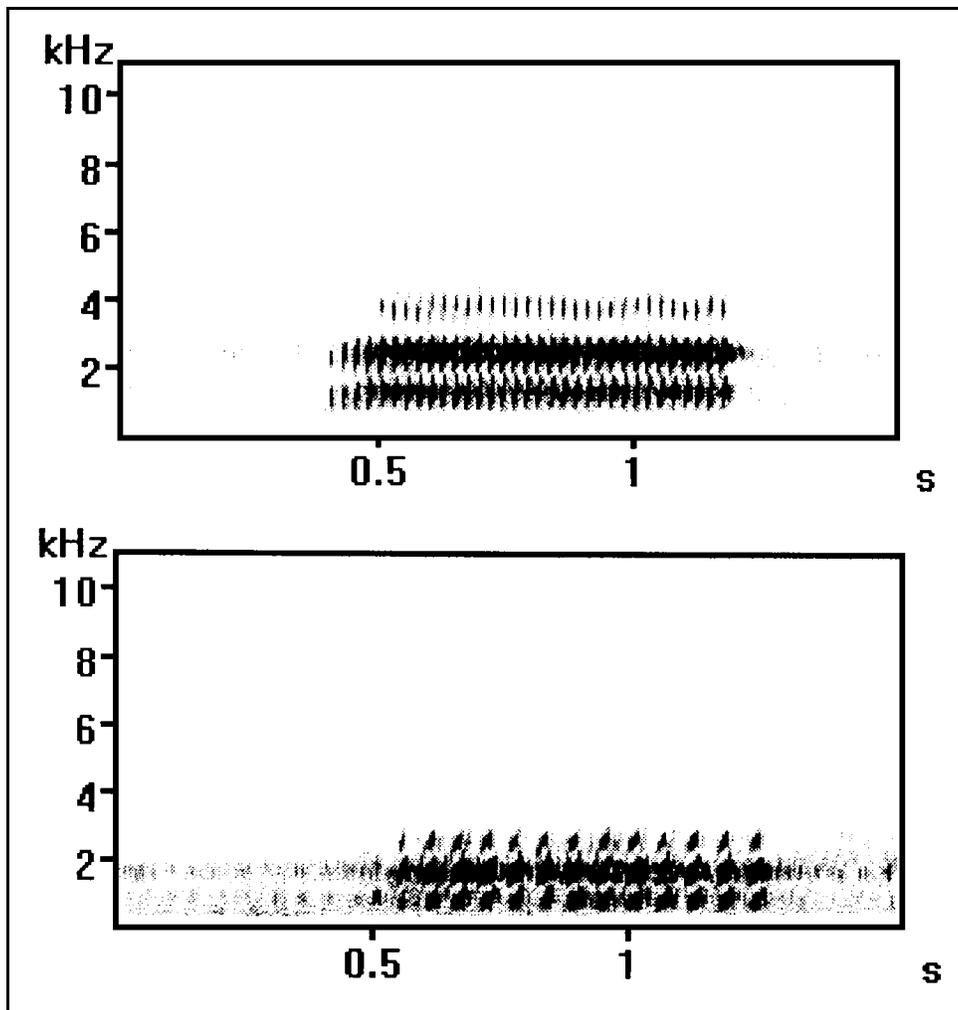

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Cover: The study of anuran vocalization has been an active field within herpetology for many years. The cover image includes audiospectrographs of a Cope's gray treefrog (*Hyla chrysoscelis*), recorded at 19.57°C in Kane County, Illinois, and an eastern gray treefrog (*H. versicolor*), recorded at 21°C in Will County, Illinois). Images provided by Michael Redmer.

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Dealing with Reptile Ticks

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Abstract

Several species of ticks use snakes, lizards, or turtles as hosts, occasionally creating minor pet-health problems. I review the advice given by pet-book authors and practicing veterinarians for dealing with tick infestations. Options range from physical removal, to the application of heat or various substances to the ticks or surrounding area, to the use of pesticidal chemicals directly on the offending parasite or in the container used to house the host animal. Each method varies in the success level attributed to it. Direct physical removal of ticks from their hosts (i.e., gently, but firmly pulling them out) appears to be the soundest method for dealing with cases of tick parasitism.

Several species of ticks (Acari: Ixodidae) use snakes, lizards or turtles as hosts; hence ticks are often present on newly imported reptiles, particularly wild-caught individuals (Burridge et al., 2000; Burridge, 2001). These are generally removed before the host animals become available in the pet trade, but they occasionally go undetected until after the business transaction leaving the herpetoculturist to deal with a minor pet-health problem. Pets kept in outdoor enclosures (e.g., tortoises and iguanas) are also parasitized occasionally by local tick species.

Ticks attach themselves to their hosts by means of piercing mouthparts. They are larger than the related and more commonly encountered mites, sometimes the same size as one of the host animal's scales (3–7 mm), and usually firmly attached. Often, ticks swell as they feed on blood from the host's tissues, making them clearly visible to the naked eye. Some species are rounded when well fed and can be easily detected as they protrude from the host's body surface. Occasionally, these are described as "looking like black or brown seeds." Another kind, seen commonly on royal pythons (*Python regius*), "is cunningly disguised as a scale, being flattened in shape and chestnut brown in colour" (Mattison, 1995).

The life cycles of ticks encountered on reptiles are complex and may involve non-reptilian intermediate hosts. Although there is little chance of a tick population explosion under captive conditions, ticks can cause their hosts irritation and unnecessary stress and are capable of spreading viral, protozoan and rickettsial diseases (Reichenbach-Klinke and Elkan, 1965; Ernst and Zug, 1996; Johnson-Delany, 1996; Flank, 1998; Burridge, 2001), including some of veterinary or medical importance. Therefore, cases of tick parasitism should be taken seriously and the bothersome animals removed upon discovery. Most pet-book authors recommend removal, but their advice varies and is sometimes conflicting. In this article, I review the removal and treatment techniques recommended in the herpetocultural literature and by veterinarians and suggest an approach I believe to be the most sound.

Methods

I reviewed a large number of popular pet manuals to docu-

ment the range of recommended tick removal and treatment approaches. I included several older references (pre-1990) in my review since these are still found frequently in circulation and are sometimes the only references available in public libraries. Twelve private practice veterinarians offering reptile care in the Upper Midwest (as identified in Beltz [1989] or through local referral) were surveyed informally by telephone. I asked practitioners for over-the-phone advice on the removal of one or two ticks from a pet snake or lizard (hypothetical situations in each case). Finally, I perused veterinary and herpetocultural sites on the World Wide Web for treatment recommendations. I report the results of these efforts here, along with comments based on my personal experiences and observations.

Results and Discussion

Authors have recommended a variety of removal and treatment techniques (Table 1). Options range from physical removal (with or without the aid of a forceps or tweezers), to the application of heat or various substances to the ticks or surrounding area, to the use of pesticidal chemicals directly on the offending parasite or in the container used to house the host animal. Each method varies in the success level attributed to it. A few authors, with little additional comment, suggest treating tick problems the same as mite infestations.

Using an Extinguished Match. Mara (1994a, 1994b) recommends lighting a match, blowing it out, and applying the hot end to the tick or the skin immediately in front of the attachment site. The discomfort from the heat induces the tick to release its grip in an attempt to escape the heat. This method is used commonly, although not always successfully, to remove ticks (*Ixodes* sp.) from the skin of humans and mammalian pets.

I found poor results when applying this method to the removal of reptile ticks. In 1990, I removed three ticks (*Amblyomma* sp.) from an adult savannah monitor (*Varanus exanthematicus*). Seven of eight attempts using this extinguished match method failed. Similar attempts in 1994 to dislodge a tick from the hind leg of a diamond-backed terrapin (*Malaclemys terrapin*) maintained at a local pet store were also unsuccessful.

Table 1. Various recommended removal and treatment approaches for dealing with reptile ticks.

Removal/Treatment Approach	Reference
“Ticks...can be controlled with commercial products, again following the instructions on the bottle.... Apply alcohol directly to the ticks, wait a few seconds, then pull on them gently until they let go.”	Staszko, 1990 (p. 47)
“Apply some rubbing alcohol to the tick’s surface (often several applications will be needed), and soon the irritated parasite will begin to withdraw its mouth parts from your lizard.... Apply some topical antibiotic to the area where you extracted the tick.”	Balsai, 1992 (p. 34)
“...they should first be dabbed with a little alcohol to make them loosen their mouthparts. They can then be pulled out with a forceps or with your thumb and forefinger.”	Coborn, 1996 (pp. 58-59)
“If you pick the ticks...with the tweezers, you might well follow up with an alcohol swab to help reduce the risk of infection at the sore spot. Perhaps a treatment with the alcohol will tend to loosen the tick before you attempt to pick it off.”	Roberts and Roberts, 1976 (p. 80)
“They can be killed by dabbing them with a drop of alcohol, for instance methylated spirits, then carefully removing them with a forceps. They should be grasped, then slowly turned over on to their backs to unhook the mouthparts.”	Mattison, 1992 (p. 100)
“Dab each tick with a cotton ball soaked in alcohol – rubbing alcohol works fine – give the tick a few minutes to realize it needs to move on, and then use tweezers to pull the tick off. One of the commercial tick removers...can be used to remove ticks.”	Bartlett and Bartlett, 2000 (pp. 122-123)
“Ticks may be removed by dabbing them with alcohol, then grasping them with forceps and carefully turning them over (“head over heels”) in order to unhook their mouthparts.”	Mattison, 1995 (p. 38)
“Pick ticks off your pet with tweezers. Perhaps lemon juice, vinegar, alcohol, or tobacco juice helps, but generally a slow gentle tug will suffice.... If the area seems irritated you might apply a tiny dab of antibiotic cream or simply wipe the area with an alcohol swab.”	Roberts, 1981 (pp. 68-69)
“A pyrethrin spray, available from veterinarians, is quite effective. Simply spray a cotton swab, apply the medication to the tick, wait a few minutes and remove the tick with tweezers. If the tick is imbedded near the snake’s head, pyrethrin is not recommended.... With a cotton swab apply a drop or two of rubbing alcohol or a small amount of petroleum jelly directly on the tick. Wait 5 to 10 minutes and remove the tick with tweezers.”	Perlowin, 1994 (p.49)
“Spray the animal and the cage with a 0.2% solution of Trichlorphon, e.g., NEGUVON (made by Bayer). Repeat eight to ten days later if remaining eggs have hatched.”	Wilke, 1983 (p. 50)
“Treat with a 0.2 percent Neguvon solution as for mites. If the lizard is very badly infested, Neguvon should not be used.... In that case, lubricate the lizard with mineral oil.... Hanging a Vapona Insect Strip can also help with a bad tick infestation.”	Jes, 1987 (p. 47)
“Follow the treatment for mite infestations.... If you detect an infestation when you purchase an animal, dip the bag in which you carried it into a two-percent solution of Nix.... Place the animal in the wet bag for several hours. If you detect a mite infestation in your terrarium, spray the animals and the entire container thoroughly with the solution. Use as fine a spray as possible.... If the extent of skin damage makes it impossible to use Nix, rubbing cod-liver ointment on the affected areas will achieve good long-term results.”	Jes, 1998 (p. 58)
“It is best to first dust them individually with Sevin powder, then return a few minutes later and pull the ticks off gently with a pair of tweezers.”	Bartlett and Bartlett, 1997 (p. 55)
“Ticks may be easily removed by spreading a mixture of one part oil and one part lindane (insecticide) on the tick.”	LeBerge et al., 2000 (pp. 89-90)
“The best way to get rid of these parasites is to pick them off the snake with pointed tweezers.... To facilitate the removal of individual ticks, dab them with oil or cod liver oil ointment.”	Griehl, 1984 (p. 48)
“[D]on’t just grab it and pull.... The most sensible procedure is to either light a match, blow it out, and then apply it to the tick (the burning will usually cause the parasite to let go), or cover the tick with a thick dab of petroleum jelly, causing it to suffocate or again, release itself in the hopes of regaining oxygen. Another solution...is to dab some sort of alcohol on the tick.... [I]f all three of the above techniques don’t work, take a pair of tweezers and grab the tick as close to the snake’s body as you can, then pull very gently.... [S]wab the spot with hydrogen peroxide twice a day for one week.”	Mara, 1994a (p. 56)
“First, grab the tick with thumb and forefinger and give it a gentle tug. If that doesn’t pull it off, light a match, blow it out, and then immediately apply it to the tick. If the creature still doesn’t let go, dab it with either a drop of rubbing alcohol, or, in more severe cases, cover the tick with a wad of petroleum jelly.... Once the tick has been removed, swab the remaining wound with hydrogen peroxide twice a day until the infection clears up.”	Mara, 1994b (pp. 58-59)
“Ticks must never be simply ripped off the host. Instead, an application of salad oil or a drop of nail polish will cause the tick to suffocate and it then lets go of the host on its own, at least in theory.... Antibiotic ointment can be applied to the wound.”	Adrian, 1988 (p. 57)
“Ticks can be removed physically...with tweezers, but they should first be dabbed with paraffin or they may leave their heads embedded in the animal....”	Roots, 1972 (p. 55)
“The safest method of persuading a tick to loosen its grip is to smear it in petroleum jelly, which will block its breathing pore. Although not immediate in its effect, this method ensures that the whole tick will soon drop off intact.”	Alderton, 1986 (p. 55)

Table 1 (cont'd).

