Pseudotriton ruber by Robin Moore

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FROGLOG

Newsletter of the Declining Amphibian Populations Task Force

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DAPTF Seed Grants 2006

We have completed our allocation of DAPTF Seed Grants for 2006. We received 32 proposals from 23 countries, and we our funding 12 projects, an outlay of $23,133. This year, for the first time, we are funding projects in Bolivia, Italy and the Seychelles. Five of the projects we are supporting in the USA are funded by the ARMI; we are very grateful to them for their continuing support. Chester Zoo, UK is funding two projects, in Bolivia and Ecuador.

Since 1992, the DAPTF has funded 167 projects through its Seed Grant programme, distributing $321,634 to researchers in 49 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 over 100.

Tim Halliday

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.

Sebastián Barrionuevo & María Laura Ponssa (2004) Monitoring three species of *Telmatobius* (Anura: Leptodactylidae) from montane streams of Tucumán Province, northwest Argentina. (*pretorum@hotmail.com*)

Arvin C. Diesmos (2002) The status of Philippine caecilians (Amphibia: Ichthyophiidae). (*g0304912@nus.edu.sg*)

Ansel Fong & Jean-Marc Hero (2003) Population ecology of the stream-dwelling *Eleutherodactylus cuneatus* on La Gran Piedra, eastern Cuba. (*ansel@bioeco.ciges.inf.cu*)

Ron Gagliardo (2004)Further exploration in search of *Atelopus varius* in Costa Rica. *(rgagliardo@atlantabotanicalgarden.org*)

Rebekah Gibble (2004) Modulating effects of atrazine on antimicrobial peptide secretion from the skin of *Xenopus laevis.* (*gibblere@tribe.ulm.edu)*

Tibor Hartel, László Demeter & Dan Cogalniceanu (2004) The factors influencing breeding habitat use of the amphibians in the middle Târnava Mare Valley and upper Olt River Valley, Romania. (*asobeka@yahoo.com*)

James Harvey (2004) Distribution and estimation of adult global population size of the critically endangered mistbelt moss frog *Arthroleptella ngongoniensis.* (*wolverine_attack100@yahoo.co.uk*)

Stephen C. Richter & Brian I. Crother (2003). Genetic consequences of population reduction and isolation in the critically endangered frog, *Rana sevosa*, with comparison to non-isolated populations of two sister taxa, *Rana areolata* and *Rana capito*. (*stephen.richter@eku.edu*)

Anna Schotthoefer (2004) Temporal and spatial analysis of *Ribeiroia ondatrae* infection risk within reconstructed wetlands. (*schottho@uiuc.edu*)

Anna Schotthoefer (2004) Effects of a crayfish predator and cover on the transmission of *Ribeiroia ondatrae*, the trematode that causes limb deformities in amphibians. (*schottho@uiuc.edu)*

David J. Zafft (2003) Cytridiomycosis in boreal toads from the Green River drainage, Wyoming. (Report by William M. Turner *et al.)* (*bill.turner@wgf.state.wy.us)*

Amy J. Lind (2004) Development of a database on reintroductions, translocations, and associated captive breeding in amphibians. (*alind@fs.fed.us*)

The following papers report work supported by DAPTF Seed Grants:

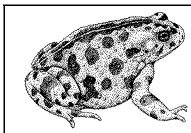
Bank, M. S., Crocker, J. B., Davis, S., Brotherton, D. K., Cook, R., Behler, J. & Connery, B. (in press) Population decline of northern dusky salamanders at Acadia National Park, Maine, USA. *Biol. Conservation:*
(Grant to Michael Bank *et al*., 2002) (*mbank@hsph.harvard.edu*)

Gutleb, A. C. (2006) Detecting the effects of environmentally relevant concentrations of thyroid hormone disrupting compounds on amphibian development. (2006) PhD Thesis, Wageningen University, The Netherlands. ISBN 90-8504-354-9
(Grant to Arno Gutleb, 1997) (*arno.gutleb@veths.no*)

