

HERPETOLOGICAL HISTORY

Herpetological Review, 2015, 46(4), 547–555.
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History and Fate of a Troubled Reptile Zoo: The Long Island Reptile Museum

For the herpetological enthusiast, New York City and the surrounding area are home to many zoological and educational facilities where live reptiles and amphibians can be viewed on public display. In addition to a suite of museums and nature centers, the region is home to several AZA accredited zoological parks and aquariums with living herpetological collections. With the exception of some of the larger zoos, particularly the Bronx, Central Park, and Staten Island Zoos, most of these facilities have maintained relatively small reptile and amphibian collections comprised predominately of native or common pet-trade species. The Long Island Reptile Museum, a for-profit herpetological exhibition which closed in 2004, was unique in this regard, as it displayed an extensive collection of live reptiles and amphibians that rivaled that of many North American zoos at the time, and saw tens of thousands of visitors from the greater metropolitan area each year. These attributes, coupled with a troubled history that may be unfamiliar to herpetological enthusiasts outside of New York, make the Long Island Reptile Museum a noteworthy facility for fanciers and historians of zoo herpetology.

In this account, I provide a detailed overview of the history and fate of the Long Island Reptile Museum compiled from interviews conducted with former staff members and volunteers, salvaged museum records, published reviews, travelogues, and newspaper reports, and my own personal experiences and reflections as a former reptile keeper of the facility. Documented herein are many of the challenges, hardships, and problems faced by the facility and its staff during its brief existence.

EARLY HISTORY AND SPECIFICATIONS

Privately owned and directed by a commercial real estate developer and exotic bird breeder, the Long Island Reptile Museum (hereafter LIRM) opened its doors in July 1995 to much acclaim (Sutton 1997). Strategically situated in Hicksville, Long Island, New York—centrally located in Nassau County (with more

than 1 million residents at the time of its opening) and just 18 km from the New York City border, the museum quickly became a popular destination for residents and tourists of the greater New York City area.

Retrofitted inside an existing two-story building once occupied by a five and dime store, the LIRM was immense by zoo reptile house standards, with allegedly 27,000 square feet (2,508 m²) dedicated to exhibit space. A large fiberglass sculpture of a Jackson's Chameleon (*Trioceros jacksonii*) in the parking lot and the fluorescent green exterior of the building (painted this color in the latter half of its existence) made the museum a familiar and near-unavoidable landmark to passing motorists on Route 107 and travelers on the heavily-commuted Long Island Railroad which ran on elevated tracks adjacent to the building. Inside, the museum featured an extensive exhibit area, a gift shop, a pet shop that sold live reptiles, amphibians, invertebrates, and supplies, and a cafeteria and concessions area that seated around 60 visitors.

The museum was open seven days a week, and welcomed visitors from the general public, schools, scout groups, senior citizen and religious groups, and summer camps. Off-site outreach programs, traveling educational presentations, and local television network appearances were also delivered with regularity. General admission to the museum included a self-guided tour through both floors of exhibits, access to a supervised petting area where visitors could handle select tortoises, lizards, and snakes under the supervision of a docent, and hourly films or live animal presentations in the museum's theater. The museum also became a popular destination for children's birthday parties, with sometimes two or three parties being held simultaneously just to meet the demand on weekends.

Staffing.—Estimates suggest that the LIRM employed close to 100 workers over its history. Excluding part-time guides, birthday party hosts, maintenance staff, and gift shop workers, three to seven keepers typically made up the animal husbandry staff at any given time. Beyond providing daily husbandry and maintaining exhibits, keepers were also responsible for delivering educational programming, museum tours, and public outreach. A variety of volunteers ranging from high school students to adult retirees assisted with diet preparation and various other husbandry-related tasks. On weekends, keepers conducted live animal demonstrations in the theater which occasionally featured venomous reptiles including rattlesnakes, cobras, and helodermatids.

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SNAKE BITES CAFE



Snake Bites Cafe is a full service snack bar offering popular as well as healthy food items & drinks at affordable prices.

REPTIQUE BOUTIQUE/REPTISAURUS



Our large gift shop not only offers numerous gift items, but also party favors, reptile & amphibian art, as well as reptile-wear.

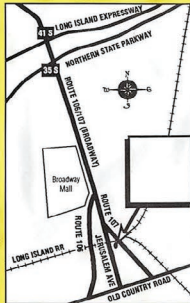
At the Museum there is a reptile shop which offers reptile & amphibian babies produced by the museum breeding program at affordable prices.

COBRA



The Museum offers a new and unique concept in parties. There are three birthday party packages that are private and includes handling the animals, games, educational films and tours through the museum as well as lunch & dessert. Corporate parties are also available at the museum after normal business hours. Call for our party brochures.

The Museum offers an educational outreach program - available to groups and schools that can not manage a trip to the museum. Members from the museum staff along with reptiles will come to you with our fully equipped Reptilevan. Outreach program packages available upon request.



DIRECTIONS:

By Car: LI Expressway to Exit 41 South or the Northern State Parkway to Exit 35 South. Travel 1 mile south on Broadway/Route 107. Museum is one block past the LI Rail Road. By Train LI Rail Road to Hicksville. Walk one block east to Broadway/Route 107.

