



Phrynosomatics

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Our purpose is to document and publicize the values and conservation needs of horned lizards, to promote horned lizard conservation projects, and to assist with horned lizard management initiatives throughout their ranges.

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Current Names: A Guide to Recent Name Changes of Horned Lizard Species

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Introduction

When I first started writing about our horned lizard species in the United States and Canada in 1981, there were seven species (Sherbrooke 1981). When I considered all the species of horned lizards in North America (including Mexico) in 2003, there were 13 species: eight in the United States and Canada, and five additional species in Mexico (Sherbrooke 2003). Today, by some accounts (see discussion below), there are 17 species. How have these increases in numbers of recognized species of horned lizards come about?

During this period there have been significant changes in the tools used by taxonomists in determining the relationships between populations of horned lizards. In the past morphological and behavioral characteristics as well as geographic and ecological distributions were strong components for making decisions. For several decades now the power of examining gene structure of lizards, through their mitochondrial and

nuclear DNA, has gained a very significant role in helping scientists to make taxonomic decisions. These techniques have been widely applied, although how they are applied is sometimes controversial.

Names are how we categorize the complexity of the world surrounding us. In science the naming of living organisms, taxonomy, is done collectively and in part with international rules, so that we may understand species names across all cultures and languages. There is a general consensus that all horned lizard species are closely related and are best categorized as representing a single genus, *Phrynosoma*. With scientific names the first letter of a genus (genera is the plural of genus) is always capitalized, but not that of species names, and both genus and species names are italicized (e.g. *Phrynosoma asio*).

If we find several horned lizards in one location, and they have very similar features, we may assume they belong to a single

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species (species is both singular and plural). This is true even if we encounter some differences between individuals, between the two sexes, and between juveniles and adults. If we encounter other horned lizards at the same location that are not similar in appearances to those already identified, we might assume they belong to another species, though that conclusion may require further careful study. If we go to another locality and find similar looking horned lizards, which differ somewhat, we might wonder if they are of the same species we have seen or are of still another species not yet encountered. It is the role of taxonomists to study these situations and make informed judgments as to how names should be applied, taking into account established procedures and the evolutionary history of the species and their close relatives.

Considering the task of naming all of evolved life on earth, taxonomists have had a very long, difficult and constantly evolving endeavor, naming nearly a million species to date (Mayr et al. 1953; Hennig 1966; Mayr 1982). The field continues to evolve as technology advances and concepts change. This all affects the naming and name changes of horned lizard species. A major historic shift was accepting species names as applying to populations of interbreeding individuals that are actually or potentially reproductively isolated from other such populations. But we find geographically isolated populations of very similar animals that have minor morphological or other differences, and it is often nearly impossible to determine how far these populations have evolved towards being reproductively isolated from one another.

Other complications arise as well, such as hybridization between populations considered to be two separate species. This situation has required informed judgments. Taxonomists use varied data to reach their conclusions and do not always agree. When morphological differences between populations have been judged to be real, but not evolutionarily significant (still within the same species), taxonomists have sometimes applied subspecies names. Over time new information may come to light and this may result in a revision of prior judgments.

After a new species, similar to species X, has been described and named species Y, there are two species. Years later Y may be judged to not really be a species distinct from the earlier described populations named species X. Then the new species Y may be changed to be a subspecies Y, or the name Y may be removed from use. Later, taxonomists with still more new data may choose to resurrect the name Y again as a full species name for the population, distinct from the population(s) of species X. Thus, over time, one species X became 2 species X and Y, and then reverted to all being 1 species X. Still later newer data may suggest populations of subspecies Y, of species X, or populations of species X that included what was species Y, are again recognized as a full species Y, resulting again in 2 species, X and Y.

In this listing of horned lizards, I will not consider the history of all subspecies or list them, but subspecies names may come into consideration as taxonomic changes bring them into judgments in correctly applying established scientific names to populations.

