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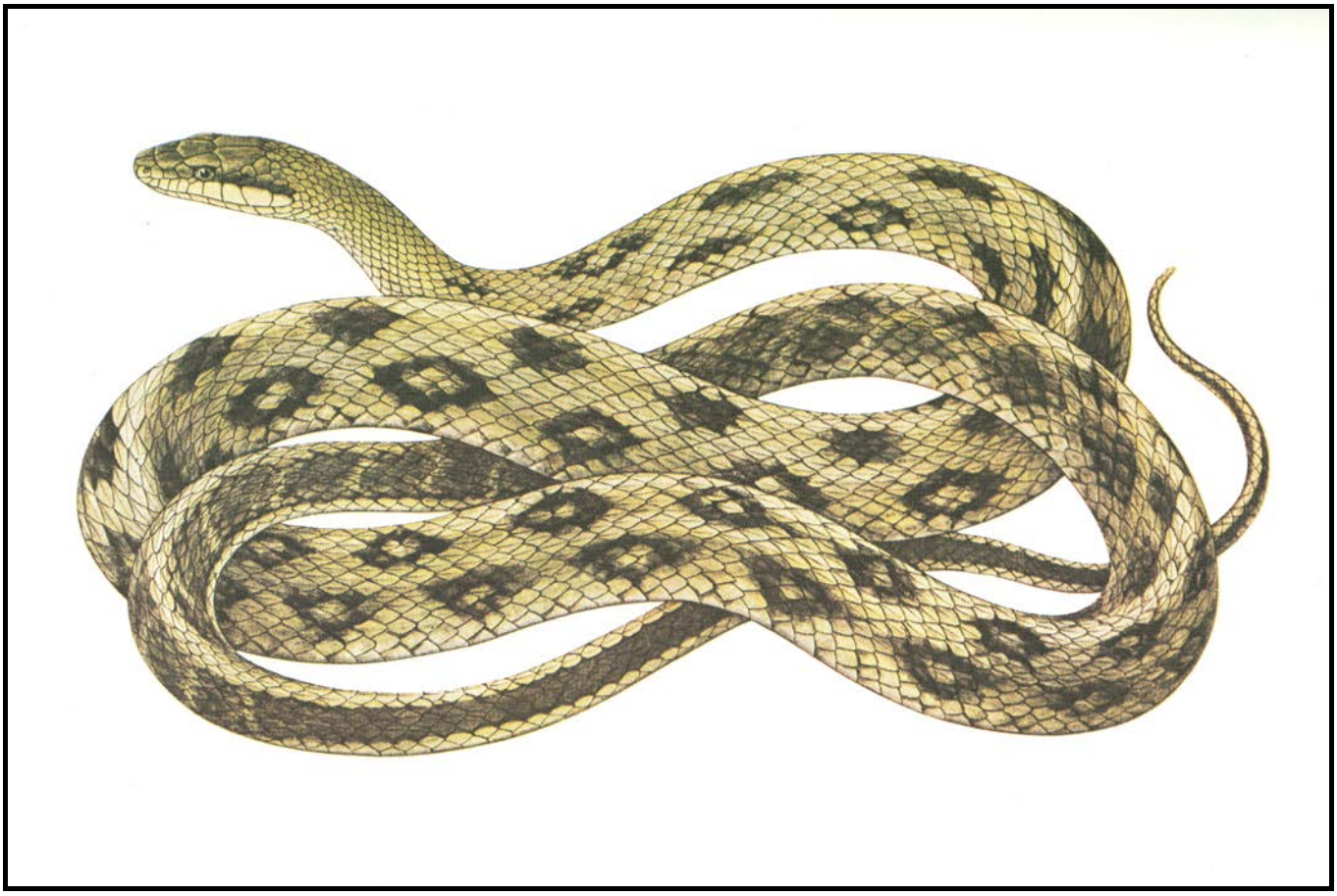

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Cover: Taiwan beauty, *Elaphe taeniura friesi*. Drawing from from *A Monograph of the Snakes of Japan* by Moichiro Maki, 1931.

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Atrox Canyon: A Paradise Lost

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I had several phone conversations with Frank about his findings. One thing that Frank stressed repeatedly was that the impact of human observations must be kept minimal in order for the reptiles to return to their "dens." To handle them, or pester them unduly could drive them away. – Repp, 1998

Prologue

There is no way in hell that the author could write this complete article in the first person. There are too many painful pronouns to deal with. The author will revert to first person toward the end of this piece. Those who stay with me will know how this author feels about shit sandwiches like that about to be portrayed. What doesn't kill us makes us stronger.

Pseudonyms for very real people are sprinkled generously below. But so are the names of some of the real people involved. Which is which really doesn't matter. The events relayed are true, and reported in the spirit of when somebody points at another person, three more fingers point straight back. While the herper in this tale was getting screwed, he was screwing others. He was also inadvertently screwing Mother Nature in the process. He did this in hopes of TV appearances and lame notions of being "the next Steve Irwin." In short, the herper got what he deserved. Roughly 20 wild rattlesnakes suffered pointlessly as a result. That's harsh!

On 1 January 1993, a local field herpetologist, one Peter "Pete" Moss, found an aggregate den of Western Diamond-backed Rattlesnakes (*Crotalus atrox*) [hereafter called "*atrox*"]. The den was located on an isolated ridge in the northwest quadrant of the Tortolita Mountains, approximately 40 miles north of Tucson, Arizona. This was not Pete's first *atrox* den. But it was the first den that was close enough to home to visit on a routine basis. With the help of many friends, one den became eight. By late March of 1993, all the snakes in the dens cleared out to begin their spring/summer/fall migratory patterns. The initial phase of clearing out is called "egress." Pete knew these snakes would return the following fall. He chose the Friday after Thanksgiving in 1993 to visit the dens again. With that first fall visit, he noted all eight dens held *atrox*. This is called "ingress." He witnessed a gradual build-up of numbers of basking *atrox* until late March 1994. Then egress ensued again. In November of 1994, ingress again. March 1995: egress. November of 1995, ingress. By early March 1996, as many as 20 *atrox* were viewed per visit. At that point, Pete inserted not just one, but *two* major nature film companies into his personal paradise. These companies are among the top five nature film companies in the world. Poor Pete had trouble with one of the two. In what follows, one crew shall be called NG (for Nice Guys). The other crew is referred to as BB (for Bad Boys).

This looks like a good place to end this prologue, and jump into hapless Pete's story:

***Atrox* Canyon**

As suggested above, Pete found *Atrox* Canyon on New Year's Day 1993. On that day, he had a party to attend, and was en route home when he noted that he still had 15 minutes left to spare. He hooked onto a road that led to favorable-looking herp habitat. He hopped out of his truck and quickly found one lone *atrox* basking in front of a gneiss boulder formation (Figure 1). Pete then ascertained that he would be "fashionably late" to the party, and continued the search for more. He eventually found a second gneiss formation with three *atrox*—two males and a female—basking just outside a gash-like soil entrance that led under the formation. Upon departure, he dubbed the spot "*Atrox* Canyon." The name proved to be prophetic.

By the time Pete arrived home, he was already *very* late for the party. The hosts were peeved and persnickety. They obviously were not herpetologists, for they thought any and all of Pete's excuses were feeble and unacceptable. Real herpers ought not even attempt to maintain friendships with normal people. They do not understand . . .

The Tortolita Mountains are a highly visible yet almost completely ignored northern boundary of the city of Tucson. The southern edge of the range is starting to fall mightily to urban sprawl, while the north side remains remote and wild. If there is anything distinctive about the northwest side of the range, it is the fact that the major east-to-west flowing drainages seem to extend forever into the piedmont beyond. Each drainage is flanked by ridges—tendrils that stretch far into the flats. That

Figure 1. This is the very first *atrox* found at *Atrox* Den Number One (AD1) in "*Atrox* Canyon." (All future mentions of den numbers will utilize the "AD" system of numbering.) The snake was first found on 1 January 1993. The author returned the next day with some photographer friends. Image by Dennis Caldwell, 2 January 1993. All figures are from Derrio Canyon, Tortolita Mountains, Pinal County, Arizona.

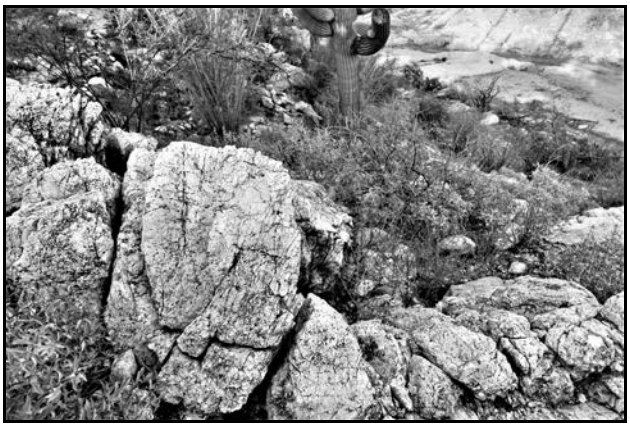

Figure 2. The "sweet spot" of *Atrox* Canyon. Four different aggregate *atrox* dens are in the framework of this image. They are AD5 (foreground) through AD8, which is not visible, but just around the corner at the far edge of this image. In addition to *atrox*, Sonoran Desert Tortoises (*Gopherus morafkai*), Sonoran Lyresnakes *(Trimorphodon lambda*) and Black-tailed Rattlesnakes (*Crotalus molossus*) were found in this sweet spot as well. Unless stated otherwise, all remaining images are by the author.

