

# **Not in *Heloderma* ... A revised taxonomy and new genus for the Gila Monster.**

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## **ABSTRACT**

The basis of this paper is an overdue review of the taxonomy of the icon lizard the Gila Monster. While it is clearly a member of the family Helodermatidae Gray, 1837, recently obtained molecular evidence has confirmed long-standing morphological and fossil evidence that it is clearly misplaced in the genus *Heloderma* Wiegmann, 1829.

While it is astounding that no herpetologist has rectified the obvious error of placement to date, this paper does exactly that.

In accordance with the Zoological Code (Ride *et al.* 1999), the new genus *Maxhosersaurus* is created to accommodate the species originally described as *Heloderma suspectum* Cope, 1869, as well as fossil material attributed to this species taxon.

To take into account the fossil Helodermatidae material that has emerged since the original description of the family and more likely to emerge in the future, both genera *Heloderma* and *Maxhosersaurus gen. nov.* are also formally placed within a single tribe defined herein.

**Keywords:** Taxonomy; nomenclature; Gila Monster; Helodermatidae; *Heloderma*; *horridum*; *suspectum*; Varanidae; *Varanus*; Bryan Fry; false claims; new genus; *Maxhosersaurus*.

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## **INTRODUCTION**

The Gila Monster and Beaded Lizards (Genus *Heloderma* Wiegmann, 1829) do not need an introduction as such, due to the fact they are known globally as the only "venomous" lizards in the world. While it is suggested that they sit on the cusp between merely having toxic saliva and being venomous, the final decision in terms of which view to take is dependent on a classification of the delivery system, rather than the compounds within the saliva itself. However a discussion of the venom delivery system of these lizards is not the purpose of this paper.

An excellent account of the Gila Monster, until now known as *Heloderma suspectum* Cope, 1869 can be found in the literature, perhaps the best readily available account for most people being that within Campbell and Lamar (2004). Likewise for the so-called Beaded Lizards, until recently grouped within a single species known generally as *Heloderma horridum* (Wiegmann, 1829), with Campbell and Lamar (2004) perhaps again being the best readily available account of the detail of the group.

In 2013, Reiserer *et al.* published results of a molecular study that showed deep divergences between the two then recognized living species of *Heloderma*. Confirming the similar findings in an earlier study they wrote: "Beaded lizards and Gila monsters (*H. suspectum*) are hypothesized to have diverged from a most-recent common ancestor in the late Eocene ~35 mya (Douglas *et al.* 2010, p. 163)."

On the molecular evidence alone, there would be absolutely no question that species with such deep divergence should be

placed in separate genera. The fossil record as documented by Bogert and del

Campo in 1956 and Beck in Pianka *et al.* (2004) (p. 518) also broadly corroborates this situation.

Campbell and Lamar (2004) provide a detailed morphological account of both *Heloderma horridum* and *H. suspectum* which highlight numerous morphological differences between the two species as recognized by them in their detailed book.

On the basis of the preceding, it is clear that there is no question that *Heloderma horridum* and *H. suspectum* should not be placed in the same genus. Because *Heloderma horridum* is the type species, it remains within *Heloderma*. The species *suspectum* Cope, 1869 is the one that needs to be placed in another genus. As no name is available under the Zoological Code (Ride *et al.* 1999), one is formally defined herein for the first time.

The only vaguely logical or potentially current argument against the placement of the species *suspectum* Cope, 1869 into a new genus is the commonly raised argument against the creation of numerous monotypic genera within a given family. While I would as a matter of course reject such an argument for such deeply divergent species, the argument is now redundant after the publication of Reiserer *et al.* (2013).

These authors elevated four previously described subspecies of *Heloderma horridum* to full species status on the basis of deep

divergences spanning millions of years, between each allopatric population.

This time frame for the various species divisions was within the time range of between 9.7 and 5 million years before present for the relevant species.

With the argument relating to the potential creation of two monotypic genera within a family in effect being removed, there would in the normal course of events be no obvious dissent to my creation of a new genus within the global herpetological community.

