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New Rattlesnakes in the genera *Crotalus* Linne, 1758, *Uropsophus* Wagler, 1830, *Cottonus* Hoser, 2009, *Matteoea* Hoser, 2009, *Piersonus* Hoser, 2009 and *Caudisona* Laurenti, 1768 (Squamata: Serpentes: Viperidae: Crotalinae).

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ABSTRACT

Ongoing studies of the iconic Rattlesnakes (Crotalinae) identified a number of reproductively isolated populations worthy of taxonomic recognition.

Prior to this paper being published, they were as yet unnamed.
These studies and taxa identified and formally named herein are following on from earlier papers of Hoser in 2009, 2012, 2016 and 2018, Bryson *et al.* (2014), Meik *et al.* (2018) and Carbajal Márquez *et al.* (2020), which besides naming new genera and subgenera, also named a total of 9 new species and 3 new subspecies.

The ten new species and eight new subspecies identified as reproductively isolated and named in accordance with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) are as follows:

1/ Two north-central Mexican populations of *Crotalus (Sayersus*) *scutulatus* (Kennicott 1861) are named as new species in line with the populations identified in earlier studies including Watson *et al.* (2019).

2/ A population until now treated as a form of *Uropsophus armstrongi* Campbell, 1979 from the mountains of southern Nayarit and adjacent Jalisco, Mexico, that is geographically and morphologically divergent is formally named as a new species. Another population from Michoacán, Mexico, is formally named as a subspecies of *U. armstrongi*.

3/ Five Mexican populations previously assigned to either *Uropsophus lepidus* (Kennicott 1861) or *U. lepidus klauberi* (Gloyd, 1936) are formally named as new species, with both the preceding taxa also treated as separate species. A further Mexican population is formally named as a subspecies.

4/ *Cottonus pricei* (Van Denburgh, 1895) of Mexico is formally split three ways with a new species being named and another form resurrected from synonymy.

5/ Three subspecies in the *Matteoea mitchelli* (Cope, 1861) complex are formally named for the first time, two from the USA and one from Baja California Sur, Mexico.

6/ A southern population of *Piersonus brunneus* Harris and Simmons, 1978 from Mexico is herein identified and named as a new subspecies, *P. brunneus bartletti sp. nov.*.

7/ One new species and two new subspecies within *Caudisona* Laurenti, 1768 are formally named.

Scientific recognition of relevant forms is the most important first step in ensuring the long-term conservation of these potentially vulnerable native forms as previously outlined by Hoser (2019a, 2019b).

Keywords: Taxonomy; snakes; nomenclature; rattlesnake; USA; Mexico; Jalisco; Michoacán; Baja; Oaxaca; California; *Crotalus*; *Piersonus*; *Sayersus*; *Uropsophus*; *Aechmorphrys*; *Cottonus*; *Caudisona*; *ravus*; *brunneus*; *scutulatus*; *lepidus*; *mitchelli*; *armstrongi*; *triseriatus*; *pyrrhus*; *stephensi*; *goldmani*; *klauberi*; *pricei*; *basiliscus*; *molossus*; *ehecatl*; new species; *wellsi*; *wellingtoni*; *oxyi*; *woolfi*; *euanedwardsi*; *elfakhariorum*; *valentici*; *swileorum*; *tomcottoni*; *evatti*; new subspecies; *strimplei*; *hammondi*; *matteoae*; *dorisioae*; *sommerichi*; *bartletti*; *teesi*; *smythi*.

INTRODUCTION

The iconic mainly north American Rattlesnakes (Crotalinae) by virtue of them being relatively large and dangerously venomous are well known to herpetologists and lay people alike.

Numerous books and scientific papers have been published relating to most forms over the past 200 years. Past authors such as Klauber, Gloyd and Campbell as cited in this paper, have done significant works on the systematics of the group, leading to a general perception for decades since the late 1970's, that the taxonomy and nomenclature of these snakes was both well-known and "settled".

Hoser (2009) showed that this was far from the case.

Whilst Klauber in particular, via his publications Klauber (1930, 1936a, 1936b, 1938, 1940, 1949, 1952, 1943 and 1972) made significant inroads into the taxonomy at the species-level, Hoser (2009b) showed quite emphatically that the genus-level taxonomy of the group had been severely neglected more than 100 years, being since Garman (1884) erected the genus *Sistrurus*.

Hoser (2009b) resurrected a number of old names (including *Sistrurus*) and was forced to assign genus names to obviously divergent groups such as the so-called long-tailed Rattlesnakes, now placed in the genus *Cummingea* Hoser, 2009.

In light of the collection of further specimens since Klauber's death in 1968, in particular from Mexico, further species of Rattlesnakes have been formally named since Klauber's death.

Following the publications of Hoser (2009b, 2012b) specifically dealing with Rattlesnakes and other papers by myself conducting overdue reviews of a diverse arrange of herpetofauna from all parts of the planet, herpetologists have collectively been motivated to revisit the Crotalinae and other well-known assemblages with a view to identifying and naming putative new taxa.

Hoser (2016, 2018) formally named three new species and three new subspecies.

These were:

Crotalus (*Sayersus*) *funki* Hoser, 2016, *Aechmophrys adelynhoserae* Hoser, 2018, *Aechmophrys jackyhoserae* Hoser, 2018, *Uropsophus pusillus gedyei* Hoser, 2016, *Uropsophus pusillus rentoni* Hoser, 2016 and *Crotalus* (*Sayersus*) *helleri idyllwildi* Hoser, 2016.

Other recent papers of Bryson *et al.* (2014), named two new species, Meik *et al.* (2018) two more new species, and Carbajal Márquez *et al.* (2020), another two new species, the taxonomy of which is also accepted herein at the species level, with genus-level taxonomy herein following that of Hoser (2009b and 2012b).

Those species named by others postdating Hoser (2009b) were: *Uropsophus campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014), *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014), *Matteoea polisi* (Meik, Schaack, Flores-Villela and Streicher, 2018), *M. thalassoporus* (Meik, Schaack, Flores-Villela and Streicher, 2018), *Caudisona ehecatl* (Carbajal-Márquez, Cedeño-Vázquez, Martínez-Arce, Neri-Castro and Machkour-M'rabet, 2020) and *C. mictlantecuhtli* (Carbajal-Márquez, Cedeño-Vázquez, Martínez-Arce, Neri-Castro and Machkour-M'rabet, 2020).

Notwithstanding the preceding descriptions, numerous studies over the preceding 50 years had flagged other potentially unnamed species of Rattlesnakes.

The basis of this study was to audit the entire Crotalinae with a view to identifying and naming any hitherto unrecognized forms at the level of species of subspecies, generally not including forms not widely recognized but for which synonym names were already available.

The purpose of the study was to ensure that all taxonomically identifiable rattlesnakes were formally named so that they can each have proper conservation programs and management implemented so that none become extinct.

Noting the skyrocketing human population growth in the southern USA, especially in regions where Rattlesnakes are most abundant and speciose, and likewise in Mexico, the need to urgently implement proper conservation management for rattlesnakes has never been more important.

As mentioned in the abstract, a total of ten new species were identified in this study as were another eight subspecies, all formally named for the first time.

MATERIALS AND METHODS

Specimens of most species were inspected either live or dead as was all relevant and available literature. In year 2019 alone, I visited the USA three times to view taxa!

The audit included all previous descriptions of taxa, including known synonyms as cited at the end of this paper. This is an expanded list over and above that published by any earlier authors, that also includes most recently described forms to early 2020.

Of particular relevance to this review, were phylogenetic and morphological studies that helped identify morphologically similar species and/or those most closely related.

Significantly phylogenetic studies that identified species level taxa within rattlesnakes were scrutinized with respect to physical biogeographical barriers as well as those barriers caused by such things as similar competing species and other factors.

These same barriers were relevant to other recently identified and named species of reptiles in the southern USA and Mexico.

The following is noted in as much as the morphological and biogeographical evidence on its own and in the absence of molecular studies would have inevitably led to the same species concepts.

Included in the audit were photos of species with good locality data and distribution maps from State Museums, based on specimens in their collections, noting that for some species, the historical distributions were very different to the extant distributions.

Where available and applicable, fossil specimens and records were also reviewed.

Past descriptions and synonymies were reviewed with a view to using available names for species identified herein if they had been properly proposed in the past, in which case no new names would have been proposed.

The putative species or species groups for which potentially hidden and unnamed taxa were identified were as follows:

Crotalus scutulatus (Kennicott, 1861),

Uropsophus Wagler, 1830,

Cottonus pricei (Van Denburgh, 1895),

Matteoea mitchelli (Cope, 1861),

Piersonus Hoser, 2009.

Caudisona Laurenti, 1768.

Publications relevant to *Crotalus scutulatus* (Kennicott, 1861) and the taxonomic decisions within this paper include, Amaral (1929), Bezy and Cole (2014), Borja *et al.* (2014), Bush and Cardwell (1999), Campbell (1979), Campbell and Lamar (1989, 2004), Canseco-Márquez and Gutiérrrez-Mayén (2010), Carbajal-Márquez and Quintero-Díaz (2016), Cardwell (2006), Cardwell *et al.* (2013), Conant and Collins (1991), Cope (1975), Crother (2012), Cruz-Sáenz *et al.* (2017), Davis and Cardwell (2017), Davis and LaDuc (2018), Degenhardt *et al.* (1996), Dixon, (2000), Dixon and Lemos-Espinal (2010), Fernaìndez-Badillo *et al.* (2016), Glenn *et al.* (1983), Heimes (2016), Hernandez *et al.* (2019), Hoser (2009b, 2012b), Jones *et al.* (2011), Kennicott (1861), Klauber (1930, 1952, 1972), Kornacker and Dederichs (2009), Laita (2013), Lazcano (2019), Lemos-Espinal and Dixon (2013), Lemos-Espinal and Smith (2015), Lemos-Espinal *et al.* (2018a, 2018b, 2019), McCranie and Wilson (2001),

McDiarmid et al. (1999), Meik and Pires-daSilva (2009), Monzel (2012), Mrinalini *et al.* (2015), Murphy and Crabtree (1988), Myers *et al.* (2016), Nevárez-de-los-Reyes *et al.* (2016), Peña-Peniche *et al.* (2017), Powell *et al.* (1990), Price (1982), Pyron *et al.* (2013), Rael *et al.* (1984), Reynolds and Scott (1982), Schield *et al.* (2018), Spinner (2017), Stebbins (1985), Strimple (1993, 1996), Tanner (1985), Tennant (2003), Tennant and Bartlett (2000), Terán-Juárez *et al.* (2016), Valdez-Lares (2013), Valencia-Hernandez *et al.* (2007), Van Devender *et al.* (1977), Vázquez Díaz and Quintero Díaz (2006), Wallach *et al.* (2014), Wartenberg (2004), Watson *et al.* (2019), Webb (1984), Werler and Dixon (2000), Werning (2012), Winchell (2007), Woodbury and Hardy (1947), Woolrich-Piña *et al.* (2017), Wüster and Bérnils (2011) and sources cited therein.

Publications relevant to the all species within the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2019 and 2012), and also those relevant to the taxonomic decisions within this paper include the following: Amaral (1929), Arenas *et al.* (2014), Armstrong and Murphy (1979), Axtell (1939), Banda-Leal *et al.* (2015), Beaman and Hayes (2008), Benabib *et al.* (1997), Bezy and Cole (2014), Blair *et al.* (2018), Borja *et al.* (2013), Boulenger (1896), Bryson (2007), Bryson and Lazcano (2005), Bryson *et al.* (2011a, 2011b, 2014), Bucio-Jiménez and Pérez-Mendoza (2016), Bush and Cardwell (1999), Cadle (1988), Calzada-Arciniega *et al.* (2017), Campbell (1979a, 1979b), Campbell and Armstrong (1979), Campbell and Lamar (1989, 2004), Canseco-Márquez and Gutiérrrez-Mayén (2010), Carbajal-Marquez and Quintero-Diaz (2015, 2016), Carbajal-Márquez *et al.* (2012, 2015, 2020), Cardwell (2006), Cardwell *et al.* (2013), Casas-Andreu *et al.* (2014), Castro-Franco and Bustos-Zagal (1994), Christman *et al.* (2016), Conant (1955), Conant and Collins (1991), Cope (1866, 1875, 1885), Crother (2012), Cruz-Sáenz *et al.* (2017), Davis and Cardwell (2017), Davis and La Duc (2018), Davis and Smith (1953), Degenhardt *et al.* (1996), Deloya and Setser (2007), Desantis *et al.* (2015), Díaz de La Vega-Pérez *et al.* (2016b), Dixon (2000), Dixon and Lemos-Espinal (2010), Dixon *et al.* (1972), Domínguez-Godoy *et al.* (2017), Domínguez-Guerrero and Fernández-Badillo (2016), Dorcas (1992), Douglas *et al.* (2006), Enderson *et al.* (2014), Farallo and Forstner (2012), Fernaìndez-Badillo and Goyenechea-Mayer (2010), Fernández-Badillo *et al.* (2012, 2016a), Fernández-Badillo *et al.* (2017), Flores-Guerrero and Sánchez-González (2016), Gibbs *et al.* (2003), Glenn *et al.* (1983), Gloyd (1936b 1936c, 1940), Gloyd and Smith (1942), Goldberg (2000), Gual-Diaz and Rendón-

Correa (2014), Güizado-Rodríguez *et al.* (2016), Günther (1895), Hardy and McDiarmid (1969), Harris and Simmons (1978b), Heimes (2016), Hernandez *et al.* (2019), Herrera-Enríquez *et al.* (2016), Herrmann (2016), Hoser (2009b, 2012b, 2016, 2018), Hidalgo (2016), Jones *et al.* (2011), Juliá-Zertuche and Treviño Saldaña (1978), Kalki *et al.* (2019), Kennicott (1861), Kisser (1980), Klauber (1930, 1938, 1940, 1952, 1972), Kornacker and Dederichs (2009), Laita (2013), Langner (2014), Lazcano *et al.* (2007, 2019), Lemos-Espinal and Dixon (2013), Lemos-Espinal and Smith (2015), Lemos-Espinal *et al.* (2018a, 2018b, 2019), Leyte-Manrique *et al.* (2015), Lillywhite (2014), Lind *et al.* (2019), Liner (1994), Loc-Barragaìn *et al.* (2019), Love (2011), Luja *et al.* (2007), Maritz *et al.* (2016), Martin (1958), Mata-Silva *et al.* (2011, 2014, 2015, 2018), McCranie (1983), McCranie and Wilson (1979, 2001), McDiarmid *et al.* (1999), Meik and Pires-daSilva (2009), Meik *et al.* (2007, 2018), Monzel (2012), Montiel-Canales *et al.* (2017), Muñoz-Nolasco *et al.* (2015), Murphy and Crabtree (1988), Murphy *et al.* (2002), Myers *et al.* (2016), Nevárez-de-los-Reyes *et al.* (2016), Palacios-Aguilar and Flores-Villela (2018), Parkinson (1999), Pérez-Mendoza *et al.* (2017), Peña-Peniche *et al.* (2017), Peterson *et al.* (2004), Philippen (2014), Powell *et al.* (1990), Price (1982), Price (2010), Pyron *et al.* (2013), Rael *et al.* (1984), Reiserer and Schuett (2016), Reynolds and Scott (1982), Ride *et al.* (1999), Roth-Monzón *et al.* (2018), Rojo-Gutieìrrez *et al.* (2018), Rorabaugh *et al.* (2019), Schmidt and Shannon (1947), Schield *et al.* (2018), Smith (1946), Smith *et al.* (1993), Spinner (2017), Stebbins (1985), Stille (1987), Strimple (1993a, 1993c, 1996), Stoll *et al.* (1964), Sunny *et al.* (2019), Tanner (1985), Tanner *et al.* (1972), Taylor (1944, 1949), Tennant (2003), Tennant and Bartlett (2000), Terán-Juárez *et al.* (2015), Tipton (2005), Valdez-Lares *et al.* (2013), Valencia-Hernandez *et al.* (2007), Van Devender and Lowe (1977), Vázquez Díaz and Quintero Díaz (2005), Velde (1995b), Vite-Silva *et al.* (2010), Wagler (1830), Wallach *et al.* (2014), Wartenberg (2004), Watson *et al.* (2019), Webb (1984), Weima (2013), Werler and Dixon (2000), Werning (2012, 2017), Winchell (2007), Woodbury and Hardy (1947), Woolrich-Piña *et al.* (2016, 2017), Wüster and Bérnils (2011) and sources cited therein.

Publications relevant to putative *Cottonus pricei* (Van Denburgh, 1895) *sensu-lato*, including the three species formally recognized wirthin this paper and the taxonomic decisions made within this paper include Alvarado-Diaz and Campbell (2004), Axtell and Sabath (1963), Beaman and Hayes (2008), Beolens *et al.* (2011), Benabib *et al.* (1997), Bezy and Cole (2014), Bryson (2007), Bryson and Lazcano (2003), Bryson *et al.* (2011c), Campbell and Lamar (1989, 2004), Carbajal-Márquez and Quintero-Díaz (2016), Crother (2012), Cruz-Sáenz *et al.* (2017), Gloyd (1940), Heimes (2016), Herrmann (2016), Hoser (2009b, 2012b, 2016, 2018), Ivanyi (2001), Klauber (1952, 1972), Lazcano *et al.* (2019), Lemos-Espinal and Dixon (2013), Lemos-Espinal *et al.* (2018a, 2018b, 2019), Love (2012), McCranie (1981a), McDiarmid *et al.* (1999), Meik and Pires-daSilva (2009), Moll (2004), Nevárez-de-los-Reyes *et al.* (2016), Prival and Schroff (2012), Prival *et al.* (2002), Pyron *et al.* (2013), Rorabaugh *et al.* (2019), Spinner (2017), Stebbins (1985), Stille (1987), Strimple (1994a), Tanner (1985), Terán-Juárez *et al.* (2016), Valdez-Lares *et al.* (2013), Van Denburgh (1895a), Van Devender (1977), Vázquez Díaz (2005), Wallach *et al.* (2014), Werning (2012), Woolrich-Piña *et al.* (2016) and sources cited therein.

Publications relevant to *Matteoea mitchelli* (Cope, 1861) *sensu lato* and the taxonomic decisions within this paper include, Amaral (1927), Baird (1859), Beaman and Hayes (2008), Beolens *et al.* (2011), Campbell and Lamar (1989, 2004), Cope (1861), Coues (1875), Crother (2012), Cunningham (1966), Douglas *et al.* (2006, 2007), Garcia-Padilla *et al.* (2018), Grismer (1999, 2002a, 2002b), Heimes (2016), Hoser (2009b, 2012b, 2016, 2018), Katti *et al.* (2019), Klauber (1936a, 1949, 1963, 1972), Laita (2013), Lindell *et al.* (2006), Mattison (2007), McCrystal and McCoid (1986), McDiarmid *et al.* (1999), Meik and Pires-daSilva (2009), Meik *et al.* (2010, 2012, 2015, 2018), Mocquard (1899), Pyron *et al.* (2013), Smith (1944), Starrett (1999), Stebbins (1985), Stille (1987), Strimple (1992, 1994b), Van Denburgh (1895b), Velde (1995a), Wallach *et al.* (2014), Werning (2011, 2012), Winchell (2007), Wong (1997), and sources cited therein.

Publications relevant to the genus *Piersonus* Hoser, 2009 and the taxonomic decisions within this paper include, Arenas *et al.* (2014), Bryson (2007), Bryson *et al.* (2011a, 2011b, 2014), Bucio-Jiménez and Pérez-Mendoza (2016), Calzada-Arciniega *et al.* (2017), Campbell and Armstrong (1979), Campbell and Lamar (1989, 2004), Canseco-Márquez and Gutiérrrez-Mayén (2010), Casas-Andreu *et al.* (2004), Cope (1866), Davis and Smith (1953), Domínguez-Godoy *et al.* (2017), Fernaìndez-Badillo *et al.* (2016), Harris and Simmons (1978b), Heimes (2016), Hoser (2009b, 2012b), Illescas-Aparicio *et al.* (2016), Kisser (1980), Klauber (1952), Lemos-Espinal and Smith (2015), Lind *et al.* (2019), Mata-Silva *et al.* (2015), McCranie and Wilson (1979), McDiarmid *et al.* (1999), Meik and Pires-daSilva (2009), Murphy *et al.* (2002), Palacios-Aguilar and Flores-Villela (2018), Parkinson (1999), Peterson *et*

al. (2004), Pyron *et al.* (2013), Stille (1987), Vega-Pérez *et al*. (2016), Valencia-Hernandez *et al.* (2007), Wallach *et al*. (2014), Werning (2017), Woolrich-Piña *et al*. (2017) and sources cited therein.