Hours: Sunday-Saturday 10-6
*Seasonal Night Time Hours
Available Call for Schedule
Closed: Thanksgiving, Christmas
and New Year's Day

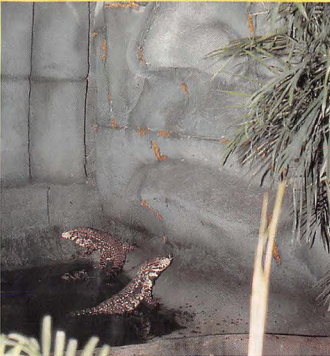
L.I. REPTILE MUSEUM

FRILLED DRAGON

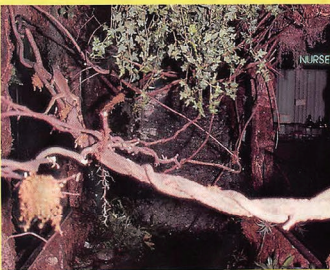


70 Broadway
Hicksville, N.Y. 11801
516-REPTILE
516-931-1500

MAYAN DISPLAY / TEGU LIZARDS



The LI Reptile Museum is a 27,000 sq. ft. facility with over 170 museum quality exhibits containing over 3,000 live reptiles & amphibians from around the world. It is the largest collection of exhibits and reptiles in the world.



The natural habitat exhibits have been created so that the animals feel right at home. The museum is state-of-the-art and in touch with the latest scientific data and knowledge concerning the animals we are presenting.

DUMERIL MONITOR



The Museum is hands on exhibits at its best, where the visitors are invited to actually handle reptiles in an open area.

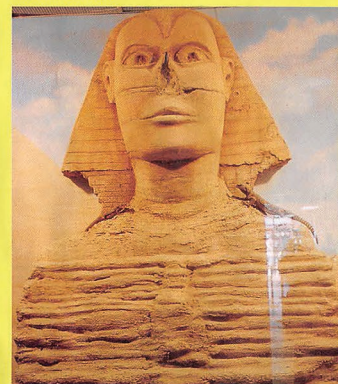


In the Museum's movie theater - movies are shown daily, featuring reptiles & amphibians. There is a wide variety of educational and entertaining films. Also, live shows are performed daily in the theater with some of the most fascinating reptiles & amphibians handled by some of the world's greatest experts. Audience participation is encouraged.

FRILLED DRAGON



The Museum offers educational trips to schools and universities - specializing in different areas of education. There are group rates available.



SPHINX EXHIBIT

FIG. 1. Promotional brochure for the Long Island Reptile Museum (LIRM).

PHOTO BY ROBERT W. MENDYK

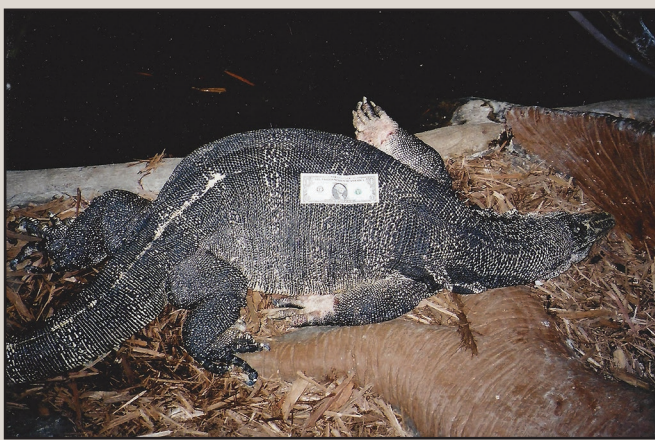


FIG. 2. A large *Varanus salvator* measuring close to 3 m in total length arrived at the LIRM in poor physical condition, obese with extensive callouses on its feet and underbelly (most likely from being maintained on bare concrete). It only survived a few months.

Exhibits.—The museum's two floors of exhibit space featured approximately 170 exhibits ranging in size from small 100 × 100 × 100-cm (L × W × H) cubicles to spacious 6 × 4 × 4-m walk-in enclosures. The largest of these exhibits featured professionally fabricated naturalistic elements including rock escarpments, boulders, trees, temple ruins, and waterfalls (Fig. 1). Other large walk-in enclosures were constructed of glass panels and relied instead on natural tree limbs, branches, and rocks as furnishings and decoration. Smaller cubicle enclosures made up the majority of the museum's exhibits, and were arranged in double-tiered rows. Glass aquaria of various dimensions were also incorporated into wall units throughout the first floor's exhibit area.

Some of the larger exhibits on the first floor of the museum featured skylights, although it is unlikely that they were constructed from a UVB-transmissive material. Several small prep rooms with sinks, hoses, and storage spaces were located throughout the museum, and were also where pumps and filtration units for some of the larger exhibits were concealed. Despite the expansive area dedicated to exhibits, a proper quarantine room and off-exhibit holding areas were not incorporated into the facility's design. A makeshift quarantine room was eventually established in a back room on the second floor around 2002, but lacked many of the requirements needed to properly accommodate, quarantine, and acclimatize newly acquired or compromised animals such as running water and wastewater drains.

Collection.—The LIRM spared no expense assembling a diverse and impressive collection of reptiles and amphibians, rivaling that of the nearby Bronx Zoo in terms of both the number of species kept and total specimens displayed. Moreover, with very limited off-exhibit space, the museum probably displayed one of the largest captive collections of reptile and amphibian taxa in the country at the time. With the museum's records likely discarded upon its closure, it is impossible to know the exact number of species and individuals maintained; however, it can be confirmed from salvaged personal records, photographs, and recollections from former keepers and volunteers that at least 224 species of reptile (representing 35 families; Table 1) and 38 species of amphibian (representing 14 families; Table 2) were maintained between 1995 and 2004.