Herrera, R. A., Steciow, M. M. & Natale, G. S. (2005) Chytrid fungus parasitizing the wild amphibian *Leptodactylus ocellatus* (Anura: Leptodactylidae) in Argentina. *Diseases of Aquatic Organisms:* **64;** 247-252.
(Grant to Mónica Steciow & Raúl Herrera, 2003) (*msteciow@museo.fcnym.unlp.edu.ar*)

Orton, F., Carr, J. A. & Handy, R. D. (2006) Effects of nitrate and atrazine on larval development and sexual differentiation in the northern leopard frog *Rana pipiens*. *Envtl. Toxicol. & Chem:* **25;** 65-71.
(Grant to Frances Orton *et al*., 2003) (*frances.orton@brunel.ac.uk*)

Smith, G. R., Temple, K. G., Dingfelder, H. A. & Vaala, D. A. (2006) Effects of nitrate on the interactions of the tadpoles of two ranids (*Rana clamitans* and *R. catesbeiana*). *Aquatic Ecology:* **40;** 125-130.
(Grant to Geoffrey Smith & Jessica Rettig, 2002) (*smithg@denison.ed*u)



New Swiss Amphibian Red List

By Benedikt R. Schmidt and Silvia Zumbach

Seventy percent of the twenty amphibian species that inhabit Switzerland are listed on the updated Red List that was compiled by the Swiss Amphibian and Reptile Conservation Program KARCH (*http://www.karch.ch/)* and published officially by the Swiss Governmental Agency for the Environment BUWAL (from 2006 on: BAFU) in November 2005. This figure is more than twice that produced by the Global Amphibian Assessment (Stuart *et al*. 2004).

The updated Red List is based on two years of field work. About 300 sites were visited multiple times and thoroughly searched for amphibians. This field protocol allowed for the estimation of detection probabilities and the proportion of sites occupied by each species (Schmidt 2005). Hence, absence is not confounded with non-detection. Indeed, statistical analyses show that field workers did an excellent job and that most species are present only in a few sites where they were not recorded.

Red List status was assessed according to the criteria of the World Conservation Union (IUCN). Because Switzerland is a small country, one might expect that many species will be red-listed simply because their distributional ranges in Switzerland are small. However, this is true for only a small fraction of the species, such as *Hyla intermedia* and *Triturus carnifex* (both EN) and *Rana latastei* (VU) which are restricted to southern Switzerland. Most species are red-listed because they have suffered strong population declines. Population declines were estimated as the proportion of sites where the species were known in the past but where they no longer occur (IUCN Red List criterion A2c). Several species have experienced declines in the last twenty years of more than 50% (*Alytes obstetricans*, *Bombina variegata*, *Bufo calamita*, *Hyla arborea*, *Triturus cristatus*, and *T. vulgaris* – all EN). These declines are staggering, given the fact that amphibians have been protected by federal law since 1966 and that it is (at least in theory) forbidden to destroy amphibian breeding sites.

Only one species has responded favourably to conservation action. *Rana latastei* was formerly CR and is now in category VU. This is because intensive surveys located several hitherto unknown populations and because many new ponds were constructed in the restricted range of the species in Switzerland (about 25 km^2; see Grossenbacher *et al*. 2002 for a review).

All the species suffering heavy declines are species that prefer temporary ponds, from small wheel ruts to large ponds that dry out only once every couple of years. Consequently, the focus of amphibian conservation action should shift towards the recreation of a more natural hydrology at the landscape level. If this is possible, then many patches will be temporarily flooded, creating prime habitat for all amphibians. Unfortunately, implementing such a conservation strategy will be difficult, given Switzerland's current political climate. This leads us to expect that Switzerland's amphibians face a dire future.

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The Adobe pdf of the Swiss Amphibian Red List is available from the website of KARCH:
http://www.karch.ch/karch/d/pro/rolia/media/RoteListe_BUWAL_KARCH.pdf
(This will open the pdf of the German text; the Red List is also available in French and Italian.)