Publications relevant to *Caudisona* Laurenti, 1768 *sensu lato* and the taxonomic decisions within this paper include, Abalos *et al*. (1964), Aeberhard (2010), Akeret (2010, 2015), Almeida-Santos *et al*. (1999), Anderson and Greenbaum (2012), Arenas *et al.* (2014), Augstenová *et al.* (2017), Axtell (1939), Baird and Girard (1853), Barbosa *et al*. (2018), Barbour and Cole (1906), Armstrong and Murphy (1979), Baird and Girard (1853), Beaman and Grismer (1994), Beaman and Hayes (2008), Benício (2016, 2018), Benicio and Martins (2018), Benyr (2016), Bernarde *et al.* (2012), Bérnils *et al.* (2001), Bezy and Cole (2014), Blanco-Torres *et al*. (2013), Boulenger (1896), Cacciali *et al.* (2016), Camarillo Rangel (1983), Campbell (1998), Campbell and Lamar (1989, 2004), Canseco-Márquez and Gutiérrrez-Mayén (2010), Carbajal-Márquez and Cedeño-Vázquez (2017), Carbajal-Marquez and Quintero-Díaz (2016), Carbajal-Marquez *et al.* (2015a, 2015b, 2017, 2018a, 2018b, 2020), Carreira Vidal (2002), Carreira *et al*. (2012), Casas-Andreu *et al*. (2014), Castro-Franco and Bustos-Zagal (1994), Cei (1993), Christman and Painter (1998), Claessen (2006), Cliff (1954), Cobarrubias *et al*. (2012), Cochran *et al.* (2014), Cole *et al.* (2013), Conant and Collins (1991), Cope (1861, 1864, 1885), Costa *et al*. (2018), Cozendey *et al*. (2017), Crother (2012), Cruz Centeno *et al.* (2008), Daan and Hillenius (1966), Dainesi *et al*. (2019), Davis and Smith (1953), Degenhardt *et al*. (1996), Díaz de la Vega-Pérez (2016a, 2016b), Ditmars (1905), Dìaz-Ricaurte *et al*. (2018), Dixon (2000), Dixon and Lemos-Espinal (2010), Duméril *et al*. (1854), Enderson (1999), Enderson *et al*. (2009, 2014), Entiauspe-Neto *et al*. (2016), Esqueda *et al.* (2001), Farr *et al*. (2015a, 2015b), Feoktistow (1893), Fernández-Badillo *et al*. (2016a, 2016b), Ferrante *et al*. (2015), Filogonio *et al.* (2019), Franca *et al*. (2006), Freitas (2014), Freitas *et al.* (2012, 2018, 2019), Frías *et al.* (2015), García-Padilla and Mata-Silva (2014), Garcia-Padilla *et al.* (2018), Gatica-Colima *et al*. (2011), Gehlbach and Collette (1957), Gloyd (1936a, 1936c, 1948), Gloyd and Kauffeld (1940), Gloyd and Smith (1942), González-Sánchez *et al*. (2017), Gorzula and Senaris (1999), Grismer (1999), Guerra Centeno *et al*. (2012), Hamdan and Lira-da-Silva (2012), Hardy and Greene (1995), Hardy and McDiarmid (1969), Harris and Simmons (1978a, 1978b), Harrison and LaDuc (1998), Hedges *et al.* (2019), Hellebuyck (2012), Henderson (2010), Henriques E Souza and Bocchiglieri (2019), Hoge (1966), Hoser (2009, 2012), Humboldt (1811), Illescas-Aparicio *et al.* (2016), Jadin *et al.* (2019), Johnson *et al.* (2015, 2017), Kacoliris *et al*. (2006), Kauffeld and Gloyd (1939), Kisser (1980), Klauber (1936b, 1938, 1941, 1949, 1952, 1972), Kornacker (1999), Kornacker and Dederichs (1997, 2009), Lazcano *et al*. (2019), Larreal *et al.* (2012), Laurenti (1768), Lee (1996, 2000), Lemos-Espinal and Dixon (2013), Lemos-Espinal and Smith (2015), Lemos-Espinal *et al*. (2016, 2018a, 2018b, 2019), Leynaud and Bucher (1999), Leyte-Manrique *et al.* (2015, 2018), Lidth de Jeude (1887), Lillywhite (2014), Linares and Eterovick (2013), Liner (1994), Linnaeus (1758), Loc-barragán *et al.* (2016, 2018, 2019), Lowe and Norris (1954), Love (2011), Luja *et al*. (2017), Madella-Auricchio *et al.* (2017), Maritz *et al*. (2016), Markezich (2002), Marques *et al.* (2011, 2016, 2017), Martin (1958), Mata-Silva *et al*. (2015, 2017, 2019), McCranie (1981b, 1984, 1986, 1993, 2011, 2015), McCranie and Wilson (1979, 2001), McDiarmid *et al.* (1999), Meik and Pires-daSilva (2009), Mertens (1952), Miranda *et al.* (2008), Monzel (2008), Monzel and Wüster (2008), Muñoz-Nolasco *et al*. (2015), Myers *et al.* (2016), Nacimento and Dos Santos (2016), Natera-Mumaw *et al.* (2015), Neves *et al*. (2019), Neill and Ross Allen (1959), Nevárez-de-los-Reyes *et al.* (2014, 2016, 2018), Olivier (2008a, 2008b), Olvera and Badillo (2006), Palacios-Aguilar and Flores-Villela (2018), Palacios-Aguilar *et al.* (2016), Parkinson (1999), Peralta-Fonseca and García-Padilla (2015), Percino-Daniel *et al*. (2013), Pérez-Santos (1988), Platt and Rainwater (2009), Porras (2006), Porras and Solórzano (2006), Porto *et al*. (2013), Price (1980), Prigioni *et al*. (2011, 2013), Quelch (1899), Quijada-Mascareñas and Wüster (2006a, 2006b), Quijada-Mascarenas *et al*. (2007), Riaño-García *et al*. (2017), Ribeiro *et al*. (2012), Rivas Fuenmayor and Amorós (2005), Rivas Fuenmayor *et al.* (2005), Rodríguez-Robles *et al*. (2003), Rojo-Gutieìrrez *et al*. (2018), Rorabaugh *et al.* (2019), Roth-Monzón *et al.* (2018), Sage and Capredon (1971), Santos *et al.* (2014), Savage *et al.* (2005), Savary (1998), Schmidt and Kunz (2005), Schmidt and Shannon (1947), Scott and Lovett (1975), Scrocchi *et al.* (2006), SenÞaris *et al.* (2018), Skubowius (2012), Smith and Taylor (1945, 1950), Soliìs *et al.* (2014), Sonnini de Manoncourt and Latreille (1801), Spinner (2017), Spranger (2015), Starace (1998, 2013), Stebbins (1985), Stille (1987), Strimple (1993b), Stuart (1935), Sunyer (2014), Tanner (1985), Taylor (1938, 1950), Tennant (2003), Tennant and Bartlett (2000), Terán-Juárez *et al.* (2015, 2016), Teskey *et al*. (2015), Travaglia Cardoso and Parpinelli (2006), Trutnau (2002), Valdez-Lares *et al.* (2013), Valencia-Hernandez *et al.* (2007), Van Denburgh (1895a), Van Devender and Lowe (1977), Vanzolini (1947), Vanzolini and Calleffo (2002), Vázquez Díaz and

Quintero Díaz (2005), Vences *et al*. (1998), Vite-Silva *et al.* (2010), Vitt *et al*. (2002), Wallach *et al.* (2014), Webb (1984), Weima (1992), Welch (1994), Werler and Dixon (2000), Werning (2009), Winchell (2007), Wirth (2011), Woolrich-Piña *et al.* (2016, 2017), Wüster and Bérnils (2011), Wüster *et al.* (2005), Zaher *et al.* (2019), Zweifel (1959), and sources cited therein

These papers as a group also effectively include and contain a near complete summary of all that is currently known to science of the ecology, captive husbandry and conservation status of the relevant putative species or species groups and to that extent form an important and near complete bibliography as of 2020.

To qualify as putative new taxa, each identified form had to be morphologically and reproductively identifiable and divergent. In deciding whether to formally name each form as a subspecies or species the degree of divergence and difference was taken into consideration.

When divergence times had been previously published for a given form the following was taken into account. Divergences well in excess of 1 MYA were taken as species-level. Divergences under 1 MYA were usually taken as subspecies-level. For those taxa that diverged between 1-2 MYA I made a judgment call based on divergence by phylogeny, morphological divergence and breeding isolation factors.

As previously noted, all the Crotalinae was subjected to the audit, including common and widespread forms, the result being that divergent and well-known forms were scrutinized and as seen in the results, some were formally named for the first time, which will come as a surprise or even "shock" to some herpetologists who are familiar with the said taxa and in many cases have worked with them for many years, but never previously suspected that they were in fact unnamed taxa.

RESULTS

A total of ten new species were identified as were eight other subspecies. Most were from Mexico, which was not altogether unexpected.

United States forms had generally been named many times and including for forms not widely recognized but found by myself to be distinct at a level worthy of taxonomic recognition, there were one or more synonym names available. This was usually not the case for smaller Mexican species as seen below.

By way of example, two well defined clades of *Hoserea atrox* (Baird and Girard, 1853) were found to be well known and names were available for both. The same applied for *H. adamanteus* (Beauvois, 1799). In both cases, sister taxa were morphologically divergent and based on molecular results they diverged 1-2 MYA.

In the case of *H. atrox*, the nominate form is from Texas and generally east of the Rocky Mountains. The name *H. atrox tortugensis* (Van Denburgh and Slevin, 1921), is available for the divergent lineage from west of the Rocky Mountains.

For *H. adamanteus* the nominate form is that from the type locality South Carolina and most of the extant range of the species. *H. giganteus* (Brattstrom, 1954) is applicable to a divergent population from Florida. Christman (1975) found *H. giganteus* to be conspecific with putative *H. adamanteus* but was unaware of the fact there were two divergent clades.

The taxa identified as reproductively isolated and evolving as separate species or subspecies, named for the first time in accordance with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) are as follows:

1/ Two north-central Mexican populations of *Crotalus* (*Sayersus*) *scutulatus* (Kennicott 1861) are named as new species in line with the populations identified in earlier studies including Watson *et al.* (2019).

2/ A population until now treated as a form of *Uropsophus armstrongi* Campbell, 1979 from the mountains of southern Nayarit and adjacent Jalisco, that is geographically and morphologically divergent is formally named as a new species. Another population from Michoacán, is formally named as a subspecies of *U. armstrongi*. Both groups had been flagged in earlier studies (Bryson *et al.* 2014 and sources cited therein).

3/ Five Mexican populations previously assigned to either *Uropsophus lepidus* (Kennicott, 1861) or *U. lepidus klauberi* (Gloyd, 1936) are formally named as new species, with both the preceding taxa also treated as separate species. A further population is formally named as a subspecies.

4/ *Cottonus pricei* (Van Denburgh, 1895) is formally split three ways with a new species being named and another form resurrected from synonymy.

5/ Three subspecies in the *Matteoea mitchelli* (Cope, 1861) complex are formally named for the first time. All had been flagged in a number of earlier studies (Douglas *et al.* 2006, Douglas *et al.* 2007 and sources cited therein).

6/ A southern population of *Piersonus brunneus* (Harris and Simmons, 1978) is herein identified and named as a new subspecies, *P. brunneus bartletti sp. nov.*. This population has not been flagged previously.

7/ Three divergent taxa within *Caudisona* Laurenti, 1768 were identified and named. Two were named

as subspecies and a third as a full species. The species named herein had not been flagged in earlier studies.

For all of the taxa within *Caudisona* and *Matteoea* named herein as new subspecies, it was a tough judgment call to make in terms of deciding whether to designate the taxa as species or subspecies. As more information comes to light, it is likely I will be found to be too conservative and some of these forms may well need to be elevated to full species. I note that divergence levels for some of these subspecies well exceed divergences for forms known to have less divergence and recognized widely as full species at the current time.

Further relevant information is provided with each formal description.

Scientific recognition of relevant forms is the most important first step in ensuring the long-term conservation of these potentially vulnerable native forms as previously outlined by Hoser (2019a, 2019b).

INFORMATION RELEVANT TO THE FORMAL DESCRIPTIONS THAT FOLLOW

There is no conflict of interest in terms of this paper or the conclusions arrived at herein.

Several people including anonymous peer reviewers who revised the manuscript prior to publication are also thanked as are relevant staff at museums who made specimens and records available in line with international obligations.

In terms of the following formal descriptions, spellings should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature as administered by the International Commission of Zoological Nomenclature (ICZN).

In the unlikely event two or more newly named taxa are deemed to be the same by a first reviser, then the name to be used and retained is that which first appears in this paper by way of page priority and as listed in the abstract keywords.

Some material in descriptions for taxa may be repeated for other taxa in this paper and this is necessary to ensure each fully complies with the provisions of the *International Code of Zoological Nomenclature* (Fourth edition) (Ride *et al.* 1999) as amended online since.

Material downloaded from the internet and cited anywhere in this paper was downloaded and checked most recently as of 18 July 2020 (including if also viewed prior), unless otherwise stated and was accurate in terms of the content cited herein as of that date.

Unless otherwise stated explicitly, colour and other descriptions apply to living adult specimens of generally good health and not under any form of stress by means such as excessive cool, heat, dehydration, excessive ageing, abnormal skin or reaction to chemical or other input.

While numerous texts and references were consulted prior to publication of this paper, the criteria used to separate the relevant species or subspecies has already been spelt out and/or is done so within each formal description and does not rely on material within publications not explicitly cited herein.

CONSERVATION

In terms of conservation of each population of each species as described in this paper, the relevant comments in Hoser (1989, 1991, 1993, 1995, 1996, 2019a and 2019b) apply.

Several of the previously cited publications cited in the “Materials and Methods” section of this paper talk extensively about declines in relevant species caused by human factors.

Wildlife laws as currently enforced in the USA and Mexico are not in a materially significant way enhancing the long-term survival prospects of any of the relevant species, noting all occur within these two nation states.

Over breeding of humans, wholly in line with government policy in both the USA and Mexico and the environmental problems associated with this overpopulation are by far the greatest long term threat to each and every relevant species, noting that already liberated feral pest species continue to cause ongoing stress and decline of some relevant species as explicitly detailed in Hoser (1991).

All forms are probably in decline and some may be in imminent danger of extinction caused by imported pest species, habitat alteration, direct killing by humans, pathogens, translocation as detailed by Hoser (1995) or other factors.

Formally naming new species is the critically important first step in their conservation as outlined by Hoser (2019a, 2019b).

In accordance with the recommendations in the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), this is being done as soon as is practicable.

***CROTALUS* (*SAYERSUS*) *WELLSI SP. NOV.* LSIDURN:LSID:ZOOBANK.ORG:ACT:5362D02A-BAD2-4DB4-A9AC-333E171E1949**

Holotype: A preserved adult male specimen at the Museum of Vertebrate Zoology, University of California, Berkeley. California, USA, specimen number MVZ 84509 collected from Pajarito Canyon, Rancho Provedencia, 26 miles south-west of Gallego, Sierra El Nido, Chihuahua, Mexico, at an elevation of 1828 metres, Latitude +29.5564 N.,

Longitude -106.6542 E. This facility allows access to its holdings.

Paratypes: All preserved specimens from the state of Chihuahua, Mexico, being at the following facilities: Brigham Young University, Provo, Utah, USA, specimen numbers BYU 13871-72, 15313-14, 15321, 15344, 15349-51, 15678, 17108, 17113, 19133, 21717; Kansas Natural History Museum, Lawrence, Kansas, USA, specimen numbers KU 35093; 45339-45, 62865, 75643; Museum of Vertebrate Zoology, University of California, Berkeley. California, USA, specimen numbers MVZ 68913, 71036-37, 71040, 71050, 73115, 73117, 73123; Texas Natural History Collections, in the Texas Natural Science Center (TNSC) at The University of Texas at Austin, Texas, USA, specimen numbers TNHC 101199, 105694; University of Texas at Arlington Amphibian and Reptile Diversity Research Center specimen numbers UTA 4554, 12587, 17932, 58939.

Diagnosis: *Crotalus* (*Sayersus*) *wellsi sp. nov.* and *Crotalus* (*Sayersus*) *wellingtoni sp. nov.* have until now been recognized as populations of *C. scutulatus* (Kennicott, 1861).

Numerous authors have recognized four morphologically and genetically divergent populations of putative *C. scutulatus*, including the nominate type form from Arizona or California, USA (see Campbell and Lamar 2004, pages 579-580) and *Crotalus scutulatus salvini* (Günther,1895) from Huamantla, Tlaxcala, Mexico, herein regarded as a full species, and called *C. salvini*. The other two forms, previously unnamed are *C. wellsi sp. nov.* from upper northern Mexico centred on the state of Chihuahua and *C. wellingtoni sp. nov.*. from mid northern Mexico, with a distribution centred on the central plateau.

The taxon originally described as *Crotalus confluentus kellyi*, Amaral, 1929, with a type locality of Needles, California is herein treated as synonymous with the type form of *C. scutulatus*, as done by Campbell and Lamar (2004) at page 580.

Crotalus scutulatus including all three species previously treated as conspecific with *C. scutulatus*, are separated from other species in the genus *Crotalus* Linne, 1758 as defined by Hoser (2009b and 2012b) by having low subdivision of head scales in both the prefrontal and parietal regions, approaching that of the genera *Sistrurus* Garman, 1883, or more distantly *Piersonus* Hoser, 2009 (see below). They also have few intersupraocular scales (usually a minimum of two spanning a row), and have a distinctive large crescentric scale at the medioposterior border of each of the supraoculars.

Nominate *C. scutulatus* is separated from each of C. *wellsi sp. nov.*, *C. wellingtoni sp. nov.* and *C. scutulatus salvini* by the following suite of characters: a yellowish to beige background colour on the dorsum, the large brown blotches on the dorsum range from light greyish brown, to dark brown or orange-brown and are bounded by moderate to well-defined whitish edges. The dark bar running from the bottom of the eye, that runs diagonally backwards to the rear upper lip is well defined and dark and has a thick border on the lower jaw, that remains wide or widens at contact with the upper jawline. This dark bar then continues as a dark border (a moderately think line) posterior for some distance along the rear jawline, bounded by light above. There is a dark triangle beneath and posterior to the sensory pit, which may be either alone or as part of a wider dark patch extending from the snout. At the snout this darker line, if present, tends to lighten.

C. *wellsi sp. nov.* is separated from each of *C. scutulatus*, *C. wellingtoni sp. nov.* and *C. salvini* by the following suite of characters: As for *C. scutulatus* diagnosed above but instead with a washed out colour on the dorsum. The upper boundary of the band running from the eye, diagonally backwards to the upper lip has a jagged edge, rather than more-or-less even in *C. scutulatus.* This dark bar does not continue as a dark border (a moderately think line) posterior along the rear jawline as described for *C. salvini* (below).

C. *wellingtoni sp. nov.* is separated from each of *C. scutulatus*, C. *wellsi sp. nov.* and *C. salvini* by the following suite of characters: The dark blotches on the dorsum have light brown centres and are blackish towards the outer edges, with zero evidence of white, light or other scales indicating lighter colouration at the boundaries, versus not so in both *C. scutulatus* and C. *wellsi sp. nov.*.

C. salvini sometimes is similar to C. *wellingtoni sp. nov.* with regards to the dorsal blotches, but when this is the case, the outer edges of the blotches have jet black scales, rather than being just blackish, or grading to blackish from brown (versus distinctly jet black scales in *C. salvini*). Most *C. salvini* have blotches that are generally very dark and quite unlike the all brown or brown centered blotches seen in the other three subspecies. In C. *wellingtoni sp. nov.* the upper boundary of the band running from the eye, diagonally backwards to the upper lip has a smooth edge, as in *C. scutulatus*, but unlike that species, it does not extend as a line posterior along the jawline.

C. salvini is further readily separated from the other three species by a strong yellowish hue, tinge, or colour to the upper and lateral surfaces of the head that contrasts with the body colour of the anterior neck and posterior to it.

C. salvini is separated from the other three species by the following unique suite of characters: only slight subdivision of the crown scales, distal tail bands that are similar in colour to dorsal blotches, versus distal tail bands that are notably darker, and dorsal blotches that lack a distinct border of pale white scales. The dorsal blotches are dark, well defined and encircled by thick-well-defined pale areas of one or usually two scales in width, being the lighter background colour of this snake. In this species, the dark bar running from the bottom of the eye, that runs diagonally backwards to the rear upper lip is sometimes well defined and dark but it is also significantly reduced in size and shape to instead form a significantly smaller semi-oval shaped blotch that terminates well above the upper jawline (not making contact with it) (e.g. Watson *et al*. 2019 on page 132 Fig. 2 B, or page 137 bottom), or otherwise is indistinct, but even when viewed closely it is still failing to extend to the lower jaw (as seen in plates 944 and 955 of Campbell and Lamar 2004), and always being otherwise bounded by light coloured scales. The dark triangle found beneath and posterior to the sensory pit in the other three subspecies is either absent or extremely faint.

Photos of living examples of each of *C. scutulatus*, C*. wellsi sp. nov.*, *C. wellingtoni sp. nov.* and *C. salvini* can be seen in that order from top to bottom, in Watson *et al.* (2019) on page 137.

Watson *et al.* (2019) on page 132 have black and white images of *C. scutulatus* Fig. 2C, *C. wellingtoni sp. nov.* Fig. 2A, 2D, and *C. salvini* Fig. 2B, 2E.

Further images of all four subspecies with location data can be found online on sites such as http://www.flickr.com.

Hoser (2009b and 2012b) defined the genus *Crotalus* and this definition is relied upon herein as follows:

Medium to large rattlesnakes. They are separated from all other rattlesnake genera by the following suite of characters, either individually and/or in any combination.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

There are two or more internasals. The tail has rings which may or may not be distinct, unless the tail is black.

The pattern is generally of blotches, as opposed to say crossbands (like in *Uropsophus*).

Unlike the genus *Hoserea* Hoser, 2019, the tail does not have distinct dark and light bands of similar width and/or if they do, they merge into the dorsal pattern anterior to this, as opposed being of a distinct cocoon-like appearance as distinct from the dorsal pattern before it.

Sistrurus and *Piersonus* are readily separated from *Crotalus* by the presence of very large head shields at the center of the crown of the head.

Schield *et al.* (2018) found genetic evidence to suggest that putative *C. scutulatus* (as conceived by them) should be divided into four separate species, with findings that each of the four main populations diverged from one another at least 1.459 MYA. They estimated nuclear divergence times of 1.459 MYA between Mohave-Sonoran (type *C. scutulatus*) and Chihuahuan populations (*C. wellsi sp. nov.*) 4.138 MYA between Chihuahuan and Central Mexican Plateau populations (*C. wellingtoni sp. nov.*), and 1.817 MYA between Central Mexican Plateau and *C. salvini* populations from in the south-central Mexican states of Hidalgo, Tlaxcala, Estado de México, Puebla, and Veracruz.

On that basis full species recognition would normally follow.

However, Watson *et al*. (2019), concluded that phenotypic similarities between populations meant that treating all four forms as a single species was the simplest way to deal with the taxonomy of the group.