However it is appropriate that I herein raise the inevitable response this paper will generate from a group known widely as the "truth haters" or "Wüster gang", the name coming from the ringleader of the group, Wolfgang Wüster, who is a pseudoacademic from Wales in the UK. These men will use all sorts of illegal, unethical and improper means to try to stop the use of the new nomenclature formally proposed within this paper. Their mode of operation is in fact outlined by the gang in Kaiser *et al.* (2012a, 2012b) (the second of these documents not having been written by Kaiser, even though it is referred to as being his), in turn properly dealt with by Hoser (2012b), and again by the Wüster gang in Kaiser *et al.* (2013) (this document not having been written by Kaiser, even though it is referred to and widely cited as being his), in turn properly dealt with by Hoser (2013).

The papers Hoser (2012a, Hoser 2012b and Hoser 2013) all deal with a vast number of cases of taxonomic and nomenclatural misconduct, vandalism, scientific fraud, criminal fraud, lies, dishonest and unethical practices and other serious matters committed by the Wüster gang in the period spanning 1998 to 2013.

In summary, all claims made by the Wüster gang in the follow-up to publication of this paper, should be ignored. This includes their comments in "social media" posts in places like "Twitter", "Facebook", internet chat forums, predatory "journals" and/or PRINO Journals ("peer reviewed in name only" Journals) they or their close friends exercise despotic editorial control over, tabloid news media and elsewhere.

Due to the vast body of literature published on the living members of the Helodermatidae and the fact that much of it is widely available, including on the world-wide web, including for example the highly relevant paper of Reiserer *et al.* (2013), I do not seek to rehash this readily available material herein.

Instead, the main purpose of this paper is to define the new genus according to the Rules of Zoological Nomenclature (Ride *et al.* 1999) to accommodate the species originally described by Cope as *Heloderma suspectum* Cope, 1869 to enable it to be properly named and classified by others according to its obvious phylogenetic origins.

The body of literature on lizards of the Helodermatidae is vast and key references over the last couple of centuries include the following: Aminetzach *et al.* (2009), Angeli (2005), Anzueto and Campbell (2010), Ariano-Sánchez (2006), Ariano-Sánchez and Salazar (2007, 2012, 2013), Beaman *et al.* (2006), Beck (2005), Beck and Jennings (2003), Beck and Lowe (1991), Bernstein (1999), Bogert and Del Campo (1956), Bonetti (2002), Boulenger (1885, 1981), Boundy *et al.* (2012), Campbell and Lamar (2004), Campbell and Vannini (1988), Canseco and Muñoz (2007), Cobarrubias *et al.* (2012), Cooper jr. and Arnett (2003), Cope (1869), Davis and DeNardo (2010), Degenhardt *et al.* (1996), Domínguez-Vega *et al.* (2012), Douglas *et al.* (2010), Duméril and Bibron (1836), Fischer (1882), Funk (1966), Furrer (2004), Garman (1890), Gienger and Beck (2007), Günther (1885), Hanley and Hanley (2003), Hartdegen and Chiszar (2001), Köhler (2000), Kunz (2004, 2007), Kwiatkowski *et al.* (2008), Lemos-Espinal *et al.* (2003), Liner (2007), Lock (2009), Lovich and Beaman (2007), McDiarmid (1963), Meléndez (2006), Monroy-Vilchis *et al.* (2005), Pregill *et al.* (1986), Pyron *et al.* (2013), Reiserer *et al.* (2013), Reisinger (2006a, 2006b),

Sánchez-De La Vega *et al.* (2012), Schmidt and Shannon (1947), Seward (2006), Smith (1935), Smith *et al.* (2010), Stebbins (1985), Stejneger (1893), Sumichrast (1864), Sullivan *et al.* (2004), Taylor (1938, 1969), Trutnau (1984), Wiegmann (1829, 1834), Weins (2008), Wilms (2006a, 2006b) and sources cited therein.

#### GENUS *HELODERMA* WEIGMANN, 1829.

**Type species:** *Trachyderma horridum* Wiegmann, 1829.

**Diagnosis:** Ear exposed. A gular fold. Digits with a series of transverse lamelle inferiorly. Upper surfaces uniformly tubercular; abdominal scales flat, juxtaposed. Labial shields present. Colouration is blackish brown above, spotted with yellow, the latter colour sometimes forming regular rings round the tail, (adopted from Boulenger, 1885).