Varanid lizards made up an important component of the collection, with a total of 27 species displayed over the museum's history. Noteworthy specimens included a melanistic form of



FIG. 3. The central petting zoo area of the museum housing *Aldabrachelys gigantea*, *Geochelone sulcata* and *Iguana iguana*.

PHOTO BY MARK BAYLESS, COURTESY OF BEN ALLER

Varanus salvator, *V. varius*, *V. cumingi*, *V. bengalensis*, *V. prasinus*, and *V. macraei*, as well as a large *V. salvator* that measured close to 3 m in total length (Fig. 2). The LIRM was also one of the first facilities in the United States to display *V. melinus* and *V. yuwonoi* in captivity following their formal descriptions in the late 1990s. Other noteworthy lizard taxa included *Ctenosaura conspicuosa*, *Sauromalus varius*, *Dracaena guianensis*, *Shinisaurus crocodilurus*, *Tiliqua rugosa*, *Cyclura cornuta*, *C. nubila*, and *C. nubila* × *lewisii* and *C. lewisii* × *nubila caymanensis* hybrids.

Typical of most public reptile exhibits, several large constrictors were prominently displayed including a five-meter long *Eunectes murinus* and several large *Python bivittatus* and *Malayopython reticulatus*. *Python molurus*, *Malayopython timorensis*, *Morelia boeleni*, *M. amethestina*, and several other pythonids (23 species total) and boids (16 species total) were also kept, as well as at least 13 species of colubrids, most notably *Drymarchon couperi*.

Two adult male *Aldabrachelys gigantea* weighing over 90 kg each were housed together with several adult *Geochelone sulcata*, *Stigmochelys pardalis*, and occasionally *Iguana iguana* in an open pit enclosure in the museum's central petting area (Fig. 3). Several smaller tortoises including *Chelonoidis petersi*, *C. carbonaria*, and *C. denticulata* were also displayed in various exhibits. As many as 20–30 aquatic turtles representing several native and exotic species were housed together in a large waterfall-fed pond adjacent to the venomous snake collection towards the exit of the exhibit hall.

A fairly large venomous collection included both venomous lizard species (*Heloderma suspectum* and *H. horridum horridum*) as well as several elapids and viperids including, but not limited to *Ophiophagus hannah* (including a 4.5-m individual), *Naja sumatrana*, *N. haje*, *N. melanoleuca*, *N. kaouthia* (including an albino specimen), *Dendroaspis angusticeps*, *Bitis gabonica*, *B. arietans*, *Atheris squamiger*, *Vipera palaestinae*, *Bothriechis schlegelii*, *Agkistrodon piscivorus*, *A. contortrix*, and at least four species of rattlesnakes: *Crotalus horridus*, *C. atrox*, *C. adamanteus*, and *Sistrurus miliarius*.

Four species of crocodilian were displayed, including an adult breeding pair of *Alligator mississippiensis*, as well as *Caiman crocodylus*, *Paleosuchus palpebrosus*, and *P. trigonatus*.

Dendrobatids (*Dendrobates*, *Phylllobates*, *Epipedobates*) were commonly displayed, as were several other terrestrial (e.g., *Mantella* spp., *Discophus guineti*, *Pyxicephalus adspersus*, *Ceratoph-*

rys spp.), aquatic (e.g., *Pipa pipa*), and arboreal (e.g., *Hyla* spp., *Agalychnis callidryas*) anurans. Although a few species were kept, caudates were poorly represented in the collection.

The museum regularly purchased rare and unusual specimens from reptile dealers, breeders, and private collectors, whereas more common pet trade species such as *Iguana iguana*, *Trachemys scripta elegans*, *Geochelone sulcata*, *Boa constrictor imperator*, and *V. niloticus* were frequently acquired through donations or the surrendering of unwanted pets to the museum. Occasionally, some less-common species would get donated, particularly Asian box turtles of the genus *Cuora* (*C. amboinensis*, *C. flavomarginata*, and *C. galbinifrons*). While unwanted pet reptiles, particularly iguanas, Red-eared Sliders, and Boa Constrictors were sometimes abandoned in boxes on the doorstep of the museum at night, even in mid-winter, the museum received the majority of these animals by accepting them with an "adoption fee" upwards of US \$150 depending on the species. At times, as many as 10 *I. iguana* were surrendered to the museum inside a month; at the behest of the owner, animals were rarely rejected or turned away.

In addition to reptiles and amphibians, the LIRM also maintained a large collection of live exotic insects and arachnids up until around 2001, when they were replaced with static displays of dinosaur and other extinct reptile fossils.