References:

Grossenbacher K., Lippuner M., Zumbach S., Borgula A. & Lüscher B. 2002. Phenology and reproduction of 3 brown frog species *Rana latastei*, *R. dalmatina*, *R. temporaria*; developments and status of the *R. latastei* populations in Mendrisiotto, southern Ticino, Switzerland, pp. 91-100 in Ferri V. (ed.): Atti del terzo Convegno Salvaguardia Anfibi. Progetto ROSPI & Museo Cantonale di Storia Naturale di Lugano, Lugano.

Schmidt B. R., 2005. Monitoring the distribution of pond-breeding amphibians when species are detected imperfectly. Aquatic Conservation, **15**: 681-692.

Schmidt B. R. & Zumbach S., 2005. Rote Liste der gefährdeten Amphibien der Schweiz. BUWAL-Reihe: Vollzug Umwelt, Bern, Switzerland. 48 p.

Stuart S. N., Chanson J. S., Cox N. A., Young B. E., Rodrigues A. S. L., Fischman D. L. & Waller R. W., 2004. Status and trends of amphibian declines and extinctions worldwide. Science, **306**: 1783-1786.

First Occurrence of Bull Frogs (*Rana catesbeiana*) in Federal District, Central Brazil

By Rocha-Miranda, F.; Martins Silva, M.J. & Mendonça, A. F.

The bullfrog (*Rana catesbeiana*) is native to central and eastern USA and southeastern Canada, but was introduced into Brazil in 1935 (Rio de Janeiro State) through authorized importing by the Brazilian Government (ISSG, 2005). Since the beginning, its farming potential generated great economic interest, because of its high reproductive capacity, growth rate, resistance to diseases and high meat value. Moreover, the species is well-adapted to the Brazilian climate, which provides a longer reproductive period and higher growth rate in comparison with native habitats (Fortes *et al*., 2004).

Currently, there are about eight large companies farming bullfrogs, with 600 establishments in Brazil (Bezerra, 2001). The estimated meat production of 400 tons/year is destined almost entirely for the domestic market, but is still thought to be insufficient to meet demand (Heifer, 2001). 1,500 to 4,000 animals are slaughtered daily to provide meat, liver (in the form of paté), skin (for diverse products), oil (for the perfume industry); what is left is recycled as frog food.

Bullfrogs are common in rivers and lakes that drain ranicultural areas (mainly in the South region), due to diverse structural and methodological problems in bullfrog cultures registered by the Ministry of Agriculture, Livestock and Food Supply. This is clear evidence that invasion into natural habitats has already begun in Brazil (Feio, 1997). Adult bullfrogs are voracious predators and may be responsible for significant levels of predation on native anurans and other aquatic and terrestrial fauna, such as snakes, frogs, mice and turtles, including young bullfrogs (Jim, 1997). Bullfrogs are highly aquatic and inhabit warm, open, permanent ponds and rivers (Bruneau & Magnin, 1980; Bury & Whelan, 1984; Govindarajulu, 2004). They prefer non-vegetated or impacted areas, tolerating polluted waters better than the majority of native species. In addition, the early stages of bullfrogs (eggs and larvae) are not palatable to the majority of predators, favouring its expansion into new habitats.

Until now, there has been no report of *R. catesbeiana* occurring in natural habitat within the Federal District. However, three specimens of *R. catesbeiana* have recently been found in Santa Maria stream (16º02`07``S 48º00`38``W) during a University of Brasilia study. There are no official bullfrog farms near this collecting site, but it is possible that there are illegal farms in the region of Santa Maria city. This hypothesis is confirmed by a report from a farmer that some neighbors had started bullfrog farming, but had abandoned it due to a lack of a market, killing the adults and releasing young bullfrogs into nature.