Removal/Treatment Approach	Reference
"Ticks can be pulled off with a tweezers and the wound cleaned with an antiseptic."	Beltz, 1989 (p. 47)
"Carefully remove ticks with tweezers and then disinfect the wound where the tick attached itself."	Palika, 1998 (p. 136)
"Ticks are simply removed with tweezers or forceps by grasping the body and steadily pulling out. An antibiotic ointment is applied to the site of tick removal and a systemic antibiotic added if a non-healing wound results."	de Vosjoli et al., 1998 (p. 75)
"They are usually quite firmly embedded and will require a good tug [with a tweezers] to get them out."	Ferrel, 1992 (pp. 48-49)
"These parasites can be easily removed with special tick pullers purchased from outdoor suppliers or some drug stores. Which way you turn the tick to pull it out does not matter."	Wilke, 2000 (p. 36)

No veterinarian I surveyed recommended this method and one characterized this as an "archaic and barbaric form of therapy" that should be "strongly recommended against." In response to the above anecdotes, one veterinarian suggested that some reptile scales might be too thick for this method to work effectively; the scale thickness would prevent the heat from reaching the tick. Whether or not this is the case remains unclear. If this method is used, extreme caution should be exercised so as not to burn the host reptile.

Using Petroleum Jelly and Other Substances. Several references recommend applying a dab of petroleum jelly to the tick (Table 1). The jelly creates an effective air barrier preventing the tick from breathing. The tick dislodges and attempts to crawl free of the jelly to avoid suffocation. Occasionally, alternative substances (e.g., cod-liver ointment, paraffin, salad oil, nail polish) are also suggested.

None of the surveyed veterinarians mentioned this method, and I have found it to produce mixed results. In the case of the savannah monitor mentioned above, coating the ticks with petroleum jelly visibly irritated the ticks, but only induced one of two covered ticks to let go. Both were hindered visibly in their leg movements by the viscous nature of the petroleum jelly. I had a similar experience trying to remove a tick (*Amblyomma* sp.) by this means from a bullsnake (*Pituophis catenifer sayi*) housed temporarily in a cage occupied previously by a rosy boa (*Lichanura trivirgata*). If this method is chosen, caution should be exercised to apply not so much jelly that the ticks are unable to detach before suffocating. This latter experience also underscores the importance of quarantining newly acquired animals and thoroughly cleaning enclosures between use by different animals.

Using Pesticides. Some references recommend the application or use of pesticidal chemicals. For example, Balsai (1992) states that infested animals can be treated safely "with a spray or powder form of some 'tickicide' containing pyrethrins or carbaryl (Sevin)," and Jes (1998) recommends the use of Nix®, a brand-name product used to kill human head and pubic lice (*Pediculus humanus* and *Phthirus pubis*). At one time, it was recommended that tick problems be dealt with by using "a little DDT powder" (e.g., Reichenbach-Klinke and Elkan, 1965, p. 546). This latter recommendation, of course, is no longer deemed to be a prudent or appropriate course of action

(in addition, DDT production has been banned in the U.S. for several years). More recently, LeBerre et al. (2000) recommended using a mixture of oil and the insecticide lindane, but specified neither the concentration of lindane nor the proportions of the mixture.

Roberts and Roberts (1976) suggest the use of a plastic insecticide strip or a piece of a dog's flea collar suspended in the cage for a week, a method more commonly used to deal with mites, as a "final answer" to tick problems. Other references mention the use of strips impregnated with the pesticide Vapona® (dichlorvos), prescribing x inches of strip for y cubic feet of cage for z hours, q times per week. Ticks, however, are not as vulnerable as mites to these types of insecticides (Klingenberg, 1993; Flank, 1998), and strips with Vapona are no longer readily available. If you do find Vapona strips, it is likely that they have been stored so long that the Vapona in them has degraded (Hunziker, 1997). In addition, toxic reactions to Vapona strips have been reported (e.g., Klingenberg, 1993), and Mader (1996) strongly recommends against their use.

More often, the literature recommends pyrethrin sprays. These are generally believed to be harmless to reptiles. Hunziker (1997), however, reports losing several baby garter snakes following an application of a pyrethrin spray and cautions that "these sprays can harm very young or very weak reptiles." Messonnier (1996) reports observing "tremors and bizarre behavior immediately after" spraying a kingsnake (*Lampropeltis*) with a pyrethrin flea spray formulated for use with domestic cats. If misused, pyrethrins may also cause respiratory problems or can damage the lens of the eye (Perlowin, 1992). Mader (1996) recommends using synthetic pyrethroid sprays, rather than the natural pyrethrins as they are less toxic (to mammals at least). Perlowin (1994) recommends thoroughly rinsing the host reptile in lukewarm water after a pyrethrin treatment is completed. Mader (1996) suggests this same procedure when using pyrethroids.

More recently, Burrige and Simmons (2001) reported that Provent-a-Mite™, a permethrin product specifically manufactured for use on reptiles, provided excellent control of exotic ticks on tortoises, snakes, and lizards. In their experiments, Provent-a-Mite treatment was combined with spraying the cage environment with Tempo®, a cyfluthrin product formulated for

premises treatment. High doses of permethrin have been used on reptiles without signs of ill health (e.g., Burrige and Simmons, 2001), but cyfluthrin has been found to be toxic to snakes and lizards at low doses (Mutschmann, 1991) and should not be used for direct treatment of infested reptiles.

When applying pesticidal products, the reptile's eyes and mucous membranes should be avoided, and extra care should be exercised to protect the host animal's water source from the chemicals. If a pesticidal spray or powder is used, the water dish should be removed from the enclosure prior to and until the treatment is complete. Several authors also caution that if a host animal is very badly infested, pesticidal products should not be used because "the presence of many perforations of the skin makes poisoning a danger" (Jes, 1987). Applying the chemicals locally and sparingly to individual ticks can lessen the chances of a toxic reaction. If pesticide impregnated pest strips are used, caution should be exercised to ensure that the host reptiles do not come into direct contact with the strip. Finally, it is important that all label directions be followed carefully whenever a pesticidal product is used.

Some veterinary references (e.g., Mader, 1996; Barnard and Durden, 2000) recommend the use of ivermectin, a broad-spectrum, antibiotic-like chemical, particularly when ticks are lodged inside a nostril or labial pit. Most references recommend the use of ivermectin as an injection or oral dose, but a few (e.g., Abrahams, 1992) recommend diluting it with water and using it as a topical spray. This drug is available only by prescription and dosages must be based on the accurate body weight of the host animal if it is injected. Most common forms of ivermectin are oil soluble, making it difficult to mix ivermectin with water and achieve an even distribution of the product through a spray bottle (S. L. Barten, pers. com.).

Although used successfully to treat mammalian pets and livestock for intestinal worms and insect parasites, higher doses of ivermectin can cause other problems. Chelonians display a unique sensitivity to ivermectin; ivermectin *never* should be used to treat turtles or tortoises. The American Board of Veterinary Toxicology's World Wide Web site <<http://www.abvt.org/>> indicates that doses of 0.1–0.4 mg/kg cause clinical symptoms of toxicity in red-footed tortoises (*Geochelone carbonaria*) and leopard tortoises (*G. pardalis*). Craft (1997) cautions that ivermectin "may be fatal" to chameleons. In dealing with mites, Roskopf (1992) reports good results in snakes treated by subcutaneous injection, but Klingenberg (1993) states that ivermectin administered parenterally had little or no effect on ticks. In addition, the Mar Vista Animal Medical Center's web site <<http://www.marvistavet.com/>> indicates that ivermectin is not effective against ticks.

None of the surveyed veterinarians suggested using pesticidal products; pesticides generally are unnecessary when dealing with ticks. Unlike mites, which can reach large populations if left unchecked, ticks usually occur only in small numbers (i.e., 1–2 on a single animal) and are much more easily seen on the host and in the cage. Authors and veterinarians more frequently recommend the other approaches discussed in this paper for dealing with tick problems.

Physically Removing Ticks. Nearly all references mention careful physical removal of the parasite, either by grasping it between the thumb and forefinger or with the aid of a forceps or tweezers (Table 1). This was the method most frequently mentioned by the surveyed veterinarians (11 of 12).

This approach requires restraining the host animal in a manner that both exposes the tick and prevents sudden movements by the host (with larger snakes and lizards, this can be a two-person job). Rotating the tick "head over heels" to help dislodge its mouthparts is recommended occasionally in the literature. Although Wilke (2000) and the veterinarians to whom I spoke stated that it did not matter which way the tick was turned to pull it out, anecdotal evidence suggests that ticks removed in this manner are more easily freed (i.e., require less of a tug).

A number of references recommend dabbing ticks with alcohol prior to physically removing them, and Davies and Davies (1997) advocate applying "surgical spirit" prior to removal. It has been suggested that this loosens the tick's mouthparts (Balsai, 1992; Coborn, 1993, 1996) and makes them easier to remove. Coborn (1996) even cautioned that if alcohol is not used, there is a danger of the head breaking off and remaining in the host's skin. While I have not experimentally tested this suggestion, I have not found the application of alcohol to be a necessary preparatory step to physical removal. Only one veterinarian suggested this additional step, and only after consulting a "desk reference."

Most references stress the importance of removing the *entire* tick, and seven of the twelve veterinarians to whom I spoke emphasized this. If the mouthparts or head remain imbedded in the skin "a local infection can develop and spread, giving rise to a condition known as cellulitis" (Alderton, 1986). Although rarely mentioned, it is more likely that the remaining imbedded parts will be cast off as part of a scab or during molting with little or no resulting health problem. Nonetheless, caution should always be exercised, and many references recommend swabbing the attachment site with alcohol, iodine, hydrogen peroxide, or an antiseptic or antibiotic following removal. For non-healing wounds, de Vosjoli et al. (1998) recommend the use of a systemic antibiotic. Systemic antibiotics can be obtained only by prescription. Keepers should seek the advice of a veterinarian.

Several references suggest using various instruments to aid physical removal. Barnard and Durden (2000) prefer using a "sharply pointed forceps" and Mader (1996) recommends that the tips of forceps be "fine enough so that the tick can be grabbed under its head, by the mouthpart, and extracted." Other references recommend the use of a "tick puller" for physical removal. This commercially available tool works "like a pair of plunger-powered tweezers" (Bartlett and Bartlett, 2000; see Wilke, 2000, p. 36, for an illustration of this tool). I have not used a tick puller and cannot comment on its effectiveness.