A modern innovation in considering the relationships of species, like among horned lizards, is a taxonomic methodology known as cladistics (Hennig 1966). In cladistics all species are seen as pairs derived from another single ancestral species and the two new ones are considered sister species. This establishes monophyletic (single) lines of evolution. These species relationships are presented as cladograms, branching diagrams that summarize ex-

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tensive character data that have been statistically analyzed for each species. They illustrate closeness of relationships between species (sister species, a clade) and older bifurcating groups of species also referred to as clades.

The tools used in determination of relationships between species and groups of organisms have been greatly enhanced by access to genetic codes incorporated in the mitochondrial and nuclear DNA of species. Nevertheless, groupings of morphological data and of molecular data regarding species may not always provide identically clear resolutions between relationships of species or groups of species (Losos et al. 2012). This has led some taxonomists of horned lizards to have different judgments concerning the naming of different horned lizard species. Those focused on morphological data have frequently used subspecies as subunits of species, whereas those using molecular data designate subdivisions as clades. Thus, the literature is mixed as to how many species there are, according to different scientists. In general, species described from morphological data are easier to identify in the field (morphological characters are often easy to see), than are species determined from laboratory molecular data. I will review recent publications of taxonomic changes of horned lizard scientific names resulting from both approaches.

Common names have been applied for centuries to horned lizards across many languages, cultures and geographical areas. Often these broadly applied names are used without recognizing scientific species differences. Widely used English common names are often applied to multiple species, e.g. horny toads, horned lizards, horned frogs, and in Spanish camaleón and tapayaxin. With modern standardizations, common names are being applied to specific species throughout their ranges and are becoming more useful (Liner and Casa-Andreu 2008; Crother et al. 2017), especially for non-scientists. But for species not well known they are often not in common use by the general public. Common names have no formal scientific recognition but are widely being incorporated to clarify informal names of scientifically determined species. Their descriptive value varies greatly. I will incorporate these in the listing of scientific names for horned lizards, with comments (Table 1).

Review

Reviewing the extensive earlier literature on horned lizards for a popular booklet in 1981, I found the following seven species to occur in the United States and Canada: *Phrynosoma cornutum*, *P. coronatum*, *P. douglassi*, *P. m'calli*, *P. modestum*, *P. platyrhinos*, and *P. solare*, (Sherbrooke 1981). In 1987 Montanucci published a taxonomic review of the entire genus, including species in Mexico, and made decisions concerning species relationships and names based on skeletal and external morphological features. He suggested that there were 12 species of horned lizards in two lineages, a "southern radiation" consisting of *Phrynosoma asio*, *P. braconnieri*, *P. ditmarsii*, and *P. taurus*, and a "northern radiation" consisting of *Phrynosoma douglassii*, *P. cornutum*, *P. coronatum*, *P. mcallii*, *P. modestum*, *P. orbiculare*, *P. platyrhinos* and *P. solare*. His analysis differed somewhat from another earlier skeletal study that recognized 14 species of horned lizards (Presch 1969). Baur and Montanucci (1998) utilized the same 12 names as Montanucci in 1987 and presented a taxonomic history of names for those species. (Note: Throughout this review I will use the spelling of species names as they appear in each publication. Minor variations in spellings of species names are due to various taxonomic issues, including linguistic considerations, or errors, but not to changes in species recognized.)

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In 1997, utilizing mitochondrial DNA data, Zamudio et al. published a review of the widespread short-horned horned lizards (*Phrynosoma douglasi*; with six subspecies) of the western United States, southwestern Canada, and northern Mexico. They clearly determined that one clade (subspecies) in the NW corner of the U.S. has an evolutionary history distinct from all other clades and is a separate species. Since those populations had previously been recognized as *Phrynosoma douglasi douglasi* those populations then became the species *Phrynosoma douglasi*. The other clades (subspecies) were all considered to be a single species and were given the name of the oldest (first) named, which was *hernandezi*, of the other named populations/subspecies or clades. Thus, they were all *Phrynosoma hernandezi*.