Diagnosics for the separation of *Heloderma* from *Maxhosersaurus gen. nov.* is given in the description of *Maxhosersaurus gen. nov.* given below.

**Distribution:** Mexico, being found in the coastal areas from Oaxaca to Sonora; Sinaloa, Jalisco, Morelos, Guerrero, Chiapas, Nayarit, Michoacan, as well as Guatemala.

**Content:** *Heloderma horridum* (Wiegmann, 1829) (type species); *H. alvarezi* Bogert and Del Campo, 1956; *H. charlesbogerti* Campbell and Vannini, 1988; *H. exasperatum* Bogert and Del Campo, 1956.

#### GENUS *MAXHOSERSAURUS* GEN. NOV.

**Type species:** *Heloderma suspectum* Cope, 1869.

**Diagnosis:** Until now, the genus *Maxhosersaurus gen. nov.* would have been diagnosed as being within *Heloderma* on the basis of the characters outlined below for the new tribe (which was formerly the diagnosis for a genus including all living Helodermatidae as given by Boulenger in 1885).

However, the genus *Maxhosersaurus gen. nov.* is separated from *Heloderma* by the following suite of characters: The tubercles on the back are separated by wide granular interspaces as opposed to being close in *Heloderma*.

For *Maxhosersaurus gen. nov.* the colouration is yellowish or orange, with blackish network on the back and cross bands on the tail. By contrast the colouration of *Heloderma* is blackish brown above, spotted with yellow, the latter colour sometimes forming regular rings round the tail.

*Maxhosersaurus gen. nov.* are also separated from *Heloderma* by the absence of enlarged post nasal scales, versus usually two in *Heloderma*.

In *Maxhosersaurus gen. nov.* there are only one pair of infralabials in contact with the chin shields, versus two pairs in *Heloderma*.

Differences in habitat preferences also separate the two genera by microhabitat where they occur sympatrically. *Heloderma* are longer, more lanky and arboreal inclined species than *Maxhosersaurus gen. nov.*

*Maxhosersaurus gen. nov.* are readily separated from *Heloderma* by their proportionately shorter tail being no more than 55 per cent of the snout-vent length, versus at least 65 per cent of the snout-vent length in all four *Heloderma* species.

The tongue in *Maxhosersaurus gen. nov.* is usually black, versus pink as it is in most *Heloderma*.

Reiserer *et al.* (2013), rejected the hypothesis that there were three subspecies of *Maxhosersaurus suspectum* on the basis of molecular evidence.

In common with *Heloderma*, *Maxhosersaurus gen. nov.* are further diagnosed with the following traits: Ear exposed. A gular fold. Digits with a series of transverse lamellae inferiorly. Upper surfaces uniformly tubercular; abdominal scales flat, juxtaposed. Labial shields present.

**Distribution:** United States of America in the areas of south-east California, Southern Nevada, South-west Utah, Arizona, New Mexico and immediately adjacent Mexico.

**Etymology:** Named in honour of my cousin, Max Hoser of Campbelltown, NSW, Australia for services to herpetology.

**Content:** *Maxhosersaurus suspectum* (Cope, 1869) (monotypic).

**TRIBE HELODERMINI TRIBE NOV.**

**Terminal taxon:** *Trachyderma horridum* Wiegmann, 1829.

**Diagnosis:** Ear exposed. A gular fold. Digits with a series of transverse lamellae inferiorly. Upper surfaces uniformly tubercular; abdominal scales flat, juxtaposed. Labial shields present (adopted from Boulenger, 1885).

**Distribution:** United States of America in the areas of south-east California, Southern Nevada, South-west Utah, Arizona, New Mexico, south through Mexico, including being found in the coastal areas from Oaxaca to Sonora; Sinaloa, Jalisco, Morelos, Guerrero, Chiapas, Nayarit, Michoacan and into Guatemala.

**Content:** *Heloderma* Wiegmann, 1829; *Maxhosersaurus gen. nov.*

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**CONFLICT OF INTEREST**

The author has no conflicts of interest in terms of this paper or conclusions within.