Figure 3. This image was taken the very day that the author first led the BB film crew to *Atrox* Canyon. There were multiple pairings of *atrox* scattered around the dens. The females were being receptive, and the males were always willing! Perfect *in situ* blue-chip nature-filming opportunities were there for the taking. The snakes were sitting ducks in a fabulous landscape!

which Pete designated as *Atrox* Canyon starts at the western edge of one of these far-reaching tendrils. A lone and lengthy ridgeline rises from out of nowhere, and begins to form the northern boundary of *the* major drainage of the northern Tortolitas. Said ridgeline is on the north side of a dry wash. In subtle fashion, it rises roughly 20 meters above a 15-meter-wide and sandy dry wash. While the drainage *is* normally a dry wash, weather factors can, at times, cause the dry wash to become a raging torrent. The ridgeline to the north side of the wash levels out at 20 meters above it, and extends for a few miles eastward until it reaches the abruptly rising western edge of the mountain range itself. The ridge maintains a stately and stable forest of saguaros, which in turn have a healthy riot of Sonoran Desert-scrub cactus, bushes and trees surrounding them. The prime *atrox* habitat on this ridge is roughly a mile of scattered quartz-bearing gneiss boulders. The white-colored boulders are massive chunks—averaging the size of a Volkswagen Beetle. All are riddled with cracks and crannies. Soil burrows stuffed with packrat detritus are in the underpinnings of many. The boulders are well separated from each other, but limited in width with regard to the top of the ridge, The scattered boulder swath follows the ridge top, and spills perhaps 30 meters to either side. Those white gneiss boulders, scattered hither and thither about the ridge, sometimes hold small pockets of *atrox*. The canyon as a whole is a scenic splendor, with the majesty of the entire northwest side of the Tortolita Mountains to the east. At this point, the steep cliffs and deep cuts climb to 400 meters (~1200 feet) above the ridge. Vast, seemingly endless vistas packed with saguaros undulate westward and downward to the distant Santa Cruz River. Many fantastic sunsets ensue here. No houses are visible anywhere. It is remote, it is quiet, and it was at one point chock-full of *atrox*. But the *atrox* were not were not the only herpetological highlights. Sonoran Desert Tortoises (*Gopherus morafkai*), Sonoran Lyresnakes (*Trimorphodon lambda*), and Black-tailed Rattlesnakes (*Crotalus molossus*) could be found here as well. In short, it was a herper's paradise (Figure 2).

At the time that Pete led both film companies (separately in March 1996) to *Atrox* Canyon, the aprons in front of all eight dens had male and female *atrox* basking, pairing, courting, but not quite mating yet (Figure 3). That, plus the scenic backdrop, had both film crews in love with the place. The behavior that occurs with reproductive behavior was exactly what they were seeking. Pete eventually got NG to commit to an area 40 miles away, and had only BB to deal with.

BB had set up several stops for their Arizona shoot. Pete did *not* know that he was merely their backup plan. BB's first stop was to be in Portal, Arizona. Prior to arriving there, BB was also in touch with Pete. The day they arrived in Portal, they were (in theory) paying Pete 150 bucks to try to find a den close to Portal. Off went Pete to seek such a den. Foolish notions of "Ka Ching" in his brain played a *huge* part in luring him away from *Atrox* Canyon, where he wanted be. BB arrived in Portal and linked up with a local there, one Barney Tomberlin. (Barney is no longer with us. RIP sir!) Barney was keeping *atrox* in his venom lab. He milked them professionally, as needed by science or the medical industry. BB made him an offer to use some of those *atrox* in their film, and Barney was happy to take the money. This happened on a Friday—the same day that Pete was making *his* big BB bucks. While "Last Resort Pete" herped a cold herpetological wasteland, the BB company were making arrangements with Barney. After some discussion, BB finalized a plan with him, and they would start the next day (which was a Saturday).

At the butt crack of dawn the next morning, Barney and the three-person BB film crew gathered to stage some *atrox* behavior. When done right, filming staged behavior is ***much*** more reliable than trying to film wild behavior. They moved four *atrox*, two males and two females, to a dry swimming pool. The smooth cement walls of the pool were vertical and four feet deep. Prior to putting the *atrox* into the "pit," they added various native plants, rocks and scenic backdrops to assure several filmable mini-biospheres for the snakes. Then they paired the snakes off in their respective new worlds. Barney knew that it would take time for any relationships to develop. Hence, he suggested "lunch." They had been working hard up to that point. It was well past noon. The Portal Store restaurant is an excellent eatery, and

off they went for a leisurely dining experience. Apparently, they weren't the only of God's creatures in Portal to be hungry. When they returned to the pit, they were dismayed to see a red-tailed hawk fly out. In its talons it was clutching an *atrox*, which had been the very last one left. Those familiar with Portal will tell you that it is *packed* with raptors. And Barney and BB had just rung their dinner bell. The *atrox* were all gone, and being efficiently reduced to hawk shit, while they all stood agape. Barney still got paid, but was out some *atrox*. While Barney could easily collect more *atrox* from the burgeoning wild populations near Portal, it would at least another month before he could find any. He did not have any dens that he was watching, and would have to rely on road cruising at a later date to procure more. However, there was no "later" for BB. They had invested time, money and monkeys to be in Arizona at this exact time. In other words, they were *screwed.*

Meanwhile—the day before the *atrox* swimming-pool party and subsequent "hawk-nado" feeding frenzy—here's old Pete burning his vacation time. Pete's mission of finding a new *atrox* den was a bust. Per request, he phoned Matt of BB the following morning. At that moment in time, Matt was forgetting about him, and going all-out to feed the hawks. Hence, poor Pete was dropped like a soiled snot rag, and his request for the promised 150 bucks was met with "Don't call us, we'll call you."

At this news, the unflappable Pete just shrugged, and headed off to herp with the NG crew. They had gotten wind of a den smack dab in the middle of an area that he knew well. The den was found. It was an outlier boulder formation composed of exfoliated granite. It was shaped like a six-meter-tall pyramid, with one side of the pyramid blasted out. The explosion had cast talus all about. A pile of rocky rubble was stacked inside that hollow, and actually spewed out of the crater for about five meters in all directions. Sprawled on the talus roughly two meters outside the crater were two hefty male *atrox* and a smaller, but still very large, female basking in the sun. One beefy male was engaging in chin rubs and tail wraps as the other looked on. While the remoteness of the setup was appealing, and the snakes being willing was a plus, the blast zone left behind by the failed mining concern could best be described as dog-ugly. NG dubbed it not worthy of further effort. Pete made a mental note of the location, thinking he might visit it later. Little did he realize that "later" was going to be *very* soon. The same moment that Pete was looking at the *atrox* in the NG den, Matt of BB—still down in Portal—began to bombard Pete with phone calls and emails. This behavior was a stellar example of "**we'll call you**." But there was a total failure to communicate, for Pete had given Matt only his work telephone number and Pete had email capabilities only through his work computer. Matt and BB suffered a major freak-out when they realized the hawks left them sans a single *atrox* to work with. Matt spent the rest of the day Saturday, and all day Sunday, leaving Pete phone messages and sending multiple emails. The exasperation levels had reached a fever pitch by Monday morning, when Pete stepped into his office to retrieve them all. He was *completely* unaware of the *atrox* pool party at that point, he only knew that BB would be in Tucson on the very day that he was retrieving his messages. For reasons suddenly clear to him, worthless Pete was suddenly a highly marketable commodity. Two *major* reputable film companies wanted a piece of him, and he began licking his chops thinking of a lucrative career in the nature film industry. And *atrox* were going to make him rich and famous! He was anxious to get his foot in the door of two of the best nature film companies in the world, and eventually rocket to stardom as a rattlesnake whisperer. He wanted to be a TV superstar. That would make his mother so proud! (When he later bragged to his mother about his newfound glory, her response was as follows: "Never mind that crap! Does my grandson have any good shoes to wear?")

Pete phoned Matt, who answered on the first ring. They were frantic, and made no effort to disguise it. They wanted to move *now*! Today! Could Pete make that happen? About the time the "now" issue arose, Pete's boss Larry stepped in for his customary Monday morning snoop. Pete asked Matt to hold a second, and turned to his boss. "I've got BB on the phone." (Their real name is widely recognized and revered.) "They need me now! May I?" His boss Larry never wasted words, and inquired: "How long do they need you?" Without even consulting with Matt, he suggested "Two days." "Ok, make sure that everybody has plenty to do before you go. I'll look in when I can." "Will do! Thanks Larry!" Larry left, pleased to be ruler of Pete's world for a couple of days. He was an engineer who loved the machine-shop guys. He was a good boss. (Larry Daggert is no longer with us. RIP boss.)