Therefore when I published on horned lizards in 2003 (Sherbrooke 2003) I recognized two species of short-horned horned lizards, *P. douglasii* and *P. hernandesii* (following Zamudio et al. 1997). That resulted in a total of 13 species in the genus, including five species found only in Mexico, *P. asio*, *P. braconnieri*, *P. ditmarsii*, *P. orbiculare*, and *P. taurus* (Sherbrooke 2003).

Further study of mitochondrial genes of these 13 species suggested they are grouped into five clades (Hodges and Zamudio 2004). However, somewhat earlier studies (Reeder and Montanucci 2001) had found difficulty in arriving at congruous grouping of 12 species (including *P. douglasi* but not *P. hernandesii*) into clades due to conflicting morphological or mitochondrial DNA data analyses. Mitochondrial DNA strongly placed *P. ditmarsii* with short-horned *P. orbiculare* and *P. douglasi*, whereas morphological data strongly suggested its exclusion from that clade and placed it near the southern species *P. braconnieri* and *P. taurus*.

In 2004 Montanucci published a paper based on morphological and color pattern data that focused on geographic differences in populations of a species formerly considered *Phrynosoma coronatum*, a single species with six subspecies (Brattstrom 1997). Its range extended from coastal northern California to the southern end of the Baja California peninsula in Mexico. Over the years various populations throughout the range had received numerous names. Not recognizing all these populations as valid species, Montanucci concluded that three named populations were distinct species, *P. blainvillii*, *P. cerroense*, and *P. coronatum*. He then described another population, of the formerly recognized widespread *P. coronatum*, as a distinct, previously undescribed species, *Phrynosoma wigginsi*. His designation of the name *coronatum* to populations at the southern end of Baja California, from where that name was originally applied, left the next oldest name *blainvillii* to be applied to more northern populations, in the state of California and northern Baja California.

Overall, this arrangement added three species (two incorporating preexisting names, *blainvillii* and *cerroense*, and one with a new name, *wigginsi*) to his former taxonomic listings of 12 horned lizard species (Montanucci 1987; Baur and Montanucci 1998; neither publication recognizing *P. hernandesii* as distinct from *P. douglasii*). The separation of those two had led to 13 species (Zamudio et al. 1997). Thus, the count of horned lizard species was raised to 16.

In 2006 Mulcany et al. published a paper in which they used mitochondrial DNA data to analyze and reexamine the status of populations of *Phrynosoma platyrhinos* previously designated as having three subspecies. They concluded that one former subspecies is a separate and distinct species, apart from the other two. So they resurrected it as a species, with its former given name of *Phrynosoma goodei*. Thus, it became recognized as a 17th species of horned lizard.

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Also, in 2006, Leaché and McGuire, recognizing the difficulties arising from some conflicts between morphological and mitochondrial DNA data, reexamined the relationships of the 17 species using mitochondrial and nuclear DNA evidence. In analyzing the data, they discovered misleading mitochondrial gene tree problems. Their resulting cladogram of relationships of the 17 species in the genus suggested four clades of related species which they named in a phylogenetic taxonomy of the genus *Phrynosoma*: (1) clade Tapaja (*P. ditmarsii*, *P. hernandesi*, *P. douglasii*, *P. orbiculare*), (2) clade Doliosaurus (*P. goodei*, *P. platyrhinos*, *P. modestum*), (3) clade Anota (*P. solare*, *P. mcalli*, *P. cerroense*, *P. wigginsi*, *P. blainvillii*, *P. coronatum*), and (4) clade Brevicauda (*P. taurus*, *P. braconnieri*), with *P. cornutum* and *P. asio* being basal to the four clades.

In 2009 Leaché et al. studied ecological, morphological, and genetic variation in four species of horned lizards previously studied morphologically by Montanucci (2004) and assigned by Leaché and McGuire (2006) to the Anota clade. These populations occur from northern California to the southern cape region of Baja California. They found only three taxonomically well-defined populations. From north to south these are *Phrynosoma blainvillii*, *P. cerroense*, and *P. coronatum*. Thus, the name *P. wigginsi* was no longer recognized as a distinct species. This brought the number of horned lizard species down to 16 (Leaché et al. 2009).