Captive breeding.—Several reptile species were successfully reproduced at the LIRM, although repeat occurrences were uncommon. Lizard taxa bred on-site included *Rhacodactylus leachianus*, *Shinisaurus crocodilurus*, *Physignathus cocincinus*, *Gehyra vorax*, *Chamaeleo calyptatus*, *Trioceros jacksonii*, *Eublepharus macularis*, *Tiliqua gigas*, and *Pogona vitticeps*. The museum may have been the first facility to receive eggs from *V. melinus* in 1999, although no live hatchlings resulted. Viable eggs were also produced by *Hydrosaurus weberi* in 2002, but were discovered by keepers after they had been destroyed by ants. According to exhibit signage, the museum claimed to have been the first facility to breed *R. leachianus* in captivity in 1998; however, the species had been bred more than a decade earlier by the Dallas Zoo in the mid to late 1980s (J. Murphy, pers. comm.). Offspring were produced from several boas and pythons including *B. constrictor imperator*, *P. regius*, and *Epicrates cenchria*. Chelonians bred onsite included *Cuora flavomarginata*, *Chelydra serpentina*, and *G. sulcata*. Although eggs had been received, it is unclear if *Alligator mississippiensis* was successfully hatched at the museum.

TROUBLED HISTORY

To say that the Long Island Reptile Museum experienced its share of problems over its brief history is perhaps a gross understatement. Many issues relating to the LIRM's directorship and financial support, flawed exhibit design, and inability to retain experienced staff affected the health and welfare of its captives, and ultimately contributed to the demise of the facility after just nine years of operation.

High staff turnover.—The museum experienced difficulty maintaining a consistent and qualified keeper staff. Although several qualified and experienced keepers were employed by the LIRM at various times, the bulk of the museum's animal keepers were recent high school graduates or college students with limited experience with captive reptiles or knowledge of their biology; in many cases, keepers were hired out of nepotism by the museum's owner. Low wages, inconsistent paydays and frustrating work

conditions (see below) led to high turnover among staff, especially animal keepers. When experienced individuals did come along, they often did not last long. By default, novice keepers were sometimes left in charge of caring for rare or sensitive species, as well as venomous reptiles, large constrictors, monitor lizards, and crocodilians during "in between" periods without experienced keeper staff. High turnover also contributed to generally poor and inconsistent husbandry and accession records.

Exhibit design.—Flawed exhibit design and construction at the LIRM directly impacted keepers' abilities to properly care for specimens and service their enclosures. Little consideration of reptilian and amphibian biology appeared to have been taken into account in their design, leading to various health and welfare issues. For example, basking lights and other heat-emitting fixtures were usually positioned at great distances from any potential basking surface, making it difficult or impossible for some captives to access appropriate temperatures for thermoregulation. Similarly, ultraviolet light fixtures, when offered, were also installed at distances too great for animals to receive any benefit from them. During colder autumn and winter months, substantial heat was lost to the large surface areas of the skylights in some of the larger exhibits, making it difficult to maintain appropriate thermal gradients inside. Open screen tops on most enclosures facilitated strong diffusion gradients and air flow, causing environmental conditions inside exhibits to equalize with the rest of the building. This created difficulties maintaining appropriate temperatures and humidity levels within enclosures, especially during the cold, dry winters of New York; inadequate humidity levels led to chronic dehydration in many species, and eventually gout in some cases (e.g., *V. varius*, *Uromastix aegyptia*).

Without an appropriate quarantine room or facility, the practice of accepting unwanted pet reptiles without proper veterinary screening and quarantine led to the transmission of parasites and pathogens to the collection. Snake mites (*Ophionyssus natricis*) were a regular scourge, and in 2003, an unidentified ulcerative dermatitis that was suspected of being introduced to the collection via a surrendered pet *Iguana iguana* spread through several herbivorous iguanid and agamid lizards including a *Cyclura nubila* × *lewisi* hybrid, *C. cornuta*, several *I. iguana*, a *Ctenosaura similis*, and a *Uromastix aegyptia*. Stomatitis and upper respiratory tract infections were commonly encountered in larger constrictor species. In 2002, several keepers simultaneously became ill and were suspected of contracting giardiasis through contact with contaminated aquatic turtle water; *Cyclemys dentata* in the collection later tested positive for *Giardia*.

Many exhibits at the LIRM featured drainage plumbing. While pools in some of the larger enclosures featured their own direct drainage lines, smaller cubicle exhibits shared drainage plumbing, allowing wastewater from adjacent exhibits to occasionally back up into neighboring enclosures. This posed threats of cross-contamination and facilitated the spread of pathogens, particularly among aquatic and semi-aquatic turtles. Additionally, the generally undersized drain lines in both types of exhibits were incapable of handling large waste products or substrate particles, resulting in frequent clogs and breakage. Several drains eventually became unusable due to impenetrable clogs, and waste water had to be flushed out manually with siphons or sump pumps.

The unusual layout of exhibits throughout the museum also presented challenges for maintenance and accessibility. Some of the entranceways to larger walk-in enclosures were too narrow to

allow for garbage cans, ladders and other equipment needed for cleaning and regular maintenance. Several walk-in exhibits were accessible only through other exhibits; in some cases requiring keepers to walk through two other exhibits to access a terminal enclosure. This presented safety issues for keepers when these exhibits housed large varanids or constrictors, as well as risks of cross-contamination between exhibits.

Unlike most zoos that utilize rear-access doors for their reptile and amphibian exhibits which prevent the public from coming into contact with animals and potential zoonotic agents, most of the exhibits at the LIRM were designed to be front-opening, with the public viewing windows doubling as access doors. This space-saving design also included the museum's venomous snake enclosures; their front-opening design and location just before the exit of the museum presented challenges for servicing enclosures during visitor hours and also posed potential safety and security risks for the general public.