Pete and Matt continued the dialogue. By this point (March 1996) Pete had done enough consulting with film companies that he had created a canned email for them. All that was needed was to change some names and dates, and it would be a done deal. Pete's rules and suggestions were concise and clear. While chatting with Matt, who was stressed out of his mind with thoughts of getting fired, Pete adjusted the canned email. When deemed ready, Pete pulled the trigger. "Matt" he quickly blurted "I'm sending you an email. Open it, respond with "I approve" and send it back to me. Then we can keep talking." The email was sent, and Matt picked it off seconds later. Matt requested time to run the email by BB's legal team. Pete reminded him of the urgency that was required. The snakes were going to fight, mate and egress within a matter of days. Tick tock. Chop-chop! Matt asked Pete to remain on the phone, this was going to happen fast. "I approve" was indeed very fast.

Pete's email opened with a paragraph about the nature of his study, and stressed the three-year-long minimal disturbance aspects involved. To try to touch or pose any wild snakes would be disastrous to what they were seeking. The snakes would just leave if they did. If they wanted mating and fighting, they would have to be patient, and catch it as it happened. The email stipulated that BB agrees to pay Pete $150 for one day of services previously rendered, and that BB will pay Pete at a rate of $150 per day for guide services, two days minimum. There then followed numbered points that went something like this:

Thou shall *not*

1. Touch any snake for any reason.
2. Bring along any researchers, academics, wildlife biologists or agency people.
3. Ever return to any site viewed without Pete's approval.
4. Ever reveal or disclose any locations shown when the filming was done.

That was all there was to it. This is what some poor attorney in Jolly Old England approved at about 1600 hours their time. It was 0800 for Matt and Pete. Pete inquired of Matt: "What are you doing an hour from now?" "Why, nothing" came his response. "Good, I'm going to show you everything I have. Meet me at I-10 Exit 236 in one hour. West side of the interstate. Park in the big lot west of the gas station. I'll be there."

"Can I bring anybody else?" Matt inquired.

"**NO! *Just you*!"** Pete thundered back.

Matt was right where he needed to be when Pete pulled in next to him. Pete approached Matt, who was seated in a fancy new silver-colored Toyota 4Runner. Matt rolled his window down, unsure of who was approaching. He suddenly recognized the open palm thrust in front of his face as a gesture that the approaching dude was his guide for the day.

"Got it right here, sir" said Matt with a sheepish grin. "Jolly good show, Peter. We *really were* going to pay you later." (Yeah, right!) He laid a crisp hundred and an equally crisp fifty into Pete's palm.

"Yes, it's a pleasure meeting you too, Matt." What else could Pete say? With the cordialities out of the way, he continued. "You'll owe me 300 bucks by nightfall tomorrow. Oh, and welcome to Arizona." Matt nodded his understanding of the fiscal issues, while trying to ascertain if the ice-cold welcome was sincere. It was not. Pete already hated this bastard for the "don't call us" routine. Moving forward, this huckster shall be known as "Maggot." By virtue of his every action, and nearly every word to spew from his cavernous gullet, "Maggot" is a suitable name. In fact, the maggot clade as a whole should be offended to the very marrow of their slimy backbones that Pete besmirches their good name in such fashion.

When Maggot stepped out of that 4Runner, he looked woefully unprepared for a day of herping. He was wearing shiny, city-boy wingtip shoes, pressed dress slacks, and a polyester shirt. His dress attire proved him to be the antithesis of his field partner for this day. He was a rather unremarkable 40-something man—a short, dumpy, pudgy pop-eyed bastard whose visage was reminiscent of Rodney Dangerfield. But his hair was dark and neatly cut in businesslike fashion. His attire and mannerisms reminded Pete of a shady used-car salesman. Pete took an instant dislike to Maggot's clothing and appearance. They were poles apart in every possible way.

Maggot offered up his 4Runner as the chariot for the day. Pete agreed to use it, but only if *he* could be the driver. Maggot could not allow Pete to drive, as his name was not listed on the rental agreement. That suited Pete just fine. He wanted to drive his own vehicle anyway. He was going to do everything in his *considerable* power to throw Maggot off the scent of his dens by taking circuitous back roads to each. His vehicle was a 1988 Suzuki Samurai. It was the short bus of all 4WD vehicles in its day. It would go *anywhere*, but it inflicted punishment to both driver and passenger alike. It would get them there, but not in comfort. On two occasions, while traveling at breakneck speed, Pete sent his passenger skyward by launching his junkbucket off a couple of rough spots in the road. Both times, Maggot's head banged against the bare-metal lid of the tin can they were trapped in. The second time it happened, Maggot got wise, and fastened his seatbelt.

Long before the head-banging began, while on the open highway, Maggot began to blather on. His gaping maw began to spew the *exact opposite* words from what Pete wanted to hear. He spoke with great disdain of something he called "blue-chip" nature filming. Pete was all over that term. "Blue-chip? What does that mean?" According to Maggot, blue-chip films depict real-deal, rarely filmed, animal behaviors. Such footage usually comes at great expense to film companies like NG and BB. In this particular situation, BB could easily spend *days* at *Atrox* Canyon, and not end up with a single inch of footage to show for it. It was a tremendous risk for them to do this. They didn't want *Atrox* Canyon to be "another bust." Pete did not know about the first "bust" yet. He did not know of "hawk-nado." (Barney told him all about *that* a few weeks later. Even back then, Pete had known Barney for eight years). Meanwhile, was there a suggestion that *Atrox* Canyon would be a bust? Really? That was a really *stupid* thing to say, but poor uptight Maggot did not trust his guide. Success at mating was guaranteed in Pete's mind, and that's what BB wanted.

"Well, what other chance do you have of getting mating if this fails?" Pete inquired. (Hence asking the proverbial question that he didn't really want answered.) But the question was like a key snapped to "on" in the ignition of the engine of motor-mouth Maggot. He spoke his mind, such as it was, clearly. Maggot's rant about Blue Chip filming changed the course of the day. In short, Pete decided *not* to take Maggot to *Atrox* Canyon. He had other *atrox* dens just a little further up the road, and that is where they headed. The extra drive time allowed even *more* time for Maggot to betray his true nature, many times over.

Maggot felt that the whole notion of trying to film wild animal behavior as it occurs was, in his words, "Bloody stupid." Let's not stop there. "Bloody ridiculous, bloody expensive, bloody pointless" and multiple other "bloody" this-and-thats were tossed in there for good measure. The whole rant was a fusillade of bloody! What BB needed was a fast-track to somebody, *anybody*, who might be keeping their target species. That would help them to have animals on hand to manipulate in order to stage behaviors. When done properly, staging caged animals was the *only* way to go. While it most certainly was *not* the only way, it was "a" way. The only problem with *atrox* as a staged target species in Arizona is that nobody keeps any! Why would they? Tucson is infested with them! BB had lucked into Barney, and fed the hawks as a result. Yeah, Maggot *was* indeed in trouble.

Next to spew out of motor-mouth Maggot came the dreaded "po' mouth." Even the 150 bucks invested in Pete was not in the film budget. Oh yeah, poor Maggot had to snivel to that *bloody* accountant to get Pete that much. He wondered aloud where he would get the extra 300. At that exact moment Pete also wondered aloud "How much did that 4Runner set you back?" There was no further mention of fiscal concerns for the rest of this day.

Their first stop together was a place now known as Hill 97. The *atrox* dens there still produce to this very day, but much more so in 1996. It is a grueling hike to get to the three closest

major dens. Halfway to the dens, Maggot was already saying "no," out of concern for his cameramen. (NG had previously jetted right up it, no problem!) But he and Pete continued the climb, and viewed five large male *atrox* coiled in various strategic (to them) places, peppered about one of the den entrances. This was a sure sign that the females had yet to emerge, and the place would be rocking soon. But Maggot was having none of it. They drove on to the next place, a den named "Ranch Den," for it overlooked a vast cattle-ranching concern. After another grueling climb, only two large adult male *atrox* were viewed outside the massive denning structure. Once again, Maggot was concerned about his cameramen and the steep terrain. (And once again, NG had been there before—no problems or complaints). Maggot's concerns left Pete with two viable options for working with BB. The first, and best, was still *Atrox* Canyon. The second was the den that he had found with NG—less than five miles away from the Ranch Den. As earlier suggested, NG had committed elsewhere. Why not take a peek?

About the time the unlikely duo were en route to the NG den, Maggot's phone rang. It was nearing 2200 hours in Jolly Old England, and the caller was "his boss." In other words, from the upper echelons of BB. When Maggot eagerly reported seeing seven different *atrox*, his boss inquired if any were collected for filming. When Maggot replied "no," there was a highly audible "bloody riot of bloody" issuing from the other end of the call. It culminated with his boss shouting "collect some rattlesnakes for our bloody film, you stupid bloody bastard!" Maggot *was* in trouble. His last and *only* hope was Pete.