All animals collected were adult females with SVLs of 22.5, 19.4 cm and 15.7 cm; weights were 550, 290 and 262g respectively. All individuals were green or medium brown in colour with white and yellow belly colours and dark spots characteristic of the species. Considering that the usual weight of juveniles is around 200g, the 250g (about three months of age) of the collected specimens suggests that they are very well-suited to the natural environment.

The stomach content of the collected animals was also analyzed and consisted mostly of invertebrates, especially aquatic insets. However, we also found young frogs inside the stomachs, indicating the possible impact of bullfrogs on native species. The occurrence of young frogs in the diet of *R. catesbeiana* has been observed in other regions of the country (Fortes *et al* 2004).

None of the animals captured had mature eggs, so we cannot determine if *R. catesbeiana* is reproducing in the natural environment. It is essential to set up an effective monitoring program in this area to verify new occurrences and to check for reproduction in the natural environment, as *R. catesbeiana* already reproduces in natural habitats in the South region (Fortes *et al.,* 2004).

Finally, it is clearly a matter of urgency to set up management and monitoring programs in the Federal

District to seek to control bullfrogs and to understand the invasion dynamics of this species in the Cerrado biome.

References:

Bezerra, J.A. 2001. Ranicultura: Salto de Qualidade. Revista Globo Rural on line **189**: pp 01-02 (*http://globorural.globo.com*)

Bruneau, M. & Magnin, E. 1980. Croissance, nutrition et reproduction des ouaouarons *Rana catesbeiana* Shawn (Amphibia: Anura) des Laurentides au nord de Montréal. Can. J. Zool. **58**: 175-183

Bury, R. B. and Whelan, J. A. 1984. Ecology and management of the bullfrog. U.S. Dept. of the Interior, Fish and Wildlife Service, Resource Publication **155**, Washington, D.C.

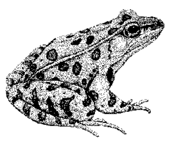
Feio, R. N. Diversidade de anfíbios no Brasil. In: IX Encontro Nacional de Ranicultura, II International Meeting on Frog Research and Technology, 1997, Santos. *Anais.* Santos: ABETRA/ABC, 1997. 236 pp. 165-168

Fortes, V.B; Gonsales, E.M.L; Branco, A.; Alves, F.C.; Martins, A.K. 2004. Perigo: anfíbio exótico ameaça biodiversidade brasileira. Revista Sul Ambiental **4** (10).

Govindarajulu, P. 2004. Introduced bullfrogs (*Rana catesbeiana*) in British Columbia: impacts on native Pacific treefrogs (*Hyla regilla*) and red-legged frogs (*Rana aurora*). Ph.D. thesis. University of Victoria, Victoria. Chapter 7.

ISSG, 2005. Invasive Species Specialist Group of The World Conservation Union. *http://www.issg.org*

Jim, J. O impacto da criação de rãs sobre o meio ambiente. In: IX Encontro Nacional de Ranicultura, II International Meeting on Frog Research and Technology, 1997, Santos. *Anais* Santos: ABETRA/ABC, 1997. 236 pp. 163-164.



Amphibian deformity frequency and monitoring methodology in Hungary

By: Miklós Puky, DAPTF Working Group Chair

The occurrence of amphibian deformities is known and documented for centuries, as the first description dates back to the 18th century (Vallisneri, 1733). In the last thirty years several authors have described and categorised different deformity types and have summarised the up-to-date knowledge in this field (see e.g. Ouellet, 1999; Johnson *et al*, 2001). Apart from genetic reasons, various environmental factors from parasites to low temperature have also been proved to cause deformities in the wild (Dubois, 1983; Gardiner & Hoppe, 1990; Ouellet *et al.*, 1997; Rowe *et al*, 1996, 1998; Rostand, 1958, 1959, 1971; Woitkewitsch, 1961). Others (e.g. high tadpole density, water chemistry modifications, high temperature, toxins, lack of vitamin D or calcium) have led to malformations under laboratory conditions (Berger, 1968, 1971; Cummings, 1987, 1989; Harfenist *et al*., 1989; Muto, 1969a, 1969b, 1970). Reports on amphibian deformities have become more common from the early 1990s and the deformity frequency was often well above the 2% background value, frequently reaching 10-30% in the 1990s and 2000s with occasional findings up to 69-80% due to e.g. severe pesticide pollution (Dubois, 1979; Ouellet *et al*., 1997; Vershinin, 1989). However, the study of amphibian deformities is still not the focus of environmental research projects in Europe, as the example of Hungary demonstrates, where the earlier literature contains only one description of a deformed amphibian, a *Rana esculenta* individual with five legs (Dely, 1960). In 2005 up-to-date knowledge on deformities was collected and is briefly summarised here.