Suggested Approach

Based on the literature, discussions with veterinarians, and

personal experience, direct physical removal of ticks from their hosts (i.e., gently, but firmly pulling them out) appears to be the soundest method for dealing with cases of tick parasitism. Avoid squeezing the tick as this can force tick blood and saliva into the wound. Gentle traction applied until the tick's mouthparts fatigue and let go is more effective than trying to dislodge the tick forcefully.

Ticks should be removed as soon as discovered. If left attached, the host animals may attempt to eliminate the irritation as they do in natural situations by rubbing against substrates or, in the case of lizards, by scratching or biting (e.g., see Williams and Bayless, 1998). These behaviors will occasionally dislodge the offending parasite, but there is also the risk of minor abrasions, additional irritation, and the possibility of infection should the head be torn away from the tick's body.

Although some references recommend the use of a "pointed

tweezers," a blunt-ended forceps works equally well and prevents the host from being stabbed if it moves suddenly. Grasp the tick as close to the head as possible and carefully remove it. Examine the extracted tick to be sure the entire animal is removed. If there is any doubt, ask a veterinarian to examine the host animal. Swabbing the attachment site with hydrogen peroxide or an antiseptic after removal can help prevent infection and is therefore recommended. The use of an over-the-counter triple antibiotic first aid cream (e.g., Neosporin®) twice per day for a few days is a reasonable precaution (S. L. Barten, pers. com.).

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Year 2000 Snakes from Chihuahua, Mexico

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Abstract

Distributional and some variational data are reported for 76 snakes of 24 species and subspecies.

The herpetological collection secured by JLE during the summer of 2000 contains 71 snakes of 23 different taxa, and two different intergrades, which we here report. All specimens were taken in Chihuahua except a few from Coahuila and Durango, so indicated. All specimens are in the collection of the Unidad de Biología, Tecnología y Prototipos, UNAM.

Arizona elegans exopolita Klauber. One: 6373, Rancho Álamos de Armendariz (27°49'4.9"N, 104°9'52.4"W), 1530 m, 6 September. This locality lies within the blank area between the projected ranges of *A. e. exopolita* and *A. e. elegans*, but very near the latter, in Dixon and Fleet's map (1976). The specimen nevertheless appears to be typical of *A. e. exopolita*, as is evident in the following comparisons, in which A = *A. e. exopolita*, B = the present specimen, and C = *A. e. elegans*. The data for A and C are from Dixon and Fleet (1976).

(1) Body blotches: A, 35–53, \bar{x} = 44.5; B, 41; C, 39–69, \bar{x} = 53.1. (2) Male ventrals: A, 188–202, \bar{x} = 193.8; B, 193; C, 197–219, \bar{x} = 206.0. (3) Midbody scale rows: A, 25–27; B, 25; C, 29–31. The percent, tail of total length (A, \bar{x} = 14.0; B, 14.9; C, \bar{x} = 15.6), is more or less intermediate.

Boa constrictor imperator Daudin. One: 5901, Arroyo El Camuchil, Batopilas (27°01'34.1"N, 107°45'44.5"W), 435 m, 14 July. This 138 cm male, in excellent condition, is the first known to have been taken in Chihuahua, although the range extension is only about 45 km ENE of Sierra de Choix, Sinaloa (USNM 46503, reported by Smith, 1943).

Bogertophis s. subocularis (Brown) × *B. s. amplinotus* Webb. One large female: 5324, Rancho El Gatunozo, base of Sierra Encinilla, mpio Camargo, on rd to Hercules (28°6'51.1"N, 104°5'52.2"W), 1353 m, 14 June.

Nuchal stripes 2–3 scale rows wide over first three head lengths, at which point they narrow to two half scale rows wide over six scale lengths, anterior to the first body blotch. Vertebral scale lengths (a) in interspaces between rear body blotches 4–7 (\bar{x} = 5.7, N = 9), and (b) in body blotches 1–5 (\bar{x} = 3.6, N = 8). Body blotches 23, tail 7. Lateral markings weak. Midbody scale rows 35; subcaudals 70; supralabials 11–11; lorilabials 5–5.

None of these features fully agree with the 9 diagnostic criteria for *B. s. amplinotus* fide Webb (1990). Of the two most reliable criteria, one (vertebral blotch vs interspace length) fully agrees with expectation for *B. s. subocularis*, whereas the other (nuchal stripe width) is more like expecta-

tion for *B. s. amplinotus*. Other criteria are of weakly diagnostic value, but two (subcaudals, tail blotches) fully agree with *B. s. subocularis*, two are intermediate but more like *B. s. subocularis* (lorilabials, body blotches), one is intermediate but more like *B. s. amplinotus* (lateral blotches), and two are intermediate without clear tendency toward either (supralabials, midbody scale rows).

On the basis of these data, we refer 5324 to intergrade status. If correct, the area of intergradation between the two subspecies is considerably enlarged. Rancho El Gatunozo is actually slightly north of the southernmost locality for *B. s. subocularis*. About 110 km E of the latter locality other intergrades are recorded in Coahuila and Nuevo León (Webb, 1990).

Crotalus atrox Baird and Girard. Thirteen: 5145–6, 5162, sand dunes at Rancho El Soledad, 7 km SE Estación Carrillo, mpio Jiménez (26°53'54.1"N, 103°51'22.4"W), 1136 m, 10–11 June; 5266, 5279, Rancho San Francisco (San Pancho) (28°2'55.5"N, 104°25'42.3"W), 1384 m, 13 June; 6001, km 11, Coyame-San Pedro (29°23'3.0"N, 105°2'14.8"W), 1147 m, 21 July; 6010, Cerros Santa Anita (29°40'14.1"N, 105°19'13.6"W), 23 July; 6044, Rancho La Zorra, mpio Tlahualilo, Durango (26°15'31.1"N, 103°36'48.8"W), 1112 m, 31 July; 6168, Ejido San Dionisio, mpio Tlahualilo, Durango (26°12'9.1"N, 103°41'47.2"W), 1111 m, 3 August; 6245, between Ejido de Jaco and Sección Honorato (27°59'17.8"N, 103°59'15.3"W), 1285 m, 5 September; 6280, Rancho Honorato de Abajo (27°56'47.6"N, 104°6'47.9"W), 1380 m, 6 September; 6311, Rancho Álamos de Armendariz (27°49'4.9"N, 104°9'52.9"W), 1530 m, 6 September; 6371, km 143 Camargo–Ojinaga, 9 August.

All localities fall within the known range of the species as depicted in Conant and Collins (1998).

Crotalus l. lepidus (Kennicott). Three: 6019, Mádano de Jaco (28°1'20.7"N, 104°00'58.9"W), 1258 m, 25 July; 6318, Rancho La Victoria (28°2'2.8"N, 104°22'53.3"W), 1433 m, 7 September; 6368, La Cañada, Cerro El Macho, La Perla (28°18'21.4"N, 104°33'7.5"W), 1610 m, 9 September.

All specimens agree with the one reported from La Perla by Lemos-Espinal et al. (2000) and with the diagnostic characters of the subspecies: mottling between dark rings present (light in two, dark in one), a postocular dark line present, and nuchal spots separated.

Crotalus lepidus klauberi Gloyd. Three: 5741–2, 900 m

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W gas station, Casas Grandes (30°21'52.8"N, 107°58'34.6"W), 1533 m, 4 July; 5743, km 10, Casas Grandes-Colonia Juárez, 3 July. Nos. 5741-2 conform with the diagnostic characters of the subspecies, having little or no intercalary markings between dorsal rings, no postocular dark line, and nuchal spots united. No. 5743 is the same except in presence of a postocular dark line. The most consistent difference between the two subspecies appears to be the fusion of the nuchal spots in *C. l. klauberi*, separation in *C. l. lepidus*.

Crotalus m. molossus Baird and Girard. One: 5379, 1 km SE El Alicante, mpio Ocampo, Coahuila (27°55'17.7"N, 103°33'57.6"W), 1310 m, 17 June. The locality lies well within the range indicated by Gloyd (1940), but in a large area extending from eastern Chihuahua into western Coahuila, where no localities of occurrence have heretofore been recorded.

Crotalus s. scutulatus (Kennicott). Ten: 5097, cemetery, La Campana, mpio Tlahualilo, Durango (26°7'39.1"N, 103°30'2.6"W), 1123 m, 9 June; 5147, sand dunes, Rancho La Soledad, 7 km SE Estación Carrillo (26°53'54.1"N, 103°51'22.4"W), 1136 m, 11 June; 5216, Camargo-Ojinaga hwy (27°46'18.7"N, 104°51'43.6"W), 1319 m, 12 June; 5740, Campo de Tiro, Camargo (27°35'0.8"N, 104°59'3.7"W), 1288 m, 30 June; 5988, La Escuelita (29°35'40.7"N, 105°15'9.3"W), 1456 m, 19 July; 5989, Entronque La Paloma (29°45'44.3"N, 105°19'6.2"W), 1456 m, 19 July; 5990, base of Cerros Tres Castillos (29°54'32.7"N, 105°42'13.3"W), 1286 m, 20 July; 6166-7, Ejido San Dionisio, mpio Tlahualilo, Durango (26°12'9.1"N, 103°41'47.2"W), 1111 m, 3 August; 6233, El Ranchito, ~400 m E Médano de Jaco (28°1'5.9"N, 104°00'22.0"W), 1268 m, 4 September.

All localities fall within the range of the subspecies as depicted by Price (1982). No. 5147 is unusual in having a minimum of three scales in a row between the supraoculars, instead of the usual 2. Its character states conform otherwise with the norm for the species, including the small rattle segments (as opposed to the larger ones in *C. atrox*)

Heterodon kennerlyi Kennicott. Two: 6253, Ejido de Jaco (27°57'34.1"N, 103°57'16.0"W), 1283 m, 5 September; 6374, La Perla, Cerro El Macho, La Cañada (28°18'21.4"N, 104°33'7.3"W), 1610 m, 9 September.

Both are females. The subcaudals are 27, 29, and both have 23 midbody and 19 preanal scale rows, 4 azygous scales, and 1-1 loreals. One (6374) has a distinct, uneverted hemipenis with a long retractor muscle on one side, none on the other. The hemipenial cavity is present, but internal structures could not be discerned without endangering future detailed study.

These localities are slightly east of the six (all bunched near the lower Río Conchos) depicted by Walley and Eckerman (1999), and within the large recordless area shown in their map in central and western Coahuila, eastern Chihuahua and Durango. However, the species has been recorded in several works from several localities in NW Chihuahua, SW Coahuila, and Durango (e.g., Smith, 1943), whereas no localities are plotted within that projected range in Walley and Eckerman (1999).

Hypsiglena torquata janii (Dugès). One: 6250, Sección Honorato (27°58'32.8"N, 104°4'27.1"W), 1367 m, 6 September. The specimen lacks a nuchal light collar and the nuchal pattern consists of three longitudinal streaks, the lateral ones connected with the postocular stripe. The locality lies very close to the Coahuila border, within the large area in eastern Chihuahua and western Coahuila lacking records in Dixon and Dean's review (1986), in which *H. t. texana* is regarded as a synonym of *H. t. janii*. Two other localities (Lemos-Espinal et al., 1997, 2000) also lie within that area.

