



FROGLOG

Newsletter of the IUCN/SSC Declining Amphibian
Populations Task Force

April 1998, Number 26.



New Seed Grant Round

We are pleased to announce that the DAPTF has succeeded in obtaining funding for a further programme of Seed Grants. These awards are intended as one-time awards of between \$500 and \$2,000 for the support or initiation of research projects which further the DAPTF's mission. Seed Grant funds will not normally be provided for personnel costs. Due to donor restrictions, we have the following funds available for this round: (1) Seed Grants limited to climate change and UVB studies - \$12,000; (2) Seed Grants limited to climate change and UVB exposure, environmental oestrogens or synergistic studies involving climate change and chemical contaminants - \$5,025; (3) Proposals from DAPTF National or Regional Working Groups - \$5,000; and (4) Unrestricted studies - \$10,000.

Succinct proposals of less than 4 pages should be addressed to Tim Halliday at the Task Force address given at the back of this *Froglog*. There is no required format, but each proposal should include a description of the intended work, a statement of how the project will fulfill the Task Force objectives and a budget. Proposals will be reviewed by external experts before approval in conjunction with DAPTF Chair, Ron Heyer, and according to funding availability. Award criteria will be based on scientific rigour and current DAPTF priorities.

The deadline for receipt of applications for grants is 1st July 1998. Applications received after that date will not be considered for this round of awards.



Amphibians and Trematodes

By Stan Sessions

At least 41 species representing 35 genera and 21 families of digenetic trematodes utilize amphibian larvae as intermediate hosts (many more than this utilize amphibians as primary hosts instead of or in addition to utilizing them as second intermediate hosts). Some of these can form cysts in developing larval structures, including eyes, limb buds, central nervous tissues, etc. One species, *Diplostomum flexicaudum*, family Diplostomidae, can cause "bloat disease" in tadpoles and froglets (Cort and Brackett, 1937, *J. Parasit.* 30: 309-321).

Many of these species are extremely common in ponds, lakes, rivers, ditches, puddles, etc. all across North America, and Europe has many of these plus others besides, not to mention the New and Old World tropics. Almost every single pond or puddle has its digenetic trematodes, and some are potentially dangerous to amphibians. The carriers of adult stages include most vertebrate carnivores, including racoons, mink, weasels, coyotes, domestic cats, dogs, birds of all sorts (including ducks, geese, herons, egrets, storks, kingfishers, etc.), reptiles, amphibians, fish, and many invertebrates. Most digenetic trematodes absolutely depend on snails or some other gastropod for larval development. In the snails, each trematode egg undergoes "embryonic amplification" by which hundreds, thousands, or even hundreds of thousands of infectious trematode larvae (cercariae) are produced.

These larvae exit the snails and bore into amphibian larvae and/or adults, in which they form metacercarial cysts. A single

amphibian larva may harbor hundreds of these cysts. We have evidence that the cysts often form in and around the limb bud-forming regions of young tadpoles, and can completely disrupt limb development, extirpating one or both hind limbs in some cases, and causing the outgrowth of multiple supernumerary limbs in others.

Trematode cysts produce cohorts of multilegged prometamorphic *Hyla regilla*, for example, throughout its range in western North America. *Hyla regilla* is not (as far as I know) in danger of decline, but some species or populations, e.g. *Rana aurora*, can also be hit hard by trematodes (although I do not know of any reported cases of multilegged *R. aurora*).

Trematode cysts are microscopic and difficult to detect. Since many trematodes can encyst on aquatic vegetation as well as on tadpoles and many other surfaces (probably even on jelly coats of amphibian egg masses), extreme caution must be exercised in cleaning boots and nets and other equipment when moving from pond to pond (esp. in late summer when the cercariae are being released). In upstate New York, we have been finding up to 6 different species of digenetic trematodes in a single small pond (and since many of the cercariae look alike, there are probably many more than that). It is possible that some species that usually encyst on fish can encyst instead on amphibians, and cause a huge amount of damage when they do. It would be very easy to inadvertently transfer trematode cysts from one pond (e.g. a large one with fish) to another (e.g. a small one with no fish, but lots of amphibians).

I strongly recommend washing equipment with hot soapy water and a stiff brush, followed by 70% ethanol, between ponds. If this is not possible, then at least scrubbing with 70% ethanol between ponds is in order.

The trematode situation in a particular pond can be assessed fairly

easily by opening snails under a dissecting microscope. We have been finding an infestation rate between 0 and 100% (average around 48%) among ponds in upstate New York. An excellent reference is Schell, S.C. 1985. *Trematodes of North America*. University of Idaho Press.