Hungary is a country of approximately 93,000 km^2 today (historically it extended to a three times larger area, which sometimes causes confusion when the status of different species are revised over time) situated entirely in the Pannonian zoogeographical region in Central Europe in the middle of the Carpathian Basin. It consists mainly of lowland and hilly areas with a mountain range in the northeast and in Transdanubia with the highest peak of 1,015 metre above sea level. The area of Hungary belongs to the catchment of three large rivers, the Danube, the Tisza and the Dráva.

The study of amphibian deformities included individual site visits in all 50 km x 50 km UTM squares covering the country and the annually-repeated monitoring of more than 30 sampling sites along the River Danube, Ipoly and Tisza (Puky & Fodor, 2002). The length of the data series varied as the monitoring of the individual sites started between 1987 and 2000. Adult amphibians were mainly examined during their peak activity period, the spring breeding season, when they migrated from land to water, but animals found later were also checked for deformities. The study of adult animals was especially important with newts, because they have the ability to heal deformities even after metamorphosis has finished (Scadding, 1981) and they also have fewer offspring and at most sites they are less abundant than Anura species. Juveniles were primarily studied in September, after they had finished their dispersal because of other considerations, e.g. abundance estimations. In addition to health conditions, the growth characteristics of common species were also recorded for further comparison between deformed and healthy individuals (Puky, 2001). Weight was measured with a spring balance, and length with KERN 462-41 digital scales. Deformed and healthy animals from the same site were compared and statistically analysed.

Since 1994, 13 taxa (*Salamandra salamandra*, *Triturus vulgaris, T. alpestris, T. dobrogicus, T. carnifex, Bombina bombina, Bufo bufo, B. viridis, Pelobates fuscus, Rana temporaria, R. arvalis, R. dalmatina, R. esculenta* c.), both Caudata and Anura species showed deformities. Three of them (*T. vulgaris, B. bombina, R. esculenta* c.) also had multiple deformities, i.e. more deformity types on one individual or the same deformity type at different parts of the body of the same individual. Four species (*S. salamandra*, *T. dobrogicus, T. carnifex, B. bombina*) had a higher relative frequency of deformities than expected from the number of individuals studied. It was surprising with *S. salamandra* (no mass deformity observations had been made earlier) and even more with *T. dobrogicus*, which had no earlier deformity records. On the other hand, *B. bombina*, which had been known to show mass deformities, and *T. carnifex*, which had different deformity types in earlier studies (e.g. Flax & Borkin, 1997; Arias & Zavanella, 1979; Zavanella *et al*., 1984) could be expected to have deformities more frequently than the other species.

Ectromely was the most common deformity type; in most species more than one type was detected. The most diverse deformity types, altogether nine and eight, were found in *R. esculenta* c. and *B. bombina*, respectively. Altogether in 17 cases, eight taxa (*S. salamandra*, *T. dobrogicus, T. carnifex, B. bombina, B. bufo, B. viridis, R. arvalis, R. esculenta* c.) have been documented to show deformity frequencies over 3%. Mass deformities (> 10% frequency of amphibian deformities found in at least 50 individuals of the same developmental stage from the same species) were found to be present in juveniles.