Watson *et al*. (2019) looked at a number of characteristics for each race and found no clear means to divide the populations.

However they did not look at some of the characters used herein to consistently separate the various taxa, which may well have altered their results and conclusions if they had done so.

Neither Schield *et al.* (2018) or Watson *et al*. (2019) appeared to seriously consider the third option of formal recognition of each form as subspecies, which was self-evidently the most sensible conservative position to take based on the evidence they had in front of them and even when faced with difficulty separating the four taxa.

Doing so would have allowed other scientists to be able to properly identify the relevant snakes by name and allow for conservation management of the populations, making sure none become extinct while scientists continue to dither over whether or not each population is a unique species or merely a variant of something bigger and perhaps therefore not worthy of conservation effort (see Hoser 2019a, 2019b).

In the event more scientists ultimately agreed with

the views of Schield *et al.* (2018) and the taxonomy this would lead to, then both *C. wellsi sp. nov.* and *C. wellingtoni sp. nov.* as defined herein could have remained as subspecies, but still as biological entities that could have been formally protected.

Noting that I found a means to readily separate the four populations consistently, I have chosen to treat all as full species rather than subspecies.

I should also note that in blind tests on 30 random photos of specimens of putative *C. scutulatus*, I was presented with, with no identifying information, I was able to accurately guess the provenance (subspecies) based on the diagnostic information presented above; (I was advised of provenance after the test).

Two other people without knowledge of snakes were presented with the same diagnostic information and asked to assign subspecies, based solely on the information provided above and also did it successfully in each case.

No other putative species of rattlesnakes were used in the tests, making each identification in effect a "multiple choice" assignment. In the absence of any knowledge the likelihood of the same result from this test would be one in 240.

Distribution: *C. wellsi sp. nov.* occurs wholly in northern Mexico and immediately adjacent parts of Texas, USA north-east of the Rio Grande, with a distribution centred on the province of Chihuahua, with populations extending to Coahuila and Durango provinces.

Nominate *C. scutulatus* is found in the Mojave and Sonora deserts of the USA, including far north-west Mexico in Sonora.

C. wellingtoni sp. nov. occurs in the region of the central Plateau of Mexico.

C. salvini occurs in the south-central Mexican states of Hidalgo, Tlaxcala, Estado de México, Puebla, and Veracruz.

Etymology: *C. wellsi sp. nov.* is named in honour of Richard Wells of Lismore, New South Wales, Australia in recognition of his many major contributions to the taxonomy and nomenclature of Australian reptiles, including the historical publications Wells and Wellington (1984, 1985).

CROTALUS* (*SAYERSUS*) *WELLINGTONI SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:A553B380-8A59-4229-98EC-0AF85E3E0EBF

Holotype: A preserved immature female specimen at the Museum of Vertebrate Zoology, University of California, Berkeley. California, USA, specimen number MVZ 275539, from Minta Santa Brigida, Municipio San Luis de la Paz, Guanajuato, Mexico, at an altitude of 2285 metres, Latitude +21.1435 N., Longitude 100.2726 W. This facility allows access to its holdings.

Paratypes: All preserved specimens from the state of Aguascalientes, Mexico, being at the following facilities: California Academy of Sciences, San Francisco, California, USA, specimen number CAS 87400; Museum of Vertebrate Zoology, University of California, Berkeley. California, USA, specimen number MVZ 275536; A and M University Biodiversity Research and Teaching Collections, Texas, USA, specimen number TCWC 38569; Amphibian and Reptile Diversity Research Center, University of Texas at Arlington, Texas, USA, specimen number UTA 18360.

Diagnosis: *Crotalus* (*Sayersus*) *wellsi sp. nov.* and *Crotalus* (*Sayersus*) *wellingtoni sp. nov.* have until now been recognized as populations of *C. scutulatus* (Kennicott, 1861).

Numerous authors have recognized four morphologically and genetically divergent populations of putative *C. scutulatus*, including the nominate type form from Arizona, or California, USA (see Campbell and Lamar 2004, pages 579-580) and *Crotalus scutulatus salvini* (Günther,1895) from Huamantla, Tlaxcala, Mexico, herein regarded as a full species, and called *C. salvini*. The other two forms, previously unnamed are *C. wellsi sp. nov.* from upper northern Mexico centred on the state of Chihuahua and *C. wellingtoni sp. nov.*. from mid northern Mexico, with a distribution centred on the central plateau.

The taxon originally described as *Crotalus confluentus kellyi*, Amaral, 1929, with a type locality of Needles, California is herein treated as synonymous with the type form of *C. scutulatus*, as done by Campbell and Lamar (2004) at page 580.

Crotalus scutulatus including all three species previously treated as conspecific with *C. scutulatus*, are separated from other species in the genus *Crotalus* Linne, 1758 as defined by Hoser (2009 and 2012) by having low subdivision of head scales in both, the prefrontal and parietal regions, approaching that of the genera *Sistrurus* Garman, 1883, or more distantly *Piersonus* Hoser, 2009 (see below). They also have few intersupraocular scales (usually a minimum of two spanning a row), and have a distinctive large crescentric scale at the medioposterior border of each of the supraoculars.

Nominate *C. scutulatus* is separated from each of C*. wellsi sp. nov.*, *C. wellingtoni sp. nov.* and *C. scutulatus salvini* by the following suite of characters: a yellowish to beige background colour on the dorsum, the large brown blotches on the dorsum range from light greyish brown, to dark brown or orange-brown and are bounded by moderate to well-defined whitish edges. The dark

bar running from the bottom of the eye, that runs diagonally backwards to the rear upper lip is well defined and dark and has a thick border on the lower jaw, that remains wide or widens at contact with the upper jawline. This dark bar then continues as a dark border (a moderately think line) posterior for some distance along the rear jawline, bounded by light above. There is a dark triangle beneath and posterior to the sensory pit, which may be either alone or as part of a wider dark patch extending from the snout. At the snout this darker line, if present, tends to lighten.

C*. wellsi sp. nov.* is separated from each of *C. scutulatus*, *C. wellingtoni sp. nov.* and *C. salvini* by the following suite of characters: As for *C. scutulatus* diagnosed above but instead with a washed out colour on the dorsum. The upper boundary of the band running from the eye, diagonally backwards to the upper lip has a jagged edge, rather than more-or-less even in *C. scutulatus.* This dark bar does not continue as a dark border (a moderately think line) posterior along the rear jawline as described for *C. salvini* (below).

C*. wellingtoni sp. nov.* is separated from each of *C. scutulatus*, C*. wellsi sp. nov.* and *C. salvini* by the following suite of characters: The dark blotches on the dorsum have light brown centres and are blackish towards the outer edges, with zero evidence of white, light or other scales indicating lighter colouration at the boundaries, versus not so in both *C. scutulatus* and C*. wellsi sp. nov.*

C. salvini sometimes is similar to C*. wellingtoni sp. nov.* with regards to the dorsal blotches, but when this is the case, the outer edges of the blotches have jet black scales, rather than being just blackish, or grading to blackish from brown (versus distinctly jet black scales in *C. salvini*). Most *C. salvini* have blotches that are generally very dark and quite unlike the all brown or brown centered blotches seen in the other three subspecies. In C*. wellingtoni sp. nov.* the upper boundary of the band running from the eye, diagonally backwards to the upper lip has a smooth edge, as in *C. scutulatus*, but unlike that species, it does not extend as a line posterior along the jawline.

C. salvini is further readily separated from the other three species by a strong yellowish hue, tinge, or colour to the upper and lateral surfaces of the head that contrasts with the body colour of the anterior neck and posterior to it.

C. salvini is separated from the other three species by the following unique suite of characters: only slight subdivision of the crown scales, distal tail bands that are similar in colour to dorsal blotches, versus distal tail bands that are notably darker, and dorsal blotches that lack a distinct border of pale white scales. The dorsal blotches are dark, well defined and encircled by thick-well-defined pale areas of one or usually two scales in width, being the lighter background colour of this snake. In this species, the dark bar running from the bottom of the eye, that runs diagonally backwards to the rear upper lip is sometimes well defined and dark but it is also significantly reduced in size and shape to instead form a significantly smaller semi-oval shaped blotch that terminates well above the upper jawline (not making contact with it) (e.g. Watson *et al*. 2019 on page 132 Fig. 2 B, or page 137 bottom), or otherwise is indistinct, but even when viewed closely it is still failing to extend to the lower jaw (as seen in plates 944 and 955 of Campbell and Lamar 2004), and always being otherwise bounded by light coloured scales. The dark triangle found beneath and posterior to the sensory pit in the other three subspecies is either absent or extremely faint.

Photos of living examples of each of *C. scutulatus*, C*. wellsi sp. nov.*, *C. wellingtoni sp. nov.* and *C. salvini* can be seen in that order from top to bottom, in Watson *et al.* (2019) on page 137.

Watson *et al.* (2019) on page 132 have black and white images of *C. scutulatus* Fig. 2C, *C. wellingtoni sp. nov.* Fig. 2A, 2D, and *C. salvini* Fig. 2B, 2E.

Further images of all four subspecies with location data can be found online on sites such as http://www.flickr.com.

Hoser (2009b and 2012b) defined the genus *Crotalus* and this definition is relied upon herein as follows:

Medium to large rattlesnakes. They are separated from all other rattlesnake genera by the following suite of characters, either individually and/or in any combination.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

There are two or more internasals. The tail has rings which may or may not be distinct, unless the tail is black.

The pattern is generally of blotches, as opposed to say crossbands (like in *Uropsophus*).

Unlike the genus *Hoserea* Hoser, 2019, the tail does not have distinct dark and light bands of similar width and/or if they do, they merge into the dorsal pattern anterior to this, as opposed being of a distinct cocoon-like appearance as distinct from the

dorsal pattern before it.

Sistrurus and *Piersonus* are readily separated from *Crotalus* by the absence of very large head shields at the center of the crown of the head.

Schield *et al.* (2018) found genetic evidence to suggest that putative *C. scutulatus* (as conceived by them) should be divided into four separate species, with findings that each of the four main populations diverged from one another at least 1.459 MYA. They estimated nuclear divergence times of 1.459 MYA between Mohave-Sonoran (type *C. scutulatus*) and Chihuahuan populations (*C. wellsi sp. nov.*) 4.138 MYA between Chihuahuan and Central Mexican Plateau populations (*C. wellingtoni sp. nov.*), and 1.817 MYA between Central Mexican Plateau and *C. salvini* populations from in the south-central Mexican states of Hidalgo, Tlaxcala, Estado de México, Puebla, and Veracruz.

On that basis full species recognition would normally follow.

However, Watson *et al*. (2019), concluded that phenotypic similarities between populations meant that treating all four forms as a single species was the simplest way to deal with the taxonomy of the group.

Watson *et al*. (2019) looked at a number of characteristics for each race and found no clear means to divide the populations.

However they did not look at some of the characters used herein to consistently separate the various taxa, which may well have altered their results and conclusions if they had done so.

Neither Schield *et al.* (2018) or Watson *et al*. (2019) appeared to seriously consider the third option of formal recognition of each form as subspecies, which was self-evidently the most sensible conservative position to take based on the evidence they had in front of them and even when faced with difficulty separating the four taxa.

Doing so would have allowed other scientists to be able to properly identify the relevant snakes by name and allow for conservation management of the populations, making sure none become extinct while scientists continue to dither over whether or not each population is a unique species or merely a variant of something bigger and perhaps therefore not worthy of conservation effort (see Hoser 2019a, 2019b).

In the event more scientists ultimately agreed with the views of Schield *et al*. (2018) and the taxonomy this would lead to, then both *C. wellsi sp. nov.* and *C. wellingtoni sp. nov.* as defined herein could have remained as subspecies, but still as biological entities that could have been formally protected.

Noting that I found a means to readily separate the four populations consistently, I have chosen to treat all as full species rather than subspecies.

I should also note that in blind tests on 30 random photos of specimens of putative *C. scutulatus*, I was presented with, with no identifying information, I was able to accurately guess the provenance (subspecies) based on the diagnostic information presented above; (I was advised of provenance after the test).

Two other people without knowledge of snakes were presented with the same diagnostic information and asked to assign subspecies, based solely on the information provided above and also did it successfully in each case.

No other putative species of rattlesnakes were used in the tests, making each identification in effect a "multiple choice" assignment. In the absence of any knowledge the likelihood of the same result by a person would be one in 240.

Distribution:

C. wellingtoni sp. nov. occurs in the region of the central Plateau of Mexico.

C. wellsi sp. nov. occurs wholly in northern Mexico and immediately adjacent parts of Texas, USA north-east of the Rio Grande, with a distribution centred on the province of Chihuahua, with populations extending to Coahuila and Durango provinces.

Nominate *C. scutulatus* is from the Mojave and Sonora deserts of the USA, including far north-west Mexico in Sonora.

C. salvini occurs in the south-central Mexican states of Hidalgo, Tlaxcala, Estado de México, Puebla, and Veracruz.

Etymology: *C. wellingtoni sp. nov.* is named in honour of Cliff Ross Wellington of Ramornie, New South Wales, Australia in recognition of his many major contributions to the taxonomy and nomenclature of Australian reptiles, including the historical publications Wells and Wellington (1984, 1985), as well as his services for wild life in Thailand and other parts of south east Asia, including many incursions in Thai bush.

UROPSOPHUS OXYI SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:0FC6DACD-1628-460D-BE11-45D0F447DE05

Holotype: A preserved specimen at the University of Kansas Biodiversity Institute. KUBI Herpetology Collection, Kansas, USA, specimen number KU KUH 29500 collected from 6 miles south of Ixtlan del Rio, Nayarit, Mexico, Latitude +20.9500 N., Longitude -104.3667 W.

Paratypes: Two preserved specimens at the University of Kansas Biodiversity Institute. KUBI Herpetology Collection, specimen numbers KU KUH

29501 and KU KUH 29502 collected from 6 miles south of Ixtlan del Rio, Nayarit, Mexico, Latitude +20.9500 N., Longitude -104.3667 W.

Diagnosis: Until now the taxon *Uropsophus oxyi sp. nov*. has been treated as an outlier population of the species *U. armstrongi* (Campbell, 1979), but the likelihood of it being a separate species has been known for many years (e.g. Campbell, 1979, Bryson *et al.* 2011, 2014).

Molecular data published by Bryson *et al.* (2011, 2014) also supports the contention that *Uropsophus oxyi sp. nov*. is a species-level taxon.

U. oxyi sp. nov. is separated from the related species *U. armstrongi* in the south-east and *U. campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) in the south-west by the Río Ameca drainage which runs into the Pacific Ocean.

U. campbelli, *U. oxyi sp. nov*. and *U. armstrongi* can be distinguished from all members of the *Uropsophus* Wagler, 1830 as defined by Hoser (2009b and 2012b), by the following unique suite of characters: (1) presence of intercanthals, (2) infrequently divided upper preocular (9.1 per cent of the time), (3) 150-154 ventrals in males, 147-152 in females, (4) 31-32 subcaudals in males, 22-26 in females, (5) small rattle (proximal rattle width 11.0-14.6 per cent of head length), (6) long tail (9.1-11.0 per cent of total body length in males, 7.5-8.9 per cent in females), (7) pale interspaces between dorsal and lateral blotches, (8) heavy venter mottling, (9) dark proximal rattle and underside of tail, and (10) usually a single large anterior intercanthal (modified from Bryson *et al.* 2014).

Uropsophus armstrongi strimplei sp. nov. has until now been treated as the Michoacán population of nominate *U. armstrongi* and is separated from that population by a series of low-elevation areas and an established population of *C. pusillus* Klauber, 1952 in the intervening high altitude areas, that appears to have cut both populations apart for about 1 MYA. On the basis of morphological and genetic divergence (for details of the latter see Bryson *et al.* 2011 and Blair *et al.* 2018) that population is formally defined and named as a subspecies.

U. armstrongi strimplei sp. nov. is readily separated from nominate *U. armstrongi armstrongi* by having a dorsum with a background colour of beige, with a shiny yellowish-pink venter and no white line or one that is barely noticeable, above the dark post-ocular stripe, versus a well defined white line or boundary in the type form of *U. armstrongi armstrongi.*

U. campbelli can be distinguished from *U. armstrongi* (including subspecies) and *U. oxyi sp. nov*. by the following suite of characters: higher mean number of ventrals (152 in males and 149 in females vs. 141 and 144), higher mean number of subcaudals in males (31 vs. 28), less frequently divided upper preocular (9.1 per cent vs. 14.3 per cent), proportionately longer tail in males (10.3 per cent of total body length vs. 9.7 per cent), smaller mean proximal rattle width (13.0 per cent of head length vs. 14.0 per cent), higher mean number of dorsal blotches (48 vs. 42), and higher number of tail bands (mode of 9 vs. 6) (derived from Bryson *et al*. 2014).

U. oxyi sp. nov. is separated from the other two species (above) by having a breaks between blotches on the dorsum of more than one scale in width, versus not usually so in the other two species; light grey or brick red background colour on the dorsum, versus grey-brown, or orange-brown in the other two species; a venter and chin that is extremely dark (instead of mottled to dark in *U. armstrongi*) and not heavily suffused with pink; darker markings on the head are well defined in all but aged specimens.

Snakes in the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2009 and 2012) are separated from all other rattlesnakes by the following suite of characters: A group of small rattlesnake species found in Mexico and adjacent southern USA. The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

Distribution: *U. oxyi sp. nov.* is known only from the forested mountains including adjacent cleared areas in the mountains in the far south of Nayarit, Mexico, including adjacent hills between routes 4 and 50 in Jalisco, generally north of the Río Ameca drainage. South and east of this drainage system one finds the allopatric species *U. campbelli* (south) and *U. armstrongi* south-east and east.

Etymology: The new species is named in honour of "Oxy", being the abbreviated name of a now deceased Great Dane dog that protected this

author's scientific research facility for 8 years. It is appropriate that a species is formally named in his honour. His full name was "Oxyuranus", being the genus name for a group of large venomous Australian elapid snakes. The new name is also useful in that it is short and easy to remember.

UROPSOPHUS ARMSTRONGI STRIMPLEI SUBSP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:AC7EA9A0-25E3-4089-8A0D-EEBA6EBCF6CA

Holotype: A preserved specimen at the American Museum of Natural History, New York City, USA, specimen number AMNH 98846, collected from Puerto Garnica, Michoacán. Mexico, Latitude +19.7131 N., Longitude -100.7887 W. This facility allows access to its holdings.

Paratypes: A preserved specimen at the University of Iowa Museum of Natural History, University of Iowa, Iowa City, Iowa, USA, specimen number UINHM 26225 collected from Mil Cumbres, Michoacán, Mexico; and two preserved specimens at the Museum of Zoology. University of Michigan, Ann Arbor, Michigan, USA, specimen number UMMZ 98941, collected from 5 miles south of Pátzcuaro near the road to Tacambaro, Michoacán, Mexico and UMMZ 121523 collected from 2.3 miles north of Opopeo, Michoacán, Mexico; and five preserved specimens at the Field Museum of Natural History, Chicago, Illinois, USA, specimen numbers FMNH 39106, 39110, 39111, 39124 and 40823 all collected near Tancítaro, Michoacán, Mexico.

Diagnosis: *Uropsophus armstrongi strimplei sp. nov.* has until now been treated as the Michoacán population of nominate *U. armstrongi* and is separated from that population by a series of low-elevation areas and an established population of *C. pusillus* Klauber, 1952 in the intervening high altitude areas, that appears to have cut both populations apart for about 1 MYA. On the basis of morphological and genetic divergence (for details of the latter see Bryson *et al.* 2011 and Blair *et al.* 2018) that population is formally defined and named as a subspecies.

U. armstrongi strimplei sp. nov. is readily separated from nominate *U. armstrongi armstrongi* by having a dorsum with a background colour of beige, with a shiny yellowish-pink venter and no white line or one that is barely noticeable, above the dark post-ocular stripe, versus a well defined white line or boundary in the type form of *U. armstrongi armstrongi.*

Until now the taxon *Uropsophus oxyi sp. nov*. has also been treated as an outlier population of the species *U. armstrongi* (Campbell, 1979), but the likelihood of it being a separate species has been known for many years (e.g. Campbell, 1979, Bryson *et al.* 2011, 2014).

Molecular data published by Bryson *et al.* (2011, 2014) also supports the contention that *Uropsophus oxyi sp. nov*. is a species-level taxon.

U. oxyi sp. nov. is separated from the related species *U. armstrongi* in the south-east and *U. campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) in the south-west by the Río Ameca drainage which runs into the Pacific Ocean.

U. campbelli, *U. oxyi sp. nov*. and *U. armstrongi* can be distinguished from all members of the *Uropsophus* Wagler, 1830 as defined by Hoser (2009 and 2012), by the following unique suite of characters: (1) presence of intercanthals, (2) infrequently divided upper preocular (9.1 per cent of the time), (3) 150-154 ventrals in males, 147-152 in females, (4) 31-32 subcaudals in males, 22-26 in females, (5) small rattle (proximal rattle width 11.0-14.6 per cent of head length), (6) long tail (9.1-11.0 per cent of total body length in males, 7.5-8.9 per cent in females), (7) pale interspaces between dorsal and lateral blotches, (8) heavy venter mottling, (9) dark proximal rattle and underside of tail, and (10) usually a single large anterior intercanthal (modified from Bryson *et al*. 2014).

U. campbelli can be distinguished from *U. armstrongi* and *U. oxyi sp. nov*. by the following suite of characters: higher mean number of ventrals (152 in males and 149 in females vs. 141 and 144), higher mean number of subcaudals in males (31 vs. 28), less frequently divided upper preocular (9.1 per cent vs. 14.3 per cent), proportionately longer tail in males (10.3 per cent of total body length vs. 9.7 per cent), smaller mean proximal rattle width (13.0 per cent of head length vs. 14.0 per cent), higher mean number of dorsal blotches (48 vs. 42), and higher number of tail bands (mode of 9 vs. 6) (derived from Bryson *et al*. 2014).

