998 had a similar high level of attendance.

The meeting was held within the imposing environs of the University of Rostock, and comprised two sessions of oral papers grouped under the headings of *Distribution and Status of Crested Newts in Central Europe*, and *Biology, Ecology and Protection*, and a small number of posters. After an opening review of the biology and ecology of crested newts by W.-R. Große, Sergius Kuzmin summarized the current status of the crested newt within the former Soviet Union. With about half of its geographical range falling within the territories of former Soviet states, the crested newt is a good example of how survey effort is heavily influenced by political - rather than ecological - boundaries. Although the threats facing the crested newt seem to be rather consistent across its range (i.e. habitat loss, habitat fragmentation and introduction of fish to breeding areas), Kuzmin estimated that population densities may be as high as 67 specimens per hectare in some of his study areas. However, he pointed out that the existing IUCN threat categories are difficult to apply to some amphibian species, including the crested newt.

Within the more intensively studied parts of western Europe, quite a large number of population studies have been completed, or are in progress. The distinctive black and yellow belly pattern of the crested newt means that individuals can be easily recognised without the need for invasive or ethically questionable marking methods. In this regard it is a very convenient species to use for individual-based population models and mark-recapture analysis. There are now sufficient data on crested newt population biology to construct some simple predictive models of population viability. As further data accumulate, it is to be hoped that more refined models will become an integral part of crested newt conservation planning.

The distribution and status of the species seems to be increasingly well covered in Germany, but there were also useful summaries of the situation in Switzerland, Denmark, the Czech Republic and Britain. Robert Jehle (Vienna) presented a particularly intriguing combination of field data and genetic analyses. The latter suggest that the effective population size (N_e) of *T. cristatus* may be an order of magnitude lower than the actual census population size, and populations of the species may be subject to more significant genetic and demographic threats than traditional field studies suggest. With rapid developments in molecular techniques and GIS - and integration between the two - one wonders how long it will be before tissue samples, polyacrylamide gels and pocket computers become standard tools for crested newt population assessment.

The meeting was efficiently organised by Andreas Krone, on behalf of the field herpetology section of Deutsche Gesellschaft für Herpetologie und Terrarienkunde (DGHT) and the Naturschutzbund Deutschland Bundesfachausschuß Feldherpetologie / Ichthyofaunistik (NABU). The proceedings are due to be published in 2001, and will add to a growing list of books and journals emanating from a prolific German herpetological community. Indeed, the proceedings volume will complement the excellent recent monograph by Thiesmeier and Kupfer (2000), which - rather surprisingly - is the first general summary of the natural history of the crested newt that has been published, at least in modern times. The German language may unfortunately prove to be a barrier to these publications receiving wider readership, but the high standards of production and scholarship that have been set should be an example for other regions to follow.

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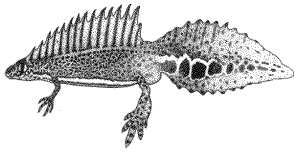

Monitoring Protocols Working Group Report

By Richard A. Griffiths, Chair

Since taking over as Chair of the group, I have been reviewing the type of activities that the group might usefully pursue. Considering the diversity of amphibian species and monitoring methods that currently exist, the task of acting as some form of coordinating centre for global activities in this area would seem to be a daunting one. On the positive side, the conspicuous nature of many amphibians at certain times of the year makes them amenable to quantitative population assessments, perhaps more so than many other cryptic taxa. An excellent start to standardizing such assessments was made by the publication of Heyer *et al*. (2000), although this volume addresses the subject from a strong North American perspective. Building capacity for amphibian monitoring in those parts of the world where resources and expertise are in short supply would therefore seem to be a priority. This can be achieved through (1) fund raising for monitoring projects in countries most in need of such activities; and (2) acting as a depository and dissemination centre for rapid communication of new ideas in monitoring protocols. To a large extent the first goal is already being embraced by the DAPTF mission and Seed Grants scheme, although there could be a more targeted role for the Monitoring Protocols Working Group here. The second goal is one that we certainly intend to develop, primarily through the development of a website that can act as a clearing house for such information. Work on the website will shortly be started in conjunction with Bruce Kingsbury and the Center for Reptile and Amphibian Conservation and Management. We are particularly keen to incorporate designs and simulations of monitoring protocols on this site, and would welcome input from the wider herpetological community in this area. One further initiative at the planning stage is a European workshop/ roundtable on monitoring protocols, possibly to be held in conjunction with the SEH meeting in Slovenia over 13-17 July, 2001. Again, I would be keen to receive ideas for specific topics that this session might address and to hear from those interested in participating.