Lampropeltis getula splendida (Baird and Girard). Two: 5993, Rancho El Alpine (29°46'35.3"N, 105°17'59.2"W), 1607 m, 23 July; no no., betw San Dionisio and Tlahualilo, Durango, 1114 m, June 9, DOR. No records for the subspecies are shown for eastern and northwestern Chihuahua (or most of Coahuila) in Blaney (1977). No. 5993 is from a locality well within that area, fairly close to the Big Bend area of Texas where several records are plotted. Both specimens conform well with expectation for the taxon (Blaney, 1977), having a light spot on each lateral scale; 55 median blotches in 5993, ? in DOR, weakly or not distinguishable at rear midbody; scale rows 23, 25; loreal triangular in DOR (narrow prefrontal contact), somewhat triangular in 5993 (broad prefrontal contact).

Masticophis flagellum lineatulus Smith. Three: 5217, km 183, hwy 18 (27°46'18.7"N, 104°51'43.1"W), 1319 m, 12 June; 5530, 1.2 km S, 4.2 km E Rancho El Gatunozo (~28°5'56"N, 104°3'37"W), 1340 m, 14 June, R. W. Axtell and R. G. Webb; 6267, Rancho Álamos de Armendariz (27°49'4.9"N, 104°9'52.9"W), 1530 m, 6 September. These localities fall within the projected range of the subspecies, in the southeastern part of the state (Wilson, 1973).

No. 5217 is a juvenile 874 mm TTL, still retaining the distinct dark crossbands of immatures; it has the typical lineate pattern on the scales in the anterior part of the body but the ventral salmon color is restricted to the tail, as described by Wilson (1970) in juveniles.

No. 5530 is half grown, 1308 mm TTL, with lineate anterior scales and salmon-colored posterior half of venter and tail.

No. 6267 is an adult 1500 mm TTL; most of the venter is salmon, most intense on tail and posterior part of the body. A linear streak is present on the anterior dorsals.

Masticophis flagellum testaceus (Say) × *M. f. lineatulus* Smith. One: 5496, km 183, hwy Camargo-Ojinaga, 20 June. Like the specimen reported by Lemos-Espinal et al. (2000) from Polvorillos, it appears to be an intergrade. The linear mark is present on anterior dorsals, but the salmon infusion on the tail is faint, and there is none on the venter, although the specimen is nearly adult (1155 mm TTL), lacking evidence of juvenile crossbands on anterior half of body. Both localities lie within the blank area between the ranges of these two subspecies as mapped by Wilson (1973).

Masticophis flagellum testaceus (Say). One: 5497, cañon de Barrera, Ejido El Álamo, 1.0 km NW Rancho El Fortín, by Río Conchos (29°32'36.4"N, 104°52'23.0"W), 939 m, 20 June.

This large specimen (1694 mm TTL) shows no evidence of salmon coloration on either body or tail, and no linear mark on anterior dorsals, although the posterior part of the dorsals is dusky. This locality is the only one known for the subspecies in Chihuahua, but is only a short distance from records across the Río Grande (Wilson, 1973).

Masticophis taeniatus girardi (Stejneger and Barbour).

Two: 5267, Sierra Espíritu Santo, Rancho Espíritu Santo, 5 km SW Rancho San Francisco (28°2'55.5"N, 104°25'42.3"W), 1384 m, 12 June; 5543, Sierra El Morrión, mpio Aldama (29°4'45.0"N, 105°35'3.7"W), 1352m, 24 June.

Camper and Dixon (1994) plotted localities of occurrence of this taxon throughout most of the state east of the mountains, except in a large eastern area near the Coahuila border. Both of the present specimens, and the one reported by Lemos-Espinal et al. (2000), are from localities within that area.

Both specimens are adults exemplifying the diagnostic alternating dorsal light and dark zones of the subspecies.

Oxybelis aeneus (Wagler). One: 5949, Arroyo El Camuchil, nr Batopilas (27°1'34.1"N, 107°45'44.5"W), 435 m, 13 July. Only two other records for the state exist (Tanner, 1989), both from the same general area as the present specimen.

Pituophis catenifer affinis (Hallowell). Three: 5384, vicinity of El Alicante, Coahuila (28°8'54.6"N, 103°39'49.7"W), 1360 m, 17 June; 5705, 900 m W gas station, Casas Grandes (30°21'52.8"N, 107°58'34.6"W), 1533 m, 4 July; 5992, Rancho El Alpine (29°46'35.3"N, 105°17'59.2"W), 1607 m, 20 July.

Sweet and Parker (1990) mapped the subspecies over most of the state, and Lemos-Espinal et al. (2000) regarded it as "the most common, widely distributed colubrid of the state." However, all of Tanner's (1989) many specimens are from the northwestern quarter of the state, and all taken by JLE (Lemos-Espinal et al., 1997, 2000, present material) are from the same area as well as from the eastern half of the state. The taxon apparently does not occur at high elevations in the southwestern part of the state. It does, however, occur at low altitudes in the deep southwestern canyons, on Pacific slopes (Batopilas; Stull, 1940), completely isolated from populations elsewhere in the state. However, these isolates are connected to the north and are regarded as consubspecific (Sweet and Parker, 1990).

Salvadora deserticola Schmidt. Three: 5948, Río Batopilas (27°1'34.1"N, 107°45'44.5"W), 435 m, 17 July; 5495, Rancho El Virulente de Afuera (28°45'50.5"N, 104°19'12.8"W), 1775 m, 20 June; 6372, entronque La Perla (28°8'21.4"N, 104°33'7.3"W), 1610 m, 10 September.

All have 9-9 supralabials and two scales separating the posterior chinshields. They conform in these respects with expectation for the species (e.g., Degenhardt et al., 1996). Nos. 5495 and 6372, from southeastern Chihuahua, also conform with expectation in having a light background with brightly distinct, separate dark stripes throughout the length of the body; the lateral ones, one scale row wide, are on the 4th

scale row anteriorly, 3rd posteriorly.

No. 5948, from the southwestern tropical lowlands, is distinctly different in color and pattern. The background is darker, so that the dark stripes are not sharply defined. The lateral and dorsolateral stripes are partially fused, not sharply distinguishable, over most of the body, and even posteriorly the lateral stripes are diffuse and poorly defined. It is likely that the Pacific slope populations represent a distinct subspecies.

Salvadora g. grahamiae Baird and Girard. One: 5359, El Alicante, mpio Ocampo, Coahuila (27°56'29.2"N, 103°34'16.9"W), 1281 m, 16 June.

Supralabials 8-8; posterior chinshields separated by a single scale; no lateral dark stripe. These character-states conform with expectation for the subspecies. The locality extends the range slightly southeastward from the limits depicted in Conant and Collins (1998).

Sonora semiannulata Baird and Girard. One: 5325, stop on brecha Hercules (28°00'20.7"N, 104°31'1.7"W), 1343 m, 12 June. Unicolor except for a large dot on each scale.

The locality is well within the range as depicted by Frost (1983).

Thamnophis c. cyrtopsis (Kennicott). Nine: 5410-6, Presa El Virulento, on Rancho El Virulento de Adentro and Rancho El Virulento de Afuera (28°47'43.1"N, 104°19'1.9"W), 1602 m, 14 June; 5704, 900 m W gas station, Casas Grandes (30°21'52.8"N, 107°58'34.6"W), 1533 m, 4 July; 6252, Rancho Honorato de Abajo (27°56'47.6"N, 104°6'47.9"W), 1380 m, 6 September.

All have sharply defined lateral stripes throughout the length of the body on scale rows 2 and 3, a pair of large, narrowly separated black blotches on neck, and a black bar on rear edge of the infralabials. In no. 5704, the only specimen from western Chihuahua, the black bars are confined to infralabials 2-4, 7-9. In all others they are on each infralabial. Whether this variation is geographic or individual remains to be established.

The specimen from Rancho Honorato de Abajo has the black blotches widely spaced and sharply defined, especially on neck; immediately posterior to the nuchal blotches the length of the interspaces exceed the length of the blotches. In other specimens they are consistently narrower.

Thamnophis cyrtopsis collaris (Jan). Eight: 5869-71, Valle de los Pinos, 9 km S Creel (27°41'43.5"N, 107°42'35.1"W), 2386 m, 10 July; 5879-80, Rancho El Ojito (27°41'21.8"N, 107°42'35.1"W), 2422 m, 11 July; 5893, Areponapuchi (27°30'27.1"N, 107°50'36.2"W), 2222 m, 12 July; 5912, 5914, Arroyo de Dolores, Batopilas (27°1'34.1"N, 107°45'44.5"W), 435 m, 13 July.

All have the lateral stripe on scale rows 2-3 anteriorly, and a pair of large black blotches on nape, as in all subspecies of *T. cyrtopsis*. They differ uniformly from *T. c. cyrtopsis* in (1) fusion of the anterior parts of the nape blotches, (2) lateral stripe diffuse and indistinct posteriorly, and (3) a black bar on only one or two of the rear infralabials.

The *Batopilas* specimens, from a much lower altitude than the others, differ from them in having the interspaces extremely narrow between the spots in both lateral rows; the light, vertical lines between the dark spots are represented by a series of very small white dots, each about one third the length of a scale. In the other specimens the light interspaces are wider, the light spots ½–1 scale long. Whether this variation is individual or geographic remains to be determined.

Thamnophis eques megalops (Kennicott). Two: 5408-9, Presa El Virulento (28°47'43.1"N, 104°19'1.9"W), 1602 m, 19 June. Both are little more than neonates, with the median stripe continuous on the vertebral scale row, extending broken on to the adjacent scale rows.

The locality is near the eastern border of Chihuahua, and extends the known range of the subspecies nearly into Coahuila, in which state it has been recorded only in the southwestern corner (Rossman et al., 1996).

Thamnophis eques virgatenuis Conant. One: 5878, Rancho El Ojito (27°41'21.8"N, 107°42'35.1"W), 2422 m, 11 July. A large adult with the median light line confined completely to the vertebral scale row. Faint evidence of lateral rows of dark spots, separated by a length of less than one scale length, is present. The locality appears to fall in the southern segment of the range of the subspecies (Rossman et al., 1996).

Thamnophis m. marcianus (Baird and Girard). Two: 5532, Rancho Santa Anita, mpio Coyame (29°32'30.3"N, 105°19'53.3"W), 1534 m, 23 June; 6251, Rancho Honorato de Abajo (27°56'47.6"N, 104°6'47.9"W), 1380 m, 6 September. Both specimens have the distinctive head pattern of the species (Rossman et al., 1996), and the lateral light stripe confined anteriorly to the third scale row.

The locality lies well within the projected range of the subspecies (Rossman et al., 1996).

Key to the Known Species and Subspecies of Garter Snakes (*Thamnophis*) of Chihuahua

- 1A. Lateral light stripe anteriorly on scale row 3 only -----
-----*m. marcianus*
- B. Not so -----2
- 2A. Lateral light stripe on scale rows 3 and 4 anteriorly-----
----- *eques* -- 3
- B. Not so -----4
- 3A. Dorsal light stripe confined completely to vertebral scale
row ----- *e. virgatenuis*
- B. Dorsal stripe wider, involving paravertebral rows -----
-----*e. megalops*
- 4A. Snout in front of eyes tapered, narrow; no stripes -----
-----*rufipunctatus*
- B. Snout not tapered; at least lateral stripes present ----- 5
- 5A. Preoculars 2–3, rarely 1 ---- *melanogaster chihuahuaensis*
- B. Preoculars single -----6
- 6A. Tongue all black; vertebral stripe on a single scale row
almost invariably -----*errans*
- B. Tongue red, black-tipped; vertebral stripe, if evident,
wider, involving paravertebral scale rows ----- 7
- 7A. Supralabials 7 -----*sirtalis dorsalis*
- B. Supralabials 8–9 ----- *cyrtopsis* -- 8
- 8A. Nape blotches fused anteriorly; lateral stripe diffuse,
indistinct posteriorly; only 1–2 rear infralabials with a
black bar -----*c. collaris*
- B. Nape blotches separate; lateral stripe distinct, sharply
defined throughout their length; anterior as well as
posterior infralabials with a black bar ----- *c. cyrtopsis*

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Bull. Chicago Herp. Soc. 37(3):55-56, 2002

**Book Review: *Tadpoles of South-east Australia* by Marion Anstis
2002. New Holland Publishers, Locked Bag 516, Frenchs Forest, NSW, 1640, Australia
<http://www.newholland.com.au/> AUS\$59.95 (roughly US\$35).
Hardcover, dust jacket, mostly full color photos and drawings throughout.
Distributed in the U.S. by Krieger Publishing Company, Malabar, FL.**

**Raymond Terrence Hoser
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AUSTRALIA**

I recall first meeting Marion Anstis in the early 1970s when she was the president of the herpetological section of the Royal Zoological Society of Sydney in New South Wales. This group used to meet monthly at the Australian Museum to discuss the usual herp type things and operated in competition to the Parramatta-based Australian Herpetological Society. Anstis later organized the merger of the two groups which history has shown was a relatively wise move.