U. oxyi sp. nov. is separated from the other two species by having a breaks between blotches on the dorsum of more than one scale in width, versus not usually so in the other two species; light grey or brick red background colour on the dorsum, versus grey-brown, or orange-brown in the other two species; a venter and chin that is extremely dark (instead of mottled to dark in *U. armstrongi*) and not heavily suffused with pink; darker markings on the head are well defined in all but aged specimens.

Snakes in the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2009 and 2012) are separated from all other rattlesnakes by the following suite of characters: A group of small rattlesnake species found in Mexico and adjacent southern USA. The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if

enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

Distribution: Known only from the elevated areas of (mainly central) Michoacán, generally east of Tancítaro and west of Cuidad Hidalgo and most probably this is the limit of the range for the subspecies.

Etymology: Named in honour of Pete Strimple or Cincinnatti, Ohio, USA, in recognition of his publications about keeping rattlesnakes of various species in captivity (e.g. Strimple 1992, 1993a, 1993b, 1993c, 1994a, 1994b, 1996), and other contributions to herpetology.

UROPSOPHUS WOOLFI SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:5DAB1986-6BEC-412C-B287-AD41516833F6

Holotype: A preserved specimen at the Royal Ontario Museum, Herpetology Collection, Ontario, Canada, specimen number ROM Reptiles and Amphibians 42410 collected from Parque Chipinque, Nuevo Leon, Mexico, Latitude +25.6187 N., Longitude -100.3602 W. This facility allows access to their holdings.

Paratypes: 1/ A preserved specimen at the Royal Ontario Museum, Herpetology Collection, Ontario, Canada, specimen number 42411 collected from La Huasteca, Nuevo Leon, Mexico. 2/ A preserved specimen at the Royal Ontario Museum, Herpetology Collection, Ontario, Canada, specimen number 42632 collected from Sierra Peña Nevada, Nuevo Leon, Mexico.

Diagnosis: Until now, *Uropsophus woolfi sp. nov.* from Parque Chipinque, Nuevo Leon, Mexico and nearby areas has been treated as either *U. lepidus* (Kennicott, 1861), type locality Texas, USA, (e.g. Campbell and Lamar, 2004), or "*Crotalus lepidus morulus* Klauber, 1952" (as originally described), from near La Joya de Salas, Tamaulipas, Mexico, or *U. morulus* (e.g. Blair *et al.* 2018).

Both *Uropsophus woolfi sp. nov.* and *U. morulus* are separated from *U. lepidus* by the following unique suite of characters: 23-25 dorsal midbody rows, 156-167 ventrals in males, 160-171 ventrals in females, 25-30 subcaudals in males and 20-25 subcaudals in females and 22-34 dorsal markings (blotches) on the body that are usually well defined on the anterior of the body where they are large and blotch-like and posteriorly they form cross-bands that usually extend to the ventrals. The occipital blotches are paired and usually are not fused (anteriorly at least) and the venter is usually dark in colour. The dorsum is strongly yellowish (in *U. morulus*) or orangeish (in *U. woolfi sp. nov.*) the dorsal blotches being dark brown, white edged in *U. morulus* and not white edged in *U. woolfi sp. nov.*.

Nominate *U. lepidus* is similar to as described above, but is separated from both *U. morulus* and *U. woolfi sp. nov.* by having narrow, strongly jagged edged darker bands or blotches across the dorsum, versus medium to wide and not strongly jagged edged in *U. morulus* and *U. woolfi sp. nov.*. Darker markings on the dorsum of the neck in *U. morulus* and *U. woolfi sp. nov.* are bold, versus not so in *U. lepidus*. *U. morulus* usually has 22-26 obvious darker dorsal blotches or bands on the upper body from neck to tail, versus 27-34 in *U. woolfi sp. nov.*.

U. woolfi sp. nov. is separated from *U. morulus* with a type locality of Tamaulipas, Mexico and generally from that state by having a generally orangeish background colour on the dorsum, versus yellow or beige in *U. morulus*, as well as having darker blotches or bands on the dorsum that are not white edged. In *U. morulus* the dark post-ocular stripe is well-bounded top and bottom by white or very light yellow, but not so in *U. woolfi sp. nov.*.

All of the morphologically similar species *U. woolfi sp. nov.*, *U. morulus*, *U. euanedwardsi sp. nov.* from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico are separated from the morphologically similar *U. klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico and *U. valentici sp. nov.* of Durango, Mexico by having paired occipital blotches and a dark venter, versus a joined or single occipital patch and a pale ventral pattern.

U. elfakhariorum sp. nov. is readily separated from *U. klauberi* by having a distinctive body pattern of widely spaced darker body bands that are unusually wide on the mid-dorsal line and form a narrow point on the lower flank, as opposed to dorsal bands of generally even width from spine to flank or only narrowing slightly at the flanks combined with lighter areas being immaculately pale, or near immaculate in colour. The background colour of the dorsum of

U. elfakhariorum sp. nov. is an immaculate grey to beige in colour, sometimes with a greenish tinge, without the peppering or speckling seen in the lighter zones of the dorsum in the Durango, Mexico species *U. valentici sp. nov.*.

Specimens of *U. klauberi* from the USA and Sonora in far north Mexico which also have immaculately coloured pale areas on their dorsum are readily separated from *U. elfakhariorum sp. nov*. by the fact that the dorsal crossbands are not of the shape described above for *U. elfakhariorum sp. nov.*, but instead are more-or-less of even thickness around the dorsum of the body.

An image of *U. elfakhariorum sp. nov*. in life can be seen online at:
https://www.facebook.com/groups/crotalus/permalink/1837412252982612/

U. valentici sp. nov. from Durango, Mexico, has body bands that are wider on the mid-dorsal line and narrower on the lower flanks, but not in the extreme manner seen in *U. elfakhariorum sp. nov.*. Instead the narrowing is relatively slight. In stark contrast to *U. elfakhariorum sp. nov.*, in *U. valentici sp. nov.* the lighter parts of the dorsum are heavily peppered with black or brown, sometimes tending towards small spots or blotches and in any event, usually on each and every lighter scale,

U. valentici sp. nov. differs from each of *U. elfakhariorum sp. nov*. and *U. klauberi* in that along the mid body, the ventral colours continue up the lower parts of the lower flanks.

A photo of *U. valentici sp. nov.* in life can be seen in Campbell and Lamar (2004) in plate 851.

U. euanedwardsi sp. nov. known only from Nayarit, Mexico and *U. maculosus* are separated from *U. woolfi sp. nov*. and *U. morulus* by the following suite of characters: having transversely aligned blotches that do not, or only partially extend to the sides of the body. In *U. woolfi sp. nov*. and *U. morulus* the anterior dorsal markings are large, well-defined and blotch-like and posteriorly form crossbands that extend to the ventrals, versus not so in *U. euanedwardsi sp. nov*. and *U. maculosus.*

U. euanedwardsi sp. nov. is separated from *U. maculosus* by having 22-23 dorsal crossbands, versus 24-38 in *U. maculosus* and transversely aligned blotches that partially extend to the sides of the body, versus not so in *U. maculosus. U. euanedwardsi sp. nov*. also has a very dark chin and belly and an undivided upper-preocular.

The species *U. aquilus* (Klauber, 1952), with a type locality of near Alvarez, San Lois Potosi, Mexico as well as the subspecies *U. aquilus hammondi subsp. nov.* which is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico and the morphologically similar closely related species *U. swileorum sp. nov.* from Querétaro, Mexico, (until now treated as a divergent population of *U. aquilus*) are separated from the above species by having the upper preocular not split vertically or if split, the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular; (versus split, with the anterior section being higher than the posterior and curved over the canthus rostralis over in front of the supraocular in the other species); dorsal body blotches occupy more longitudinal space than the interspaces, versus less than the interspaces in the preceding species.

U. aquilus and *U. swileorum sp. nov.* are separated from the morphologically similar species *U. triseriatus* Wagler, 1830, with a type locality of Mexico (presumed to be the central plateau region), *U. armstrongi* (Campbell, 1979), type locality of Rancho San Francisco, 1.5 miles north west of Tapalpa, Jalisco, Mexico, elevation 2103 m., *U. campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Sierra de Cuale, 9 km north east of El Teosinte, municipality of Talpa de Allende, Jalisco, Mexico, *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Los Llanos, at 2200-2300 metres above sea level, 10 km by road from Taxco towards Tetipac, Sierra de Taxco, municipality of Tetipac, Guerrero, Mexico, Latitude +18.36 N., Longitude -99.37 W., and *U. oxyi sp. nov.* from far southern Nayarit and adjacent Jalisco, Mexico by the following suite of characters: rattle fringe scales usually 10 (versus usually 8), rattle tends to be larger (versus smaller); in snakes exceeding 400 mm in length the dorsoventral length of the proximal rattle lobe exceeds one percent of the overall body length (versus not exceeding this in the other species); in snakes less than 400 mm in length the width of the proximal rattle lobe plus 1 mm is more than .0075 times the body length (versus not so).

Uropsophus swileorum sp. nov. from the eastern mountains of the Reserva de la Biosfera Sierra Gorda, Querétaro has until now been treated as a population of *Uropsophus aquilus* Klauber, 1952, with a type locality of near Alvarez, San Luis Potosi, Mexico and with the nominate subspecies as defined herein, occurring generally east and north of Querétaro, to the vicinity of the type locality.

The subspecies *U. aquilus hammondi subsp. nov.* is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes

in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico.

The three forms are readily separated from one another as follows:

The type form of the nominate subspecies of *U. aquilus* has a dorsum with a background colour that is an immaculate light (pale) grey, with widely spaced squarish brown blotches running along the midline, with the blotches not running onto the flanks in any way. The flanks in turn have smaller widely spaced blotches on the lower half. The blotches are separated from 2-3 rows or light scales.

The top of the head has obvious dark markings on it.

Uropsophus swileorum sp. nov. is a snake with a distinctively brownish coloured dorsum, occasionally dark slaty grey in general colouration, with closely spaced chocolate brown (or dark slaty grey) rectangular spots on the dorsal line, each broken from one another by a narrow light brown interspace, being no more than one scale wide. The light brown (or slaty) coloured flanks have numerous narrow semi-distinct chocolate coloured (or near black) blotches running up the flanks, being 1-2 scales wide, forming semi-distinct bands on the sides. Each of these blotches corresponds to a mid-dorsal rectangle and because the side blotches are narrow, this means that the flanks are mainly light brown (or slaty grey) in colour, versus mainly chocolate brown (or dark slaty grey) along the mid dorsal line, where the rectangles run in a longitudinal way. The top of the head is unicolor with no markings or peppering.

U. aquilus hammondi subsp. nov. is separated from both preceding taxa in that it has a generally yellowish to beige background colour (versus grey (light or dark slate) or brown) on the dorsum. Dorsal blotches are squarish to rectangular in shape but the sides (all four) are not even, although they are well defined at the boundary. The blotches along the mid dorsal line are dark brown, becoming blackish, but not fully black on the edges. They are usually separated from one another by 1-2 scales, but sometimes the blotches merge to form a continuous thick mid-dorsal line along the anterior or mid dorsum. The upper surface of the head has peppering on it, or distinct dark markings.

U. aquilus aquilus is depicted in life in Campbell and Lamar (2004) in plates 767 and 769.

U. swileorum sp. nov. is depicted in life in Campbell and Lamar (2004) in plate 760.

U. aquilus hammondi subsp. nov. is depicted in life in Campbell and Lamar (2004) in plate 765.

The species *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) is separated from all other species within the genus *Uropsophus* by the following unique suite of characters: (1) presence of intercanthals, (2) undivided upper preocular, (3) 152-164 ventrals in males, 156-165 in females, (4) 27-33 subcaudals in males, 22-32 in females, (5) small rattle (proximal rattle width 11.1-14.5 per cent of head length), (6) long tail (8.9-11.3 per cent of total body length in males, 8.0-10.7 per cent in females), (7) usually two pairs of symmetrical, similarly sized intercanthals, and (8) dark postocular stripe that noticeably narrows before reaching the posterior of the eye (taken directly from Bryson *et al.* 2014).

The morphologically similar species *U. pusillus* (Klauber, 1952), with a type locality of Michoacan, Tancitaro; 5,000 feet elevation, occurring in north east Michoacan and southern Jalisco is readily separated from all the preceding species by having prefrontals (canthals) paired and in contact, and with even but convex posterior edges, versus more than two scales in the prefrontal area of all the preceding species.

Rattlesnakes in the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2009b and again in 2012b) are separated from all other rattlesnakes by the following unique suite of characters: A group of small rattlesnake species found in Mexico and adjacent southern USA.

They are separated from all other rattlesnake genera by the following suite of characters.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

A photo of *U. woolfi sp. nov.* in life can be seen in Campbell and Lamar (2004) plate 859.

U. morulus in life is depicted in Campbell and Lamar

(2004) in plates 860-863.

The five preceding images readily depict the diagnostic characters used to separate the two species.

Julía-Zertuche and Treviño-Saldaña, (1978) described a taxon *Crotalus lepidus castaneus* without identifying a holotype. Campbell and Lamar (2004) stated:
"Holotype: None designated, based apparently on multiple specimens ["Los ejemplares que se describen son adultos ..."]. Type locality: "Paraje Las Huertas, en la Sierra Madre Oriental, al Sur de Monteray, N. L.", Mexico. [Not a valid publication under the Articles of the Code.]"

The original description was translated and I accessed a copy of the second edition of the *International Code of Zoological Nomenclature* (Stoll *et al*. 1964) to confirm that if in fact failure to designate a type specimen made the description and the name unavailable under the rules of the code.

This was the case.
On pages 44-45 of the Second edition of the *International Code of Zoological Nomenclature* one finds the following text:
***"*X. TAXA OF THE SPECIES-GROUP AND THEIR NAMES**

Article 45. Taxa of the species-group.

(a) Categories included.-The species-group, for the purposes of this Code, includes the categories species and subspecies.

(b) Basis.-Each taxon of the species-group is objectively defined only by reference to its type-specimen."

Therefore I was able to confirm that the name "*Crotalus lepidus castaneus*" is unavailable.

I also note that with no disrespect to Campbell and Lamar (2004), it was important that I engage in the scientific method and confirm their statement by independently checking the original literature and the code itself and not risking making a false or improper statement by failing to make proper checks based on a potentially erroneous secondary publication as detailed in cases outlined in Hoser (2015a-f).

Distribution: *U. woolfi sp. nov.* is only known from the region near the type locality in Nuevo Leon, Mexico.

Etymology: Named in honour of Paul Woolf of Walloon, Brisbane, Queensland, Australia, foundation president of the Herpetological Society of Queensland Incorporated in recognition of many decades of valuable contributions to herpetology, including by strongly opposing taxonomic vandalism in all forms.

UROPSOPHUS EUANEDWARDSI SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:A7879302-CAE0-4892-AB3B-F1AF5975DA37

Holotype: A preserved specimen at the Biodiversity Research and Teaching Collections, Texas A and M University, College Station, Texas, USA, specimen number 33359 collected from east of Huajicori, Nayarit, Mexico, Latitude +22.6391 N, Longitude -105.3195 W. This facility allows access to its holdings.

Paratype: A preserved specimen at the Biodiversity Research and Teaching Collections, Texas A and M University, College Station, Texas, USA, specimen number 33358 collected from east of Huajicori, Nayarit, Mexico, Latitude +22.6391 N, Longitude -105.3195 W.

Diagnosis: Until now *Uropsophus euanedwardsi sp. nov*. known only from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico have been treated as the same species-level taxon.

Also until now, *Uropsophus woolfi sp. nov*. from Parque Chipinque, Nuevo Leon, Mexico and nearby areas has been treated as either *U. lepidus* (Kennicott, 1861), type locality Texas, USA, (e.g. Campbell and Lamar, 2004), or *Crotalus lepidus morulus* Klauber, 1952 (as originally described), from near La Joya de Salas, Tamaulipas, Mexico, or *U. morulus* (e.g. Blair *et al.* 2018).

Both *Uropsophus woolfi sp. nov*. and *U. morulus* are separated from *U. lepidus* by the following unique suite of characters: 23-25 dorsal midbody rows, 156-167 ventrals in males, 160-171 ventrals in females, 25-30 subcaudals in males and 20-25 subcaudals in females and 22-34 dorsal markings (blotches) on the body that are usually well defined on the anterior of the body where they are large and blotch-like and posteriorly they form cross-bands that usually extend to the ventrals. The occipital blotches are paired and usually are not fused (anteriorly at least) and the venter is usually dark in colour. The dorsum is strongly yellowish (in *U. morulus*) or orangeish (in *U. woolfi sp. nov*.) the dorsal blotches being dark brown, white edged in *U. morulus* and not white edged in *U. woolfi sp. nov*..

Nominate *U. lepidus* is similar to as described above, but is separated from both *U. morulus* and *U. woolfi sp. nov*. by having narrow, strongly jagged edged darker bands or blotches across the dorsum, versus medium to wide and not strongly jagged edged in *U. morulus* and *U. woolfi sp. nov*.. Darker markings on the dorsum of the neck in *U. morulus* and *U. woolfi sp. nov*. are bold, versus not so in *U. lepidus. U. morulus* usually has 22-26 obvious darker dorsal blotches or bands on the upper body from neck to tail, versus 27-34 in *U. woolfi sp. nov*..

U. woolfi sp. nov. is separated from *U. morulus* with a type locality of Tamaulipas, Mexico and generally from that state by having a generally orangeish background colour on the dorsum, versus yellow or beige in *U. morulus*, as well as having darker blotches or bands on the dorsum that are not white edged. In *U. morulus* the dark post-ocular stripe is well-bounded top and bottom by white or very light yellow, but not so in *U. woolfi sp. nov*..

All of the morphologically similar species *U. woolfi sp. nov.*, *U. morulus*, *U. euanedwardsi sp. nov*. from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico are separated from the morphologically similar *U. klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico and *U. valentici sp. nov.* of Durango, Mexico by having paired occipital blotches and a dark venter, versus a joined or single occipital patch and a pale ventral pattern.

U. elfakhariorum sp. nov. is readily separated from *U. klauberi* by having a distinctive body pattern of widely spaced darker body bands that are unusually wide on the mid-dorsal line and form a narrow point on the lower flank, as opposed to dorsal bands of generally even width from spine to flank or only narrowing slightly at the flanks combined with lighter areas being immaculately pale, or near immaculate in colour. The background colour of the dorsum of *U. elfakhariorum sp. nov.* is an immaculate grey to beige in colour, sometimes with a greenish tinge, without the peppering or speckling seen in the lighter zones of the dorsum in the Durango, Mexico species *U. valentici sp. nov.*.

Specimens of *U. klauberi* from the USA and Sonora in far north Mexico which also have immaculately coloured pale areas on their dorsum are readily separated from *U. elfakhariorum sp. nov*. by the fact that the dorsal crossbands are not of the shape described above for *U. elfakhariorum sp. nov*., but instead are more-or-less of even thickness around the dorsum of the body.

An image of *U. elfakhariorum sp. nov*. in life can be seen online at:
https://www.facebook.com/groups/crotalus/permalink/1837412252982612/

U. valentici sp. nov. from Durango, Mexico, has body bands that are wider on the mid-dorsal line and narrower on the lower flanks, but not in the extreme manner seen in *U. elfakhariorum sp. nov*.. Instead the narrowing is relatively slight. In stark contrast to *U. elfakhariorum sp. nov*., in *U. valentici sp. nov.* the lighter parts of the dorsum are heavily peppered with black or brown, sometimes tending towards small spots or blotches and in any event, usually on each and every lighter scale,

U. valentici sp. nov. differs from each of *U. elfakhariorum sp. nov*. and *U. klauberi* in that along the mid body, the ventral colours continue up the lower parts of the lower flanks.

A photo of *U. valentici sp. nov.* in life can be seen in Campbell and Lamar (2004) in plate 851.

U. euanedwardsi sp. nov. known only from Nayarit, Mexico and *U. maculosus* are separated from *U. woolfi sp. nov*. and *U. morulus* by the following suite of characters: having transversely aligned blotches that do not, or only partially extend to the sides of the body. In *U. woolfi sp. nov*. and *U. morulus* the anterior dorsal markings are large, well-defined and blotch-like and posteriorly form crossbands that extend to the ventrals, versus not so in *U. euanedwardsi sp. nov*. and *U. maculosus.*

U. euanedwardsi sp. nov. is separated from *U. maculosus* by having 22-23 dorsal crossbands, versus 24-38 in *U. maculosus* and transversely aligned blotches that partially extend to the sides of the body, versus not so in *U. maculosus. U. euanedwardsi sp. nov*. also has a very dark chin and belly and an undivided upper-preocular.

The species *U. aquilus* (Klauber, 1952), with a type locality of near Alvarez, San Lois Potosi, Mexico as well as the subspecies *U. aquilus hammondi subsp. nov.* which is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico and the morphologically similar closely related species *U. swileorum sp. nov.* from Querétaro, Mexico, (until now treated as a divergent population of *U. aquilus*) are separated from the above species by having the upper preocular not split vertically or if split, the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular; (versus split, with the anterior section being higher than the posterior and curved over the canthus rostralis over in front of the supraocular in the other species); dorsal body blotches occupy more longitudinal space than the interspaces, versus less than the interspaces in the preceding species.

U. aquilus and *U. swileorum sp. nov.* are separated from the morphologically similar species *U. triseriatus* Wagler, 1830, with a type locality of Mexico (presumed to be the central plateau region), *U. armstrongi* (Campbell, 1979), type locality of Rancho San Francisco, 1.5 miles north west of Tapalpa, Jalisco, Mexico, elevation 2103 m., *U. campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a

type locality of Sierra de Cuale, 9 km north east of El Teosinte, municipality of Talpa de Allende, Jalisco, Mexico, *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Los Llanos, Latitude +18.36 N., Longitude -99.37 W., at 2200-2300 metres above sea level; 10 km by road from Taxco towards Tetipac, Sierra de Taxco, municipality of Tetipac, Guerrero, Mexico and *U. oxyi sp. nov.* from far southern Nayarit and adjacent Jalisco, Mexico by the following suite of characters: rattle fringe scales usually 10 (versus usually 8), rattle tends to be larger (versus smaller); in snakes exceeding 400 mm in length the dorsoventral length of the proximal rattle lobe exceeds one percent of the overall body length (versus not exceeding this in the other species); in snakes less than 400 mm in length the width of the proximal rattle lobe plus 1 mm is more than .0075 times the body length (versus not so).