While en route to the NG den, the used-car salesman suddenly began to stroke Pete's ego. He was impressed with what he had seen thus far. He now knew that he was "with the man." He went on to score a perfect bull's-eye with Pete's ego by saying "We often find in our travels that the best people to work with are *not* the academics. They are people like you! We want to work with you in the years ahead. We want to make you famous!" Pete swallowed those words and took the bait—hook, line and sinker. His attitude shifted favorably toward the weasel to his right, and mutual admiration became the new order of the day. As they pulled up to the NG den, Pete had already decided to take Maggot and BB to *Atrox* Canyon the following day. And he told Maggot this. Pete was going to milk this new relationship, and rise to stardom as a result. He and his good buddy Maggot! The NG den was less than 50 feet from their parking spot. The same three *atrox*, two males and one female as viewed two days previous, were basking. Nothing had changed. One male was courting the female, while the other male watched. Maggot began to *beg* Pete to collect all three snakes to be used for staged footage. Pete was adamantly opposed for ethical reasons too numerous to mention here. The two biggest were that this was *not* his den to raid, and his own ethics did not permit this sort of behavior. The used-car salesman began to wear him down with such talk as "This could be your finest hour" and "the upper brass of BB would be *far* more willing to work with you if are willing to bend a little." Pete pushed back by remonstrating what any such actions might cause to the near-term den dynamics, not to mention long into the future. (He learned a few years later that removing just one female from a den had disastrous consequences. But that is another story, for another time.) But Maggot wore him down with talk of fame and fortune. And he promised Pete that he would be paid to return these three *atrox* to this den when the filming was done. Ka Ching! Another 150 bucks! Thus it was a combination of greed and vanity that motivated Pete to agree to do what came next.

Pete almost *always* had two five-gallon pails, complete with tight-fitting lids, seat-belted in place on his back seat. They were used to store everything but the kitchen sink when he entered the field. The contents of the buckets were dumped, and both Maggot and Pete trudged up the incline and onto the rocky talus moorings of the unwitting stars of the upcoming film. Pete snagged the lone male with his infallible Whitney snake tongs, and dropped him into bucket number 1. Maggot was quick to slap the lid in place. Male number 2 was snagged and dropped into bucket number 2. Pete hastily ordered Maggot to secure the lid on this bucket as well. The female began to nose-dive into the talus. Pete was not messing around, he bare-handed her tail, and carefully worked her out of the rocky rubble. He hand-carried her down to his parking spot. She dangled a full arm's length away from his body, lunging left, right, and upward while trying to get a piece of Pete. But she was otherwise putty in Pete's hands. Maggot followed with the two buckets. Pete wanted to wait a half-hour before dropping the female into bucket number 2. This would allow minimal time for the male to acclimate to the bucket, and hopefully relax a little. They had just abruptly taken him from his sweetheart, and his rattling was profuse and sustained. While Pete gently worked the meter-plus-long hefty lady into some deep, cool shade, Maggot called to inform his irate boss of the progress. They now had two males *and* a female *atrox* to do their bidding. This was major situational uptick from where BB had begun the day. Maggot made the boss happy, even though it was nearing midnight in the UK by then. The boss was happy, Maggot was happy, and Pete wasn't so sure. But another 150 bucks coming his way, plus a shot at fame, was the perfect setup for greed and vanity to distort his thinking. Not to mention his judgment.

Shortly after the phone call, it was time to put the female in the bucket with the male who, roughly 30 minutes earlier, had been peacefully wooing her. Any breeder of snakes will tell you that successful reproduction depends on introducing the female into the male's turf. Pete's logic was sound enough, but 30 minutes in a bucket did nothing for the disposition of the male. His rattle sang nonstop, right up to the time that the female was reintroduced to him. Pete explained that this was going to be a quick drop into the bucket. Maggot was going to whip the lid off its moorings, Pete would stuff the meter-plus-long, hefty girl into the bucket headfirst with his tongs, with a perfect slam dunk of her tail to follow. At exactly that split second in time, Maggot was to quickly but carefully replace the snap-on lid and seal it. Pete snagged the hefty girl roughly 15 cm behind the head with his tongs, while grasping her just above the tail with his right hand. At Pete's nod, Maggot removed the lid, and stepped back. Briskly, and with blinding speed, Pete stuffed that lady in head first. The tail came swiftly after, and Maggot was perfect at his end. Both snakes were now contained.

But they were not "safely" contained. It was on this day that Pete learned a harsh lesson. (This whole damn story is a *long-*

Figure 4. (Left) Jeff and his chopper. (Right) Jeff's chopper. There were no such thing as commercially available drones in 1996. There were several options available to BB to get aerial shots. They chose to hire a mechanical genius who had aerial filming down to an inexpensive art form. He designed and masterfully built the radio-controlled helicopter seen above. The cockpit could quickly be exchanged with different lenses, which were waiting in modular fashion for a snap-in change when needed. His footage was *the* highlight in an otherwise flop of a film.

assed and continuous harsh lesson.) Said harsh lesson du jour was "Never try to put two *atrox* in one bucket." As fast as Pete was, the bucketed male was quicker. The whole tongs-to-sealed-bucket process took one second flat. It took less than one-tenth of that time period for the agitated male to strike upward. One fang caught the female dead center of the pupil of her left eye. A bull's-eye! The strike was a quick punch in and out. The last thing Pete saw as Maggot effectively brought that lid down was blood starting to pool at the bottom of that all-white bucket. This was not good.

But the sealing of the bucket went so smoothly that it put Pete in a better frame of mind toward Maggot. There is always something about working together to contain rattlesnakes that bonds strangers. In this case, the mutual admiration was brief, but made for a pleasant ride to *Atrox* Canyon. Pete was no longer in it for the dime, he was in it for the dollar. His work ethic was such that he wanted to *earn* his keep for these people who were paying him. This is how one makes a name for themselves in other worlds. In other worlds, it works. And of course, as soon as Maggot saw *Atrox* Canyon in all of its majesty, and all those jiggling pairs of *atrox*, it was on!

They met at 0600 the next day, at the same place Maggot had met Pete the previous morning. Pete was alone. BB's 4Runner held Maggot, Andy, Saul and Jeff. Jeff jumped in with Pete, and they led the charge. Jeff had been hired by BB specifically for this project. Like Pete, he was a hired consultant. Jeff had built, from scratch, a radio-controlled helicopter large enough to accommodate a somewhat bulky video camera. (These were *not* the days of cheap workhorse film drones.) Jeff was a master of many trades. His handiwork included sophisticated machining and fabrication techniques, precise welding expertise, an understanding of the miniature engine mechanics, along with a thorough knowledge of radio frequency, electronics and plumbing. In short, Jeff was a mechanical genius. He also had his own video cameras, of which there were several varieties, lenses, focal lengths, etc. Each camera had a housing that easily snapped in place. Jeff was there to film sweeping views of *Atrox* Canyon and beyond (Figure 4).

The first order of business upon arrival was a quick meet and greet. Pete was shocked to the very core of his being to learn that Saul was a master's student in the biological science and fisheries branch of Arizona State University (ASU). Within earshot of Saul, who was about six-foot-four of solid muscle and weighed 235 pounds, Pete turned to Maggot and angrily reminded him: "I said no wildlife biologists! Do you want to see the agreement? How could I have made it any plainer?" Saul did not give the withering Maggot a chance to respond. The young biologist began to mention the names of people who he was working with. These were names that Pete respected, but it wasn't going to be that easy. Pete feared researchers taking over anything under his watch. Once hands-on started, the behaviors of everything under watch would be altered. He told Saul these things, and Saul insisted that he would follow Pete's protocol, and never return when the filming was done. While Saul and Pete jousted, Maggot opened the bucket that contained "Cyclops," the female who had suffered a fang in the eye on the previous day. While her wounded eye looked like it had been replaced by a small dollop of hamburger, the wound was clean. Maggot informed Pete that it was Saul who handled the first aid. At that point, Pete was defeated. He had little choice but shake hands with Saul and thank him. He would deal with Maggot's *filthy lying ass* in private soon enough.