Anyway, even back then it was clear that she was more into frogs than reptiles. This was way back in the days when people here in Australia could capture and collect any herps they wanted without having to worry about laws that allegedly “protected” them, raids by wildlife department officials and the like. They really were the good old days as far as being a herp keeper was concerned.

One weekend we were up at Capertee Valley, a couple of hours drive northwest of Sydney, herping when Marion gave me a good introduction to her local knowledge of frogs. We found tadpoles, and she told me what was for which species. At night we heard frogs calling and she was quick to tell us what call was for what frog. With this and other field trips,

she gave me the grounding to be able to find this sort of thing out myself, so that over the following decades I was able to work out which tadpoles grew into what frogs, not just in my home grounds of southeastern Australia, but also the tropical north and other parts of Australia that I was lucky enough to visit.

I recall returning from the Capertee Valley with Anstis and another reptile man, Alex Antenor, happy in the knowledge that we had in a bag a broad-headed snake (*Hoplocephalus bungaroides*) that we had found under a sandstone slab on a large mountain. As we drove along the single-lane winding road down the Blue Mountains we could see the sprawling mass of Sydney on the flats below, with the city Skyline nearly 100 km away in the distance.

It was one of those nights when an offshore low pressure system brought in that steady torrential rain that lasts for days. Sydney gets these big lows several times a year. Great frog weather, but not good for much else! And where in Sydney did you find the greatest diversity of frog species? King Georges Road, Penhurst of course! And what was there? Marion’s house.

At the time she was living there with her parents and the whole backyard was a mass of ponds, tubs and any other receptacle that held water and allowed frogs to breed. Even at that stage, Marion had been bringing back frogs and tadpoles from her travels and raising them in ponds in her backyard, where most lived “free” and had basically multiplied. The noise of various frogs croaking in her backyard was truly something marvelous, particularly in view of the sheer number of different types of call that she could identify.

Now all this was back in the days before we realized the folly of translocating species to areas they hadn’t come from, but in our ignorance, all this seemed like bliss.

Anstis never really took to the reptile side of herpetology. That in itself was fairly unusual, as the trend here in Australia seems to be for the frog-lovers to “graduate” into keeping lizards and then snakes and the frogs become all but forgotten. I recall Marion having a stropny [Editor’s note: that’s Aussie for “bad-tempered” (short for obstreporous?)] broad-headed snake in a cage (but what broad-headed snake isn’t stropny?), and her telling me “I’m too scared to handle the thing!” I think that she later got rid of it.

Over the following two or more decades Marion teamed up with the likes of Mike Tyler and Margaret Davies in Adelaide to study frogs throughout Australia, although she seemed to concentrate her efforts to her local southeast, which happens to have no shortage of interesting species.

She was able to witness firsthand the dramatic decline of frogs across much of Australia (the east at least), caused at first by the cane toads (*Bufo marinus*) in Queensland and then the chytrid fungus throughout eastern Australia.

And yes, we all saw how frogs went from being those taken for granted creatures in their millions to the ever increasingly rare components of our native fauna that really were in need of help to survive.

Anstis has developed a reputation as a dedicated and meticulous worker and her book *Tadpoles of South-eastern Australia* will no doubt enhance that image. The book is truly a quality production in all aspects and sets a benchmark for future publications on frogs in all parts of the world.

The style and format of the book are in many ways typical of a herp book and bearing in mind that it is targeted at the herpetologist audience, buyers of the book will have little trouble navigating their way through the book and/or finding a particular section or species within the book.

The contents run as follows: The obligatory acknowledgements, followed by a foreword by Hal Cogger, the preface, a glossary and then the introduction.

Divided into the three main parts is Part One: “Some Background”, which explains frog classification, developmental stages (very important for understanding the later parts of the book), collecting and raising tadpoles, and frog and tadpole conservation issues.

Part Two details tadpole features, has an excellent tadpole key, egg and embryo features and an egg and embryo key. Part Three has a map of the area of study in Australia’s south-east and then has the details of the various species described. In terms of page numbers, these descriptions are by far the major part of the book. The book ends with a detailed bibliography and then an index.

The information on each species sticks to a similar format and is essentially similar to that of most other “stamp catalogue-style” herp books. That is, the species name is given in the order: scientific name, common name, then describer and date. There is then a color photo of an adult frog with locality data. The headings tend to be of the following format and order: distribution and breeding sites (with map), embryos (with subheads), tadpoles (with subheads) and including photos and excellent b/w drawings, including of the oral region and also including size details, metamorphosis, behavior and finally similar species.

The detail is fantastic and because it is consistent for every species in the book and so comprehensive, the book is obviously an excellent tool to use for anyone who wants to themselves go on and study frogs and tadpoles from this region of Australia. Within its domain, the book is hard to fault.

My relatively limited expertise on frogs makes it hard for me to critically assess the factual information within this book. However it is clear that the study of frogs in the last twenty years has come a long way forward from back in the old days when Marion and I were pottering around the swamps of inland NSW and elsewhere in search of tadpoles.

My main criticism of the book is that it has limited itself in an already limited market by giving relatively brief (and in my view too brief) accounts of the adult frogs. The criticism is particularly poignant bearing in mind that relatively speaking the amount of work and effort to increase these accounts is small considering the already vast amount of time and effort Marion must have spent to painstakingly inspect, photograph and draw the tadpoles of all the relevant species.

Thus while the book is an excellent tool for anyone with a serious interest in frogs from this region, I found that it is perhaps best seen in the context of a companion to the other books already available about the frogs of the same region. In some ways this is a pity as I felt that had Marion given greater emphasis on the adult frogs, her book would have easily and effectively usurped those other publications, making the need for people new to the hobby and science to buy more than one book redundant.

Furthermore, due to the explosion in the number of excellent regional herp and specialist guides hitting the market over the last few years, it is likely that the appeal of this book outside of its own region will also be relatively little. However, one can only hope that the publisher sells enough books to make a profit so that they and other publishers will continue to publish such excellent works and advances in our general herpetological knowledge.

**Book Review: *Anuran Communication* edited by Michael J. Ryan
2001. Smithsonian Institution Press, Washington and London. ix + 252 pp.
Hardbound. ISBN 1-56098-973-4. Amazon.com price: \$50**

**Michael Redmer
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Among the traditionally classified “lower vertebrates,” the amphibian order Anura (frogs and toads) is the group most often associated with the ability to vocalize. Anuran vocalizations are very often audible to human observers, and even most non-biologists/non-herpetologists could probably recite that frogs “croak” or “ribbit.” That vocalization is so widespread in this group of vertebrates has undoubtedly led to the common use of anurans as model organisms for the study of vocalization. There are now numerous classical studies of the relationships between anuran vocalization and its role in evolution, social behavior, physiology, energetics, etc. Indeed, the study of vocalization could be considered one of several sub-disciplines of the larger topic of anuran communication, which is the subject of this book.

This book is the published result of a 1998 symposium held in honor of Dr. A. Stanley (“Stan”) Rand, himself a recognized authority on anuran communication. The symposium was convened at the joint annual meeting of the American Society of Ichthyologists and Herpetologists, Herpetologists’ League, and the Society for the Study of Amphibians and Reptiles. It draws on the expertise of 25 authors who contributed or collaborated on chapters in their own specialties. *Anuran Communication* is organized into seventeen chapters in five parts:

Part One. Introduction to Anuran Communication.

Chapter 1. The importance of taxon-centered research in biology. M. J. West-Eberhard.

Chapter 2. A history of frog call studies. A. S. Rand.

Part Two. Physiology and Energetics.

Chapter 3. Acoustic communication, endocrine control, and the neurochemical systems of the brain. W. Wilczynski and J. Chu.

Chapter 4. Male advertisement calls: Behavioral variation and physiological processes. S. B. Emerson.

Chapter 5. The energetics of calling in frogs. K. D. Wells.

Chapter 6. Ectothermy’s last stand: Hearing in the heat and cold. P. M. Narins.

Part Three. Acoustic and Visual Signaling.

Chapter 7. Auditory tuning and frequency preferences in anurans. H. C. Gerhardt and J. J. Schwartz.

Chapter 8. Feature weighting in signal recognition and discrimination by *Túngara* frogs. M. J. Ryan and A. S. Rand.

Chapter 9. Patterns of differentiation in temporal properties of acoustic signals of anurans. M. J. Littlejohn.

Chapter 10. Visual signaling in anuran amphibians. W. Hödl and A. Amézquita.

Part Four. Neural Processing.

Chapter 11. The neuroethology of acoustic communication in Pacific treefrogs. E. A. Brenowitz, G. J. Rose and T. Alder.

Chapter 12. Producing and perceiving frog songs:

Dissecting the neural bases for vocal behaviors in *Xenopus laevis*. D. B. Kelley, M. L. Tobias and S. Horng.

Chapter 13. History’s lessons: A neural network approach to receiver biases and the evolution of communication.

S. M. Phelps.

Part Five. Behavior and Evolution.

Chapter 14. Call monitoring and interactive playback systems in the study of acoustic interactions among male anurans. J. J. Schwartz.

Chapter 15. Advertisement call variation and speciation in the *Bufo viridis* complex. C. Giacoma and S. Castellano.

Chapter 16. Communication and mating in the midwife toads (*Alytes obstetricans* and *Alytes cisternasii*). R.

Márquez and J. Bosch.

Chapter 17. Kin recognition, sexual selection, and mate choice in toads. B. Waldman.

The introductory chapters are interesting, and along with the Editor’s Preface, they lay important philosophical (Chapter 1) and historical (Chapter 2) framework for the remaining parts. Chapter 1 was refreshing in that the author argues convincingly for taxon-centered research, such as that presented in this book. In the second chapter, Stan Rand’s historical account is fascinating in both its detailed summaries of certain classical studies of anuran communication, as well as in his overview of the “who’s who” of biologists (and academic lineages of biologists) who have worked or are working in this field.

The remaining chapter titles reflect the scholarly nature of this book, and the diversity of subjects covered within. Some chapters give detailed coverage of their very specialized subject matter. Admittedly, while preparing this review, I read most carefully the chapters having subject matter most interesting to me (i. e., those in Parts One and Five), but skimmed some chapters that presented topics about which I have little or no expertise or interest (Parts Two through Four). It is noteworthy that individual chapters in Parts Two and Three are written in a way that summarizes past work, while still presenting some new data. Parts Four and Five include chapters that are more taxon-specific, and both parts could have profited from at least one more summary chapter apiece. Nevertheless, evolutionary biologists, ethologists, physiologists, or anuran biologists of various sub-specialties could possibly find all of the chapters useful at some point in their studies. The higher division into five parts should be particularly useful for quick reference to topics in the major categories.

I counted 107 figures throughout the text. Typical of many multi-authored scholarly books, most of these are graphs, cladograms, and other representations of quantitative data.

The text is in a typeface that is easy to read, and the text,

tables and figures are laid out in an uncluttered and generally very organized fashion.