Uropsophus swileorum sp. nov. from the eastern mountains of the Reserva de la Biosfera Sierra Gorda, Querétaro has until now been treated as a population of *Uropsophus aquilus* Klauber, 1952, with a type locality of near Alvarez, San Luis Potosi, Mexico and with the nominate subspecies as defined herein, occurring generally east and north of Querétaro, to the vicinity of the type locality.

The subspecies *U. aquilus hammondi subsp. nov.* is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico.

The three forms are readily separated from one another as follows:

The type form of the nominate subspecies of *U. aquilus* has a dorsum with a background colour that is an immaculate light (pale) grey, with widely spaced squarish brown blotches running along the midline, with the blotches not running onto the flanks in any way. The flanks in turn have smaller widely spaced blotches on the lower half. The blotches are separated from 2-3 rows or light scales.

The top of the head has obvious dark markings on it.

Uropsophus swileorum sp. nov. is a snake with a distinctively brownish coloured dorsum, occasionally dark slaty grey in general colouration, with closely spaced chocolate brown (or dark slaty grey) rectangular spots on the dorsal line, each broken from one another by a narrow light brown interspace, being no more than one scale wide. The light brown (or slaty) coloured flanks have numerous narrow semi-distinct chocolate coloured (or near black) blotches running up the flanks, being 1-2 scales wide, forming semi-distinct bands on the sides. Each of these blotches corresponds to a mid-dorsal rectangle and because the side blotches are narrow, this means that the flanks are mainly light brown (or slaty grey) in colour, versus mainly chocolate brown (or dark slaty grey) along the mid dorsal line, where the rectangles run in a longitudinal way. The top of the head is unicolor with no markings or peppering.

U. aquilus hammondi subsp. nov. is separated from both preceding taxa in that it has a generally yellowish to beige background colour (versus grey (light or dark slate) or brown) on the dorsum. Dorsal blotches are squarish to rectangular in shape but the sides (all four) are not even, although they are well defined at the boundary. The blotches along the mid dorsal line are dark brown, becoming blackish, but not fully black on the edges. They are usually separated from one another by 1-2 scales, but sometimes the blotches merge to form a continuous thick mid-dorsal line along the anterior or mid dorsum. The upper surface of the head has peppering on it, or distinct dark markings.

U. aquilus aquilus is depicted in life in Campbell and Lamar (2004) in plates 767 and 769.

U. swileorum sp. nov. is depicted in life in Campbell and Lamar (2004) in plate 760.

U. aquilus hammondi subsp. nov. is depicted in life in Campbell and Lamar (2004) in plate 765.

The species *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) is separated from all other species within the genus *Uropsophus* by the following unique suite of characters: (1) presence of intercanthals, (2) undivided upper preocular, (3) 152-164 ventrals in males, 156-165 in females, (4) 27-33 subcaudals in males, 22-32 in females, (5) small rattle (proximal rattle width 11.1-14.5 per cent of head length), (6) long tail (8.9-11.3 per cent of total body length in males, 8.0-10.7 per cent in females), (7) usually two pairs of symmetrical, similarly sized intercanthals, and (8) dark postocular stripe that noticeably narrows before reaching the posterior of the eye (taken directly from Bryson *et al.* 2014).

The morphologically similar species *U. pusillus* (Klauber, 1952), with a type locality of Michoacan, Tancitaro; 5,000 feet elevation, occurring in north east Michoacan and southern Jalisco is readily separated from all the preceding species by having prefrontals (canthals) paired and in contact, and with even but convex posterior edges, versus more than two scales in the prefrontal area of all the preceding species.

Rattlesnakes in the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2009b and again in 2012b) are separated from all other rattlesnakes by

the following unique suite of characters: A group of small rattlesnake species found in Mexico and adjacent southern USA.

They are separated from all other rattlesnake genera by the following suite of characters.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

A specimen USNM 46333 (at the United States National Museum (now National Museum of Natural History; Smithsonian Institution; Washington, DC), USA) from Santa Teresa, Nayarit is probably also of the species *U. euanedwardsi sp. nov.*.

Distribution: *Uropsophus euanedwardsi sp. nov*. is presently only known from Nayarit, Mexico.
Etymology: The new species *U. euanedwardsi sp. nov*. is named in honour of Euan Edwards, of the Gold Coast, Queensland, Australia, but having lived in Madagascar, the USA and elsewhere in recognition of many decades of services to herpetology, including with respect to assisting myself with research and access to specimens of live rattlesnakes of numerous species from the USA and Mexico to inspect.

UROPSOPHUS ELFAKHARIORUM SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:9BA51723-3DF7-408E-A91F-59B9C788E0E1

Holotype: A preserved specimen in the Herpetology Collection of the Royal Ontario Museum, Ontario, Canada, specimen number ROM 42617, collected from Valpariso, Zacatecas, Mexico, Latitude +22.7709 N., Longitude -103.5697 W.

This facility allows access to its holdings.

Paratypes: 1/ A preserved specimen in the Herpetology Collection of the Royal Ontario Museum, Ontario, Canada, specimen number ROM 42618, collected from Valpariso, Zacatecas, Mexico. 2/ A preserved specimen in the Ichthyology and Herpetology Collection of the Michigan State University Museum, Michigan, USA, specimen number HE.10720 collected from 9 miles north west of Valparaiso, Zacatecas, Mexico.

Diagnosis: The three species *Uropsophus klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico and *U. valentici sp. nov.* of Durango, Mexico have until now been treated as conspecific.

Until now *U. euanedwardsi sp. nov*. known only from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico have been treated as the same species-level taxon.

Also until now, *Uropsophus woolfi sp. nov*. from Parque Chipinque, Nuevo Leon, Mexico and nearby areas has been treated as either *U. lepidus* (Kennicott, 1861), type locality Texas, USA, (e.g. Campbell and Lamar, 2004), or *Crotalus lepidus morulus* Klauber, 1952 (as originally described), from near La Joya de Salas, Tamaulipas, Mexico, or *U. morulus* (e.g. Blair *et al.* 2018).

Both *Uropsophus woolfi sp. nov*. and *U. morulus* are separated from *U. lepidus* by the following unique suite of characters: 23-25 dorsal midbody rows, 156-167 ventrals in males, 160-171 ventrals in females, 25-30 subcaudals in males and 20-25 subcaudals in females and 22-34 dorsal markings (blotches) on the body that are usually well defined on the anterior of the body where they are large and blotch-like and posteriorly they form cross-bands that usually extend to the ventrals. The occipital blotches are paired and usually are not fused (anteriorly at least) and the venter is usually dark in colour. The dorsum is strongly yellowish (in *U. morulus*) or orangeish (in *U. woolfi sp. nov.*) the dorsal blotches being dark brown, white edged in *U. morulus* and not white edged in *U. woolfi sp. nov.*.

Nominate *U. lepidus* is similar to as described above, but is separated from both *U. morulus* and *U. woolfi sp. nov*. by having narrow, strongly jagged edged darker bands or blotches across the dorsum, versus medium to wide and not strongly jagged edged in *U. morulus* and *U. woolfi sp. nov.*. Darker markings on the dorsum of the neck in *U. morulus* and *U. woolfi sp. nov*. are bold, versus not so in *U. lepidus. U. morulus* usually has 22-26 obvious darker dorsal blotches or bands on the upper body from neck to tail, versus 27-34 in *U. woolfi sp. nov.*.

U. woolfi sp. nov. is separated from *U. morulus* with a type locality of Tamaulipas, Mexico and generally from that state by having a generally orangeish background colour on the dorsum, versus yellow or beige in *U. morulus*, as well as having darker blotches or bands on the dorsum that are not white edged. In *U. morulus* the dark post-ocular stripe is

well-bounded top and bottom by white or very light yellow, but not so in *U. woolfi sp. nov.*.

All of the morphologically similar species *U. woolfi sp. nov.*, *U. morulus*, *U. euanedwardsi sp. nov*. from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico are separated from the morphologically similar *U. klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico and *U. valentici sp. nov.* of Durango, Mexico by having paired occipital blotches and a dark venter, versus a joined or single occipital patch and a pale ventral pattern.

U. elfakhariorum sp. nov. is readily separated from *U. klauberi* by having a distinctive body pattern of widely spaced darker body bands that are unusually wide on the mid-dorsal line and form a narrow point on the lower flank, as opposed to dorsal bands of generally even width from spine to flank or only narrowing slightly at the flanks combined with lighter areas being immaculately pale, or near immaculate in colour. The background colour of the dorsum of *U. elfakhariorum sp. nov.* is an immaculate grey to beige in colour, sometimes with a greenish tinge, without the peppering or speckling seen in the lighter zones of the dorsum in the Durango, Mexico species *U. valentici sp. nov.:*

Specimens of *U. klauberi* from the USA and Sonora in far north Mexico which also have immaculately coloured pale areas on their dorsum are readily separated from *U. elfakhariorum sp. nov*. by the fact that the dorsal crossbands are not of the shape described above for *U. elfakhariorum sp. nov.*, but instead are more-or-less of even thickness around the dorsum of the body.

An image of *U. elfakhariorum sp. nov*. in life can be seen online at:
https://www.facebook.com/groups/crotalus/permalink/1837412252982612/

U. valentici sp. nov. from Durango, Mexico, has body bands that are wider on the mid-dorsal line and narrower on the lower flanks, but not in the extreme manner seen in *U. elfakhariorum sp. nov.*. Instead the narrowing is relatively slight. In stark contrast to *U. elfakhariorum sp. nov.*, in *U. valentici sp. nov.* the lighter parts of the dorsum are heavily peppered with black or brown, sometimes tending towards small spots or blotches and in any event, usually on each and every lighter scale,

U. valentici sp. nov. differs from each of *U. elfakhariorum sp. nov*. and *U. klauberi* in that along the mid body, the ventral colours continue up the lower parts of the lower flanks.

A photo of *U. valentici sp. nov.* in life can be seen in Campbell and Lamar (2004) in plate 851.

U. euanedwardsi sp. nov. known only from Nayarit, Mexico and *U. maculosus* are separated from *U. woolfi sp. nov*. and *U. morulus* by the following suite of characters: having transversely aligned blotches that do not, or only partially extend to the sides of the body. In *U. woolfi sp. nov*. and *U. morulus* the anterior dorsal markings are large, well-defined and blotch-like and posteriorly form crossbands that extend to the ventrals, versus not so in *U. euanedwardsi sp. nov*. and *U. maculosus.*

U. euanedwardsi sp. nov. is separated from *U. maculosus* by having 22-23 dorsal crossbands, versus 24-38 in *U. maculosus* and transversely aligned blotches that partially extend to the sides of the body, versus not so in *U. maculosus. U. euanedwardsi sp. nov*. also has a very dark chin and belly and an undivided upper-preocular.

The species *U. aquilus* (Klauber, 1952), with a type locality of near Alvarez, San Lois Potosi, Mexico as well as the subspecies *U. aquilus hammondi subsp. nov.* which is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico and the morphologically similar closely related species *U. swileorum sp. nov.* from Querétaro, Mexico, (until now treated as a divergent population of *U. aquilus*) are separated from the above species by having the upper preocular not split vertically or if split, the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular; (versus split, with the anterior section being higher than the posterior and curved over the canthus rostralis over in front of the supraocular in the other species); dorsal body blotches occupy more longitudinal space than the interspaces, versus less than the interspaces in the preceding species.

U. aquilus and *U. swileorum sp. nov.* are separated from the morphologically similar species *U. triseriatus* Wagler, 1830, with a type locality of Mexico (presumed to be the central plateau region), *U. armstrongi* (Campbell, 1979), type locality of Rancho San Francisco, 1.5 miles north west of Tapalpa, Jalisco, Mexico, elevation 2103 m., *U. campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Sierra de Cuale, 9 km north east of El Teosinte, municipality of Talpa de Allende, Jalisco, Mexico, *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Los Llanos, Latitude +18.36 N., Longitude -99.37 W., at 2200-2300 metres above sea level; 10 km by road from Taxco towards

Tetipac, Sierra de Taxco, municipality of Tetipac, Guerrero, Mexico and *U. oxyi sp. nov.* from far southern Nayarit and adjacent Jalisco, Mexico by the following suite of characters: rattle fringe scales usually 10 (versus usually 8), rattle tends to be larger (versus smaller); in snakes exceeding 400 mm in length the dorsoventral length of the proximal rattle lobe exceeds one percent of the overall body length (versus not exceeding this in the other species); in snakes less than 400 mm in length the width of the proximal rattle lobe plus 1 mm is more than .0075 times the body length (versus not so).

Uropsophus swileorum sp. nov. from the eastern mountains of the Reserva de la Biosfera Sierra Gorda, Querétaro has until now been treated as a population of *Uropsophus aquilus* Klauber, 1952, with a type locality of near Alvarez, San Luis Potosi, Mexico and with the nominate subspecies as defined herein, occurring generally east and north of Querétaro, to the vicinity of the type locality.

The subspecies *U. aquilus hammondi subsp. nov.* is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico.

The three forms are readily separated from one another as follows:

The type form of the nominate subspecies of *U. aquilus* has a dorsum with a background colour that is an immaculate light (pale) grey, with widely spaced squarish brown blotches running along the midline, with the blotches not running onto the flanks in any way. The flanks in turn have smaller widely spaced blotches on the lower half. The blotches are separated from 2-3 rows or light scales.

The top of the head has obvious dark markings on it.

Uropsophus swileorum sp. nov. is a snake with a distinctively brownish coloured dorsum, occasionally dark slaty grey in general colouration, with closely spaced chocolate brown (or dark slaty grey) rectangular spots on the dorsal line, each broken from one another by a narrow light brown interspace, being no more than one scale wide. The light brown (or slaty) coloured flanks have numerous narrow semi-distinct chocolate coloured (or near black) blotches running up the flanks, being 1-2 scales wide, forming semi-distinct bands on the sides. Each of these blotches corresponds to a mid-dorsal rectangle and because the side blotches are narrow, this means that the flanks are mainly light brown (or slaty grey) in colour, versus mainly chocolate brown (or dark slaty grey) along the mid dorsal line, where the rectangles run in a longitudinal way. The top of the head is unicolor with no markings or peppering.

U. aquilus hammondi subsp. nov. is separated from both preceding taxa in that it has a generally yellowish to beige background colour (versus grey (light or dark slate) or brown) on the dorsum. Dorsal blotches are squarish to rectangular in shape but the sides (all four) are not even, although they are well defined at the boundary. The blotches along the mid dorsal line are dark brown, becoming blackish, but not fully black on the edges. They are usually separated from one another by 1-2 scales, but sometimes the blotches merge to form a continuous thick mid-dorsal line along the anterior or mid dorsum. The upper surface of the head has peppering on it, or distinct dark markings.

U. aquilus aquilus is depicted in life in Campbell and Lamar (2004) in plates 767 and 769.

U. swileorum sp. nov. is depicted in life in Campbell and Lamar (2004) in plate 760.

U. aquilus hammondi subsp. nov. is depicted in life in Campbell and Lamar (2004) in plate 765.

The species *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) is separated from all other species within the genus *Uropsophus* by the following unique suite of characters: (1) presence of intercanthals, (2) undivided upper preocular, (3) 152-164 ventrals in males, 156-165 in females, (4) 27-33 subcaudals in males, 22-32 in females, (5) small rattle (proximal rattle width 11.1-14.5 per cent of head length), (6) long tail (8.9-11.3 per cent of total body length in males, 8.0-10.7 per cent in females), (7) usually two pairs of symmetrical, similarly sized intercanthals, and (8) dark postocular stripe that noticeably narrows before reaching the posterior of the eye (taken directly from Bryson *et al.* 2014).

The morphologically similar species *U. pusillus* (Klauber, 1952), with a type locality of Michoacan, Tancitaro; 5,000 feet elevation, occurring in north east Michoacan and southern Jalisco is readily separated from all the preceding species by having prefrontals (canthals) paired and in contact, and with even but convex posterior edges, versus more than two scales in the prefrontal area of all the preceding species.

Rattlesnakes in the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2009b and again in 2012b) are separated from all other rattlesnakes by the following unique suite of characters: A group of small rattlesnake species found in Mexico and adjacent southern USA.

They are separated from all other rattlesnake genera by the following suite of characters.

The top of the head has scales of various sizes,

more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

Distribution: *U. elfakhariorum sp. nov.* is known only rom Zacatecas and Jalisco, Mexico.

Etymology: The new species *U. elfakhariorum sp. nov.* is named in honour of Moses, Danny and Akram El Fakhari, their magnificent wives, children and parents, all of Ilma Grove, Northcote, Victoria, Australia in recognition for their services to science, herpetology and the taxi industry over many decades.

UROPSOPHUS VALENTICI SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:21F0717E-E0D2-4BEA-8973-584F73D56043

Holotype: A preserved specimen in the Herpetology Collection of the Royal Ontario Museum, Ontario, Canada, specimen number ROM 45245, collected from Rancho Santa Barbara, Durango, Mexico, Latitude +24.00.57 N., Longitude -105.2656 W. This facility allows access to its holdings.

Paratype: Two preserved specimens in the Herpetology Collection of the Royal Ontario Museum, Ontario, Canada, specimen numbers ROM 47002 and ROM 47003 from Rancho Santa Barbara, Durango, Mexico, Latitude +24.00.57 N., Longitude -105.2656 W.

Diagnosis: The three species *Uropsophus klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. valentici sp. nov.* of Durango, Mexico and *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico have until now been treated as conspecific.

Until now *U. euanedwardsi sp. nov.* known only from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico have been treated as the same species-level taxon.

Also until now, *Uropsophus woolfi sp. nov.* from Parque Chipinque, Nuevo Leon, Mexico and nearby areas has been treated as either *U. lepidus* (Kennicott, 1861), type locality Texas, USA, (e.g. Campbell and Lamar, 2004), or *Crotalus lepidus morulus* Klauber, 1952 (as originally described), from near La Joya de Salas, Tamaulipas, Mexico, or *U. morulus* (e.g. Blair *et al.* 2018).

Both *Uropsophus woolfi sp. nov.* and *U. morulus* are separated from *U. lepidus* by the following unique suite of characters: 23-25 dorsal midbody rows, 156-167 ventrals in males, 160-171 ventrals in females, 25-30 subcaudals in males and 20-25 subcaudals in females and 22-34 dorsal markings (blotches) on the body that are usually well defined on the anterior of the body where they are large and blotch-like and posteriorly they form cross-bands that usually extend to the ventrals. The occipital blotches are paired and usually are not fused (anteriorly at least) and the venter is usually dark in colour. The dorsum is strongly yellowish (in *U. morulus*) or orangeish (in *U. woolfi sp. nov.*) the dorsal blotches being dark brown, white edged in *U. morulus* and not white edged in *U. woolfi sp. nov.*.

Nominate *U. lepidus* is similar to as described above, but is separated from both *U. morulus* and *U. woolfi sp. nov.* by having narrow, strongly jagged edged darker bands or blotches across the dorsum, versus medium to wide and not strongly jagged edged in *U. morulus* and *U. woolfi sp. nov.*. Darker markings on the dorsum of the neck in *U. morulus* and *U. woolfi sp. nov.* are bold, versus not so in *U. lepidus. U. morulus* usually has 22-26 obvious darker dorsal blotches or bands on the upper body from neck to tail, versus 27-34 in *U. woolfi sp. nov.*.

U. woolfi sp. nov. is separated from *U. morulus* with a type locality of Tamaulipas, Mexico and generally from that state by having a generally orangeish background colour on the dorsum, versus yellow or beige in *U. morulus*, as well as having darker blotches or bands on the dorsum that are not white edged. In *U. morulus* the dark post-ocular stripe is well-bounded top and bottom by white or very light yellow, but not so in *U. woolfi sp. nov.*.

All of the morphologically similar species *U. woolfi sp. nov.*, *U. morulus*, *U. euanedwardsi sp. nov.* from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico are separated from the morphologically similar *U. klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico and *U. valentici sp. nov.* of Durango, Mexico by having paired occipital blotches and a dark venter, versus a joined or single occipital patch and a pale ventral pattern.

U. elfakhariorum sp. nov. is readily separated from

U. klauberi by having a distinctive body pattern of widely spaced darker body bands that are unusually wide on the mid-dorsal line and form a narrow point on the lower flank, as opposed to dorsal bands of generally even width from spine to flank or only narrowing slightly at the flanks combined with lighter areas being immaculately pale, or near immaculate in colour. The background colour of the dorsum of *U. elfakhariorum sp. nov.* is an immaculate grey to beige in colour, sometimes with a greenish tinge, without the peppering or speckling seen in the lighter zones of the dorsum in the Durango, Mexico species *U. valentici sp. nov.*.

Specimens of *U. klauberi* from the USA and Sonora in far north Mexico which also have immaculately coloured pale areas on their dorsum are readily separated from *U. elfakhariorum sp. nov*. by the fact that the dorsal crossbands are not of the shape described above for *U. elfakhariorum sp. nov*., but instead are more-or-less of even thickness around the dorsum of the body.