Then a paper published in 2014 described a newly discovered population of horned lizards in Mexico. After careful study of nuclear and mitochondrial genetic data, and morphological data, it was determined to be a new species from Guerrero, Mexico, *Phrynosoma sherbrookei* (Nieto-Montes de Oca et al. 2014). This new species resulted in there again being a total of 17 species of horned lizards. Later Leaché and Linkem (2015), using new DNA sequencing techniques for a scaled-up analysis of the 17 species of horned lizards (without *P. wigginsi*, but with *P. sherbrookei*) confirmed the four clades described earlier (Leaché and McGuire 2006), and placed *P. sherbrookei* in the clade Brevicauda.

Central Mexico is a topographically complex home, including the Trans-volcanic Belt, to widely distributed populations of horned lizards that have received numerous names over decades by various taxonomists (six subspecies, Baur and Montanucci 1998). They are currently known collectively as *Phrynosoma orbiculare* (Montanucci 1979; Bryson et al. 2012; Morano Barajas et al. 2013). Bryson et al. used mitochondrial DNA to examine the history of *P. orbiculare* and to estimate the timing and tempo of lineage diversification. Their study supported 11 geographic lineages or clades, variously associated with the earlier described subspecies. The authors suggested that further studies would be advisable prior to alterations in scientific species names that might be suggested by their initial findings.

Then in 2015 Montanucci used comparative morphological traits and color patterns in a massive taxonomic revision of short-horned horned lizards in the *Phrynosoma douglasii* complex, five subspecies that occur throughout the Inter-montane West and Great Plains of western North America, southward into Mexico. The separation of *P. douglasii* as a species apart from *P. hernandesi* (Zamudio et al. 1997) was confirmed. But two of the five subspecies, *P. douglasii brevirostris* and *P. douglasii ornatissimum*, were resurrected as full species (*P. brevirostris* and *P. ornatissimum*), being considered distinct from *P. hernandesi*. In addition, two new species were named from populations not formerly designated with

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names. They were named *P. bauri* and *P. diminutum*. These taxonomic changes, two of revised status of former subspecies to species and two as new descriptions of populations not formerly recognized as distinct, raised the number of species of horned lizards from 17 to 21.

But at odds with that view of the taxonomy of the *P. douglasii* complex, Crothers et al. 2017, in a review of common and scientific herpetological names, suggested that this arrangement by Montanucci (2015) exhibits both conflicts with inferred phylogenetic relationships based on mitochondrial and nuclear DNA studies and internal inconsistencies. Therefore, they relegated the four species newly recognized by Montanucci (2015) to subspecies status, pending an analysis of explicit species delimitations based on multilocus genetic data (Crothers et al. 2017). Accepting that conclusion leaves the short-horned species complex with two species, *P. douglasii* and *P. hernandesi*. And, it brings our list of current horned lizard species in the genus *Phrynosoma* back to 17 species (Table 1).

I have accepted the published and most recent conclusions regarding valid species names without changes. These are discussions of scientists who have been expending great effort to understand the history and evolution of horned lizards. As they continue their efforts and engage others, we will learn more. A careful reading of the taxonomic literature will clearly reveal there are still lingering issues not fully resolved in determining the current limits of relationships between populations and species of horned lizards. This leaves me with acceptance that further studies, some in progress, will continue to alter some of the species designations that have been presented here. I will present below my understanding of current scientific names of the various populations of horned lizards of North America. I look forward to future contributions to our understanding of horned lizard evolution.