The first order of business was to hoof the 200 or so meters along the ridge to see what the *atrox* were doing this day. The dens carried numbers that followed the west-to-east ascension of the ridgeline. Hence, "*Atrox* Den Number one," or "AD1," was the first they inspected. A single pair of *atrox* was viewed, coiled together, and the male was courting his lady with a series of head jerks. AD2 had several *atrox* visible in its many crevices. AD3 had two pairs of courting snakes on the apron of the den. AD4 was a bust. The staging area of AD5 and AD6 was the sweet spot of the day. Three pairs of courting snakes dotted the vicinity. They were well spread out from each other, and none was close to either den's entrance. AD7 was another bust, and AD8—which was a short but steep distance east of the rest of the dens—held a pair that were still stuffed into their narrow, vertical crevice home. AD8 was deemed unfit and unsafe; it was

Figure 5. (Left) The author "shines" reflected sunlight into the soil gash under the top boulder of AD3, 8 March 1993. (Right) *Atrox* in front, *Gopherus morafkai* behind. AD3 continues to routinely produce tortoises, but the *atrox* seem to be gone. Images by: (Left) Don Swann, and (Right) Chip Hedgcock.

a crowded little hellhole of catclaw and cholla. The crew would focus their filming efforts on AD3, and on AD5 / AD6. Back to the vehicles went the crew. Jeff got his helicopter in the air, and sent it swooping, hovering, and filming the ridgeline and beyond. Andy and Saul hefted the massive camera cases, while Maggot carried a cooler packed with food and water. Everybody, Pete included, carried backpacks stuffed with miscellaneous gear and necessities to take them through the day. Pete also carried two of the three buckets, the third and new bucket containing the female was carried by Saul. They devoted one of the cameras to AD3 (Figure 5). There was an amazing scenic backdrop near AD3, and it was determined that Maggot and Saul would work their staged shots here. Andy—who was actually the crew boss—and Pete trudged over to AD5 / AD6. As soon as Andy zeroed in on the pair of *atrox* who were courting the most vigorously, Pete volunteered to check some dens that resided on the south side of the wash. Andy blessed this effort, and off went Pete for a six-hour solo hike. He found several tortoises, several individual *atrox*, and visited a Black-tailed Rattlesnake (*Crotalus molossus*) who had been found one year previous. The snake was home, and would continue to return for the next 13 years! (Figure 6). Fidelity of rattlesnakes to their dens was to prove useful in Pete's personal arsenal of observing them long into the future. This was not to be the case with the best part of *Atrox* Canyon. One day after BB left the place for good, Pete did a sweep of AD1 to AD8 et al. The only *atrox* visible were the pair in AD8 that BB chose to ignore (Figure 7). The other dens were devoid of *atrox*. The reader can trust that the preceding couple of sentences will be revisited shortly.

Meanwhile, back on the ranch—or the *Atrox* Canyon recording studio—Pete arrived back from his wanderings at approximately 1600 hours, and was surprised to see the crew in the initial phases of packing up. The crew was a happy, chattering bunch of UKer's, yucking it up, talk of "bloody smashing" and "bloody spectacular" cheerfully emanating from their gullets. Jeff's helicopter footage was out of sight, they had miles of courtship, and a brief combat episode. They also had good "posed" shots of their ill-gotten studio snakes. Of course, all angles of the NG-den female were of her right profile, as the left side of her face was just plain grotesque to behold. The crew was happy, and would return for the next three days.

There became a pecuniary score to settle once the gear was packed up. Maggot was not exactly lightning fast to his wallet. As his hand inched slowly toward that, a deluge of "po' mouthing" began to flow from the sniveling slit beneath his shaggy nostrils. Oh yes, the whole bloody notion of some damn nature writer who has *never* seen a wild *atrox* writing the script that they were *forced* to film was bloody ridiculous. There was

Figure 6. This Black-tailed Rattlesnake (*Crotalus molossus*) was one of the rattlesnakes that avoided an overzealous film crew. This image, taken one year after the BB carnage, returned to this den 14 years in a row. He was initially found in March of 1995.

Figure 7. One day after the filming was finished, the author visited all eight dens in *Atrox* Canyon. AD8 was the only den to have any *atrox* visible. It is the only den remaining that consistently harbors overwintering snakes. See also Figure 9.

nothing in the budget for . . .

"**Wait a minute**!" Pete interjected. "Are you saying that somebody wrote a script for this *before* you did any filming?" "Bloody right!" Maggot replied. "Well, that's *really* stupid! Why not get the footage first, and build the story around *that*?" Pete's mind was blown by this previously unknown detail. For the first time, Maggot explained to Pete the notion of the nature scriptwriter having to build a whole series of "Fantastic Journeys in Nature." A dozen or so different animals were to be chronicled from birth to adulthood, and this poor writer had to pound out a dozen scripts. This at the whim of a producer, in a very short period of time. The story line behind their *atrox* segment was that a young *atrox* is born in the wild, and is filmed in various stages of life, eventually reaching maturity. BB had canned footage of birthing, feeding events and predation of many young *atrox*. They had a smattering of mid-sized *atrox* in action, the neonate star was getting bigger. They had a combat event filmed at night. They did not have mating or courtship. Now they had courtship but no mating. The producers were happy to gamble two more days to get that.

Following another weak complaint about budgetary woes, Maggot fished out his wallet, and a trembling hand reluctantly offered three crisp Benjamins to Pete, who promptly snapped them up. Pete had set up the next three days of wrangling with a starving herpetology student, who was eager to work at one-third of what Pete cost. When Pete parted company with Maggot, the arrangement was that Pete would not return for those three days. Day four was to be a Saturday, and Pete would visit *Atrox* Canyon for a checkup. He fully expected a call from Maggot by then. Arrangements to release the NG-den *atrox*, including the one now missing an eye, needed to be made. That call never came. Because by then, the whole damn crew had flown the coop! They were back in the UK!

BB used Pete's student helper exactly one day. They paid him his 50 bucks, and cut him loose. The *fool* did not notify Pete when this happened. He was supposed to be Pete's mole—his insider—and BB probably both knew and didn't like that. They had their man Saul, and didn't need the student. Or a witness. With the student gone, Maggot and company had two days to do whatever the hell they wanted, and they did exactly that. Any agreement no longer existed in their minds. They had paid Pete for his services, and now, to their way of thinking, the land *and* the *atrox* that it contained was now theirs. They probably gave it one more day before collecting every *atrox* that they could find, using them for staged shots in other parts of their film. When Pete got out there on Saturday, any missing *atrox* could have easily been snakes that egressed naturally. But both AD8 snakes were still tucked away in that crevice, and they did not egress for another week. He also had that *Crotalus molossus* mentioned earlier still home. This fact alone should have tripped some warning alarms. But it wasn't until after a few games of phone tag led him to Maggot that the real unease began. It was then that Pete learned the whole crew had flown home the day before his checkup. When asked about the release of the three NG-den *atrox*, Maggot assured him that Saul had taken care of that detail. Pete grew suspicious that some form of foul play had transpired, but he really couldn't prove anything.

Figure 8. Once again, our repeater *Crotalus molossus* in his overwintering home. Image date was 3 March 2001. See text for more details on this and all other figures.

The harsh reality of what had happened at *Atrox* Canyon did not hit Pete until the Friday after Thanksgiving in 1996. That is when Pete returned to check on both ingress—and den fidelity—in his customary fashion. AD1 through AD7 were completely devoid of *atrox*. Three years of plenty, ingress-wise. Now *nothing*? Further confirming Pete's suspicions, AD8 had two *atrox* in it. This was the den that BB had ignored—and probably missed as they swept the remaining areas free of all snakes. The *Crotalus molossus* described earlier also demonstrated fidelity—for the next 13 successive years! (Figure 8). Thankfully, this snake overwintered roughly a kilometer east of BB's filming efforts. Maggot and company had no clue that he was there. To wrap this up as quickly as possible, Pete's visits to *Atrox* Canyon never stopped. But seeing large numbers of *atrox did* stop. The day that BB collected those *atrox* for their *shitty* film was the day that Paradise was lost. To quote Don McLean, it was "the day the music died."

Epilogue (the author steps out of Pete's shadow)

We maintain the film company pseudonyms moving forward, but we are mostly done with the name "Pete." Pete was obviously the author in the story above. The parts I *really* couldn't handle with the proper pronouns were twofold. The first was raiding NG's den to assist their swindling competitor. Worse yet was that the dismissal of my own personal ethics of respecting the nature of the beast was "not me" all the way. Yet it *was* me! Every aspect of that moment was so against who I was and what I was trying to accomplish that it shames me! Any well-intentioned effort at maintaining my own mantra went right out the window. But what pains me the most is the memory of that huge male *atrox* sinking a fang right into the pupil of that female's eye. While I've got some hard bark on me, that moment punches through it all and coldly plunges straight into my conscience. It always will. When I dwell on it, I feel so low that I'd have to grope six feet upward just to tickle a nightcrawler's belly with a pheasant's tail feather. This was *bad.*

But in reality, everything negative just relayed is *nothing* compared to the hard-core research that I later embraced. I can only imagine how flummoxed any researcher might have been with Pete's (my) 1996 perspective toward the biological sciences. As stated, the clause excluding an academic presence was one of the most important "thou shalt not" statements issued to

BB. The year 1996 was very early in my understanding of what invasive science can do to an ecosystem. I was also warned by others of my ilk about research and herps in holes (Repp, 1998). Based on the advice of those who went before me, I was four years deep into their minimal disturbance mantra at *Atrox* Canyon. I had also personally observed the effects of research several times over elsewhere, even this early in my 30-plus years of doing this. How do I feel about hard-core research at my favorite spots? Putting it bluntly, I would show my best site to a collector before I would hand it over to an unknown researcher. There is a devastating Yin and Yang aspect of research, a two-edged sword that cuts sharply into a tightly-knit grouping of creatures like *atrox*. Having been on both sides of research, I say with confidence that whatever effect human-related disturbances have on creatures like *atrox*, these things *know* that something is rotten in Denmark when the stabbing and jabbing starts. To even suggest they know these things sets up a no-win situation for even the best of intentions of hypothesis-driven science. How dare we to assume they can't learn something new, and retain that knowledge? (Some experts do make that claim.) In my own estimation, they learned who we were—and adjusted quickly! These things are so unlike us that they could be from another planet! How dare we even pretend to know their mental prowess? How can we learn what they know, and we can't know? All that we can do is watch, and do our best to accurately interpret what we see. It took years for the *atrox* dens in the long term (currently 31 years) Suizo Mountain Study to recover after each of our intrusions. Some are just now finally coming back to full steam, roughly ten years after we quit harassing them. My personal mentality toward hands-on research mostly matches Pete's in 1996. "Mostly" is the key word in the previous sentence. I do still lend a hand when needed on the study plots of others. But not in *my* house!