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www.hartwick.edu/biology/def_frogs/index.html



**By Ken Dodd
DAPTF US - South East**

On December 4-5, 1997, the National Institute of Environmental Health Sciences (NIEHS) sponsored a workshop entitled Strategies for Assessing the Implications of Malformed Frogs for Environmental Health at Research Triangle Park, North Carolina. The workshop was attended by approximately 140 persons reflecting a wide array of interests, including the press, although most of the speakers represented US state or federal government agencies. Three workshop goals were addressed: (1) a review of the NIEHS National Toxicology Program findings and strategies, (2) an assessment of the implications of NIEHS/Minnesota Pollution Control Agency findings for human and ecological health, and (3) a forum to allow for broad scientific, industry, and government input and perspective on the malformed frogs issue.

Workshop topics were developed around the stated goals, with the first day devoted to a review of ongoing research and potential explanations, and the second day devoted more to human health issues. Although one of the NIEHS' goals was a discussion of ecological health, this topic was not generally addressed except for a cursory recognition that other species may be affected by whatever factor(s) are causing malformed frogs.

Most observed anuran deformities in nature affect the hind limbs, ranging from complete absence to supernumerary complete or nearly complete limbs. Missing eyes and malformations of the front limbs and jaw are much rarer. The type of deformity gives clues as to when the deformity occurred and to which layer of developmental tissue was responsible. In turn, these give clues

as to the type of stressors that might be responsible for the malformation. Certain deformities seem to be present in frogs of specific size classes (mostly recent metamorphs and juveniles); deformities in adults are exceedingly rare because deformed frogs do not appear to survive winters very well. Almost nothing is known concerning larval deformities. Deformities have been found in many anuran species in North America, especially in the upper Midwest (also see Reaser and Johnson, 1997).

Twenty-four presentations were given, ranging from thought-provoking and informative to superficial and even embarrassing, as may be expected from a workshop with such varied speakers representing divergent academic and health-related backgrounds. Below, I provide notes on a few highlights of the workshop that need reiteration as research on amphibian malformities is pursued.

Lawrence Reiter (US Environmental Protection Agency) noted that the problem of amphibian deformities needs to be put into the larger context of amphibian declines, that deformities may have multiple anthropogenic causes related to stressors and xenobiotics, that factors relating to anuran and ecosystem health are of concern as public health issues, and that there is a need for multi-disciplinary collaborative research with results published in peer-reviewed journals.

Mike Lannoo (US DAPTF National Coordinator) gave a general introduction to the DAPTF (many participants seemed surprised that there were so many field scientists involved!), amphibian declines, and the deformity question. He reviewed the three main current hypotheses to explain deformities, including parasitism, UV-B radiation, and xenobiotics. Lannoo made a plea for participants to recognize that the welfare of the frogs should be the number one concern, that "model" animal tests may not be appropriate in all cases because of anuran diversity and phylogeny, that field herpetologists should be included in causative research, that the life histories of bioindicator species need to be better understood, and that results need to be presented in appropriate scientific outlets rather than published hastily by the popular press. In what seems to be an unfortunate necessity considering the level of controversy surrounding deformed frogs, Lannoo reminded his colleagues that hypotheses are disproven, not discredited.

Carol Meteyer (USGS) pointed out that data on the prevalence of

malformities in natural populations only represent the survivors to that particular stage. Embryos with severe malformations may never survive to the point that they can be counted in the field. In effect, a particular stressor may have many more severe impacts than indicated by simple counts of anurans with deformities.

Robert Hale (Virginia Institute of Marine Science) noted that chemicals are released into the environment and exist as complex mixtures, yet often they are studied as isolates. Environmental systems are complex; for example, sediments can act both as sources and sinks. Hale stressed that toxicologists need to examine not only for the presence of xenobiotics, but also for their bioavailability. No single toxic endpoint is totally protective, especially considering chemical metabolites and the synergistic interaction of chemicals in the environment.

David Lee (Atomic Energy Commission of Canada) showed that groundwater enters wetlands at shorelines. Hence, he felt that it is not surprising that deformities sometimes are found non-randomly distributed around a wetland. What we see in groundwater today may have entered it years or decades ago.

Ken Sexton (University of Minnesota) reminded participants that science is a method of inquiry, not a substitute for decision making. In assessing health threats from the presence of deformed frogs in the environment, public health officials must use a "weight of the evidence" approach.