An image of *U. elfakhariorum sp. nov*. in life can be seen online at:
https://www.facebook.com/groups/crotalus/permalink/1837412252982612/

U. valentici sp. nov. from Durango, Mexico, has body bands that are wider on the mid-dorsal line and narrower on the lower flanks, but not in the extreme manner seen in *U. elfakhariorum sp. nov*.. Instead the narrowing is relatively slight. In stark contrast to *U. elfakhariorum sp. nov*., in *U. valentici sp. nov.* the lighter parts of the dorsum are heavily peppered with black or brown, sometimes tending towards small spots or blotches and in any event, usually on each and every lighter scale,

U. valentici sp. nov. differs from each of *U. elfakhariorum sp. nov*. and *U. klauberi* in that along the mid body, the ventral colours continue up the lower parts of the lower flanks.

A photo of *U. valentici sp. nov.* in life can be seen in Campbell and Lamar (2004) in plate 851.

U. euanedwardsi sp. nov. known only from Nayarit, Mexico and *U. maculosus* are separated from *U. woolfi sp. nov*. and *U. morulus* by the following suite of characters: having transversely aligned blotches that do not, or only partially extend to the sides of the body. In *U. woolfi sp. nov*. and *U. morulus* the anterior dorsal markings are large, well-defined and blotch-like and posteriorly form crossbands that extend to the ventrals, versus not so in *U. euanedwardsi sp. nov*. and *U. maculosus.*

U. euanedwardsi sp. nov. is separated from *U. maculosus* by having 22-23 dorsal crossbands, versus 24-38 in *U. maculosus* and transversely aligned blotches that partially extend to the sides of the body, versus not so in *U. maculosus. U. euanedwardsi sp. nov*. also has a very dark chin and belly and an undivided upper-preocular.

The species *U. aquilus* (Klauber, 1952), with a type locality of near Alvarez, San Lois Potosi, Mexico as well as the subspecies *U. aquilus hammondi subsp. nov.* which is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico and the morphologically similar closely related species *U. swileorum sp. nov.* from Querétaro, Mexico, (until now treated as a divergent population of *U. aquilus*) are separated from the above species by having the upper preocular not split vertically or if split, the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular; (versus split, with the anterior section being higher than the posterior and curved over the canthus rostralis over in front of the supraocular in the other species); dorsal body blotches occupy more longitudinal space than the interspaces, versus less than the interspaces in the preceding species.

U. aquilus and *U. swileorum sp. nov.* are separated from the morphologically similar species *U. triseriatus* Wagler, 1830, with a type locality of Mexico (presumed to be the central plateau region), *U. armstrongi* (Campbell, 1979), type locality of Rancho San Francisco, 1.5 miles north west of Tapalpa, Jalisco, Mexico, elevation 2103 m., *U. campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Sierra de Cuale, 9 km north east of El Teosinte, municipality of Talpa de Allende, Jalisco, Mexico, *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Los Llanos, Latitude +18.36 N., Longitude -99.37 W., at 2200-2300 metres above sea level; 10 km by road from Taxco towards Tetipac, Sierra de Taxco, municipality of Tetipac, Guerrero, Mexico and *U. oxyi sp. nov.* from far southern Nayarit and adjacent Jalisco, Mexico by the following suite of characters: rattle fringe scales usually 10 (versus usually 8), rattle tends to be larger (versus smaller); in snakes exceeding 400 mm in length the dorsoventral length of the proximal rattle lobe exceeds one percent of the overall body length (versus not exceeding this in the other species); in snakes less than 400 mm in length the width of the proximal rattle lobe plus 1 mm is more than .0075 times the body length (versus not so).

Uropsophus swileorum sp. nov. from the eastern mountains of the Reserva de la Biosfera Sierra Gorda, Querétaro has until now been treated as a

population of *Uropsophus aquilus* Klauber, 1952, with a type locality of near Alvarez, San Luis Potosi, Mexico and with the nominate subspecies as defined herein, occurring generally east and north of Querétaro, to the vicinity of the type locality.

The subspecies *U. aquilus hammondi subsp. nov.* is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico.

The three forms are readily separated from one another as follows:

The type form of the nominate subspecies of *U. aquilus* has a dorsum with a background colour that is an immaculate light (pale) grey, with widely spaced squarish brown blotches running along the midline, with the blotches not running onto the flanks in any way. The flanks in turn have smaller widely spaced blotches on the lower half. The blotches are separated from 2-3 rows or light scales.

The top of the head has obvious dark markings on it.

Uropsophus swileorum sp. nov. is a snake with a distinctively brownish coloured dorsum, occasionally dark slaty grey in general colouration, with closely spaced chocolate brown (or dark slaty grey) rectangular spots on the dorsal line, each broken from one another by a narrow light brown interspace, being no more than one scale wide. The light brown (or slaty) coloured flanks have numerous narrow semi-distinct chocolate coloured (or near black) blotches running up the flanks, being 1-2 scales wide, forming semi-distinct bands on the sides. Each of these blotches corresponds to a mid-dorsal rectangle and because the side blotches are narrow, this means that the flanks are mainly light brown (or slaty grey) in colour, versus mainly chocolate brown (or dark slaty grey) along the mid dorsal line, where the rectangles run in a longitudinal way. The top of the head is unicolor with no markings or peppering.

U. aquilus hammondi subsp. nov. is separated from both preceding taxa in that it has a generally yellowish to beige background colour (versus grey (light or dark slate) or brown) on the dorsum. Dorsal blotches are squarish to rectangular in shape but the sides (all four) are not even, although they are well defined at the boundary. The blotches along the mid dorsal line are dark brown, becoming blackish, but not fully black on the edges. They are usually separated from one another by 1-2 scales, but sometimes the blotches merge to form a continuous thick mid-dorsal line along the anterior or mid dorsum. The upper surface of the head has peppering on it, or distinct dark markings.

U. aquilus aquilus is depicted in life in Campbell and Lamar (2004) in plates 767 and 769.

U. swileorum sp. nov. is depicted in life in Campbell and Lamar (2004) in plate 760.

U. aquilus hammondi subsp. nov. is depicted in life in Campbell and Lamar (2004) in plate 765.

The species *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) is separated from all other species within the genus *Uropsophus* by the following unique suite of characters: (1) presence of intercanthals, (2) undivided upper preocular, (3) 152-164 ventrals in males, 156-165 in females, (4) 27-33 subcaudals in males, 22-32 in females, (5) small rattle (proximal rattle width 11.1-14.5 per cent of head length), (6) long tail (8.9-11.3 per cent of total body length in males, 8.0-10.7 per cent in females), (7) usually two pairs of symmetrical, similarly sized intercanthals, and (8) dark postocular stripe that noticeably narrows before reaching the posterior of the eye (taken directly from Bryson *et al.* 2014).

The morphologically similar species *U. pusillus* (Klauber, 1952), with a type locality of Michoacan, Tancitaro; 5,000 feet elevation, occurring in north east Michoacan and southern Jalisco is readily separated from all the preceding species by having prefrontals (canthals) paired and in contact, and with even but convex posterior edges, versus more than two scales in the prefrontal area of all the preceding species.

Rattlesnakes in the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2009b and again in 2012b) are separated from all other rattlesnakes by the following unique suite of characters: A group of small rattlesnake species found in Mexico and adjacent southern USA.

They are separated from all other rattlesnake genera by the following suite of characters:

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if

paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

Distribution: *U. valentici sp. nov.* is currently known only from Durango, Mexico.

Etymology: The new species *U. valentici sp. nov.* is named in honour of Robert Valentic, of Donnybrook, Victoria, Australia in recognition of his many contributions to herpetology in Australia over some decades, including via his many excellent photos seen in books, magazines and the like, including examples as seen on his website at: http://www.gondwanareptileproductions.com/photogallery.html

UROPSOPHUS SWILEORUM SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:62B98D30-08D6-4AB6-A3E8-F160A80B4A45

Holotype: A preserved specimen in the Herpetology Collection of the Royal Ontario Museum, Ontario, Canada, specimen number 47042 collected from 2.5 km NW of the deviation (Carr. 120) to Valle de Guadalupe, Querétaro, Mexico, Latitude +21.3728 N., Longitude -99.2000 W. This facility allows access to its holdings.

Diagnosis: The species *U. aquilus* (Klauber, 1952), with a type locality of near Alvarez, San Lois Potosi, Mexico as well as the subspecies *U. aquilus hammondi subsp. nov.* which is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico and the morphologically similar closely related species *U. swileorum sp. nov.* from Querétaro, Mexico, (until now treated as a divergent population of *U. aquilus*) are separated from the other species in the genus *Uropsophus* by having the upper preocular not split vertically or if split, the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular; (versus split, with the anterior section being higher than the posterior and curved over the canthus rostralis over in front of the supraocular in the other species); dorsal body blotches occupy more longitudinal space than the interspaces, versus less than the interspaces in the preceding species.

U. aquilus and *U. swileorum sp. nov.* are separated from the morphologically similar species *U. triseriatus* Wagler, 1830, with a type locality of Mexico (presumed to be the central plateau region), *U. armstrongi* (Campbell, 1979), type locality of Rancho San Francisco, 1.5 miles north west of Tapalpa, Jalisco, Mexico, elevation 2103 m., *U. campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Sierra de Cuale, 9 km north east of El Teosinte, municipality of Talpa de Allende, Jalisco, Mexico, *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Los Llanos, Latitude +18.36 N., Longitude -99.37 W., at 2200-2300 metres above sea level; 10 km by road from Taxco towards Tetipac, Sierra de Taxco, municipality of Tetipac, Guerrero, Mexico and *U. oxyi sp. nov.* from far southern Nayarit and adjacent Jalisco, Mexico by the following suite of characters: rattle fringe scales usually 10 (versus usually 8), rattle tends to be larger (versus smaller); in snakes exceeding 400 mm in length the dorsoventral length of the proximal rattle lobe exceeds one percent of the overall body length (versus not exceeding this in the other species); in snakes less than 400 mm in length the width of the proximal rattle lobe plus 1 mm is more than .0075 times the body length (versus not so).

Uropsophus swileorum sp. nov. from the eastern mountains of the Reserva de la Biosfera Sierra Gorda, Querétaro has until now been treated as a population of *Uropsophus aquilus* Klauber, 1952, with a type locality of near Alvarez, San Luis Potosi, Mexico and with the nominate subspecies as defined herein, occurring generally east and north of Querétaro, to the vicinity of the type locality.

The subspecies *U. aquilus hammondi subsp. nov.* is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico.

The three forms are readily separated from one another as follows:

The type form of the nominate subspecies of *U. aquilus* has a dorsum with a background colour that is an immaculate light (pale) grey, with widely spaced squarish brown blotches running along the midline, with the blotches not running onto the flanks in any way. The flanks in turn have smaller widely spaced blotches on the lower half. The blotches are separated from 2-3 rows or light scales.

The top of the head has obvious dark markings on it.

Uropsophus swileorum sp. nov. is a snake with a distinctively brownish coloured dorsum, occasionally dark slaty grey in general colouration, with closely spaced chocolate brown (or dark slaty grey) rectangular spots on the dorsal line, each broken from one another by a narrow light brown interspace, being no more than one scale wide. The light brown (or slaty) coloured flanks have numerous narrow semi-distinct chocolate coloured (or near

black) blotches running up the flanks, being 1-2 scales wide, forming semi-distinct bands on the sides. Each of these blotches corresponds to a mid-dorsal rectangle and because the side blotches are narrow, this means that the flanks are mainly light brown (or slaty grey) in colour, versus mainly chocolate brown (or dark slaty grey) along the mid dorsal line, where the rectangles run in a longitudinal way. The top of the head is unicolor with no markings or peppering.

U. aquilus hammondi subsp. nov. is separated from both preceding taxa in that it has a generally yellowish to beige background colour (versus grey (light or dark slate) or brown) on the dorsum. Dorsal blotches are squarish to rectangular in shape but the sides (all four) are not even, although they are well defined at the boundary. The blotches along the mid dorsal line are dark brown, becoming blackish, but not fully black on the edges. They are usually separated from one another by 1-2 scales, but sometimes the blotches merge to form a continuous thick mid-dorsal line along the anterior or mid dorsum. The upper surface of the head has peppering on it, or distinct dark markings.

U. aquilus aquilus is depicted in life in Campbell and Lamar (2004) in plates 767 and 769.

U. swileorum sp. nov. is depicted in life in Campbell and Lamar (2004) in plate 760.

U. aquilus hammondi subsp. nov. is depicted in life in Campbell and Lamar (2004) in plate 765.

The species *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) is separated from all other species within the genus *Uropsophus* by the following unique suite of characters: (1) presence of intercanthals, (2) undivided upper preocular, (3) 152-164 ventrals in males, 156-165 in females, (4) 27-33 subcaudals in males, 22-32 in females, (5) small rattle (proximal rattle width 11.1-14.5 per cent of head length), (6) long tail (8.9-11.3 per cent of total body length in males, 8.0-10.7 per cent in females), (7) usually two pairs of symmetrical, similarly sized intercanthals, and (8) dark postocular stripe that noticeably narrows before reaching the posterior of the eye (taken directly from Bryson *et al.* 2014).

The three species *Uropsophus klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. valentici sp. nov.* of Durango, Mexico and *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico have until now been treated as conspecific.

Until now *U. euanedwardsi sp. nov*. known only from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico have been treated as the same species-level taxon.

Also until now, *Uropsophus woolfi sp. nov*. from Parque Chipinque, Nuevo Leon, Mexico and nearby areas has been treated as either *U. lepidus* (Kennicott, 1861), type locality Texas, USA, (e.g. Campbell and Lamar, 2004), or *Crotalus lepidus morulus* Klauber, 1952 (as originally described), from near La Joya de Salas, Tamaulipas, Mexico, or *U. morulus* (e.g. Blair *et al.* 2018).

Both *Uropsophus woolfi sp. nov*. and *U. morulus* are separated from *U. lepidus* by the following unique suite of characters: 23-25 dorsal midbody rows, 156-167 ventrals in males, 160-171 ventrals in females, 25-30 subcaudals in males and 20-25 subcaudals in females and 22-34 dorsal markings (blotches) on the body that are usually well defined on the anterior of the body where they are large and blotch-like and posteriorly they form cross-bands that usually extend to the ventrals. The occipital blotches are paired and usually are not fused (anteriorly at least) and the venter is usually dark in colour. The dorsum is strongly yellowish (in *U. morulus*) or orangeish (in *U. woolfi sp. nov.*) the dorsal blotches being dark brown, white edged in *U. morulus* and not white edged in *U. woolfi sp. nov.*.

Nominate *U. lepidus* is similar to as described above, but is separated from both *U. morulus* and *U. woolfi sp. nov*. by having narrow, strongly jagged edged darker bands or blotches across the dorsum, versus medium to wide and not strongly jagged edged in *U. morulus* and *U. woolfi sp. nov.*. Darker markings on the dorsum of the neck in *U. morulus* and *U. woolfi sp. nov*. are bold, versus not so in *U. lepidus. U. morulus* usually has 22-26 obvious darker dorsal blotches or bands on the upper body from neck to tail, versus 27-34 in *U. woolfi sp. nov.*.

U. woolfi sp. nov. is separated from *U. morulus* with a type locality of Tamaulipas, Mexico and generally from that state by having a generally orangeish background colour on the dorsum, versus yellow or beige in *U. morulus*, as well as having darker blotches or bands on the dorsum that are not white edged. In *U. morulus* the dark post-ocular stripe is well-bounded top and bottom by white or very light yellow, but not so in *U. woolfi sp. nov.*.

All of the morphologically similar species *U. woolfi sp. nov.*, *U. morulus*, *U. euanedwardsi sp. nov*. from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico are separated from the morphologically similar *U. klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico and *U. valentici sp. nov.* of Durango, Mexico by having paired occipital blotches and a dark venter, versus a joined or single occipital patch and a pale ventral pattern.

U. elfakhariorum sp. nov. is readily separated from *U. klauberi* by having a distinctive body pattern of widely spaced darker body bands that are unusually wide on the mid-dorsal line and form a narrow point on the lower flank, as opposed to dorsal bands of generally even width from spine to flank or only narrowing slightly at the flanks combined with lighter areas being immaculately pale, or near immaculate in colour. The background colour of the dorsum of *U. elfakhariorum sp. nov.* is an immaculate grey to beige in colour, sometimes with a greenish tinge, without the peppering or speckling seen in the lighter zones of the dorsum in the Durango, Mexico species *U. valentici sp. nov.*.

Specimens of *U. klauberi* from the USA and Sonora in far north Mexico which also have immaculately coloured pale areas on their dorsum are readily separated from *U. elfakhariorum sp. nov*. by the fact that the dorsal crossbands are not of the shape described above for *U. elfakhariorum sp. nov*., but instead are more-or-less of even thickness around the dorsum of the body.

An image of *U. elfakhariorum sp. nov*. in life can be seen online at:
https://www.facebook.com/groups/crotalus/permalink/1837412252982612/

U. valentici sp. nov. from Durango, Mexico, has body bands that are wider on the mid-dorsal line and narrower on the lower flanks, but not in the extreme manner seen in *U. elfakhariorum sp. nov*.. Instead the narrowing is relatively slight. In stark contrast to *U. elfakhariorum sp. nov*., in *U. valentici sp. nov.* the lighter parts of the dorsum are heavily peppered with black or brown, sometimes tending towards small spots or blotches and in any event, usually on each and every lighter scale,

U. valentici sp. nov. differs from each of *U. elfakhariorum sp. nov*. and *U. klauberi* in that along the mid body, the ventral colours continue up the lower parts of the lower flanks.

A photo of *U. valentici sp. nov.* in life can be seen in Campbell and Lamar (2004) in plate 851.

U. euanedwardsi sp. nov. known only from Nayarit, Mexico and *U. maculosus* are separated from *U. woolfi sp. nov*. and *U. morulus* by the following suite of characters: having transversely aligned blotches that do not, or only partially extend to the sides of the body. In *U. woolfi sp. nov*. and *U. morulus* the anterior dorsal markings are large, well-defined and blotch-like and posteriorly form crossbands that extend to the ventrals, versus not so in *U. euanedwardsi sp. nov*. and *U. maculosus.*

U. euanedwardsi sp. nov. is separated from *U. maculosus* by having 22-23 dorsal crossbands, versus 24-38 in *U. maculosus* and transversely aligned blotches that partially extend to the sides of the body, versus not so in *U. maculosus. U. euanedwardsi sp. nov*. also has a very dark chin and belly and an undivided upper-preocular.

The morphologically similar species *U. pusillus* (Klauber, 1952), with a type locality of Michoacan, Tancitaro; 5,000 feet elevation, occurring in north east Michoacan and southern Jalisco is readily separated from all the preceding species by having prefrontals (canthals) paired and in contact, and with even but convex posterior edges, versus more than two scales in the prefrontal area of all the preceding species.

Rattlesnakes in the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2009b and again in 2012b) are separated from all other rattlesnakes by the following unique suite of characters: A group of small rattlesnake species found in Mexico and adjacent southern USA.

They are separated from all other rattlesnake genera by the following suite of characters:

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

Distribution: *U. swileorum sp. nov.* is only known from eastern Querétaro, Mexico.

Etymology: The new species *U. swileorum sp. nov.* is named in honour of Ernie (Ernest), Vona, Benjamin, Marlene and Keenan Swile and families all of Athlone and Mitchell's Plain in remote southern Africa, (Cape Town, Western Cape Province) in recognition of their services to herpetology in Africa, including logistical support for important fieldwork conducted by myself on that continent.

Included in this was lugging equipment up Mountains when searching for Vipers, tramping through leech infested swamps looking for Cobras and other critters and generally having to put up with doing strange things in strange times of day in strange places, all in the name of science.

UROPSOPHUS AQUILUS HAMMONDI SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:C677425E-9A6B-4778-8359-A98F6B1827BD

Holotype: A preserved specimen at the Herpetology Collection of the Royal Ontario Museum, Ontario, Canada, specimen number ROM 47031 collected from Acambay, northern Estado de Mexico, Mexico, Latitude +19.9543 N., Longitude -99.8441 W. This facility allows access to its holdings.

Paratype: A neonate specimen at the Herpetology Collection of the Royal Ontario Museum, Ontario, Canada, specimen number ROM 47033 collected from Acambay, northern Estado de Mexico, Mexico, Latitude +19.9543 N., Longitude -99.8441 W.

Diagnosis: The species *U. aquilus* (Klauber, 1952), with a type locality of near Alvarez, San Lois Potosi, Mexico as well as the subspecies *U. aquilus hammondi subsp. nov.* which is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico and the morphologically similar closely related species *U. swileorum sp. nov.* from Querétaro, Mexico, (until now treated as a divergent population of *U. aquilus*) are separated from the other species in the genus *Uropsophus* by having the upper preocular not split vertically or if split, the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular; (versus split, with the anterior section being higher than the posterior and curved over the canthus rostralis over in front of the supraocular in the other species); dorsal body blotches occupy more longitudinal space than the interspaces, versus less than the interspaces in the preceding species.

U. aquilus and *U. swileorum sp. nov.* are separated from the morphologically similar species *U. triseriatus* Wagler, 1830, with a type locality of Mexico (presumed to be the central plateau region), *U. armstrongi* (Campbell, 1979), type locality of Rancho San Francisco, 1.5 miles north west of Tapalpa, Jalisco, Mexico, elevation 2103 m., *U. campbelli* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Sierra de Cuale, 9 km north east of El Teosinte, municipality of Talpa de Allende, Jalisco, Mexico, *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) with a type locality of Los Llanos, Latitude +18.36 N., Longitude -99.37 W., at 2200-2300 metres above sea level; 10 km by road from Taxco towards Tetipac, Sierra de Taxco, municipality of Tetipac, Guerrero, Mexico and *U. oxyi sp. nov.* from far southern Nayarit and adjacent Jalisco, Mexico by the following suite of characters: rattle fringe scales usually 10 (versus usually 8), rattle tends to be larger (versus smaller); in snakes exceeding 400 mm in length the dorsoventral length of the proximal rattle lobe exceeds one percent of the overall body length (versus not exceeding this in the other species); in snakes less than 400 mm in length the width of the proximal rattle lobe plus 1 mm is more than .0075 times the body length (versus not so).