Financial support.—Although significant, the effects of staff turnover and poorly designed exhibits paled in comparison to the problems and hardships associated with the museum owner's reluctance or inability to adequately fund the facility. In a telling premonition, monetary issues were apparent before the museum opened to the public, with various contractors, construction crews and exhibit builders walking out on the job due to nonpayment. There were also issues with paying utility companies; on one occasion during the winter before the museum officially opened, the building's heat was shut off due to nonpayment, resulting in the deaths of several animals from hypothermia. As a temporary solution, electric space heaters were placed inside exhibits to keep their inhabitants warm during periods without natural gas service for heat (Fig. 4). Payment issues with electrical and heating utilities continued throughout the museum's history (see below).

Insufficient funding took a direct hit on keepers' abilities to care for animals properly. Although not a problem initially, funding for animal diets became scarce, and keepers were eventually pressured to come up with alternative ways of feeding the collection which included asking local supermarkets for handouts of the previous day's wilted or expired produce and obtaining live rodents for free through local research laboratories. Limited funding also affected the ability to purchase new materials and equipment such as mulch, sand, and other substrates, heating and lighting fixtures, handling equipment and maintenance supplies. Fluorescent UV lamps were often used beyond their intended lifespans, to where they were probably no longer emitting beneficial UV-B wavelengths.

Veterinary practices began refusing to see animals from the LIRM due to nonpayment or simply the museum owner's reputation for nonpayment. In fact, over the course of just nine years, the LIRM went through around a dozen local veterinary practices, including all of the experienced reptile veterinarians on Long Island. The inability to receive veterinary support when needed, especially towards the end of the museum's operation, further limited keepers' options when it came to treating sick or injured animals in the collection. Similarly, given their expense, necropsies were rarely performed to establish a cause for death, making it difficult for keepers to learn from these experiences.

The museum's owner continued to accept unwanted pet reptiles even if there was not sufficient space to accommodate them, in an effort to collect the accompanying "adoption fee." Curiously, when the museum became overwhelmed with surrendered iguanas, the owner would arrange shipments to



FIG. 4. A *Varanus varius* clings to an electric space heater placed in its exhibit during a period when the museum's heat was shut off in mid-winter due to nonpayment.

PHOTO BY MARK BAYLESS, COURTESY OF BEN ALLER

dealers in Florida, who purportedly paid US \$10–15 per iguana. It is difficult to imagine why anyone would pay money for large and particularly intractable iguanas (many of these animals were not tame or tolerant of human interaction) when thousands sit awaiting adoption in rescue groups throughout the country or roam free in southern Florida. Although their true fates were never revealed, some keepers suspected that they were being sold to food markets.

Investigation by the Turtle Trust.—Alerted to the conditions present at the LIRM, members from the UK-based Tortoise Trust visited the museum in December 2000 and prepared an extensive investigative report detailing the problems and inadequacies observed at the facility as well as recommendations for their remedy (Highfield and Gill 2000). Among their findings, Highfield and Gill (2000) called special attention to the quality of care being provided, the museum's educational value, and the overall conservation message of the facility. In addition to several of the issues hitherto discussed including overcrowding, cross-contagion, mites, and the use of open-topped enclosures which made maintaining appropriate climatic conditions difficult, Highfield and Gill (2000) noted outdated enclosure designs, the unnecessary mixing of unrelated species, inadequate UV exposure, and metabolic bone disease among several tortoises and iguanas in the collection (though these were likely specimens surrendered as adults by pet owners that were already afflicted). The educational focus of the museum was questioned since the conditions on display did not illustrate to the public what they considered to be proper reptile and amphibian husbandry. Also criticized was the conservation message of the facility, since many wild-caught reptiles and amphibians were offered for sale in the museum's pet shop, as well as several species that are poorly suited for private collections including *Geochelone sulcata*, *Python bivittatus*, *Iguana iguana*, and *Varanus salvator*. Similar concerns about the condition of the facility and its husbandry were raised by Harris (2002) following a herpetological society visit to the museum in 2002.

Interestingly, the same conditions and inadequacies highlighted by Highfield and Gill (2000) and Harris (2002) went largely unnoticed or dismissed by the general public, including many reptile hobbyists. Herpetological enthusiasts frequently visited the museum from all over the United States, yet few noticed or raised concerns about its conditions; to the contrary,

TABLE 1. Breakdown of the LIRM's reptile collection by family (1995–2004). Current taxonomic conventions based on Uetz (2014).

Order	Suborder	Family	Number of Species
Crocodylia	Alligatoroidea	Alligatoridae	4
Squamata	Anguimorpha	Anguidae	3
		Helodermatidae	2
		Shinisauridae	1
		Varanidae	27
	Gekkota	Diplodactylidae	4
		Eublepharidae	2
		Gekkonidae	10
		Phyllodactylidae	1
		Sphaerodactylidae	1
	Iguania	Agamidae	16
		Chamaeleonidae	5
		Iguanidae	16
	Lacertoidea	Lacertidae	3
		Teiidae	5
	Scincomorpha	Cordylidae	3
		Gerrhosauridae	2
		Scincidae	6
	Serpentes	Boidae	16
		Colubridae	13
		Elapidae	6
		Natricidae	3
		Pythonidae	23
		Viperidae	13
Testudines	Cryptodira	Carettochelyidae	1
		Chelydridae	2
		Emydidae	8
		Geomydidae/Bataguridae	7
		Kinosternidae	2
		Platysternidae	1
		Testudinidae	8
		Trionychidae	2
	Pleurodira	Chelidae	3
		Pelomedusidae	1

many offered their compliments and some even inquired about employment opportunities. An article appearing in *Reptile and Amphibian Hobbyist* magazine around the same time as Highfield and Gill's (2000) investigative report praised the facility and the work that it was doing (Labenda 2000). This would suggest that many reptile and amphibian hobbyists are not familiar with sound husbandry practices or able to recognize signs of impaired animal health and welfare, which raises concerns about the quality of information available to the general pet reptile keeping community and the resulting standards of care they may be providing in their own collections.