Inasmuch as the workshop focused on human health issues, it was not unexpected that so little attention was given to the effects of deformities on native frog populations. However, the lack of knowledge of frog demography and life history by some speakers was sometimes disconcerting, at least to a field herpetologist. Biologists studying anuran populations would, for instance, be surprised to hear that frog population size is correlated with pond size, as one speaker maintained. It was clear that the speakers and many of those in the audience represented "big" science, highly technical and well-funded. When human health potentially is concerned, perhaps this is not surprising. Yet in discussions, one participant informed me that good field research could be conducted by volunteers, hence, life history studies did not need the levels of funding represented by the US\$600,000 spent by NIEHS on the deformed frogs issue thus far. I note that the technicians in all those toxicology, developmental, and physiological research labs were

probably not volunteers. Clearly, field researchers need to educate the press and some of our laboratory colleagues about the technical aspects of field data collection, interpretation, and analysis if the sciences of ecology and population biology are to take their rightful place in efforts to determine the effects of malformed frogs on ecological and human health.

Reference

Reaser, J.K. and Johnson, P.T. (1997) Amphibian abnormalities: A review. *Froglog* 24: 2-4.

A summary of the NIEHS workshop will be available. Interested persons should write to: Dr. James Burkhart, National Institute of Environmental Health Sciences, P.O. Box 12233, Research Triangle Park, North Carolina 27709, USA.

The National Reporting Center for Amphibian Malformities (NARCAM) can be accessed on the internet at: <http://www.npsc.nbs.gov/narcam>

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In Defence
of Offham
Marshes

By Trevor Beebee

Offham marshes, in southern England, is one of very few localities to have been given statutory protection as a "Site of Special Scientific Interest" (SSSI) specifically on account of its amphibian inhabitants. Heavily-wooded chalk hills about a low-lying river valley containing pastureland which is often flooded during winter and early spring. A plethora of interesting wildlife is found at the site. In particular, large populations (many hundreds and several thousands respectively) of common frogs (*Rana temporaria*) and common toads (*Bufo bufo*) were found during the late 1980s breeding in the flooded fields and drainage ditches. Substantial numbers of smooth newts (*Triturus vulgaris*) and palmate newts (*T. helveticus*) also occur.

Unfortunately, the frog and toad populations have declined to the extent that only a few clumps of frogspawn and only around 100 toads have been seen in recent years. There is no obvious anthropogenic cause of decline for the toads, though improved field drainage coupled with a series of unusually dry years may

have affected the frogs. It may be that the toads are undergoing a natural population size fluctuation and that numbers will rise again. There is anecdotal evidence of such population cycles at Offham in the past, and the breeding habitat is less predictable than those usually used by this species, because the ditches are dredged regularly and undergo seral succession cycles for years afterwards. During 1996, however, English Nature (the government agency responsible) decided to approve an application by the landowner to grow flax on part of the site, and later to plant rye grass on another field right next to the main toad breeding ditches. Both entailed ploughing up important areas of terrestrial habitat, and the prospect of fertiliser and/or pesticide applications. Flax was duly grown in one field, to the outrage of conservationists and with consequent furore involving (among others) Friends of the Earth, The Sussex Wildlife Trust, many local individuals, English Nature and the landowner. Several conservationists camped on the site during the summer of 1997 with a view to stopping further destructive ploughing. Finally the new Minister, Michael Meacher, intervened to instruct English Nature to reverse its approval for further ploughing and reach an agreement with the landowner to safeguard the site. The future of Offham Marshes SSSI now looks a lot safer than it did a year ago. Part of the rescue package includes research into the critical question of what has caused the decline of the site's toads.

This whole episode highlights the weakness of current habitat protection measures. Firstly, English Nature was too quick to reduce the site's priority for conservation. Despite the fact that it is now well-established that amphibian populations can oscillate wildly over long time-frames, this ecological perspective was ignored and an assumption made that the place was no longer worth protecting. Secondly, the financial incentives to landowners are clearly awry. Flax-planting receives a subsidy from the EU, under the common agricultural policy (CAP), of some £600 per acre irrespective of whether the land is protected (eg. as a SSSI) or not. English Nature cannot compete, in terms of compensation or positive management support, with this and other CAP counter-incentives to conservation. And finally there has been little or no political support for getting tough when all else fails to defend a SSSI; the law makes allowance of Nature Conservation Orders prohibiting damaging activities while negotiations continue, and for compulsory purchase if all else fails.

But the former are rarely invoked while the latter has only been tried once (unsuccessfully) since the passage of the 1981 Wildlife and Countryside Act. Evidently a lot must change, and soon, if habitat protection is to have real meaning in Britain.

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Froglog Shorts

The deadline for receipt of annual reports from all DAPTF Working Groups this year will be July 31st 1998. Would regional coordinators in Canada and Australia please send any reports to their National Chairs. Reports from groups covering parts of the former Soviet Union should this year be sent to the CIS Working Group Chair, Sergius Kuzmin, well in advance of the deadline. All other reports should be sent directly to John Wilkinson at the UK Central Office in order to be included in the 1997-98 Annual Report.