Uropsophus swileorum sp. nov. from the eastern mountains of the Reserva de la Biosfera Sierra Gorda, Querétaro has until now been treated as a population of *Uropsophus aquilus* Klauber, 1952, with a type locality of near Alvarez, San Luis Potosi, Mexico and with the nominate subspecies as defined herein, occurring generally east and north of Querétaro, to the vicinity of the type locality.

The subspecies *U. aquilus hammondi subsp. nov.* is found on the western and southern side of the distribution *U. aquilus* in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico.

The three forms are readily separated from one another as follows:

The type form of the nominate subspecies of *U. aquilus* has a dorsum with a background colour that is an immaculate light (pale) grey, with widely spaced squarish brown blotches running along the midline, with the blotches not running onto the flanks in any way. The flanks in turn have smaller widely spaced blotches on the lower half. The blotches are separated from 2-3 rows or light scales.

The top of the head has obvious dark markings on it.

Uropsophus swileorum sp. nov. is a snake with a distinctively brownish coloured dorsum, occasionally dark slaty grey in general colouration, with closely spaced chocolate brown (or dark slaty grey) rectangular spots on the dorsal line, each broken from one another by a narrow light brown interspace, being no more than one scale wide. The light brown (or slaty) coloured flanks have numerous narrow semi-distinct chocolate coloured (or near black) blotches running up the flanks, being 1-2 scales wide, forming semi-distinct bands on the sides. Each of these blotches corresponds to a mid-dorsal rectangle and because the side blotches are narrow, this means that the flanks are mainly light brown (or slaty grey) in colour, versus mainly chocolate brown (or dark slaty grey) along the mid dorsal line, where the rectangles run in a longitudinal way. The top of the head is unicolor with no markings or peppering.

U. aquilus hammondi subsp. nov. is separated from both preceding taxa in that it has a generally yellowish to beige background colour (versus grey (light or dark slate) or brown) on the dorsum. Dorsal blotches are squarish to rectangular in shape but the sides (all four) are not even, although they are well defined at the boundary. The blotches along the mid dorsal line are dark brown, becoming blackish, but not fully black on the edges. They are usually separated from one another by 1-2 scales, but sometimes the blotches merge to form a continuous thick mid-dorsal line along the anterior or mid dorsum. The upper surface of the head has peppering on it, or distinct dark markings.

U. aquilus aquilus is depicted in life in Campbell and Lamar (2004) in plates 767 and 769.

U. swileorum sp. nov. is depicted in life in Campbell and Lamar (2004) in plate 760.

U. aquilus hammondi subsp. nov. is depicted in life in Campbell and Lamar (2004) in plate 765.

The species *U. tlaloci* (Bryson, Linkem, Dorcas, Lathrop, Jones, Alvarado-Diaz, Grunwald and Murphy, 2014) is separated from all other species within the genus *Uropsophus* by the following unique suite of characters: (1) presence of intercanthals, (2) undivided upper preocular, (3) 152-164 ventrals in males, 156-165 in females, (4) 27-33 subcaudals in males, 22-32 in females, (5) small rattle (proximal rattle width 11.1-14.5 per cent of head length), (6) long tail (8.9-11.3 per cent of total body length in males, 8.0-10.7 per cent in females), (7) usually two pairs of symmetrical, similarly sized intercanthals, and (8) dark postocular stripe that noticeably narrows before reaching the posterior of the eye (taken directly from Bryson *et al.* 2014).

The three species *Uropsophus klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. valentici sp. nov.* of Durango, Mexico and *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico have until now been treated as conspecific.

Until now *U. euanedwardsi sp. nov*. known only from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico have been treated as the same species-level taxon.

Also until now, *Uropsophus woolfi sp. nov*. from Parque Chipinque, Nuevo Leon, Mexico and nearby areas has been treated as either *U. lepidus* (Kennicott, 1861), type locality Texas, USA, (e.g. Campbell and Lamar, 2004), or *Crotalus lepidus morulus* Klauber, 1952 (as originally described), from near La Joya de Salas, Tamaulipas, Mexico, or *U. morulus* (e.g. Blair *et al.* 2018).

Both *Uropsophus woolfi sp. nov*. and *U. morulus* are separated from *U. lepidus* by the following unique suite of characters: 23-25 dorsal midbody rows, 156-167 ventrals in males, 160-171 ventrals in females, 25-30 subcaudals in males and 20-25 subcaudals in females and 22-34 dorsal markings (blotches) on the body that are usually well defined on the anterior of the body where they are large and blotch-like and posteriorly they form cross-bands that usually extend to the ventrals. The occipital blotches are paired and usually are not fused (anteriorly at least) and the venter is usually dark in colour. The dorsum is strongly yellowish (in *U. morulus*) or orangeish (in *U. woolfi sp. nov.*) the dorsal blotches being dark brown, white edged in *U. morulus* and not white edged in *U. woolfi sp. nov.*.

Nominate *U. lepidus* is similar to as described above, but is separated from both *U. morulus* and *U. woolfi sp. nov*. by having narrow, strongly jagged edged darker bands or blotches across the dorsum, versus medium to wide and not strongly jagged edged in *U. morulus* and *U. woolfi sp. nov.*. Darker markings on the dorsum of the neck in *U. morulus* and *U. woolfi sp. nov*. are bold, versus not so in *U. lepidus. U. morulus* usually has 22-26 obvious darker dorsal blotches or bands on the upper body from neck to tail, versus 27-34 in *U. woolfi sp. nov.*.

U. woolfi sp. nov. is separated from *U. morulus* with a type locality of Tamaulipas, Mexico and generally from that state by having a generally orangeish background colour on the dorsum, versus yellow or beige in *U. morulus*, as well as having darker blotches or bands on the dorsum that are not white edged. In *U. morulus* the dark post-ocular stripe is well-bounded top and bottom by white or very light yellow, but not so in *U. woolfi sp. nov.*.

All of the morphologically similar species *U. woolfi sp. nov.*, *U. morulus*, *U. euanedwardsi sp. nov*. from Nayarit, Mexico and *U. maculosus* with a type locality of Durango, Mexico are separated from the morphologically similar *U. klauberi* Gloyd, 1936, with a type locality of Carr Canyon, Huachuca Mountains, Cochise County, Arizona, USA, *U. elfakhariorum sp. nov.* from Zacatecas and Jalisco, Mexico and *U. valentici sp. nov.* of Durango, Mexico by having paired occipital blotches and a dark venter, versus a joined or single occipital patch and a pale ventral pattern.

U. elfakhariorum sp. nov. is readily separated from *U. klauberi* by having a distinctive body pattern of widely spaced darker body bands that are unusually wide on the mid-dorsal line and form a narrow point on the lower flank, as opposed to dorsal bands of generally even width from spine to flank or only narrowing slightly at the flanks combined with lighter areas being immaculately pale, or near immaculate in colour. The background colour of the dorsum of *U. elfakhariorum sp. nov.* is an immaculate grey to

beige in colour, sometimes with a greenish tinge, without the peppering or speckling seen in the lighter zones of the dorsum in the Durango, Mexico species *U. valentici sp. nov.*.

Specimens of *U. klauberi* from the USA and Sonora in far north Mexico which also have immaculately coloured pale areas on their dorsum are readily separated from *U. elfakhariorum sp. nov*. by the fact that the dorsal crossbands are not of the shape described above for *U. elfakhariorum sp. nov*., but instead are more-or-less of even thickness around the dorsum of the body.

An image of *U. elfakhariorum sp. nov*. in life can be seen online at:
https://www.facebook.com/groups/crotalus/permalink/1837412252982612/

U. valentici sp. nov. from Durango, Mexico, has body bands that are wider on the mid-dorsal line and narrower on the lower flanks, but not in the extreme manner seen in *U. elfakhariorum sp. nov*.. Instead the narrowing is relatively slight. In stark contrast to *U. elfakhariorum sp. nov*., in *U. valentici sp. nov.* the lighter parts of the dorsum are heavily peppered with black or brown, sometimes tending towards small spots or blotches and in any event, usually on each and every lighter scale,

U. valentici sp. nov. differs from each of *U. elfakhariorum sp. nov*. and *U. klauberi* in that along the mid body, the ventral colours continue up the lower parts of the lower flanks.

A photo of *U. valentici sp. nov.* in life can be seen in Campbell and Lamar (2004) in plate 851.

U. euanedwardsi sp. nov. known only from Nayarit, Mexico and *U. maculosus* are separated from *U. woolfi sp. nov*. and *U. morulus* by the following suite of characters: having transversely aligned blotches that do not, or only partially extend to the sides of the body. In *U. woolfi sp. nov*. and *U. morulus* the anterior dorsal markings are large, well-defined and blotch-like and posteriorly form crossbands that extend to the ventrals, versus not so in *U. euanedwardsi sp. nov*. and *U. maculosus. U. euanedwardsi sp. nov*. is separated from *U. maculosus* by having 22-23 dorsal crossbands, versus 24-38 in *U. maculosus* and transversely aligned blotches that partially extend to the sides of the body, versus not so in *U. maculosus. U. euanedwardsi sp. nov*. also has a very dark chin and belly and an undivided upper-preocular.

The morphologically similar species *U. pusillus* (Klauber, 1952), with a type locality of Michoacan, Tancitaro; 5,000 feet elevation, occurring in north east Michoacan and southern Jalisco is readily separated from all the preceding species by having prefrontals (canthals) paired and in contact, and with even but convex posterior edges, versus more than two scales in the prefrontal area of all the preceding species.

Rattlesnakes in the genus *Uropsophus* Wagler, 1830 as defined by Hoser (2009b and again in 2012b) are separated from all other rattlesnakes by the following unique suite of characters: A group of small rattlesnake species found in Mexico and adjacent southern USA.

They are separated from all other rattlesnake genera by the following suite of characters:

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

Distribution: *U. aquilus hammondi subsp. nov.* is known from a region encompassing the western and southern side of the distribution *U. aquilus* in the case of this new subspecies, being in a line from Aguascalientes in the north to the central Mexican uplands in the south, and including the Mexican states of Guanajuato, western Querétaro, Michoacán and northern Estado de Mexico.

Etymology: The new subspecies *U. aquilus hammondi subsp. nov.* is named in honour of Ray Hammond of Hamilton, western Victoria, Australia, in recognition of his logistical services to Snakebusters, Australia's best reptiles shows over many years and for his work in combating police corruption in Victoria.

COTTONUS TOMCOTTONI SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:D0A1A14A-A94C-412A-A550-32A7E7B6AE8D

Holotype: A preserved specimen at the Museum of Zoology, at the University of Michigan, Michigan, USA, specimen number UMMZ 110878 collected from west of Rincon de Romas in the Sierra Fria, Aguascalientes, Mexico, Latitude 22.2289 N., Longitude -102.3206 W. This facility allows access to its holdings.

Diagnosis: Putative "*Crotalus pricei* Van Denburgh, 1895", was placed by Hoser (2009) in the genus *Aechmorphrys* Coues, 1875, type species *Crotalus cerastes* Hallowell,1854 and in turn in the subgenus *Cottonus* Hoser, 2009 with a type species of *Crotalus intermedius* Troschel, 1865.

The phylogeny of Pyron *et al.* (2013) supported the contention that *Cottonus* should be treated as a full genus and separate from *Aechmorphrys*, which explains the placement of this newly named species in this paper.

Until now *Cottonus pricei* (Van Denburgh, 1895) (being a *comb. nov*. in this paper) has been treated as including populations of the nominate form from Arizona, USA, extending south along the Sierra Madre Occidental in west Mexico, as well as another population in the Sierra Madre Oriental in East Mexico.

The eastern form was formally named as "*Crotalus triseriatus miquihuanus* Gloyd, 1940". A third form was more recently found in Aguascalientes, Mexico, and while assigned to the putative species *Cottonus pricei* (Van Denburgh, 1895) (e.g. Cambell and Lamar, 1989, 2004), it was never formally named.

All three forms are morphologically divergent from one another, well and truly reproductively isolated and not likely to merge at any time in the forseeable future and by any reasonable definition should be treated as separate species. This contention is futher supported by results of molecular studies involving vertebrate species groups with similar distribution patterns (e.g. Benabib *et al.* 1997, for the *Sceloporus scalaris* species group).

Hence the three relevant species are *Cottonus pricei* (Van Denburgh, 1895) for the taxon found from Arizona in the north, southwards to northern Durango*. Cottonus tomcottoni sp. nov*. is the taxon found in Aguascalientes, Mexico. *Cottonus miquihuanus* (Gloyd, 1940) is the taxon found in the Sierra Madre of far southern Coahuila, Nuevo Leon and far mid-west Tamaulipas, Mexico.

C. miquihuanus is separated from *C. pricei* by having a grey rather than brown, orange or red colouration of the dorsum, middorsal blotches are usually divided medially (versus usually not), the head plates are less subdivided, and there are fewer ventrals being in the range of 137-143, versus 149-171 in *C. pricei.*

The dark stripe running back from the eye to the neck has a well defined upper boundary, versus not so in *C. pricei.* The line is also thin.

C. miquihuanus is separated from both *C. pricei* and *C. tomcottoni sp. nov*. by having white on the anterior and posterior of each of the dark mid-dorsal blotches, versus not so in the other two species.

C. tomcottoni sp. nov. is similar in most respects to *C. miquihuanus* as defined above, but is most readily separated from that taxon by being dark brown in dorsal colour (versus grey), the dark stripe running back from the eye to the neck is thick, with a well defined upper boundary (also separating it from *C. pricei*) and there is no white on the anterior and posterior of each of the dark mid-dorsal blotches.

C. miquihuanus has ill-defined blotches on the flanks. These are absent in both *C. pricei,* and *C. tomcottoni sp. nov*..

C. tomcottoni sp. nov. in life is depicted in Campbell and Lamar (2004) in plates 927 and 928.

C. miquihuanus in life is depicted in Campbell and Lamar (2004) in plates 924-926.

C. pricei in life is depicted in Campbell and Lamar (2004) in plates 922-923.

C. pricei, C. miquihuanus and *C. tomcottoni sp. nov*. are separated from all other rattlesnakes by the following unique suite of characters: Top of head with more than 12 smaller asymmetrically arranged scales, including several in the frontal area and numerous scales in the parietal region; lateral edges of the supraoculars are not extended into pointed hornlike processes; fewer than 40 subcaudal scales in males and less than 35 in females; tip of snout and anterior portion of the canthus is not raised into a sharp ridge; rostral and mental are not marked with a median vertical pale line; prenasals contacting the rostral; upper preoculars usually not divided or if so, divided only vertically with the anterior portion of the scale conspicuously higher than the posterior section and curced over the canthus in front of the supraocular; dorsoventral width of proximal rattle segment is more than 2.5 times the head length; anterior subocular contacts one or more (usually two) supralabials; supraoculars are not transversely crossed by a thin, black bordered pale line; there is no distinctly outlined round or oval dark blotch below the eye; midbody scale rows plus supralabials on both sides is less than 41; loreal is not in contact with any supralabial; lower preocular passes above the facial pit and makes contact with the loreal; body pattern includes paired usually vaguely squarish spots along the dorsum, often merged to form a single blotch along much of the dorsum (it is not of longitudinal elipses and there are no obvious crossbands spanning the body).

Rattlesnakes in the genus *Cottonus* Hoser, 2009 are separated from other rattlesnakes by the following characters: A dorsal scale row formula of 21-21-17, 8-10 labials (a low number for rattlesnakes), a relatively small head, weak or no keeling in the parietal region, and simple arrangement of relatively few scales on the side of the head.

Distribution: *C. tomcottoni sp. nov*. is presently known only from the far southern Sierra Madre Occidental, Aguascalientes, Mexico, but may occur north of here in adjacent Zacatecas.

Etymology: Named after Australian wildlife demonstrator Thomas (Tom) Cotton, of Ringwood North, Victoria, Australia, in honour of his conservation work with our wildlife education enterprise, Snakebusters: Australia's best reptiles shows, which leads the way in wildlife conservation in Australia. Tom's educational efforts brought countless people into contact with reptiles and created a whole generation of herpetologists, scientists and conservationists.

MATTEOEA MITCHELLI MATTEOAE SUBSP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:D864FBEA-961A-4475-841D-B32EE5BE3337

Holotype: A preserved specimen at the Brigham Young University, Provo, Utah, USA, specimen number BYU 34748 collected at Juncalito, Baja California Sur, Mexico, Latitude +25.8348 N., Longitude -111.3380 W. This facility allows access to its holdings.

Diagnosis: Meik *et al.* (2018) confirmed that the species *M. mitchelli* (Cope, 1861) is confined to Baja California Sur, Mexico, with the northern state border being the apparent northern limit of the distribution of the species. *M. pyrrhus* (Cope, 1866) occupies the mainland (northern part) of the state of Baja California, Mexico and extends into the southern parts of the USA states of California, Nevada, Arizona and Utah, as well as the state of Sonora in adjacent Mexico.

The molecular study of Douglas *et al.* (2006) found that *M. mitchelli* as defined by them and previous authors divided into two clades that diverged by their estimation about 2 MYA (see Fig. 5 and text).

The nominate form of *M. mitchelli mitchelli* with a type locality of Cabo San Lucas, Baja California Sur, Mexico, is the subspecies found south of about La Paz, and including islands to the north, while the divergent *M. mitchelli matteoae subsp. nov.* is known to occur from Juncalito on the Baja Peninsula, north to about Santa Rosalia. It is the subspecies found in the Sierra de la Giganta.

Nominate *M. mitchelli mitchelli* are the species found mainly in the Sierra de la Laguna.

The two subspecies are apparently separated by a flat, low elevation region between the two range systems immediately north of La Paz and a distance of about 20-40 km (straight line) and no known intergradations.

M. mitchelli matteoae subsp. nov. is separated from *M. mitchelli mitchelli* by colouration.

M. mitchelli mitchelli has a beige base colour on the dorsum, sometimes with a very slight pink hue, overlain with dark grayish-brown squarish blotches running down the spine and not extending to the flanks on the anterior, but doing so on the posterior body, where the blotches enlarge and form jaged bands or elongate blotches, separated by well-defined pale interspaces, becoming much wider than the narrow light interspaces, Dark markings on the lower labials are well defined. Diagnostic of this subspecies is a reasonably well defined whiteish line running down either side of the dorsolateral edge (not in *M. mitchelli matteoae subsp. nov.*) and black tail bands that are usually broken at least once.

By contrast, *M. mitchelli matteoae subsp. nov*. is of similar general colouration to *M. mitchelli mitchelli*, although slightly darker (see below), but is defined by an indistinct patterning on the anterior dorsum (versus distinct), dark interiors of light scales on the light interspaces of the anterior dorsum (versus not so in *M. mitchelli mitchelli*), the result being a more uniform colouration appearance of the anterior dorsum, when viewed from a distance. Bands of the lower body and tail before the rattle are usually even and well defined, vesus uneven, broken or as blotches in *M. mitchelli mitchelli.* Scattered dark peppering or flecks on the dorsum of *M. mitchelli matteoae subsp. nov.* is dark brown, versus black in *M. mitchelli mitchelli.*

M. mitchelli matteoae subsp. nov. does not have a reasonably well defined whiteish line running down either side of the dorsolateral edge that is seen in *M. mitchelli mitchelli.*

M. mitchelli matteoae subsp. nov. in life is depicted in Fig. 2B of Douglas *et al.* (2007).

M. mitchelli mitchelli in life is depicted in Campbell and Lamar (2004) in plates 864 and 865.

Both subspecies of *M. mitchelli* are separated from all other species and subspecies in the genus *Matteoea* Hoser, 2009 by the following suite of characters: Last supralabial is conspicuously longer than those before it, being about twice the length; head is relatively smaller than in other species of *Matteoea*, the length of the head is contained in the overall adult body lenfth more than 24 times; the original rattle button, if present is less than 7.5 mm wide dorsoventrally.

The species within the genus *Matteoea*, are *M. mitchelli* (type for genus), with the subspecies *M. mitchelli matteoae subsp. nov.* described in this paper; *M. pyrrhus* (Cope, 1866) including the subspecies *M. pyrrhus goldmani* (Schmidt, 1922) and *M. pyrrhus dorisio subsp. nov*. described in this paper; *M. stephensi* (Klauber, 1930), including the subspecies *M. stephensi sommerichi sp. nov*. described in this paper; *M. angelensis* (Klauber,

1963); *M. polisi* (Meik, Schaack, Flores-Villela and Streicher, 2018) and *M. thalassoporus* (Meik, Schaack, Flores-Villela and Streicher, 2018).

The species *M. mitchelli*, *M. pyrrhus*, *M. stephensi* and *M. angelensis* have been confirmed by the molecular evidence of Douglas *et al.* (2007) and later authors including Meik *et al.* (2018).

The subspecies named or recognized within this paper have also had their significant subspecies-level divergences confirmed by the studies of Douglas *et al.* (2006, 2007) and Meik *et al.* (2018). Species-level recognition of *M. polisi* and *M. thalassoporus* is tentative as the molecular results were ambiguous and subspecies-level recognition, within *M. pyrrhus* may ultimately be appropriate.

The species *M. muertensis* (Klauber, 1949), with a type locality of El Muerto Island, Gulf of California, Mexico, is herein treated as a synonym of *M. pyrrhus goldmani* (Schmidt, 1922), with a type locality of El Piñón, Baja California North, Mexico. The species "*Crotalus tigris* Kennicott, 1859", published in Baird (1859), placed in *Matteoea* by Hoser (2019) has been removed from this genus on the basis of phylogenetic results of Pyron *et al.* (2013), indicating a better placement of this taxon within *Edwardsus* Hoser, 2019, but the placement of this taxon in *Edwardsus* is tentative.

As a result, of the preceding, all species of *Matteoea* Hoser, 2009 are now defined and separated from all other rattlesnakes as follows: Rattle matrix is normal and not shrunken; there are always at least one or more loose rattle segments beyond the juvenile stage; the outer edges of the supraoculars are not extended into pointed (but flexible) hornlike processes (as seen in species in the genus *Aechmorphrys* Coues, 1875); prenasals are usually separated from the rostral by small scales or granules; or at least the front edges of the prenasals are chipped and sutured; upper preoculars are divided horizontally, vertically, or both.