Thefts and escapes.—Given the rarity of many specimens in the collection and the poor construction of some of the museum's exhibits, animals were occasionally targeted and stolen from the LIRM by visitors, burglars, and possibly even employees and volunteers. Species stolen from the museum included *Varanus bengalensis*, *V. prasinus*, *Rhacodactylus leachianus*, *Sanzinia madagascariensis*, *Shinisaurus crocodilurus*, and *Heloderma su-*

TABLE 2. Breakdown of the LIRM's amphibian collection (1995–2004) by family. Current taxonomic conventions based on Frost (2014).

Order	Suborder	Family	Number of Species
Anura	Archaeobatrachia	Bombinatoridae	1
		Megophryidae	1
	Mesobatrachia	Pipidae	2
		Bufonidae	4
	Neobatrachia	Ceratophryidae	2
		Dendrobatidae	6
		Dicroglossidae	1
		Hylidae	9
		Leptodactylidae	1
		Mantellidae	3
		Microhylidae	2
Caudata	Salamandroidea	Ranidae	2
		Ambystomatidae	2
		Salamandridae	2

spectrum; some, but not all were later recovered by law enforcement officials (Sutton 1996; Lenkowitz 2002; Rafferty 2002).

Snake and lizard escapes were not uncommon at the LIRM, with some animals never recovered. Among the most notable escapes were a *Naja kaouthia* that escaped into the floorboards beneath the theater's stage, a five-meter long *Eunectes murinus* that I almost stepped on in a dark hallway one morning after it had escaped from its enclosure the night before when a keeper failed to lock its exhibit door, and a *Varanus melinus* that was regularly spotted throughout the museum, even basking in morning sunlight filtered through the building's skylights, but evaded capture for several weeks. Additionally, like many other zoo reptile buildings, the museum's exhibit area and prep rooms were home to a sizeable breeding population of escaped (or intentionally released?) Tokay Geckos (*Gekko gekko*) which thrived on loose feeder insects and resident cockroaches. Nighttime herping forays for geckos and their eggs became a popular pastime of museum staff and volunteers.

Snakebite.—Emergency responders were called to the museum on 28 December 1997 in response to its first and only venomous snakebite (Crowley 1997; Gearty 1997; McFadden 1997; Miller et al. 1997). A 24-year old keeper was bitten on the hand and envenomated by a 1.2-m long *Bitis gabonica* as he reached into its enclosure to retrieve a water bowl by hand. The victim, who had allegedly been working at the museum for around two years, was airlifted by helicopter to Jacobi Medical Center in the Bronx, where he underwent a fasciotomy and required several vials of antivenom procured by the Bronx Zoo's herpetology department. The keeper eventually recovered from the bite, but never regained full use of his hand. As a result of these injuries, he was later awarded US \$1.6 million in damages by a Nassau County Supreme Court referee in 2003 (Anonymous 2003). It is unclear, however, if such a payment was ever received by the victim.

CLOSURE

By 2002, the LIRM had fallen into a state of disrepair, with very little funding available to properly maintain its collection, pay

its employees, and cover basic operational expenses. Faced with even less support from the owner, some keepers began meeting with local authorities from the Nassau County Society for the Prevention of Cruelty to Animals (SPCA) chapter and other rescue organizations, seeking assistance with removing animals in need of veterinary care and getting the museum closed. Despite these talks and knowledge of the museum's conditions by the Nassau County SPCA (Healy 2003), nothing was accomplished and conditions continued to persist for another two years. Keepers were able to convince the owner to voluntarily release some turtles to local rescue groups in 2003; many of these animals required treatment for flagellates (*Giardia* sp. and *Entamoeba* sp.) and nematodes (*Capillaria* sp.). It was also later discovered that during this time a museum volunteer had been working as an undercover operative for an animal rights group and was secretly taking detailed notes and photographs of the museum's conditions, the owner's activities and whereabouts, and the work of its keepers, although this had no apparent effect on the closure of the museum or actions taken against it.