In December of 1998, I was seated at the breakfast table with Dr. Erika Nowak, a Flagstaff herp researcher of repute, and her partner John Grahame. I mention both by name, as I'm proud to call them friends. I told them the above story. John seemed to understand everything that I was revealing. He was nodding along through the whole thing. When I finished, John informed me that in his former life, he was a nature film producer. He went on to say that in that role, he would have done exactly what BB did to me. They feed on pride, greed, vanity or whatever head trip that idiots like me can be on. One has but to watch any one of these silly game shows to know what people will do to get on the television. John even made the joke that Maggot had made during one of his motor-mouth marathons: "You should pay *us* to put you on TV. We're going to make you famous!"

The final kick in the groin came by way of mail. A package containing the VCR of the film arrived coincidentally about the time I realized that *Atrox* Canyon was now toast. I eagerly watched that film, hoping to find something purposeful—some educational value—just plain *something* or *anything* of worth to be had from this film. To be sure, our wee neonate *atrox* star witnessed many things on his "fantastic journey." He managed to choke down a whiptail just after he crawled out of the nest. He saw his sister get murdered by a centipede that was longer than her, and twice the mass. That is some nasty and cruel shit. Gee, how do they get footage like this? Nothing to it! Just feed a wee girl to a multi-legged terror, and film her dying an agonizing death. Nothing to it—why not? They might as well be the worst kind of herpers with that kind of *creepy* thinking! Jeff's video helicopter stole what little show there was. His wee chopper flitted about the landscape in two blessed locations. *Atrox* Canyon was magnificent, and so were his shots from Portal, Arizona. Portal was where the film's young *atrox* wound up. He traveled close to 200 miles to get there, maturing into an adult in the process. He grew, he fought, maybe he came back to *Atrox* Canyon to court that female in the film. He was something special indeed.

There were also scenes where perhaps 20 *atrox* were piled in front of and within an artificial den. I wonder, Where did those *atrox* come from? When I left BB, they only had three. In short, the film was a turd. A complete farce and disgrace. As soon as I ejected it from the deck, I walked it straight to the garbage can and dumped it. And spiders frolic upon my grave every time I wonder what happened to those *Atrox* Canyon rattlesnakes. They were probably all just dumped into the nearest wash when the filming was done. They didn't get them all, but they got most. The place is *still* not the same.

In a recent recounting of this tale, I was asked why I did not try to sue BB. I actually still have paper copies of the email exchange in a burgeoning file folder. They were not deemed worthy of the effort. If I *had* fought them, I doubt that I would be retired comfortably today. Big corporations have good lawyers who know how to bleed pissants like me dry. No, in today's

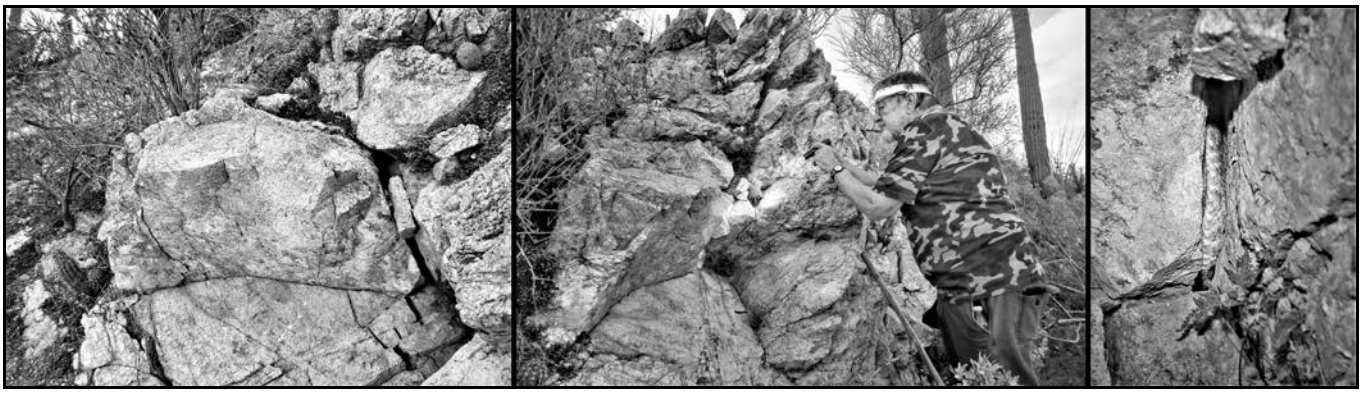

Figure 9. (Left) AD8 in all its pristine glory, 9 December 2002. Not visible are the two two *atrox* that were in this crevice. This den has sporadically been occupied since March of 1994. (Center): After a long absence, the author returns to AD8 to take a peek. (Left) Moments after the peek in the center image came this one. **You bloody bastards didn't get them all, did you?** Center and right images by Patti Mahaney, 20 February 2023.

world, where nobody ever admits to doing anything wrong, where honesty and integrity no longer matter, I can still look at all this and blame the person most responsible. The buck stops here! This was all on me. I did not own the land these dens were on. I owned the secret of the magnificent stretch of land that retained this beautiful and tiny bite-sized crop of *atrox*. They were sweet little itty-bitty things. How I *wish* I were still seeing them today. That could have been and *should* have been. But once I revealed the secret of paradise, it was all over but the crying. When I think of the crimes against nature that occurred here as a result, it really hurts. How does Gordon Lightfoot's *Carefree Highway* lyric go? "Knowing I got no one else to blame" can be a harsh reality.

Another quote from 1998 is in order:

"*And the intent now is to adhere to the original plan of hands-off herping for all future winter forays, for all the reptiles that are encountered. In so doing, we eliminate the possibility of human intervention being the cause of a non-returning herp*."

Do I really mean it this time? You bet!

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are above average. I leave you with three images and a caption to convey that AD8—and AD8 alone—is still alive and well at *Atrox* Canyon (Figure 9).

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Notes on Reproduction of Spring Peepers, *Pseudacris crucifer* (Anura: Hylidae), from Oklahoma

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Abstract

I conducted a histological examination of gonads from 35 *Pseudacris crucifer* adults from Oklahoma consisting of 23 adult males and 12 adult females. Males contained sperm from all months examined: March to May and September, November. In addition, testes from three of the five September males were in recrudescence in which the majority of the seminiferous tubules contained spermatocytes, spermatids and only occasional sperm. The smallest mature male (sperm in lumina of seminiferous tubules) measured 23 mm SVL and was from April. Females in spawning condition were from March, September and November. There were no female samples from May to July. The smallest reproductively active female measured 24 mm SVL, was from November and was in spawning condition. I found no evidence (gravid females containing postovulatory follicles from a recent spawning) to indicate *P. crucifer* spawns more than once in the same year in Oklahoma.

Pseudacris crucifer (Wied-Neuwied, 1838) occurs in eastern North America, east of a line from eastern Texas to Winnipeg, Canada, except for the southern half of the Florida peninsula (Green et al., 2013). P*seudacris crucifer* breeding in Oklahoma occurs mainly from late winter to early spring (Bragg, 1943; Sievert and Sievert, 2021). Ethier et al. (2021) reported *P. crucifer* breeding occurred November to June. In the current paper I present data on the *P. crucifer* reproductive cycle from a histological examination of gonadal material from Oklahoma. Utilization of museum collections for obtaining reproductive data avoids removing additional animals from the wild.

A sample of 35 *P. crucifer* from Oklahoma collected 1934 to 2019 (Appendix) consisting of 23 adult males (mean SVL = 26.2 mm ± 1.7 SD, range = 23–30 mm) and 12 adult females (mean SVL = 28.8 mm ± 3.6 SD, range = 20–32 mm) was examined from the herpetology collection of the Sam Noble Museum of Natural History (OMNH), Norman, Oklahoma USA (Appendix). An unpaired t-test was used to test for differences between adult male and female SVLs (Instat, vers. 3.0b, Graphpad Software, San Diego, CA).

A small incision was made in the lower part of the abdomen of the 35 *P. crucifer* and the left testis was removed from males and a piece of the left ovary from females. Gonads were embedded in paraffin, sections were cut at 5 μm and stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). Histology slides were deposited at OMNH.

Testes of *P. crucifer* are surrounded by black pigment as previously reported by Rugh (1941) and Oplinger (1966). The testicular morphology of *P. crucifer* was first described by Rugh (1941) and is similar to that of other anurans as described in Ogielska and Bartmañska (2009a). Within the seminiferous tubules, spermatogenesis occurs in cysts which are closed until the late spermatid stage is reached; cysts then open and differentiating sperm reach the lumina of the seminiferous tubules

Table 1. Two monthly stages in the testis cycle of 23 adult male *Pseudacris crucifer* from Oklahoma.