Central European Salamander Project: Miklós Puky (Chair, DAPTF Hungary) has been awarded a grant by the Regional Environmental Center for Central and Eastern Europe to carry out a conservation and education programme based on *Salamandra salamandra*. The programme currently involves Hungary, Slovenia, Croatia and Yugoslavia, and it is hoped to include Romania, Poland and Bosnia, as well as any other interested countries. For full details of participation, contact Miklós Puky: pm@alfa.elte.hu

DAPTF Slovenia, in collaboration with the Society for Bird Research and Nature Protection (DPPVN) and other conservation bodies has produced two full-colour posters highlighting amphibian conservation and wetland biodiversity issues, with support from the Slovenian Ministry of Environment and Ministry of Education. For full details contact: Nusa Vogrin, Vransko 121, SLO-3305 Vransko, SLOVENIA.

Owen Stephens offers his services to anyone in the herpetological world who is making a film and requires a director/cameraman. Contact him at: FROGFILMS@aol.com

DONATIONS The Anonymous donor sent the \$10,000 match to the challenge given to the Task Force to raise funds for the Seed Grant Program in the area of climate change. In addition to this gift, we gratefully acknowledge receipt of the following donations from 1 October

1997 through 28 February 1998.

Organizations: Library, University of Aarhus; American Association of Zoo Keepers, Henry Doorley Zoo Chapter; SEEDS Environmental Science Club, Athens Academy; Cincinnati Zoo; Center for Biological Conservation; Biology Club, Creighton University; Desert Fishes Council; El Paso Zoological Society; Library, McGill University; Minnesota Herpetological Society; National Aquarium in Baltimore; Clyde Peeling's Reptileland; Zoological Society of Philadelphia; Wyoming Natural Diversity Database; Zoologischer Garten, Köln.
Individual Donors: Kraig Adler; Jim Andrews; Neil Armantrout; Chris Banks; Breck Bartholomew; H. Thomas Bartlett; Val Beasley; Gale Belinky; Mike Bohac; Sabitry Choudhury Bordoloi; Robert Brooks; Lincoln Brower; Patricia Brown; Elizabeth Cameron; Charles Carpenter; Charlotte Corkran; Paul Daniel; Joseph K. Davidson; Ted Davis; Tom Diez; Roger Downie; Connie L. Duersch; Arthur Echternacht; Sharon Emerson; Evan E. Evans III; Carol Farneti Foster; Donald & Eugenia Farrar; Walter Fish; Nadine Foley; James Fowler; Thomas Fritts; Karen Furnweger; Robert Gannon; James Gillingham; Steve Gorzula; Susan Graf; P.A. Greenberg; Michelle Grigore; Suzanne Gunderman; James Hanken; James Harding; Julian Harrison; Jane Hey; Stanley Hillman; Eugene Holmes; Rene Honegger; Moira Hope; Peter Hovingh; Roberto Ibáñez D.; Fui Lian & Robert Inger; Karen L. Jacobs; Chad Janowski; Terry Jaworski; Mark Jennings; Jett; Douglas Johnson; Lee Kats; Richard Keehn; Mary Kostalos; Linda LaClaire; Jeffrey Lang; Ewald Lapioli; Charlotte LaTier; Michael Lau; David M. Leavitt; Beth Leuck; Marc D. Linton; Michael Lodato; Thomas Lovejoy; Steven Lowen; Ellen Manes; Ronald Marlow; Alan McCreedy; Ernst Meyer; Matthew Mickiewicz; Kelly Mihok; Edward & Judith Moll; Robert H. Mount; Peter Moyle; Anthony Murphy; Christopher Norment; Patricia Novar; Dennis Oliver; Marilyn Ort; Stephane Ostrowski; Hidetoshi Ota; William Parker; Debra Patla; Christopher Pearl; Don Perschau; James Petranka; Belinda J. Porter; Harvey Pough; Jeffrey Proudfoot; Charles V. Quinn; Hubert R. Quinn; A. Stanley Rand; David Reed; Alan Resetar; Martha Reslock; David Rubin; Rodolfo Ruibal; David Sever; Andrew Sheldon; David Sinclair; Heather Skadsen; Hobart Smith; Andy Snider; Michelle Sorensen; Camille Speck; Albert Spencer; Glenn Stewart; Margaret Stewart; Mark Stromberg; Merril Tawse; Susan Tressler; Tom Tynning; Beatrice Busch

von Gontard; David & Marvalee Wake; Peter Warny; Richard Wassersug; Frank T. Watrous III; Will Watson; Christopher Wedeles; Shauna Weyrauch; Robert B. Willey; Richard Zweifel.