Current Scientific and Common Names of Horned Lizards

Current scientific names are presented alphabetically. These species and common names follow those established by Crother et al. (2017) and Liner and Casas-Andreu (2008) (all in bold in Table 1), with my addition of the latest new species, *Phrynosoma sherbrookei*, not considered by those authors. In some cases of common names, I have suggested alternatives (added, not in bold) to those listed from Liner and Casas-Andreu (2008) and Crother et al. (2017). I do not include names of currently recognized subspecies.

These additions carry superscripts ¹⁻⁹ to notations at the end of the list where I append my reasons for future herpetological common name reviewers to consider changes. I do not expect all, perhaps none, to be accepted. Standardizing common names for scientific horned lizard species, a very worthy pursuit, is somewhat difficult as the scientific understanding of the species change. A change of a scientific name of a species or its application to populations in different geographic areas may cause incongruent use of a previously assigned common name, or in some wider context, descriptive common names may be inappropriate in relation to another species' common name.

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Table 1. Scientific and Common Names of 17 Horned Lizards, genus *Phrynosoma*, with notations of countries of occurrence (United States, US; Mexico, MX, Canada, CAN). There are 9 species in the United States, 16 in Mexico, and 1 + 1 (?) in Canada (with *P. douglasii* apparently extirpated in Canada; Powell and Russell 1998). Those not in bold font are suggested alternatives.

<i>Phrynosoma asio</i>	Giant Horned Lizard	MX
<i>Phrynosoma blainvillii</i>	¹ Blainville's Horned Lizard	US, MX
	¹ Pacific Coast Horned Lizard	
<i>Phrynosoma braconnieri</i>	² Short-tailed Horned Lizard	MX
<i>Phrynosoma cerroense</i>	³ Cedros Island Horned Lizard	MX
	³ Baja Horned Lizard	
<i>Phrynosoma cornutum</i>	Texas Horned Lizard	US, MX
<i>Phrynosoma coronatum</i>	⁴ Coast Horned Lizard	MX
	⁴ Baja-Cape Horned Lizard	
<i>Phrynosoma ditmarsii</i>	Rock Horned Lizard	MX
	⁵ Ditmars' Horned Lizard	
<i>Phrynosoma douglasii</i>	Pygmy Short-horned Lizard	US, CAN (?)
<i>Phrynosoma goodei</i>	⁶ Goode's Horned Lizard	US, MX
	⁶ Sonoran Horned Lizard	
<i>Phrynosoma hernandesi</i>	Greater Short-horned Lizard	US, MX, CAN
<i>Phrynosoma mcallii</i>	Flat-tailed Horned Lizard	US, MX
<i>Phrynosoma modestum</i>	Round-tailed Horned Lizard	US, MX
<i>Phrynosoma orbiculare</i>	⁷ Mountain Horned Lizard	MX
	⁷ Mexican-plateau Horned Lizard	
<i>Phrynosoma platyrhinos</i>	Desert Horned Lizard	US, MX
<i>Phrynosoma sherbrookei</i>	⁸ Guerrero Horned Lizard	MX
	⁸ Sherbrooke's Horned Lizard	
<i>Phrynosoma solare</i>	Regal Horned Lizard	US, MX
<i>Phrynosoma taurus</i>	⁹ Mexican Horned Lizard	MX
	⁹ Bull Horned Lizard	

¹ The resurrection of the name *P. blainvillii*, introduces an unfamiliar and non-descriptive common name to populations in California and northern Baja California long known as Coast Horned Lizards. Until recently all populations of *P. coronatum* carried that common name. Using that old common name (Coast Horned Lizard) does not seem to clearly apply solely to populations of *P. coronatum* now limited to parts of southern Baja California in Mexico (see ⁴ *P. coronatum* below). Retaining the relationship of populations of this species to areas broadly adjacent to the ocean and adding some uniqueness to the common name, I suggest Pacific Coast Horned Lizards for *P. blainvillii*. This name seems more geographically expansive than Cape Horned Lizard used for *P. blainvillii* (Edley and Nossaman 2015).