Ironically, the LIRM was forced to close its doors to the public on 29 October 2004 by county officials not because of animal welfare concerns, but because of US \$140,000 worth of building and fire code violations (Melago 2004a). After losing heat and electricity to the building several days later due to nonpayment, a small army of volunteers led by the Suffolk County SPCA and representing various agencies, organizations, and rescue groups including Turtlehomes.org and the International Fauna Society (IFS) descended upon the LIRM the evening of 2 November 2004 to remove its living inhabitants as temperatures rapidly dropped to 10°C inside the building (Melago 2004c,d; Winzelberg 2004). Due to a general lack of organization and oversight, several animals mysteriously disappeared from the premises that night without ever being inventoried. The 182 animals that were officially seized were distributed among several rescue groups in the tri-state area for temporary holding, with the majority of animals going to the IFS headquarters in Hauppauge, New York. When it was declared that the owner of the LIRM would not be taking the animals back, some were retained by the IFS for display at its short-lived Serpenterium in Riverhead, New York; others were adopted out or transferred to rescue organizations, and some of the more valuable specimens, including an adult pair of *Varanus cumingi*, were purportedly sold to the public. Many of the animals seized from the museum were in poor physical condition, requiring extensive veterinary treatment or euthanasia.

Coincidentally, the museum's closure occurred just as its owner was in the process of developing a new, floating reptile zoo and aquarium in New York City that was to be permanently docked at South Street Seaport, a popular tourist destination in lower Manhattan. Architectural blueprints had already been drafted and construction of the facility had begun aboard the Cone Johnson, a decommissioned 72-m long ferry purchased from Galveston, Texas (Stewart 2003). Closure of the museum on Long Island and the negative publicity it generated, as well as the owner's citation for misdemeanor animal neglect (Melago 2004b), essentially sealed the fate of this floating facility before it could come to fruition.

The building housing the LIRM was razed the following year and replaced with a retail shopping center.

DISCUSSION

Missed Opportunities for Research.—With such an extensive living collection that included many rare and poorly studied

taxa, it is unfortunate that nothing was contributed by the museum's staff to help advance understanding of their biology or husbandry through captivity-based behavioral research or the publication of keeping and breeding reports. For example, captive reproduction occurred in several species at the LIRM that had rarely been bred at the time (e.g., *Rhacodactylus leachianus* and *Shinisaurus crocodilurus*); in these cases, the museum missed out on contributing valuable information to what was then known about their biology, husbandry, and reproduction. Similarly, the museum also missed out on contributing case reports describing novel or unusual health issues and diseases such as the ulcerative dermatitis hitherto discussed as well as an unidentified viral infection that affected the museum's *Aldabrachelys gigantea*.

Financial Sustainability.—Many larger, accredited zoological institutions rely heavily on governmental subsidies, grants, bonds, endowments, corporate beneficiaries, and private donors for covering large parts of their operational expenses; others have branched out to include other revenue streams such as exhibit design to help cover these expenses (e.g., Peeling 2014). As a small for-profit entity, the LIRM relied solely on revenue generated from admission sales, educational programs, and birthday parties to cover its overhead. While the financial mismanagement and business practices of the museum's owner undoubtedly played the greatest contributing role in the facility's demise, it is difficult to imagine how the LIRM could have ever been financially sustainable even if it had been managed effectively. The sheer size of the facility and its associated operational expenses, particularly its monthly electrical usage and heating and cooling costs, should have rendered it cost-prohibitive from its inception. A smaller facility with a smaller collection could have conceivably met the same goals of the LIRM and reached the same number of visitors, while maintaining a much lower operational overhead.

Preventing similar occurrences.—One of the most perplexing questions surrounding the history of the Long Island Reptile Museum is how could it have been allowed to persist for as long as it did given the many problems and animal welfare issues it experienced throughout its history? Where were the authorities? More importantly, what can be learned from the LIRM to prevent similar situations in the future?

First, although volunteer-based animal law enforcement agencies such as the Nassau County SPCA may be highly skilled at pinpointing and addressing welfare concerns among companion animals and domestic livestock, they do not appear as competent or knowledgeable in matters relating to reptiles and amphibians. This may stem from unfamiliarity with reptilian and amphibian biology and husbandry, a general unwillingness to pursue cases involving these taxa, or even a lack of authoritative power regarding the seizure of animals from privately-owned facilities. This latter point may explain why the Suffolk County SPCA (an actual law-enforcement entity) was involved in the LIRM'S seizure rather than the local, volunteer-based Nassau County chapter. Increased training and educational opportunities supported by zoos, federal and state wildlife agencies, and non-profit organizations can help better equip law enforcement officials and related agencies with the knowledge and skills needed for identifying and addressing concerns of poor reptile and amphibian husbandry and welfare.

Second, with the exception of annual license renewals for displaying venomous reptiles and crocodilians through New York State's Department of Environmental Conservation (DEC), the LIRM was exempt from oversight and regulation by



FIG. 5. A young keeper (RWM) experiments with constructing a rock background for a refurbished lizard exhibit.

governmental agencies that monitor or regulate the keeping of certain wildlife groups in captivity such as the United States Fish and Wildlife Service (USFWS) and the United States Department of Agriculture (USDA). Although all facilities publicly displaying live mammals in the U.S. must be licensed as exhibitors through the USDA's Animal and Plant Health Inspection Service (APHIS), which requires adherence to standardized husbandry practices and site inspections, no such regulatory system is in place for facilities displaying live reptiles and amphibians. Additionally, although many zoos and aquariums in North America belong to the AZA, a non-governmental organization that sets rigorous standards for animal husbandry, welfare, and education among its accredited member institutions, membership to the AZA is voluntary, and facilities displaying live animals are not required to join. Thus, problematic herpetological facilities like the LIRM can operate outside the jurisdiction of regulatory governmental agencies and oversight of zoo organizations, where suboptimal husbandry and veterinary care can occur and persist.