The literature syntheses provided by the bibliographies of multi-authored volumes like this one are to me important features. One very pleasant surprise in this book is the arrangement of the bibliographies which appear after each individual chapter. Editors and/or publishers of similar multi-authored, multi-chapter texts often require the separate chapter bibliographies to be consolidated as one at the end of the book. This common practice undoubtedly eliminates a redundancy (of same citations made in different chapters) and thus reduces page and production costs. However, I have always found it cumbersome (and ultimately damaging to the pages) to repeatedly flip between chapters and references nestled in large bibliographies at the backs of large books. I wish publishers

and editors would more often follow the example set by *Anuran Communication*.

The list price of this book is fairly high, at least when compared to other contemporary synthetic works on amphibian biology topics. However, the hardcover review copy I have is well constructed and bound such that I am not concerned about its durability. When all the above are considered, *Anuran Communication* is still not only a worthwhile buy, but also a title which should find its way onto the bookshelf of professional anuran biologists or serious frog enthusiasts alike.

Editors'/Author's Note: The Chicago Herpetological Society is an **Amazon.com** affiliate. Purchases of this and other books at Amazon.com by "click-throughs" from the **CHS web site** (<http://chicagoherp.org/misc/amazon.htm>) benefit the CHS.

Bull. Chicago Herp. Soc. 37(3):58-59, 2002

HerPET-POURRI

by Ellin Beltz

Could they or couldn't they?

English researchers have found a dinosaur trackway in an Oxfordshire quarry that shows theropod impressions slowly rambling along, then beginning to run. Their analysis suggests an 18-mph dash. "Our evidence shows unambiguous evidence of running in this . . . [1 to 2 metric ton, big meat-eating] animal," according to a Cambridge University paleontologist. The trackway is about 110 feet long and shows the three-toed, two-legged tracks known to be made by relatives of velociraptors and tyrannosaurs. Think "huge chickens" or great legs for a real life hut of Baba Yar. The usual consensus has been that only theropods less than one ton could run. [*Chicago Tribune*, January 31, 2002, from Ray Boldt] In contrast, sauropods produced the round track, four-footed, leg and each corner group. The speed for both groups is calculated by considering leg height to hip and track distance. There are some caveats in this technique. The Wyoming trackway photo on my website <<http://ebeltz.net>> shows both kinds of tracks.

March, the month of the Croc

CHS member Paul Sereno recently E-mailed me a reminder, "on March 15, we open up the big exhibit 'The Science of SuperCroc' at the Museum of Science and Industry until May 30." You can also see *Sarcosuchus imperator* on the Project Exploration Website <<http://www.projectexploration.org>> and in the January 2002 *National Geographic* Magazine. The *Sun-Times* described Supercroc, "It was perhaps the largest crocodile to ever roam the earth, as long as a school bus and tough enough to take down a dinosaur." It was about "twice as long and 10 times as heavy as the biggest modern crocodile." Paul told the reporter, "A small sauropod, 20 or 30 feet in length, would have been no problem." The animal was originally discovered and named from small fragments by a French paleontologist in the 1960s. Paul's 2000 Africa expedition unearthed and transported specimens containing about 50 percent of the skeleton—including a complete skull. The

next largest crocodile fossil is only 75 million years old, and was found in West Texas. [October 26, 2001, from Marco Mendez] Also, check out the cute little lagertos on the cover of *National Wildlife* Magazine. [February/March 2002, from Ray Boldt]

Ancient trees at risk?

"The very thought of the North Coast's grand redwood cathedrals winding up like the plagued and dying oak groves of central California is enough to send shivers up your spine," reports the *Eureka Times-Standard*. Research that shows that "DNA taken from redwood sprouts growing in Big Sur and at the University of California—Berkeley . . . proved positive for *Phytophthora ramorum* spores, which cause sudden oak death. Other members of the genus, which is like a brown algae, caused the Irish potato famine . . . and . . . [infections in the] Port Orford cedar, a valuable lumber tree." No one knows if the redwoods, ancient trees whose ancestors provided habitat for dinosaurs will succumb to the algae. [January 10, 2002, from K. S. Mierzwa]

New way to steal gators

Sometimes writing this column gets hard because there's nothing "new." Snakes bite, squeeze, slither and escape. Turtles are found, released and relocated. Other than the occasional residential fire, lizards seem to bask harmlessly unless operated on or lost into trees. Frogs are either deformed, disappearing or translocated and too loud. Least newsworthy of all, my "Salamander" file is still only half an inch thick after 15 years. But this one, folks is a new one on me. "State officials charged a Boca Grande [FL] man with forging documents to illegally hunt dozens of alligators. . . . [The 57-year-old-man] was charged with 67 felony counts that include trafficking in stolen property, uttering a forged instrument, identity theft and unlawful harvest of alligators." Basically he pretended to be a bunch of people to get gator tags.

[Citrus County, Florida, *Chronicle*, December 29, 2001, from Alan Rigerman]

Very karmic collapse

A building used as a research center on sea turtles had to be torn down late last year because it was falling into the ocean after years of erosion. But the lead researcher pointed out that taking out the seawall and the building would permit a dune to rebuild which would probably be used someday by sea turtles to nest. According to the researcher, twenty-five percent of all loggerheads and 35 percent of all green sea turtles on U.S. shores nest along a 20-mile stretch of Florida coastline. [Orlando Sentinel, December 4, 2001, from Alan Rigerman]

Turtle net finds

- Louisiana turtle farms <<http://www.laturtles.com>> and <<http://www.louisianaturtles.com>>
- Salmonella information from the World Health Organization <<http://www.who.int/m/topics/salmonella/en/index.html>>
- Humane Society of the United States <<http://ww.hsus.org/news/090601b.html>>
- The Ocean Conservancy <<http://www.oceanconservancy.org>>

You have to read this

Econews, journal of the Northcoast Environmental Center [NEC] is back and as good as ever it was before their headquarters in Arcata burned down last summer. If you enjoy humorous writing, original cartoons and environmental issues, subscribe for \$20/year. Contact NEC at 575 H Street, Arcata, California 95521. They also publish the bird counts and mention unusual birds sighted on the North Coast.

Be afraid, you're out-of-doors

A writer for the *Miami Herald* seems to have had a typical snake hunter's experience. She wrote, "For about three hours, we slogged . . . slip[ped] . . . and clawed our way through dense . . . [vegetation] looking all around us and slapping mosquitoes. We turned over logs, rocks... and ... debris." They didn't find a snake all day, but that didn't stop the writer's imagination, "It's very unsettling to step off a boat onto a deserted island and realize each time you put your foot down, you might be treading on a deadly rattlesnake." [February 7, 2002, from Alan Rigerman]

Do they teach the Lazlo Protocols anywhere?

Firefighters responding to the Aurora, Colorado, home where a man was strangled by his pet python tried to put the snake away. One said "The rest of the crew took the patient up the stairs to begin resuscitation. I planned on letting go of the snake, but it got two coils around my arm. . . . It was one of the most powerful things I have ever encountered, like being squeezed by a hydraulic arm. At one point I was laying on top of it, and it was carrying me across the basement floor with no problem. During the struggle, I kept talking to it, saying things like 'Stay calm,' but that was more for me than for the snake." The sad part of this story is that the firefighter was alone during this struggle and only got the upper hand when a

police officer came down into the basement and discovered the struggle in progress. The firefighter reported only numbness and tingling in his arm and said, "They don't teach you how to deal with this in the Fire Academy. The next time, I think I'll let somebody else have the experience." [*The News Star*, February 13, 2002, George Patton and Martha Messinger] The Lazlo Protocol for snakes says: (1) never handle a potentially dangerous animal alone. All the other rules and corollaries follow from rule one. Make your 2002 resolution to always follow and teach the Lazlo Protocol for animal handling. Think of how many stories here start out with "A ____ was found after being ____ by a pet ____." Please don't fill in those blanks yourself.

I thought dogs were immune

"A Mexican gray wolf found dead in July apparently died from a rattlesnake bite, according to a necropsy report. . . . The alpha male of the Lupine Pack was found near where the pack was released. . . . There was a large rattlesnake where the wolf was found. . . . The snakebite caused the wolf to suffocate after its throat became blocked." [*Albuquerque Journal*, September 15, 2001, from J. N. Stuart]

When the world changed before

Right after Pearl Harbor, the Hawaiian "zoo made contingency plans to kill its poisonous snakes." One wonders why they were keeping venomous animals non-native to their islands in the first place, but the rest of the newspaper story is really about WWII and not about snakes on Hawai'i. [*Albuquerque Journal*, December 2, 2001, from J. N. Stuart] The only other WWII reptile story I can think of is the accidental moving of the brown tree snake from its original home to Guam. Can anyone think of any others?

A number to remember

Ann Landers [*Eureka Times-Standard*, March 2, 2002] reports on a new standardized poison control number (800) 222-1222. It is supposed to connect you to poison control in all 50 states and be able to access your local assistance from the national center. Write this one down next to your phone if you keep anything venomous, poisonous or dangerous — including plants like *Poinsettia* and other traditional florals. I haven't yet tried it — but I certainly would if I needed it — and it reminded me to write down the hospital numbers somewhere prominent, too. Take a minute and consider your protocols. Remember the Ides of March.

Thanks to everyone who contributed this month and to Ernie Liner and Wes for big, plump envelopes I haven't opened yet. Also thanks to Ms. G. E. Chow, Rob Streit, Ray Boldt, Marty Marcus (cutest envelope of the month), Wes von Papineau and everyone who helps bring you this column month after month. You can contribute, too. Send whole pages of newspapers and magazines to: Ellin Beltz, P.O. Box 934, Ferndale, CA 95536-0934. I love decorated envelopes — really makes the postal workers notice the new kids in town. Also you can E-mail me <ebeltz@ebeltz.net> and visit my website <<http://ebeltz.net>> for scientific name information for North American reptiles and amphibians.

Unofficial Minutes of the CHS Board Meeting, February 15, 2002

CHS President Jack Schoenfelder called the meeting to order at 7:36 P.M. Board members Greg Brim and Steve Sullivan were absent. Jack thanked Lori King for chairing the last meeting in his absence.

Officers' Reports

Recording Secretary: Emily Forcade read and distributed the minutes of the January board meeting. Corrections were made and the minutes were accepted.

Membership Secretary: Mike Dloogatch said that he would not be distributing a membership report at the board meetings since the *Bulletins* are now being mailed after the board meeting. He will continue to report any unusual incidents regarding membership.

Vice-president: Lori King said that the speaker at the February general meeting would be Dr. Richard King who would be talking about the movements and hibernation of the Lake Erie water snake. In March we can anticipate Don Wheeler's talk regarding rattlesnakes. In April, Karen Becker, D.V.M., will discuss a holistic approach to treating herps. Bob Bavirsha related a wonderful experience about Dr. Becker's treatment of his African rock python.

Corresponding Secretary: Steve Sullivan was absent. Jack said he had recently heard a phone message from another organization, which he thought we should consider incorporating in our message. The initial phone prompt stated, "If you want information about (the organization), leave your name and address and we will send you a packet."

Publications Secretary: Mike Redmer said that he expects several book reviews to come in soon. He said that if anyone sees a recently published book he or she would like to review, either positively or negatively, please volunteer.

Standing Committees

ReptileFest: Darin Croft said that there would be a committee meeting on Sunday, March 3, at Mike Dloogatch's office. Lots of bodies would be welcome since they will be addressing and stamping postcards. Ron Humbert said that Bush Herpetological has responded very favorably to our need for cages for the "Herps of Illinois" exhibit. They are providing some to us at a fraction of their wholesale price. We will be able to keep these for use at future CHS shows. Ron also reported that he has six applications for 'Fest exhibitors. He's encouraging all CHS members to consider displaying their animals. Claus Sutor said that representatives from the Salt Creek Watershed have a static display — would we be interested? Ron said absolutely yes. We have lots of exhibit space available.