Nearly 90% of all deformities recorded were found in deformity-oriented monitoring, which emphasises the importance of special amphibian deformity-monitoring surveys. To help future data collection, a standardised monitoring protocol for juveniles and adults was compiled on the basis of our field experience from 1994. The main characteristics of the recommended method include the investigation of at least 50 individuals per species per developmental stage, a three-level categorisation (< 3% deformity rate, 3-10% deformity rate, >10% deformity rate, i.e. mass deformity if at least 50 individuals per species per developmental stage was checked) detailed description of deformity types, their location and symmetry (if more than one occur) and the recording of additional information including both biotic and abiotic parameters (for details see Fodor & Puky, 2002).

Approximately 80% of all deformities described occurred along the River

Danube, Ipoly and Tisza (Puky & Fodor, 2002). In the Gemenc floodplain of the Danube the frequency of amphibian deformities was over 3% for several species in several years (Puky, 2003; Puky & Fodor, 2002). Mass deformities (frequency 71%, 32%, 20%, respectively) also occurred there, and in two of the three cases the length and weight of deformed juveniles were significantly shorter and lighter ($p<0.01$) than those of the healthy individuals. The analysis of the deformity types, species included, and habitat characteristics revealed four possible causes (extremely high tadpole density, high water temperature, pesticides, and bacterial infection). Average monthly temperatures, however, did not differ significantly between 1997 and 2001, and several other factors (e.g. industrial pollution, and increased UV-B radiation) cannot completely be excluded (Puky & Fodor, 2002). Deformities were only recorded when the Danube flooded the area, which emphasises the importance of the medium in the process. It also stresses the importance of further studies on amphibian deformities in floodplains.

References:

Arias, E, & Zavanella, T. (1979): Teratogenic effects of manganese ethylenebisdithiocarbamate (maneb) on forelimb regeneration in the adult newt, *Triturus cristatus carnifex*. Bull. Env. Contam. Toxicol. **22**: 297-304.

Berger, L. (1968): The effect of inhibitory agents in the development of green-frog tadpoles. Zool. Polon. **18:** 381-390.

Berger, L. (1971): Viability, sex and morphology of F2 generation within forms of *Rana esculenta* complex. Zool. Polon. **21**: 345-393.

Cummins, C. P. (1987): Factors influencing the occurrence of limb deformities in common frog tadpoles raised at low pH. Ann. Soc. R. Zool. Belg. 117(Suppl 1): 353-364.

Cummins, C. P. (1989): Interaction between the effects of pH and density on growth and development in *Rana temporaria* L. tadpoles. Func. Ecol. **3**: 45-52.

Dely O. Gy. 1960): Une grenouille verte (*Rana esculenta* L.) á cinq extrémités. Vertebr. Hung. **2**:41-47.

Dubois, A. (1979): Anomalies and mutations in natural populations of the *Rana "esculenta*" complex (Amphibia, Anura). Mitt. Zool. Mus. Berlin. **55**: 59-87.

Dubois, A. (1983): L'anomalie P des grenouille vertes (complexe de *Rana* kl. *esculenta* Linné 1785) et les anomalies voisines chez les amphibiens. In Vago, C. & Matz, G. (eds): Comptes Rendus du Premier Colloque International de Pathologie des Reptiles et des Amphibiens. Angers, France. Presses de l'Université d'Angers. 215-221.

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

Fodor, A. & Puky, M. (2002): Herpetological methods: II. Protocol for monitoring amphibian deformities under temperate zone conditions. Opusc. Zool. Budapest. **34**: 45-52.

Gardiner, D. M. & Hoppe, D. M. (1999): Environmentally induced limb malformations in mink frogs (*Rana septentrionalis*). J. Experimental Zool. **284**: 207-216.

Harfenist, A., Power, T., Clark, K. L. & Peakall, D. B. (1989): A review and evaluation of the amphibian toxicological literature. Ottawa, Ontario, Canada. CWS. Technical Report Series No. **61**. pp. 222.