While no such system is currently in place for reptiles and amphibians in the USA and no immediate plans to include these taxa have been voiced by the USDA, future inclusion of reptiles and amphibians into APHIS could provide a way in which facilities operating outside the oversight of the AZA like the LIRM can be held accountable and compliant to acceptable standards of herpetological husbandry and welfare. Whether the USDA is logistically capable of launching such a program and effectively regulating herpetological facilities remains to be seen, however, and many zoo curators and registrars would probably argue against such an initiative given the added strain and bureaucracy that it would inevitably create.

Was the Long Island Reptile Museum Valuable to Society?—It might be difficult to look past the many problems and issues experienced by the Long Island Reptile Museum to see any positive aspects, and in reality, an entire book could, and perhaps should be dedicated to the many details of its troubled history and fate. However, in spite of its problems and brief longevity, the LIRM did make three important contributions to society.

First, the Long Island Reptile Museum provided opportunities to many budding herpetologists and naturalists seeking to gain experience working with reptiles and amphibians in captivity. Today, entry-level reptile keeper positions at most AZA accredited zoos in the United States require a bachelor's degree in the biological sciences as well as some level of prior experience

working with reptiles and amphibians in a captive setting. First-hand experience gained through private facilities like the LIRM as well as museums and nature centers have prepared individuals for future careers in zoo biology, veterinary medicine or academia, and many prominent zoo biologists have undoubtedly begun their careers at smaller, non-accredited facilities. Several former keepers and volunteers of the LIRM including myself have used the experience as a jumping off point to successful careers in zoo biology, veterinary medicine, environmental law, science education, and zoological exhibit design.

Working under such stressful conditions at the LIRM did end up benefiting keepers and volunteers in ways they may not have noticed or appreciated at the time. From my own experience and based on feedback from other former keepers, these suboptimal working conditions contributed to faster learning curves than those we've experienced under more favorable conditions at other zoological facilities. Without in-house maintenance, plumbing, electrical, carpentry, pest control, or exhibit departments to call upon for emergencies and repairs, keepers were forced to learn a myriad of skills and trades on the job through trial and error, teamwork, and collaboration. Solving such problems on a regular basis gave rise to ingenuity and creativity in ways keepers at other zoological institutions might not typically experience or utilize in the day-to-day performance of their jobs. Today, many former keepers of the LIRM are familiar with most areas of general construction and experienced in the fabrication and repair of zoological exhibits (Fig. 5).

Similarly, with very limited husbandry and veterinary support, novice keepers were forced to learn about the biology, health, and medical management of species on their own, by familiarizing themselves with the zoological and veterinary literature and consulting with outside experts. Under unfavorable conditions beyond their control, keepers quickly learned about the individual preferences and tolerances of many reptiles and amphibians as well as their behavioral responses to unnatural social groupings and dominance hierarchies, and suboptimal thermal and hydric conditions. Although far from ideal, these conditions contributed to valuable learning opportunities and unique keeping perspectives that would not have otherwise been possible at other facilities. The experience, knowledge, and know-how gained through working at the LIRM have helped many former keepers succeed and excel at other zoological institutions.

Second, the LIRM played an important role in changing public opinions towards reptiles and amphibians. As some of the most feared and loathed groups of animals on the planet, reptiles and amphibians are frequently misunderstood and misrepresented by the general public, law enforcement officials, politicians, and the media. Zoos and smaller facilities like the LIRM are a necessity for educating people about reptiles and amphibians, while also dispelling fears, myths, and prejudices that can lead to their endangerment in the wild. Given the quantity and breadth of visitors reached through the museum's educational and outreach programs, the LIRM undoubtedly helped further this initiative.

Lastly, and perhaps most importantly, the LIRM was instrumental in inspiring a new generation of herpetologists, naturalists, and wildlife conservationists. For many former keepers, one of the most rewarding aspects of the job was talking with children who returned to the museum with their supportive parents every weekend, who knew the entire collection as well as every minor detail about a species' natural history. It was

gratifying to know that someday these individuals might go on to pursue careers in herpetology or related fields. To further emphasize this final point and conclude this article, I highlight the following experience.

Around 2002, the LIRM was contacted by an 11-year old reptile enthusiast seeking assistance with a proposed project for his elementary school's science fair. As an admirer of snakes and fascinated with snake venoms, the student's ambitious project sought to test and demonstrate, under professional supervision, the effects of rattlesnake venom on human blood. Using just a few droplets of venom collected by keepers from a Pygmy Rattlesnake (*S. miliarius*) in the collection, and petri dishes of fresh blood drawn on-site from the child's father by an accompanying physician, the remarkable platelet-aggregating effect of the venom was demonstrated in real-time and recorded on video by the student. While it is unclear if the student went on to win top prize at his science fair, one can imagine the impact that this experience had on this budding herpetologist's life and career aspirations. Given his age at the time of the experiment, it would not be surprising if this person is now a graduate student on his way to becoming a lead researcher of snake venoms, and perhaps even reading this account.

Acknowledgments.—I thank Lori Green and the many former staff members and volunteers who contributed useful information to this article but who chose to remain anonymous. I am grateful to John Adragna and Ben Aller for sharing images. Finally, I thank Jim Murphy for his support of this project, and Judith Block, Lauren Augustine, and Kyle Miller for helpful comments on earlier drafts of this manuscript.

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