Grants: Mike Redmer said there were 30 grant applications this year — twice as many as last year. The quality of the applications was excellent. The committee gave out three \$500 grants and four \$250 grants. This exhausted the \$2000 that had been allocated by the board for grants this year plus an additional \$500 that was available from last year's funds. Emphasizing

that conservation is part of our mission, Lori King moved to allocate an additional \$500 grant this year to fund Chuck Knapp's project of long-term study and conservation of the Andros iguana. Mike Dloogatch seconded the motion. The motion was passed unanimously. The board discussed various ways to get more funds to support the grants program. Perhaps the new membership form could include a line allowing people to donate an additional amount directed solely to funding grants. Bob Bavirsha offered to make a permanent display of the grants program that would include photos of the grant projects we've funded. Lori suggested that our Herps of Illinois display could include a drop site for funds dedicated to supporting grants that deal with Illinois herps. Jack said that Mike Spinella of the U.S. Forest Service has contacted him about \$125 left over from money we gave them in 1995 to print brochures that list the herps of the Shawnee National Forest. They are no longer able to spend this money unless they receive renewed permission from us. Ron Humbert made a motion that we give the U.S. Forest Service through Mike Spinella approval to spend the \$125 we gave them for brochures several years ago. Tom Anton seconded. A vote was taken and the motion carried unanimously.

Shows: Jenny Vollman said that Friday, March 8, is Family Night at the Peggy Notebaert Nature Museum. They have invited us to do a display similar to what we did over the holidays. Jenny has four volunteers but can use more. Jenny also needs volunteers for the Arlington Pet Show, March 15–17. Due to parking restrictions, Jenny requested people who can stay full days. Ron Humbert requested volunteers for two other shows. On March 10, the Oak Park Conservatory wants a herp display. Steve Spitzer and Jenny Vollman have volunteered so far. On March 16–17 Jim and Kirsten Kranz have asked us to exhibit at the Milwaukee County Museum from 9 A.M. to 4 P.M. Rob Carmichael has volunteered so far, but they have allocated 82 linear feet for the CHS. Bob Bavirsha said he got a free booth at the Tinley Park Hunting and Fishing Show; 5,870 people passed through and he gave out many 'Fest notices. He also did a full day program for 300 children K–5 and gave out 300 flyers. Lori said that from March 15 to the end of May, the SuperCroc exhibit by Paul Sereno and Gabe Lyon would run at the Museum of Science and Industry. On the weekends the museum would like us to display herps. They have been informed that there will be fees associated with such displays.

Raffle: There is still no permanent chairperson. Ron Humbert and Linda Malawy will do the February raffle. Ron said he just received another "Chicago Region Frog Calls" CD for the next raffle.

Ad Hoc Committees

CAS Temporary Exhibit: Ron Humbert reported that the committee met prior to the board meeting. They came up with a number of ideas, but they would always welcome more. Ron will meet with the design and creative departments at the Notebaert.

Awards: There is one more award to be given. Jack suggested that the current awards committee begin thinking of ideas now for the 2002 awards.

Trips: Mike Redmer is looking into the feasibility of a board member trip on April 19– 21 to south-central Illinois to learn about the ongoing research on eastern massasaugas.

Salamander Safari: Tom Anton and Ron Humbert can be contacted for driving directions to the Middle Plum Preserve where the safari will be held, March 23, 9 A.M. to 4 P.M.

New Business

Mike Redmer raised several instances where CHS members had cited their membership as a qualification for receiving information or backing a project. Mike was concerned that this use without sanction of the board was inappropriate. Mike Dloogatch suggested a statement to this effect in the *Bulletin*. Mike Redmer will draft one and bring it to the board for review.

Ideas and Suggestions

Ron Humbert said that perhaps we should insist on an honorarium when we are asked to do shows. These could be designated to cover grants and be payable to the CHS. Bob Bavirsha said he routinely gets a letter to go to the school principal when he puts on a show in schools. Perhaps this subject could be included in such a letter. Mike Redmer asked Lori about

honoraria for our speakers. We don't provide this but it has never been a problem.

Round Table

Mike Dloogatch mentioned that if we had had \$10,000 available for grants, it could have been well spent because the applicants were so good.

Jim Hoffman said he complained to AOL that his E-mails intended for all local CHS members aren't getting through to AOL subscribers. AOL will look into the problem.

Bob Bavirsha said that the state is considering a bond for the care of an animal when people are arrested for an animal-related infraction.

Ron Humbert said that when we do shows it would be nice if we could have signs that the show was sponsored by the CHS. Bob Bavirsha offered to work on small signs or banners that could be used for this.

Jack said he is giving a presentation to the Hoosier Herp Society about reptiles in advertising. If anyone sees an interesting ad that uses herps, please pass it on to him. It will be photographed and returned.

The meeting adjourned at 9:36 P.M.

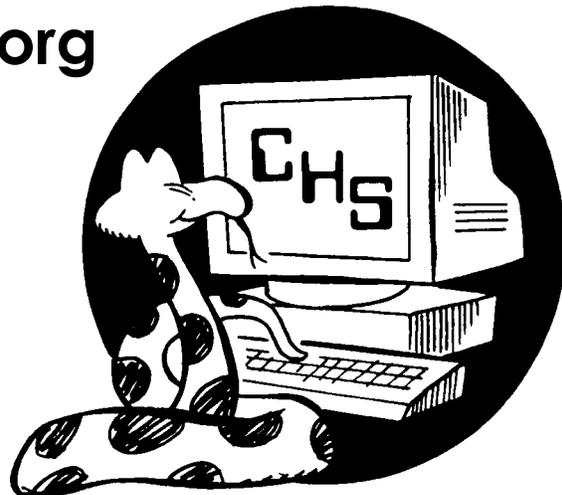
Respectfully submitted by Recording Secretary Emily Forcade

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Chicagoherp.org is accepting applications for banner advertisements or links from herpetoculturists and manufacturers of herp-related products. Visit the site and contact the webmaster for details on how you can sponsor CHS!

Herpetology 2002

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

AGGRESSIVE BEHAVIOR IN COTTONMOUTHS

J. W. Gibbons and M. E. Dorcas [2002, *Copeia* (1):195-198] note that venomous snakes are often perceived as aggressive antagonists, with the North American cottonmouth, *Agkistrodon piscivorus*, having a particularly notorious reputation for such villainy. The authors designed tests to measure the suite of behavioral responses by free-ranging cottonmouths to encounters with humans. When confronted, 23 (51%) of 45 tested tried to escape, and 28 (78%) of 36 tested used threat displays and other defensive tactics; only 13 of 36 cottonmouths bit an artificial hand used in the tests. These findings challenge conventional wisdom about aggressive behavior in an animal perceived as more dangerous than it is. Changing irrational negative attitudes about venomous snakes is a necessary step toward quelling the recently documented global decline in reptiles.

AMPHISBAENIAN ECOLOGY

L. E. Vega [2001, *Amphibia-Reptilia* 22(4):447-454] studied the reproductive and feeding ecology of the amphisbaenian *Anops kingii* in east-central Argentina. Reproduction occurred from late winter (July) to early summer (December). Clutch size, based on the number of oviductal eggs, ranged from 2 to 4 eggs ($\bar{x} = 3$), whereas mean clutch size based on the number of yolked follicles was 2.2 eggs. Adult females were significantly larger than males and all male individuals had conspicuous precloacal pores, whereas all females lacked them. Diet was not diverse and consisted mainly of coleopteran larvae. Foraging activity decreased during the coldest months of the year. Individuals were found under large rocks predominantly during winter and spring. This seasonal pattern of activity near the surface would seem to be related more to thermoregulatory than to trophic requirements.

DESMOGNATHUS THERMOREGULATION

L. M. Sievert and P. T. Anreadis [2002, *Copeia* (1):62-66] report that despite the potential constraints imposed by cutaneous respiration and nocturnality, some salamanders actively thermoregulate when conditions permit. They measured substrate temperature selection in two species of *Desmognathus* in a moist thermal gradient in the laboratory. *Desmognathus monticola* selected significantly higher temperatures than *Desmognathus quadramaculatus*. Although the substrate temperatures selected by *D. quadramaculatus* did not vary over time (mean \pm 1 SE = $13.6 \pm 1.1^\circ\text{C}$), *D. monticola* selected significantly higher temperatures at night than during the day. Mean temperatures selected by *D. monticola* were $14.0 \pm 1.5^\circ\text{C}$ from 1200 to 1600 h and $19.7 \pm 1.6^\circ\text{C}$ from 2000 to 0000 h. This difference in temporal patterns is consistent with field behavior, because *D. monticola* is more frequently found away from water at night than is *D. quadramaculatus*.

RESPONSES BY REPTILES TO FOOD CHEMICALS

W. E. Cooper, Jr., et al. [2001, *J. Herpetology* 35(2):255-263] conducted experimental tests of the responses to food chemicals presented on cotton swabs or ceramic tiles by tuataras (*Sphenodon punctatus*) and by other insectivorous species from several families of iguanian lizards. Tuataras, which are primarily carnivorous, never tongue-flicked but frequently bit cotton balls bearing prey surface chemicals, suggesting that they may be able to detect airborne prey chemicals via olfaction. None of the lizards tested, the agamids *Chamaeleo pardalis* and *Acanthosaura crucigera*, the polychrotids *Anolis smallwoodi* and *Chamaeleolis chamaeleonides*, the phrynosomatids *Sceloporus variabilis* and *Uta stansburiana*, and the crotophytid *Crotaphytus collaris*, exhibited any differential responses among prey chemicals, chemicals from palatable plants, and pungency control or odorless control stimuli. The findings buttress previous work that has shown a lack of prey chemical discrimination in ambush foragers, including all sampled iguanian insectivores. Given that all tested omnivores and herbivores respond strongly to plant chemicals, the findings are also consistent with the hypothesis that discriminatory lingual and biting responses to plant chemicals occur only in species having diets with a large plant component. Correlated evolution between herbivory and plant chemical discrimination remains to be established. For unknown reasons, *Sceloporus variabilis* tongue-flicked less frequently in tile tests with romaine lettuce stimuli than with cricket and banana stimuli.

RICTAL STRUCTURES OF SOME SNAKES

G. Underwood [2002, *Herpetologica* 58(1):1-17] describes rictal structures (that is, structures around the corner of the mouth) of some snakes. *Anilius* has a large serous superior rictal gland lateral to the quadrato-maxillary ligament and a large serous inferior rictal gland. Other rictal structures of henophidian grade snakes are mesial to the ligament. *Cylindrophis* has a medium superior rictal gland and a large inferior gland. Two uropeltines have a large superior rictal gland opening into a rictal bulb with thick folded walls. *Xenopeltis* has a large superior rictal gland opening by three ducts into a thick-walled rictal pocket. *Aspidites*, *Calabaria*, *Exiliboa*, *Loxocemus*, *Tropidophis* and *Ungaliophis* have a rictal pocket into which open glands that may be mucous or serous. *Candoia* has glands opening around, but not into, a rictal pocket. Bolyerines show no evidence of differentiated rictal structures. *Pareas* has a superior rictal gland with serous tubules leading to mucous tubules; supralabial gland lobules also have serous leading to mucous tubules and, from about midway forwards, these lobules form a double row; there is no evidence of a dental gland. Two xenodermatines have supralabial serous tubules leading to mucous tubules, but no evidence of alternating mucous and serous cords. Some alternative evolutionary interpretations are discussed.

Advertisements

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail: GrmtRodent@aol.com.