Publications of Interest

Blaustein, A.R., Kiesecker, J.M., Chivers, D.P. & Anthony, R.G. (1997) Ambient UV-B radiation causes deformities in amphibian embryos. *Proc. Natl. Acad. Sci. USA* **94**: 13735-13737.

Flax, N.L. & Borkin, L.J. (1997) High incidence of abnormalities in anurans in contaminated industrial areas (eastern Ukraine). In: *Herpetologica Bonnensis*, W. Böhme, W. Bischoff & T. Ziegler (eds.), SEH, Bonn. pp. 119-123.

Green, D.M. (Ed.) (1997) *Amphibians in Decline. Canadian Studies of a Global Problem*. SSAR, St Louis, Missouri.

Hayes, T.B. (1997) Steroid-mimicking environmental contaminants: their potential role in amphibian declines. In: *Herpetologica Bonnensis*, W. Böhme, W. Bischoff & T. Ziegler (eds.), SEH, Bonn. pp. 145-149.

Hill, B.D. Green, P.E. & Lucke, H.A. (1997) Hepatitis in the green tree frog (*Litoria caerulea*) associated with infection by a species of Myxidium. *Australian Veterinary Journal* **75(12)**: 910-911.

Hopkins, W.A., Mendonça, M.T. & Congdon, J.D. (1997) Increased circulating levels of testosterone and corticosterone in southern toads, *Bufo terrestris*, exposed to coal combustion waste. *Gen. Comp. Endocrinol* **108**: 237-246.

Kaiser, J. (1997) Deformed frogs leap into spotlight at health workshop. *Science* **278**: 2051-2052.

Parent, G.H. (1997) Chronique de la régression des Batraciens et des Reptiles en Belgique et au Grand-Duché de Luxembourg au cours du XX^{ème} siècle. *Les Naturalistes Belges* **78(4)**: 257-304. ("An account of the decline of amphibians and reptiles in Belgium and the Grand Duchy of Luxembourg during the 20th century")

Pleguezuelos, J.M. (Ed.) (1997) Distribución y Biogeografía de los Anfíbios y Reptiles en España y Portugal. Universidad de Granada & Asociación Herpetológica Española, Granada.

Schneeweiss, N. & Schneeweiss, U. (1997) Amphibienverluste infolge mineralischer Düngung auf Agrarflächen. *Salamandra* **33**: 1-8.

(Mortality of amphibians as a consequence of mineral fertilizing.)

Shiroye, L.J., Bishop, C.A., Green, D.M., MacDonald, C.J., Brooks, R.J. and Helferty, N.J. (1997) Validation tests of an amphibian call count survey technique in Ontario, Canada. *Herpetologica* **53**: 312-320.

Takeishi, M. (1996) On the frog, *Rana ornativentris*, with Supernumerary Limbs Found at Yamada Greenery Area in Kitakyushu City, Fukuoka Prefecture, Japan. *Bull. Kitakyushu Mus. Nat. Hist.* **15**: 119-131.

Northwestern Naturalist Volume 78(1) contains three papers of interest to DAPTF members: Hartwell *et al*, A Habitat-Based Design for Sampling and Monitoring Stream Amphibians with an Illustration from Redwood National Park; Marnell, Herpetofauna of Glacier National Park; and Corn *et al*, Surevey and Assessment of Amphibian Populations In Rocky Mountain National Park. Copies of this issue of *Northwestern Naturalist* can be purchased for \$6 (including shipping). For full details, contact: Janet Jones, Treasurer, Society for Northwestern Vertebrate Biology, 4820 Yelm Highway SE, Suite B175, Olympia, WA 98503, USA.

The following three abstracts were published in the *Proceedings of the Desert Fishes Council* Volume XXVIII, 1997. Edited by Gary P. Garrett. For information, contact Phil Pister (phildesfish@telis.org).

Perkins, M.J., L.D. Lentsch, C.J. Keleher, R.A. Fridell, and D. Ross. Utah ushers spotted frog towards recovery. Pp. 68-69.

Ross, D.A. and R.A. Fridell. Distribution and status of the boreal toad (*Bufo boreas*) in Utah: New toads of the purple sage. P. 75.

Sjoberg, J.C., J. Stein, and J.E. Heinrich. Status and distribution of the Amargosa toad, *Bufo nelsoni*. Pp. 77-78.

This issue's cover illustration is of *Bufo mauritanicus* from Tunisia, courtesy of James Lee Hance.

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