² The common name Short-tailed Horned Lizard for *P. braconnieri* has not been widely used. Descriptively, Short-tailed Horned Lizard could apply to several other species (e.g. *P. ditmarsii*, *P. sherbrookei*, *P. taurus*). Short-tailed Horned Lizard has been used by Liner and Casas-Andreu 2008, Jiménez-Arcos et al. 2014, and Edley and Nossaman 2015. Perhaps a more distinctive common name is not available?

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³ The use of the scientific name *P. cerroense* has been expanded from a population on a small Pacific coastal island (Cedros Island) to populations on a significant portion of the Baja California peninsula. Thus, naming it the Cedros Island Horned Lizard seems misleading. The name Baja Horned Lizard corresponds to its wide geographic distribution throughout the mid-Baja peninsula. This name seems more appropriate, but its use would result in instability for the current common name.

⁴ The common name of *P. coronatum* has a history as the Coast Horned Lizard (see ¹ above; *P. blainvillii*), but with the restriction of the scientific name to populations in southern Baja California, with other former populations of that species now located to the north (*P. cerroense* and *P. blainvillii*), *P. coronatum* should have a more restrictive common name. Based on biogeography (Grismer 2002; Bezy et al. 2019), I suggest Baja-Cape Horned Lizard for these populations (*P. coronatum*) on the southern end of the peninsula.

⁵ The common name of *Phrynosoma ditmarsii* has been Ditmars' Horned Lizard for some time (Roth 1971, 1997; Lowe and Howard 1975; Sherbrooke 1997), but more recently has been called Rock Horned Lizard (Lowe and Howard 1975; Liner and Casas-Andreu 2008; Edley and Nossaman 2015; Rorabaugh and Lemos-Espinal 2016; Molina-Padilla et al. 2019). Unfortunately, its descriptive nature could be applied to several other species of horned lizards considered stone or rock mimics (e.g. *P. modestum*). Additionally, in discussions people frequently refer to *P. ditmarsii* as Ditmars' Horned Lizard. In part this is due to its over half century disappearance and interesting history of rediscovery (Lowe et al. 1971; Roth 1971, 1997; Sherbrooke 1997). Such a change in common name would disrupt name stability, but might reflect real "common name" usage.

⁶ The resurrection of the scientific name *Phrynosoma goodei* has led to the coining of common names for the species. Two sources have simply incorporated the species name honoring a person, Goode's Horned Lizard, thus giving no information about distribution or features (Liner and Casas-Andreu 2008; Crother et al. 2017). Liner and Casas-Andreu (2008) give a Spanish common name of Camaleón de Sonora, but an English common name of Goode's Desert Horned Lizard. Mulcahy et al. (2006) refer to "The Sonoran horned lizard (*Phrynosoma goodei* Stejneger 1893)..." They did not capitalize it as a common name. Given the distribution of the species within the Sonoran Desert and within the Mexican state of Sonora, I think the common name of Sonoran Horned Lizard is most appropriate.

⁷ The name Mexican-plateau Horned Lizard (Sherbrooke 2003; Edley and Nossaman 2015; Van Devender et al. 2015) has been used for *Phrynosoma orbiculare*, as has Mountain Horned Lizard (Beltrán-Sánchez et al. 2000; Liner and Casas-Andreu 2008). Unfortunately, Mountain Horned Lizard might seem to apply to other horned lizard species living at higher elevations, both in the United States and Mexico. This species, living in the northern and central highlands of Mexico, might better be called Mexican-plateau Horned Lizard, or Mexican Mountain Horned Lizard.

⁸ Edley and Nossaman (2015) used the common name of Sherbrooke's Horned Lizard for *Phrynosoma sherbrookei* described in 2014 (Nieto-Montes de Oca et al. 2014). But a note reporting a new location for the species, also in the Mexican state of Guerrero, has used the common name Guerrero Horned Lizard (Bautista-del Moral et al. 2019). A "formal" common name awaits selection.