For sale: murine-pathogen-free rats and mice available in all sizes, live or frozen: pinkies, fuzzies, crawlers, small, medium and large. Frozen crawler mice in lots of 2000, \$.17 each. Also available, full grown hairless mice. FOB shipping point. Master Card accepted. Call (518) 537-2000 between 8:00 A.M. and 5:00 P.M. or write SAS Corporation, 273 Hover Avenue, Germantown NY 12526 for prices and additional information.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. We feed our colony a nutritionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice starting from: pinks, \$.17 each; fuzzies, \$.24 each; hoppers, \$.30 each; weanling, \$.42; adult, \$.48. Rats: starting with pinks at \$.45 each, to XL at \$1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. P.O. Box 85, Alpine TX 79831. Call us **toll-free** at (800) 720-0076 or visit our website: <http://www.themousefactory.com>.

For sale: from Bayou Rodents, excellent quality feeder mice and rats. Every size available. Pinks starting at \$20/100. Orders are shipped by overnight service Monday thru Thursday. We accept Visa, MasterCard and Discover. For more info, contact Rhonda or Peggy, (800) 722-6102.

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For sale: Styrofoam shipping boxes, 17½" × 17½" × 9½", \$4 each. All proceeds going to local food pantry. Ask for Iggy or Ty, (847) 593-2831.

For sale: 125-gallon aquarium, 72" × 18" × 24", with a wood stand. Stand needs some fresh stain. Does not include a hood or any filters. \$175 or best offer. Also have a 100-gallon aquarium without a stand for sale. \$125. Call (630) 469-9765.

For sale: books. *The Book of Indian Reptiles* by J. C. Daniel, 1983, 144 pp. plus 41 colored plates (drawings and photos) and 13 b&w plates (photos), contains much natural history info on 140 species, good printing and binding for India publication, DJ, hardbound, \$35; *The Cold-Blooded Australians* by Gunther Schmida, 1985, 208 pp. (large format), many excellent color photos of some seldom-photographed reptiles, amphibians and fish and their habitats, signed by author, DJ, hardbound, \$80; *Handbook of Common New Guinea Frogs* by J. I. Menzies, 1976, 75 pp., 12 color plates, plastic covers, \$27; *The Big Cats, the Paintings of Guy Coheleach*, 1986 (1982), 243 pp., 154 illustrations including 59 plates in full color of Coheleach's superb paintings with excellent text, too, DJ, as new condition; hardbound, \$42; *The Amphibians and Reptiles of Illinois* by Philip W. Smith, reprinted 1971 (1961), 298 pp., 251 figs., softbound, \$25. All books in excellent condition. Prices postpaid. William R. Turner, 6838 S. Ivy Street, Apt. 302, Englewood, CO 80112, (720) 493-9378, E-mail: turnerbmrk@prodigy.net.

For sale: one male and one female c.b.b. '99, red Storr's monitors; one female c.b.b. '00 and one male c.b.b. '01, yellow ackies, both have lots of orange tint. Scott, (309) 836-1042, erycine1@aol.com. [downstate IL]

For sale: **Now accepting reservations for 2002 rare/unusual garters**: We expect offspring to be available in June or July. **Easterns**: Blais flames, \$50–125 each; Blais speckled flames, \$125 each; Blais peach flames, \$50 each; erythrisc easterns (high red) \$50–100 each; double het (erythrisc × melanistic eastern), \$175/pair; double het (erythrisc × Blais flame), \$175/pair; melanistic eastern, \$35 each; Florida Blue, \$10–50. **Plains**: Snow plains (2 strains), \$300 each, hets, \$150 each; Albino plains (2 strains), \$125 each, hets, \$50; anerythrisc plains (2 strains), \$75 each, hets, \$40 each, possible het plains (66%), \$35 each; normal plains, \$25 each / 2 for \$40. **Red-sideds**: Albino red-sideds (very limited numbers), \$350 each, 66% possible het, \$100 each, 50% possible het, \$75 each; anerythrisc red-sided, \$100 each, hets, \$50, possible hets, \$35 each; normal red-sideds \$25 each / 2 for \$40. **Wandering**: Het albino wandering, \$75 each; normal wandering, \$25 each / 2 for \$40. Shipping is extra. Questions, call Scott at (919) 365-6120 EST, E-mail: SFelzergarters@aol.com, web address: www.thamnophis.com/features/ScottFelzer/. [NC]

For sale: Green anacondas, c.b. 9/01, beautiful, healthy and DOCILE, \$175 each; yellow anacondas, c.b. 6/01, flawless little screamers, \$95 each; Amazon tree boas, c.b. 7/01, solid yellow, \$125, orange and green, \$150, both are female; 11' female tiger retic, stunning specimen, tame and a great feeder, \$550 or best offer; jungle carpet pythons from nice black and yellow parents, \$100 each or \$175/pair. Mark Petros, Strictly Serpents, (847) 836-9426, E-mail: MLPserpent@hotmail.com.

For sale: Send SASE to CRC, P.O. Box 0731, Las Vegas NV 89125-0731 for brochures and list of species available. Limited bookings available for guided tours of herpetological collection sites in Nevada. Call/fax (702) 450-0065. URL <http://www.herp.com/crc/> E-mail: crcsafetie@aol.com.

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News and Announcements

2002 CHS GRANT RECIPIENTS

The CHS Grants Committee is pleased to announce the CHS grant recipients for 2002. The committee consisted of Michael Dloogatch, Lori King and Michael Redmer. This year we received 30 applications, almost twice as many as last year, far exceeding the number of grants that could be awarded based on available funds. After a difficult decision process, eight grants were awarded, in varying amounts, as follows:

- Rachel Goodman, Department of Ecology and Evolutionary Biology, University of Tennessee. “Habitat Utilization and Behavior of Released Blue Iguanas, *Cyclura nubila lewisi*, on Grand Cayman,” \$500.
- Charles Knapp, Department of Wildlife Ecology and Conservation, University of Florida. “Ecology and Conservation of the Andros Iguana (*Cyclura cychlura cychlura*),” \$500.
- Robert Lovich, Wildlife Biologist, U.S. Department of Defense (USMC Camp Pendleton) et al. “Survey to Determine the Distribution and Status of the Arroyo Southwestern Toad (*Bufo californicus*) in Baja California, Mexico,” \$500.
- Milton Yacelga, Department of Biology, University of Texas at Tyler. “Foraging Behavior of Semi-aquatic Snakes in a Floodplain Forest,” \$500.
- Matt Allender, College of Veterinary Medicine, University of Illinois. “Characterization of the Reproductive Biology of the Eastern Massasauga Rattlesnake (*Sistrurus catenatus catenatus*), an Endangered Species,” \$250.
- James R. Lee, Department of Biological Sciences, Towson University. “Hibernation Ecology of an Endangered Rattlesnake (*Sistrurus catenatus*) in Missouri,” \$250.
- Day B. Ligon, Department of Zoology, Oklahoma State University. “Conservation of the Alligator Snapping Turtle (*Macrolemys temminckii*): Evaluating the Effects of Incubation Temperature on a Headstart Program in Southeastern Oklahoma,” \$250.
- Geoffrey G. Sorrell, Waverly, Alabama. “Population Ecology of *Bothriechis schlegelii* in Western Panama,” \$250.

CHICAGO WILDERNESS HERP SURVEYS

The Chicago Wilderness Calling Frog Survey is expanding this year, and we **need your help!** Over 200 monitors are currently trained to listen for frogs and toads in the spring (maybe you’re one of them?) This spring, we’re branching out into the rest of the herp world with our **Great Herp Searches**. At several different forest preserves, monitors will spend a couple of hours conducting visual searches for snakes, salamanders, frogs, toads, lizards and turtles. We’ll be collecting information for land managers who want to know what’s crawling around at their sites but haven’t had the time or the bodies to find out.

Dates and locations will be in the April *Bulletin*, but please call Karen (847) 965-1150, x12 if you’d like more information. Also, please let us know if you have experience finding or identifying reptiles and amphibians and would enjoy serving as a *mentor* or *leader* at one or more Herp Searches—this is a great way to help newer monitors increase their skills.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, March 27, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. Our own **Don Wheeler**, creator of "The Adventures of Spot," will lecture and show slides on "Tales from the Golden Age of Rattlesnake Hunting." Don will have copies available of his new book of the same title, and will be happy to autograph them.

The April 24 meeting will feature **Karen Becker, D.V.M.**, speaking about holistic approaches to herp medicine.

The regular monthly meetings of the Chicago Herpetological Society now take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful new building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the April 12 board meeting, to be held at the North Park Village Administration Building, 5801 North Pulaski Road, Chicago. To get there take the Edens Expressway, I-94, and exit at Peterson eastbound. Go a mile east to Pulaski, turn right and go south to the first traffic light. Turn left at the light into the North Park Village complex. At the entrance is a stop sign and a guardhouse. When you come to a second stop sign, the administration building is the large building ahead and to your left. There is a free parking lot behind the building.

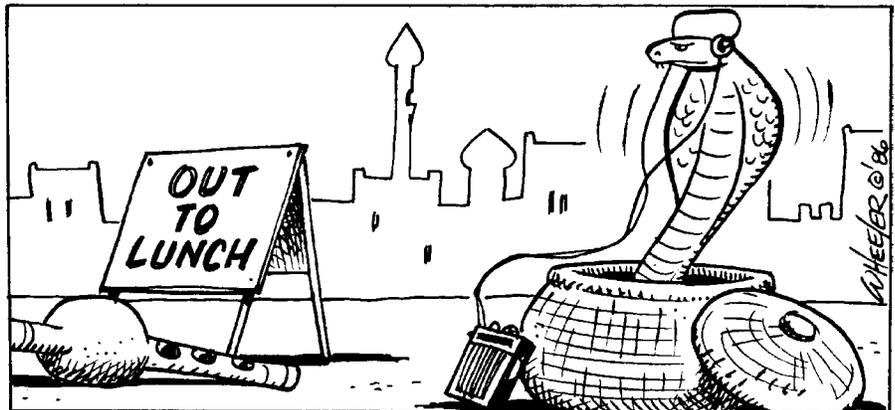
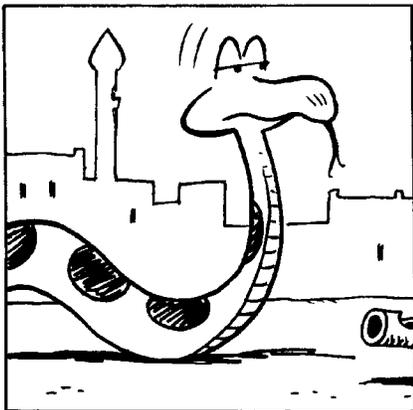
The Chicago Turtle Club

The monthly meeting of the Chicago Turtle Club was held earlier than normal in March. The next meeting will be April 28, 1:00 – 3:30 P.M., at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Meetings are informal; questions, children and animals are welcome; parking is free. For more info call Lisa Koester, (773) 508-0034, or visit the CTC web site: <http://www.geocities.com/~chicagoturtle>.

2002 SALAMANDER SAFARI

This year, the annual CHS Salamander Safari will be held on Saturday, March 23, 9 A.M. – 3 P.M., beginning at the newly renovated Plum Creek Nature Center at Goodenow Grove Forest Preserve in Will County. Goodenow Grove is south of Crete, Illinois, 1½ miles east of the intersection of Route 1 and Route 394 on Goodenow Road. If you need directions to get to this area, call Ron Humbert at (630) 620-7377, or Tom Anton at (847) 441-7536. From the nature center we will drive to a new Forest Preserve District of Will County land acquisition approximately 2–3 miles north of the nature center, and search for amphibians known to occur at this site. Species found or heard calling in previous inventories include blue-spotted salamanders, gray treefrogs, spring peepers, chorus frogs, bullfrogs, green frogs, and northern leopard frogs. Species not yet found but possibly occurring (or occurring at preserves nearby) include spotted salamanders, newts and wood frogs. As in past safaris, CHS members may bring interesting animals from your personal collections for photography and display purposes. Coffee, juice and donuts will be provided, and a good time will be had by all!

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