Johnson, P. T. J., Lunde, K. B., Haight, R.W., Bowerman, J. & Blaustein A. R. (2001): *Ribeiroia ondatrae* (Trematoda: Digenea) infection induces severe limb malformations in western toads (*Bufo boreas*). Can. J. Zool. **79**: 370-379.

Muto, Y. (1969a): Anomalies in the hind limb skeletons of the toad larvae reared at a high temperature. Cong. Anom. **9**: 61-73.

Muto, Y. (1969b): Hind limb development and malformations of toes in the larvae reared at high temperature in the toad, *Bufo vulgaris formosus*. Cong. anom. **9**: 1-12.

Muto, Y. (1970): Digital malformations in the forelimbs of the toad larvae reared at a high temperature. Cong. Anom. **10**: 135-147.

Ouellet, M. (1999): Amphibian deformities: current state of knowledge. In: Sparling, D. W., Linder, G. & Bishop, C. (eds): Ecotoxicology of amphibians and reptiles. 617-661.

Ouellet, M., Bonin, J., Rodrigue, J., Desgranges, J-L. and Lair, S. (1997): Hind limb deformities (ectromely, ectrodactyly) in free living anurans from agricultural habitats. J. Wildl. Dis. **33**: 95-104.

Puky, M. (2001): A comprehensive three-year herpetological survey in the Gemenc Region of the Danube - Dráva National Park, Hungary. Opusc. Zool. Budapest. XXXIII: 113-128.

Puky, M. & Fodor, A. (2002): Occurrence of amphibian deformities along the Hungarian section of the River Danube, Tisza and Ipoly. Limnological Reports of the International Association for Danube Research. **34**: 845-852.

Rostand, J. (1958): Les anomalies des amphibiens anoures. Paris, France. SEDES. pp. 100.

Rostand, J. (1959): L'anomalie P chez la grenouille verte (*Rana esculenta* L.). Bulletin Biol. Fr. Belg. **93**: 7-15.

Rostand, J. (1971): Les étangs á monstres: histoire d'une recherche (1949-1970). Paris, France: Stock. pp. 85.

Rowe, C. L., Kinney, O. M. & Congdon, J. D. (1998): Oral deformities in tadpoles of the bullfrog (*Rana catesbeiana*) caused by conditions in a polluted habitat. Copeia. 244-246.

Rowe, C. L., Kinney, O. M., Fiori, A. P., & Congdon, J. D. (1996): Oral deformities in tadpoles (*Rana catesbeiana*) associates with coal ash deposition: effects of grazing ability and growth. Freshwater Biol. 36: 723-730.

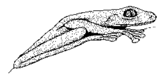
Scadding, S. R. (1981): Limb regeneration in adult Amphibia. Can. J. Zool. **59**: 34-46.

Vallisneri, A. (1733): Opere fisico-mediche. Volume 2. Venezia (Venice), Italy. pp. 551.

Vershinin, V. L. (1989): Morphological anomalies in urban amphibians. Ékologiya (**3**): 58-66.

Woitkewitsch, A. A. (1961): Le développement des extrémités surnuméraires chez les amphibiens. Bull. Biol. Fr. Belg. 95: 569-600.

Zavanella, T., Pacces Zaffaroni, N. Arias, E. (1984): Abnormal limb regeneration in adult newts exposed to the fungicide maneb 80. A histological study. J. Toxicol. Env. Health. **13:** 735-745.



Froglog Shorts

Amphibian Declines in Latin America: A special section of seven papers in the journal *Biotropica* 37 (2) (2005) is devoted to *Amphibian Declines in Latin America* and includes introductory and summary papers by Karen Lips.

DONATIONS:

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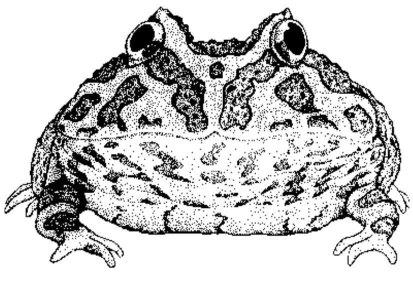

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