⁹ *Phrynosoma taurus* has long been known by the common name of Bull Horned Lizard (Sherbrooke 2003; Edley and Nossaman 2015), reflecting its spectacular horn arrangement. Therefore, it seems strange that its Spanish common name is given as Camaleón Toro, and its common name in English is given as Mexican Horned Lizard in Liner and Casas-Andreu (2008), and by García-Vázquez and Canseco-Marquez (2006). I would hope that the very descriptive name Bull Horned Lizard would be used in place of a name that could be applied to 16 species of horned lizard occurring in Mexico, eight exclusively.

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I thank the collectors of museum specimens and tissues, the collections curators and managers who curate them, and the scientists who have handled and studied horned lizards and shared their insights and knowledge with all of us. This has led to our current understanding of the naming of horned lizards. And in similar fashion, I acknowledge the gift of horned lizards that we have all received from the evolving life forces on our planet, of which we are a part.



Los Angeles Zoo Tour Announcement!

featuring behind the scenes with the Giant Horned Lizard (*P. asio*)

By Taylor Dee

The Los Angeles Zoo and its Curator of Reptiles and Amphibians, Ian Recchio, is offering the HLCS a tour of its Living Amphibians, Reptiles and Invertebrates (LAIR) facility. During this tour we will get a behind the scenes look at the LAIR facility including the 60+ species Ian and his team care for in addition to the captive breeding program of the giant horned lizard. The Giant Horned Lizard's range includes the Pacific coast forests of western Mexico. Until recently not much was known about the species.

The Los Angeles Zoo is the first institution to successfully breed Giant Horned Lizards in captivity and through their program has tremendously contributed to our understanding of the species' unique breeding behaviors. In addition to Giant Horned Lizards, Ian and his staff work on captive breeding programs of multiple sensitive species including exotic species such as the Armenian viper and a southern California local, the southern mountain yellow-legged frog.

Saturday March 14, 2020; 9:30AM

*the tour will not wait for late arrivals

Los Angeles Zoo and Botanical Gardens
5333 Zoo Drive, Los Angeles, CA 90027

Limited spots are available to HLCS members and family so please join/renew your membership before the tour. If reserving a spot for a family of up to four, at least one attending member of the family to be an active member of the HLCS.

- Age requirement is 7+ years of age.
- The tour will include walking a 15-minute walk up a hill to one of the breeding facilities.



Hatchling Giant Horned Lizards. Photo by L.A. Zoo.

For questions and to reserve your spot, please email Taylor Dee at tdee@ecorpconsulting.com. Please specify how many spots you are reserving for. This event was coordinated and brought to you by the HLCS Southern California Regional Contacts: Taylor Dee & Cheryl Jenkins.



Giant Horned Lizard hatching. Photo by L.A. Zoo.



Adult Giant Horned Lizard. Photo by L.A. Zoo.



Announcement - Horned Lizard Conservation Conference!

Join HLCS at the Phoenix Zoo in Phoenix, Arizona on June 6th, 2020 for a conference dedicated to all things horned lizard. We are excited to bring our biennial conference in celebration of our 30th anniversary to the southwest. The Phoenix Zoo offers free parking and is close to numerous hotels and restaurants. In addition, the Phoenix area offers great opportunities for herping, especially for horned lizards!

We are excited to announce that our keynote speaker will be the illustrious Dr. Wade Sherbrooke. Dr. Sherbrooke has published over 60 papers and notes on horned lizard biology, in addition to publishing a wonderful book, "Introduction to Horned Lizards of North America."

If you are interested in presenting at the conference, please email your abstract to Mason Lee at masonmlee3@gmail.com. Please use "Horned Lizard Conference Abstract" in the subject line. Abstract length is 300-500 words. In addition to the abstract, please include presentation type (oral or poster) and presentation title. Oral presentations will be 20 minutes plus 5 minutes for questions.

Deadline for abstract submission has been extended to April 15th.

Look for the registration on the conference page of our website under News. Dinner is included with the registration. Entrance into the zoo is free for registered attendees. Hope to see you there!