Month	N	Recrudescence	Spermiogenesis
March	8	0	8
April	7	0	7
May	2	0	2
September	5	3	2
November	1	0	1

Table 2. Three monthly stages in the spawning cycle of 12 adult female *P. crucifer* from Oklahoma; * = abundant postovulatory follicles present.

Month	N	Not in spawning condition	Yolking	Ready to spawn
March	2	1*	0	1
April	2	2	0	0
August	1	1	0	0
September	5	0	1	4
October	1	0	1	0
November	1	0	0	1

Table 3. Locality, breeding season and source for *Pseudacris crucifer* from the United States and Canada.

Locality	Breeding Season	Source
Alabama	January to April	Mount, 1975
Arkansas	March to May	Trauth et al., 2004
Canada	April or May	Froom, 1982
Carolinas and Virginia	October to March	Beane et al., 2010
Connecticut	March to May	Klemens, 1993
Eastern Canada	April–May	Logier, 1952
Florida	late October to April	Krysko et al., 2019
Georgia	call late fall through spring	Jensen et al., 2008
Iowa	April	LeClere, 2013
Illinois	January to late spring	Phillips et al., 2022
Indiana	March to May	Minton, 2001
Kansas	late February to late May	Collins et al., 2010
Kentucky	March to June	Barbour, 1971
Louisiana	eggs January to April	Dundee and Rossman, 1989
Louisiana	November to April	Boundy and Carr, 2017
Maine	May	Hunter et al., 1999
Maryland	February to May	Cunningham and Nazdrowicz, 2018
Michigan	late March through May	Harding and Holman, 1999
Minnesota	April to May	Moriarty and Hall, 2014
Missouri	late February to mid-May	Briggler and Johnson, 2021
New Brunswick	April to June	Gorham, 1970
New England	March to June	DeGraaf and Rudis, 1983
New Jersey	early March through May	Schwartz and Golden, 2002
New York	April–May	Wright, 1914
New York	March through May	Gibbs et al., 2007
No exact locality	April 1 to June 15	Wright and Wright, 1933
No exact locality	April to June	Rugh, 1941
North Carolina	call November to April	Dorcas et al., 2007
Ohio	March to May	Walker, 1967 [1946]
Oklahoma	late winter to early spring	Sievert and Sievert, 2021
Ontario	March to May	Johnson, 1989
Pennsylvania	early in spring	Hulse et al., 2001
Quebec and Maritimes	March to June	Desroches and Rodrique, 2014
Rhode Island	late March to early June	Raithel, 2019
Tennessee	January into April	Niemiller and Reynolds, 2011
Texas	November to March	Tipton et al., 2012
West Virginia	February to July	Green and Pauley, 1987
Wisconsin	April	Vogt, 1981

(Ogielska and Bartmañska, 2009a). In *P. crucifer* male*s* undergoing sperm formation (= spermiogenesis), clusters of sperm filled the seminiferous tubules. A ring of germinal cysts was located on the inner periphery of each seminiferous tubule. The monthly stages in the *P. crucifer* testis cycle are in Table 1. Two stages were present: (1) "Recrudescence," in which seminiferous tubules are filled with spermatocytes, spermatids and occasional cysts containing sperm; (2) "Spermiogenesis," in which seminiferous tubules contain open cysts filled with spermatozoa. The smallest mature male in my study (spermiogenesis) measured 23 mm SVL and was from April (OMNH 39594). Wright and Wright (1933) reported adult *P. crucifer* (as *Hyla crucifer*) males ranged from 18 to 29 mm in body size. Rugh (1941) reported that sperm produced by *P. crucifer* (as *Hyla crucifer*) mature in late autumn and are utilized during spring breeding. My finding of September males in recrudescence, (prior to sperm formation) (Table 1) supports Rugh (1941).

The mean SVL of *P. crucifer* females was significantly larger than that of males ($t = 2.8$ df = 33, $P = 0.007$). The ovaries of *P. crucifer* are typical of other anurans in consisting of paired organs located on the ventral sides of the kidneys; in adults they are filled with diplotene oocytes in various stages of development (Ogielska and Bartmañska, 2009b). Mature oocytes are filled with yolk droplets; the layer of surrounding follicular cells is thinly stretched. Three stages were present in the spawning cycle (Table 1): (1) "Not in Spawning Condition," in which previtellogenic or atretic oocytes predominated; (2) "Yolking," with follicles in process of accumulating yolk; (3) "Ready to Spawn Condition," in which mature oocytes predominated. The smallest reproductively active female (ready to spawn) *P. crucifer* in my study measured 24 mm SVL (OMNH 22912) and was from November. Wright and Wright (1933) reported adult females of *P. crucifer* ranged from 20 to 33 mm. I consequently considered OMNH 46492 (SVL = 20 mm) from April, which was not reproductively active, to be an adult.

It was unexpected to observe yolk deposition in September and November (Table 2) as most records of *P. crucifer* reproduction are from spring (Table 3). However, it should be noted (Table 3) that *P. crucifer* commences reproduction in the fall in the south in Florida (Krysko et al., 2019) and Louisiana (Dundee and Rossman, 1989).

Jørgensen et al. (1979) reported ovaries are close to breeding size by the time of hibernation in frogs from the temperate zone. It appears to be advantageous for frogs to be capable of spawning soon after emergence from hibernation, rather than needing to undergo a period of yolk deposition.

Atretic follicles were noted in the ovaries of 1/12 (8%) of *P. crucifer* ovaries (OMNH 38753). Atresia is a widespread process occurring in the ovaries of all vertebrates (Uribe Aranzábal, 2009). It is common in the amphibian ovary (Saidapur, 1978) and is the spontaneous digestion of a diplotene oocyte by its own hypertrophied and phagocytic granulosa cells which invade the follicle and eventually degenerate after accumulating dark pigment (Ogielska and Bartmañska, 2009b). See Saidapur and Nadkarni (1973) and Ogielska et al. (2010) for a detailed description of follicular atresia in the frog ovary. Atresia plays an important role in fecundity by influencing numbers of ovulated oocytes (Uribe Aranzábal, 2011). Incidences of follicular atresia increase late in the reproductive period (Saidapur, 1978). Saved energy will be presumably utilized during a subsequent reproduction.

One female *P. crucifer* from March (OMNH 38753) had recently spawned and contained numerous postovulatory follicles in the ovary. Postovulatory follicles form when the ruptured follicle collapses after ovulation; the follicular lumen disappears and proliferating granulosa cells are surrounded by a fibrous capsule (Redshaw, 1972). Postovulatory follicles are short-lived in most anuran species and are resorbed after a few weeks (Redshaw, 1972). Residual follicles were not reproductively active (no yolk deposition). Thus, I found no suggestion of multiple spawning of *P. crucifer* in Oklahoma which would have been suggested by the presence of mature follicles and the concurrent presence of postovulatory follicles (*sensu* Redshaw, 1972).

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Appendix

Thirty-five *Pseudacris crucifer* Oklahoma examined by county from the herpetology collection of the Sam Noble Museum, University of Oklahoma (OMNH), Norman, Oklahoma.

Adair: OMNH 42520, 42523, 46491, 46492**; Cherokee**: OMNH 35590**,** 35591, 35593, 37772, 38108, 38119, 38120, 38753, 39323, 48234; **Delaware:** OMNH 46494, 46495**; Le Flore:** OMNH: 39325, 39326, 41692, 43428–43430; **McCurtain:** OMNH 17545, 22912, 35594, 35595, 44435; **Muskogee:** OMNH 39590–39592, 39594, 39596, 46499, 46501; **Pushmataha:** OMNH 43432.

Herpetological Art in the Columbian Park Zoo, Lafayette, Indiana—September 2, 2022

Photos and story by
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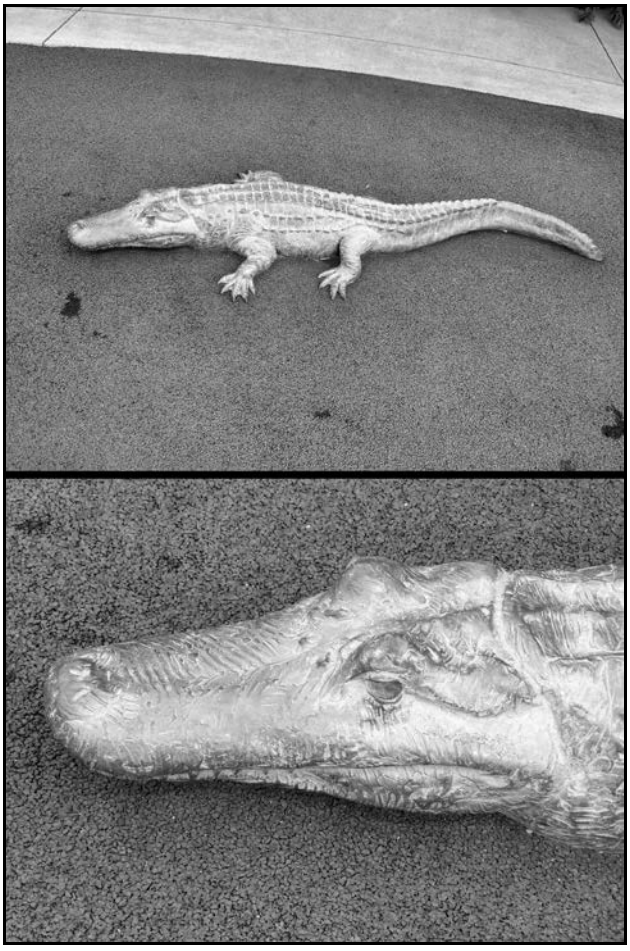
The Columbian Park Zoo in Lafayette, Indiana, is a small zoo, such that it only took us about an hour to get through the displays. It doesn't have a herpetarium of any kind.