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Amphibian harvesting in Romania

By Nemes Szilárd & Kovásznay Csengele

Amphibians are harvested for medicinal purposes or as food items all over the world. in Europe, however, their use for medicinal purposes is not common, while in some parts of the continent they serve as food items for the local population.

In the spring of 2000 during a short survey of the breeding sites of frogs and toads in the vicinity of Sf. Gheorghe (Romania), we found a great deal of dead frogs and toads with their hind legs removed for consumption. Only large sized frogs and toads (*Rana temporaria, Rana dalmatina, Rana esculenta* complex and *Bufo bufo*) had fallen victim. Green frogs of the *Rana esculenta* complex were the most exploited species. Green frogs are also harvested in large quantities in the Danube Delta (Török 1996). *Rana temporaria, Rana dalmatina* and *Bufo bufo* are rare and vulnerable in Romania, while the *Rana esculenta* complex is common (Cogãlniceanu et al 2000).

The harvesting of amphibians occurs mostly in the breeding period due to their increased vulnerability. This decreases local amphibian populations not only by the killing of individuals but also by reducing the number of offspring produced, as females often get killed before breeding. The impact of amphibian harvesting on populations is not quantitatively known. We would like to study this further in the future. *If you have information or can give advice, please contact us:* Nemes Szilárd & Kovásznay Csengele, Str. Gabor Aron 28/28/3, Sf.Gheorghe Ro-4000, Romania.
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Froglog Shorts

All recent donations to the DAPTF will be acknowledged in the next issue of *Froglog*.

Conservation News

- As predicted for some time, the cane toad (*Bufo marinus*) has found its way into Kakadu National Park, in northeast Australia. Introduced to Queensland 66 years ago, the cane toad has spread south and west at the rate of about 30 km per year and has had a negative impact on many of Australia's endemic frogs.
- Reversing a policy more than 100 years old, the California Department of Fish and Game is slashing its programme of stocking Sierra lakes with trout, in an effort to protect endangered amphibians.
- The area in coastal California set aside for the arroyo toad (*Bufo microscaphus californicus*) has been drastically reduced from 478,400 to 182,360 acres.

Addendum to “A short note about the status and abundance of caecilian populations” (Froglog 42)

I would like to add that the presence of caecilians is highly connected with the presence of earthworms (*Oligochaeta),* their main prey. As observed, even the size of caecilians corresponds with the size of the earthworms in their habitat. Gigantic earthworms are found in some places in the South American mountains, where caecilians also reach a respectable size (up to 150 cm in Colombia). If earthworm populations are disturbed by human activities (pesticides, herbicides, mechanical ground disturbance, heavy agricultural machinery, intensive agriculture) earthworms decline. A high density of cattle also disturbs some earthworm species, which has especially destructive effects in areas with high rainfall (e.g. formerly forested areas). Cattle faeces are unable to dry up and decay slowly in such places; they are washed into water courses and pollute the ground water. As observed in Ecuador in December 2000, many, formerly crystal-clear, mountain rivers are today polluted. This has caused a total change of the ecosystem. Caecilians, of course, also decline in such places. The number of grazing cattle per hectare should therefore be limited, especially in regions with high rainfall.

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DAPTF Board Member, Mike Lannoo, has been awarded the Field Museum of Chicago's 2001 Parker Gentry Award for Conservation. Biology. (See **www.fmnh.org/research_collections/ecp/ecp_sites/Parker_Gentry/**) The award is international, "to honor an outstanding individual, team, or organization whose efforts have had a significant impact on preserving the world's heritage, and whose actions and approaches can serve as a model to others". Mike is the first person working in North America who has won it.

Rohan Pethiyagoda, also a member of the DAPTF Board, has received a Rolex Award for Enterprise. This prestigious award will allow Rohan to continue his studies of the recently-discovered direct-developing rhacophorine frog fauna of Sri Lanka (which, according to Rohan, so far appears unaffected by the declining amphibian syndrome).

Our congratulations to Mike and Rohan for these achievements!

The DAPTF has been invited to participate in IBOY (International Biodiversity Observation Year) and has been accepted as one of their core projects. For details, see **www.nrel.colostate.edu/iboy/how_changing.html#daptf**

The Center for North American Herpetology (CNAH) is pleased to announce its new, completely updated and expanded internet web site at **www.naherpetology.org**

There is a new Working Group Chair for Italy. *Contact:* Vincenzo Ferri, "Toads Project" - ARCADIA Centre, Local. Cavagnino di Sotto, 1, I-25015 Desenzano del Garda (Brescia), Italy).
www.utenti.tripod.it/bufo2000/index.html

For info on New Zealand frogs, visit: **http://www.otago.ac.nz/Zoology/frogs/index.html**

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