\$40 non-members (\$35 if register before March 1st)

\$30 members (\$25 if register before March 1st)

\$15 students (\$10 if register before March 1st)

no charge for presenters

\$50 at the door on the conference day for all but students which is \$25 at the door.



Member Survey Announcement

HLCS would like to know what your thoughts are on how we are doing and how we can improve. We are planning to send you a survey through email. Please consider answering the questions so we can provide better value to you and to horned lizard conservation.



Contribute through AmazonSmile Foundation

If you are an online Amazon shopper, please consider shopping via www.smile.amazon.com. The AmazonSmile Foundation helps you support a charity of your choice while doing your regular shopping on Amazon!

1. Just login or create an account at www.Smile.Amazon.com
2. Type in "Horned Lizard Conservation Society" and choose "Select"

Once you select the Horned Lizard Conservation Society as your charity to support, our society will receive 0.5% of the price of eligible purchases. And from then on, every purchase made through AmazonSmile will benefit the Horned Lizard Conservation Society. Every little bit helps!



President's Message *by Leslie Nossaman*

What a fantastic year HLCS had in 2019! We had a strong board to help carry us through this past year and implement many great improvements. There have been so many they can't all be listed here!

We are currently at 311 total members which is up from 262 this time last year. We currently have members in 27 U.S. states and Washington, D. C., three Mexican states, and one Canadian province. Percentage-wise New Mexico has shown the greatest increase in member numbers over the past several years.

Our public page for Facebook has significantly increased in Likes and Follows. In less than two years the number has more than doubled from 800 Followers in December 2017 to 1655 Followers now. In addition, the Facebook page started 10 years ago and has grown tremendously in the past two years, especially this past year. Last year at this time we had 1045 Followers which shows an increase of 610! We started a Facebook page just for dues-paying members to give you current information and let you know of various activities which also continues to grow. Check page 2 of the newsletter for the links. Thanks to Mason Lee for all her hard work on our social media and everyone who contributed! It is helping to spread the word about our mission.

HLCS also awarded a record number of grants in 2019 at six and we are very excited by their work proposals! You can read about them on our website under "Grants".

The website had many changes in late 2019 with major edits to update the old information, make it more streamlined, and to improve the flow and location of information. More information has also been added with much more to come.

We also made many improvements to processes such as sales which included a counted inventory and tracking procedure, treasury management which also included an improved banking process, storage unit move and clean-out which included organizing the archival items, and a new process for archival of electronic files. We also corrected the logo on four of our sales items, sponsored three wonderful surveys for horned lizards, completely cleaned up and organized the membership database, and even created new stationery.

We also helped several people who had accidentally picked up horned lizards and did not know what to do with them. And we made new contacts in several states and countries.

In August we were awarded the Bronze level of transparency by Guidestar which is a non-profit watch organization which we have never had before.

At the end of the year we had one person donate \$3,000 to help with horned lizard conservation. Also the Elm Fork Chapter for Texas Master Naturalist, Inc. chose HLCS as their Christmas fundraiser with a big donation. We are so grateful for these donations and all donations that people give to advance the mission to conserve the horned lizard! We will put the donations to good work.

I would also like to thank Dr. Wade Sherbrooke for writing the front page article on the horned lizard names at HLCS request. This is such a milestone to have this published.

This year already looks like it will also be fantastic especially with our Horned Lizard Conservation Conference on June 6. Please consider attending and presenting. We've done a lot to spread the word about our mission, improve our processes, and strengthen our infrastructure and have helped a lot of horned lizards but still have a lot yet to do. Looking forward to another successful year!





Return Service Requested

PLEASE JOIN US! Students/Seniors: \$10; Regular: \$25; Contributing: \$50; Lifetime: \$300
Families: \$25 for the first person and \$10 for each additional member
HLCS is a 501(c)(3) non-profit organization. Contributions are deductible to the extent allowable by law.

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to get on the email distribution list**