Just inside the front entrance is a splash park with water fountains for children to get wet and cool off on hot summer days. At this splash park is a bronze statue of an alligator that is four feet long — also bronze statues of a chimpanzee, a penguin and a bear with a fish in its mouth. At the time of our visit the fountains were shut off.

Among the zoo animals is one Galapagos tortoise, with the following description: "Habitat: Open grassy areas. Range: Galapagos islands. Size: Up to 4 feet across the shell; over 500 lbs. Diet: cactus, leaves, fruit. Lifespan: 150+ years." The exact species here wasn't identified. Near the display of the live tortoise is a bronze statue of a Galapagos tortoise that is about the same size as the live tortoise and looks just like the live one. There is a bronze plaque that says: "Rita Hadley. Gentle ways, 2009. Bronze. A GIFT FROM: JAMES K. RISK FAMILY FOUNDATION. Columbian Park Zoo."

The live tortoise was the only herp that we saw.



Herpetology 2023

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.

BODY SIZES OF TIMBER RATTLESNAKES

W. S. Brown and M. G. Simon [2021, Journal of Herpetology 55(4):396-403], at a field site in northeastern New York during a 40-yr study, measured the body sizes (total length, snout–vent length [SVL], mass) in three intrinsic groups of adult *Crotalus horridus*: nongravid (N) females, gravid (G) females, and males. The authors argue that a bounty system in effect for 75 yr caused a probable decline of the largest animals. After this lengthy period of exploitation, they observed that body sizes began to increase. Across four decades, the three intrinsic groups were significantly larger in the final decade (2009–2018) than in the first decade (1979–1988), stabilizing at a mean body mass of ≈710 g in N females, ≈870 g in G females, and ≈1200 g in males. Mean SVLs of N females (94.1 cm) and males (111.0 cm) in the final three decades were significantly larger than their SVLs in the first decade. The body condition index (BCI) increased over time, and the intrinsic groups differed significantly in mean BCI: N females (-0.0764), G females (0.0146), and males (0.0899). Among recaptured snakes, wide fluctuations of body mass were not uncommon as most snakes experienced annual losses as well as gains. Geographic variation in body size of *C. horridus* is illustrated by comparing the authors' New York population with a northern population (Massachusetts) and a southern population (Virginia). Across the species' range, they suggest that body size could be associated primarily with prey size. Because many populations of *C. horridus* are slow growing and long lived, correlated effects of exploitation on body size may negatively affect the snakes' reproductive biology and longevity.

FIRE ANTS AND SOUTHERN TOADS

A. K. Darracq et al. [2022, Journal of Herpetology 56(1):84-91] note that the southeastern United States supports some of the greatest levels of amphibian diversity in North America, and several species are in decline. Invasive species in the southeastern United States, such as the red imported fire ant (*Solenopsis invicta*; hereafter RIFA), may be a factor in amphibian declines via depredation, injury of, and/or competition with native amphibians for arthropod prey. The authors' objective was to assess the influence of RIFAs and RIFA reductions on the diet, growth, and survival of southern toads (*Anaxyrus terrestris*). In 2013 and 2014 they randomly assigned juvenile toads into enclosures either treated with an insecticide, hydramethylnon, to reduce RIFAs (hereafter RIFA treatment) or maintained with ambient levels of RIFAs (hereafter control; n = 4 enclosures per treatment). The mean proportion of recaptured toads was 9.5 and 21 times greater in the RIFA treatment compared to the control in 2013 and 2014, respectively. Toads in the control enclosures were 23% larger at the end of the study than toads recaptured in the RIFA treatment enclosures, though this was driven largely by differences in toad densities. Toad diets in the control and RIFA treatment enclosures overlapped 94%. When considering the dietary overlap of different ant genera only, the dietary overlap was 44%. This study provides evidence RIFAs alter amphibian populations and may be contributing to amphibian declines in the southeastern United States. Given the high mortality rates we observed, RIFAs should be considered when developing conservation plans for any amphibian species found in areas where RIFAs are present.

Minutes of the CHS Board Meeting, March 14, 2023

A meeting of the CHS board of directors was called to order via Zoom at 7:41 P.M. All board members were in attendance. Zorina Banas, Caitlin Monesmith and Jason Smith also attended. Minutes of the January 10 board meeting were read and accepted.

Officers' reports

Vice-president: Jason Smith volunteered to assume the duties of vice-president. John Archer appointed him to this previously vacant position. The board approved the appointment unanimously.

Treasurer: Rich Crowley reviewed the February financial reports.

Media secretary: Gabrielle Evans reported that Instagram is our best online media site with 40–80 responses per post.

Membership secretary: Mike Dloogatch read through the list of recent nonrenewals.

Sergeant-at-arms: There were 20 in-person attendees at the February meeting.

Committee reports

Adoptions: Chairperson Margaret Ann Paauw will be moving from the Chicago area later this year. She has someone in mind as a replacement and will keep us updated. Margaret is trying to streamline the process for the next chairperson.

New business

John Archer reported that the CHS rental storage unit is filled to capacity. We need a group to work their way through and decide what to keep and what to donate and/or trash..

The meeting adjourned at 8:54 P.M.

Respectfully submitted by recording secretary Gail Oomens

UPCOMING MEETINGS

Monthly meetings of the Chicago Herpetological Society begin at 2:00 P.M. on the third Sunday of each month. Please try to join us online or *in person* at the Notebaert Nature Museum, 2430 N. Cannon Drive, Chicago. The next meeting will take place on April 16. **Maria and Doug Eifler** will speak to us via Zoom from the country of Tunisia. The program will cover several species of lizards and other herps found at the edge of the Sahara Desert. The Eiflers are the founders and leaders of the Erell Institute, a not-for-profit NGO based in Lawrence, Kansas. The Institute runs annual "Lizard Camps," which provide a hands-on research training experience for emerging women in science.

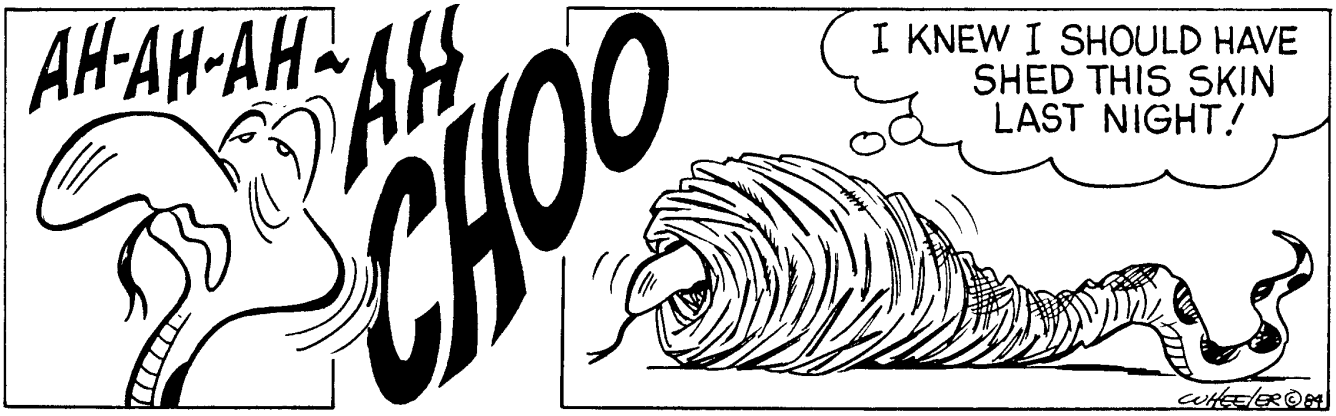
The speaker at the May 21 meeting will be **Anthony Pierlioni**, senior director/vice-president of theTurtleRoom (tTR). The mission of tTR is to advance survival of the world's turtles and tortoises through collaborative education, conservation, and research programs

Please check the CHS website or Facebook page each month for information on the program. Information about attending a Zoom webinar can be found here:
<https://support.zoom.us/hc/en-us/articles/115004954946-Joining-and-participating-in-a-webinar-attendee->

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? The next board meeting will be held online. If you wish to take part, please email: jarcher@chicagoherp.org.

THE ADVENTURES OF SPOT



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