All three subspecies, *M. mitchelli matteoae subsp. nov.*, *M. pyrrhus dorisioi sp. nov.* and *M. stephensi sommerichi sp. nov.* diverged from the nominate subspecies 1-2 MYA, forming the reasoning for each being accorded subspecies status. Two of the three apparently diverged 1.5 MYA or earlier, these being *M. mitchelli matteoae subsp. nov.* and *M. pyrrhus dorisioi sp. nov.* so a strong case for full species recognition could be made. *M. stephensi sommerichi sp. nov.* diverged from the nominate subspecies about 1 MYA (Douglas *et al.* 2006).

Distribution: *M. mitchelli matteoae subsp. nov.* is known to occur from Juncalito on the Baja Peninsula, north to about Santa Rosalia (wholly Baja California Sur, in Mexico). It is the species found in the Sierra de la Giganta.

Etymology: As for the genus *Matteoea*. This subspecies is named in honour of Cathryn Matteo, of Mornington, Victoria, Australia, previously of Hawthorn, Victoria, Australia, a close personal friend, with no direct interest in herpetology, but whom over 30 years has provided untold and immense assistance's in all kinds of projects the net result including there being a legal regime in most parts of Australia, whereby as of 2020 most people can legally obtain, keep and study reptiles. This was not the case prior to the publication of Hoser (1993, 1996), which forced a change of laws that for 20 years had made it a serious crime to have any interaction with Australian wildlife.

Those two books would not have been published without the assistance's of Cathryn Matteo and herpetologists worldwide owe her a debt of gratitude.

MATTEOEA PYRRHUS DORISIOI SUBSP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:87485D2E-4812-4525-AFC9-9D6E8872495D

Holotype: A preserved adult specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS HERP 201174, collected from Highway 243, 0.3 miles south of Lake Fulmor in the San Jacinto Mountains, Riverside County, California, USA, Latitude +33.8001 N., Longitude -116.7789 W. This facility allows access to its holdings.

Paratype: A preserved adult specimen at the California Academy of Sciences, San Francisco, California, USA, specimen number CAS HERP 192748 collected from 14 miles north of Highway 10, the Joshua Tree National Monument, Riverside County, California, USA, Latitude +33.8322 N., Longitude -115.7612 W.

Diagnosis: The studies of Douglas *et al.* (2006, 2007) and Meik *et al.* (2018) indicated that the putative species *M. pyrrhus* (Cope, 1866) consisted of a number of significantly divergent clades. These included the nominate subspecies with a type locality of Arizona, USA (see Klauber, 1972), and the Baja Peninsula forms, Mexico, for which the name *M. pyrrhus goldmani* (Schmidt, 1922) is available as well as a distinctive hitherto unnamed form from southern California in the region generally east and south of Los Angeles, herein formally described as *M. pyrrhus dorisioi sp. nov.*.

Douglas *et al.* (2006) indicated a divergence of this form from all other *M. pyrrhus* at about 1.5 MYA, which is similar to the more recent results of Meik *et al.* (2018) and could be taken as a species-level divergence (see earlier this paper).

M. pyrrhus dorisioi sp. nov. is readily separated from nominate *M. pyrrhus pyrrhus* and *M. pyrrhus*

goldmani by the following suite of characters: A generally orange, or brick-red dorsum, with moderately defined cross-bands on the upper dorsum, although sometimes grayish above, but always with orange interspaces between darker bands on the lower flanks of the posterior half of the body, versus, light interspaces on the body that are beige, yellow or brown (including on the flanks) in nominate *M. pyrrhus pyrrhus*, or dark grayish-brown bands on the dorsum with pink on the lighter interspaces of the lower flanks of the posterior half of the body in *M. pyrrhus goldmani.*

M. pyrrhus dorisioi sp. nov. have lighter labials and upper chin scales that are whitish or yellow, versus ones that are pink in both *M. pyrrhus goldmani* and *M. pyrrhus pyrrhus.*

M. pyrrhus dorisioi sp. nov. in life is depicted online at:
http://www.californiaherps.com/snakes/images/cmpyrrhusrivnb7156.jpg
and
http://www.californiaherps.com/snakes/images/cmpyrrhusrivnb7155.jpg

Nominate *M. pyrrhus pyrrhus* in life is depicted on plate 870 of Campbell and Lamar (2004).
M. pyrrhus goldmani in life is depicted online at:
https://www.flickr.com/photos/naturestills/12175654065/in/photolist-jxVpL6-jxWxzD-dTzDGx
and
https://www.flickr.com/photos/naturestills/12175875483/in/photolist-jxVpL6-jxWxzD-dTzDGx

All three subspecies of *M. pyrrhus* are separated from all other species and subspecies in the genus *Matteoea* Hoser, 2009 by the following suite of characters: Last supralabial is not conspicuously longer than those before it, and is not about twice the length; head is relatively larger than in *M. mitchelli*, the length of the head is contained in the overall adult body length less than 24 times; the original rattle button, if present is more than 7.5 mm wide dorsoventrally; 23 or 25 mid-body rows; supraoculars without sutures or indentations at the outer edges; more than one scale between the prenasal and rostral; preocular is usually divided, often irregularly, vertically or horizontally (not seen in the other species, except perhaps in aberrant individuals).

The species within the genus *Matteoea*, are *M. mitchelli* (type for genus), with the subspecies *M. mitchelli matteoae subsp. nov.* described in this paper; *M. pyrrhus* (Cope, 1866) including the subspecies *M. pyrrhus goldmani* (Schmidt, 1922) and *M. pyrrhus dorisio subsp. nov*. described in this paper; *M. stephensi* (Klauber, 1930), including the subspecies *M. stephensi sommerichi sp. nov*. described in this paper; *M. angelensis* (Klauber, 1963); *M. polisi* (Meik, Schaack, Flores-Villela and Streicher, 2018) and *M. thalassoporus* (Meik, Schaack, Flores-Villela and Streicher, 2018).

The species *M. mitchelli*, *M. pyrrhus*, *M. stephensi* and *M. angelensis* have been confirmed by the molecular evidence of Douglas *et al.* (2007) and later authors including Meik *et al*. (2018).

The subspecies named or recognized within this paper have also had their significant subspecies-level divergences confirmed by the studies of Douglas *et al.* (2006, 2007) and Meik *et al*. (2018). Species-level recognition of *M. polisi* and *M. thalassoporus* is tentative as the molecular results were ambiguous and subspecies-level recognition, within *M. pyrrhus* may ultimately be more appropriate.

The species *M. muertensis* (Klauber, 1949), with a type locality of El Muerto Island, Gulf of California, Mexico, is herein treated as a synonym of *M. pyrrhus goldmani* (Schmidt, 1922), with a type locality of El Piñón, Baja California North, Mexico.

As a result, of the preceding (in this paper), all species of *Matteoea* Hoser, 2009 are now defined and separated from all other rattlesnakes as follows: Rattle matrix is normal and not shrunken; there are always at least one or more loose rattle segments beyond the juvenile stage; the outer edges of the supraoculars are not extended into pointed (but flexible) hornlike processes (as seen in species in the genus *Aechmorphrys* Coues, 1875); prenasals are usually separated from the rostral by small scales or granules; or at least the front edges of the prenasals are chipped and sutured; upper preoculars are divided horizontally, vertically, or both.

All three subspecies, *M. mitchelli matteoae subsp. nov.*, *M. pyrrhus dorisioi sp. nov.* and *M. stephensi sommerichi sp. nov.* diverged from the nominate subspecies 1-2 MYA, forming the reasoning for each being accorded subspecies status. Two of the three apparently diverged 1.5 MYA or earlier, these being *M. mitchelli matteoae subsp. nov.* and *M. pyrrhus dorisioi sp. nov.* so a strong case for full species recognition could be made. *M. stephensi sommerichi sp. nov.* diverged from the nominate subspecies about 1 MYA (Douglas *et al*. 2006).

Distribution: *M. pyrrhus dorisioi subsp. nov.* occurs in southern California in the region generally east and south of Los Angeles in California, USA.

Etymology: This subspecies is named in honour of Morrie Dorisio, of Reservoir, Victoria, Australia, previously of Bulleen, Victoria, Australia, a close personal friend, with no direct interest in herpetology, but whom over 30 years has provided untold and immense assistance's in all kinds of projects the net result including there being a legal

regime in most parts of Australia, whereby as of 2020 most people can legally obtain, keep and study reptiles. This was not the case prior to the publication of Hoser (1993, 1996), which forced a change of laws that for 20 years had made it a serious crime to have any interaction with Australian wildlife.

Those two books would not have been published without the assistance's of Morrie Dorisio and herpetologists worldwide owe him a debt of gratitude.

MATTEOEA STEPHENSI SOMMERICHI SUBSP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:9F9686DB-814C-4CEF-824D-E32CCCB94762

Holotype: A preserved specimen at the Natural History Museum of Los Angeles County, Los Angeles, USA, specimen number LACM Herps 188020, collected crossing the Gorge Road/Owens Gorge Pipeline Road, 6.55 km north-east of the intersection of CA-395 at an elevation of about 1640 metres, Mono, California, USA, Lat +37.4913 N., Longitude -118.5677 W. This facility allows access to its holdings.

The snake was found alive on the road under light wind and partly cloudy skies, air temperature 72 Degrees farenheight.

Paratype: A preserved female specimen at the Natural History Museum of Los Angeles County, Los Angeles, USA, specimen number LACM Herps 188022 collected crossing the road at upper Red Rock Canyon, along Morris Mine Road 100 metres west of the Chidago Canyon Road intersection, Mono, California, USA, Latitude +37.6578 N., Longitude 118.5192 W.

Diagnosis: The studies of Douglas *et al.* (2006, 2007) and Meik *et al.* (2018) indicated that the putative species *M. stephensi* (Cope, 1866) consisted of two significantly divergent clades, with one of these confined to a small region in Mono County, California. Douglas *et al.* (2006), indicated a sequence divergence of about 1 MYA for the subspecies described herein as *M. stephensi sommerichi sp. nov..*

M. stephensi sommerichi sp. nov. is readily separated from *M. stephensi stephensi* by having a distinctively bold dorsal patterning incorporating well defined large dark brown spots on the dorsum, edged with black and then white over a light tan background. Posteriorly the blotches form well-defined brown bands tipped with white, with tan interspaces of similar width. The dark stripe running back from the eye is distinct. Anterior dorsal blotches are obviously squarish.

By contrast the patterning on nominate *M. stephensi stephensi* is dull and not distinct. The stripe running from the back of the eye is either absent or appears as a flush, rather than as a distinctive stripe. Anterior dorsal blotches are not obviously squarish.

M. stephensi sommerichi sp. nov. in life is depicted in plate 875 of Campbell and Lamar (2004) and also in Fig. 2A of Douglas *et al.* (2007).

M. stephensi stephensi in life is depicted in plates 873 and 874 of Campbell and Lamar (2004).

Both subspecies of *M. stephensi* are separated from all other species and subspecies in the genus *Matteoea* Hoser, 2009 by 1/ Having prominently ridged and/or creased supraocular scales; 2/ Absence of internasal scales; 3/ Ground coloration of tail that is congruent with the ground coloration of the body, and, 4/ Black tail bands restricted to the distal 15 per cent of the tail (traits not seen in the other species) (Douglas *et al.* 2007).

The species within the genus *Matteoea*, are *M. mitchelli* (type for genus), with the subspecies *M. mitchelli matteoae subsp. nov.* described in this paper; *M. pyrrhus* (Cope, 1866) including the subspecies *M. pyrrhus goldmani* (Schmidt, 1922) and *M. pyrrhus dorisio subsp. nov.* described in this paper; *M. stephensi* (Klauber, 1930), including the subspecies *M. stephensi sommerichi sp. nov.* described in this paper; *M. angelensis* (Klauber, 1963); *M. polisi* (Meik, Schaack, Flores-Villela and Streicher, 2018) and *M. thalassoporus* (Meik, Schaack, Flores-Villela and Streicher, 2018).

The species *M. mitchelli*, *M. pyrrhus*, *M. stephensi* and *M. angelensis* have been confirmed by the molecular evidence of Douglas *et al.* (2007) and later authors including Meik *et al.* (2018).

The subspecies named or recognized within this paper have also had their significant subspecies-level divergences confirmed by the studies of Douglas *et al.* (2006, 2007) and Meik *et al.* (2018). Species-level recognition of *M. polisi* and *M. thalassoporus* is tentative as the molecular results were ambiguous and subspecies-level recognition, within *M. pyrrhus* may ultimately be more appropriate.

The species *M. muertensis* (Klauber, 1949), with a type locality of El Muerto Island, Gulf of California, Mexico, is herein treated as a synonym of *M. pyrrhus goldmani* (Schmidt, 1922), with a type locality of El Piñón, Baja California North, Mexico.

As a result, of the preceding, all species of *Matteoea* Hoser, 2009 are now defined and separated from all other rattlesnakes as follows: Rattle matrix is normal and not shrunken; there are always at least one or more loose rattle segments beyond the juvenile stage; the outer edges of the supraoculars are not extended into pointed (but flexible) hornlike processes (as seen in species in the genus

Aechmorphrys Coues, 1875); prenasals are usually separated from the rostral by small scales or granules; or at least the front edges of the prenasals are chipped and sutured; upper preoculars are divided horizontally, vertically, or both.

Distribution: *M. stephensi sommerichi sp. nov.*appears to be restricted to hilly areas within Mono County, California.

Etymology: Named in honour of Rodney Sommerich, originally of Castle Cove, New South Wales, Australia in recognition of his services to herpetology in the 1970's and 1980's, including ferrying myself around Australia on the back of his motorbike at a time when I was the first and only government-licensed snake catcher on the planet, for the purposes of relocating snakes that appeared in people's homes.

PIERSONUS BRUNNEUS BARTLETTI SUBSP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:6CEA8632-C407-48D2-8B04-DC339F1A6E68

Holotype: A preserved specimen at the American Museum of Natural History, New York, USA, specimen number AMNH 65174 collected from Quiegolani, Oaxaca, Mexico, Latitude 16.2774 N., Longitude 96.0517 W. This facility allows access to its holdings.

Paratypes: 1/ A preserved specimen at the American Museum of Natural History, New York, USA, specimen number AMNH 65175 collected from Quiegolani, Oaxaca, Mexico, Latitude 16.2774 N., Longitude 96.0517 W. and: 2/ A preserved specimen at the California Academy of Sciences, San Francisco, California, USA specimen number CAS HERP 134051 collected from Rte 175 to Puerto Angel at San Jose de Pacifico, Oaxaca, Mexico, Latitude 16.56 N., Longitude -96.7 W.

Diagnosis: *Piersonus brunneus bartletti subsp. nov*. has until now been treated as putative *P. brunnerus* Harris and Simmons, 1978, known in most contemporary texts as "*Sistrurus ravus brunneus*", "*Sistrurus brunneus*", "*Crotalus ravus brunneus*", or "*Crotalus brunneus*".

The subspecies *Piersonus brunneus bartletti subsp. nov*. would identify as "*Sistrurus ravus brunneus* Harris and Simmons" as defined by Campbell and Armstrong (1979) on pages 311-313.

P. brunneus bartletti subsp. nov. is readily separated from nominate *P. brunneus brunneus* with a type locality of 2.7 km east of Ixtlan de Juárez, Oaxaca, Mexico by having a base colour on the dorsum of a reddish to pink-orange brown, versus light brown to beige in nominate *Crotalus brunneus.* It also is further separated by obvious speckling or peppering on the lower labials and chin shields.

Both subspecies of *P. brunneus* are separated from all other species within *Piersonus* Hoser, 2009 by the following unique suite of characters: 23 dorsal midbody rows; 3-6 prefoveals; 5-8 tail bands in males, and 4-6 in females; rattle smaller, (the regressions of tail length against dorsoventral width of the proximal rattle segment (PRW) usually less than 10 per cent of tail length in males,13 per cent in females), respectively body blotches usually exceeding 34; parietals usually undivided.

The three species within the genus *Piersonus* Hoser, 2009 are separated from all other rattlesnakes (Crotalinae) by the following suite of characters: Low rostral with a pointed apex, indistinct canthus

rostralis, dorsal blotches that are usually longer than wide and a lateral series of well-defined vertically narrow blotches.

Blair *et al.* (2018) at Fig. 6. On page 11 found that the three named species within *Piersonus* Hoser, 2009 diverged from their nearest related Rattlesnake species by more than 10 MYA, confirming the sensibility of the decision of Hoser (2009) to erect the genus *Piersonus.*

Distribution: The subspecies *P. brunneus bartletti subsp. nov*. is known only from San Jose de Pacifico, Oaxaca, being separated from the main population of *P. brunneus bartletti* by an area of lower elevation immediately to the north where the Rio Copalita flows.

Etymology: Named in honour of the Late Richard D. Bartlett of Fort Meyers in Florida, USA, for various contributions to herpetology over his lifetime.

CAUDISONA* (*CAUDISONA*) *EVATTI SP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:3424AFB2-C4BB-43E8-8E5D-5B240D30BA08

Holotype: A preserved specimen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ Herp R-27819, collected from Tapanatepec, Oaxaca, Mexico, Latitude +16.37 N., Longitude -94.19 W. This facility allows access to its holdings.

Paratypes: A preserved specimen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ Herp R-27821, collected from Tapanatepec, Oaxaca, Mexico, Latitude +16.37 N., Longitude -94.19 W.

Diagnosis: Morphologically similar to and closely related to *Caudisona ehecati* (Carbajal-Márquez, Cedeño-Vázquez, Martínez-Arce, Neri-Castro and Machkour-M'rabet, 2020), *Caudisona evatti sp. nov*. is both divergent and apparently allopatric to *C. ehecati*, so warrants recognition as a full species.

Molecular studies also indicates these two taxa are more divergent than other commonly recognized species level divisions, including for example *C. simus* (Latreille, 1901) and *C. durissus* (Linnaeus, 1758) (Cedeño-Vázquez *et al*. 2020).

C. ehecati with a type locality of San Joseì Tintonishac at 1504 metres elevation, Las Margaritas, Chiapas, Mexico, Latitude16.2937 N., Longitude -91.9618 W. is herein confined to the mountains in the northern half of that state.

C. evatti sp. nov. is found in the high altitude region of Oaxaca, Mexico, near the border with Chiapas, and is separated from *C. ehecati* by an area of low elevation in the far west of Chiapas. Cedeño-Vázquez *et al*. (2020) indicate that *C. evatti sp. nov*. as defined herein may be found along the southern coast of Oaxaca to Puerto Angel.

C. evatti sp. nov. is similar in most respects to *C. ehecati*, but is separated from that taxon by having a grayish to black lower body and tail, versus brownish or blackish-brown in *C. ehecati. C. evatti sp. nov*. also differs in the colouration of the scales within the mid dorsal diamonds running down the back of the snake.

In *C. evatti sp. nov*. each scale in the mid section of the diamonds has heavy dark peppering on the inner part of the posterior of each scale, versus unicolour in *C. ehecati.*

C. evatti sp. nov. and *C. ehecati* can be distinguished from all members of the genus *Caudisona* Laurenti, 1768 species complex by the following unique suite of characters: paravertebral stripes of two scale rows, usually paravertebral stripes with light center on the nape, length of paravertebral stripes of 22 scales, 31 dorsal body blotches, intercanthal scales in 18.7% (n=16) of specimens,

interpreocular scale in 50% (n=16) of specimens, first infralabial scale divided in 18.7% (n=16), postrostral scale in 12.5% (n=16), usually 1 postsupraloreal scale, contact between lacunal and supralabial scales in 56.2% (n =16) of specimens, postocular stripe of three scales, usually with light center, contact between paravertebral stripes and supraocular scales in 68.7% (n=16) of specimens, and a dark prefrontal bar interrupted in 93.7% (n=16) of specimens (taken from Cedeño-Vázquez *et al*. 2020).

Photos of *C. evatti sp. nov.* in life can be found in Cedeño-Vázquez *et al*. (2020) in Fig. 4, C-F, and Campbell and Lamar (2004), plate 956.

C. ehecati is depicted in life in Cedeño-Vázquez *et al*. (2020) in Fig. 4, A-B.

Snakes of the genus *Caudisona* Laurenti, 1768 as defined by Hoser (2009b and 2012b) are defined as follows:

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

Prenasals contact the rostral. The body pattern comprises diamonds, hexagons, rectangles or ellipses, or if bands, not made up of conspicuous dots; dorsoventral width of the proximial rattle in the head length more than two and a half times. The anterior subocular fails to reach any supralabial.

There are two internasals only. The upper preocular is not split vertically, or if split the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular, dorsal body blotches occupy more longitudinal space than the interspaces, and the pattern of diamonds, hexagons, rectangles or ellipses usually exceeds 24 in number.

There are more than 164 ventrals.

Tail rings are indistinct or absent. There are usually four or less often six or more large flat scales occupying the internasal/prefrontal area and not including the subcanthals or supraloreals.

Distribution: *C. evatti sp. nov*. is found in the high altitude region of Oaxaca, Mexico, near the border with Chiapas, and is separated from *C. ehecati* by an area of low elevation in the far west of Chiapas. Cedeño-Vázquez *et al*. (2020) indicate that *C. evatti sp. nov*. as defined herein may be found along the southern coast of Oaxaca to Puerto Angel.

Etymology: *C. evatti sp. nov.* is named in honour of the late Clive Andreas Evatt, a human rights barrister from Turramurra, (Sydney) in New South Wales, Australia, in recognition of his services to wildlife conservation in Australia, including successfully stopping several attempts through the courts to ban the best-selling book *Smuggled-2: wildlife trafficking, crime and corruption in Australia* (Hoser, 1996).

CAUDISONA* (*SMYTHUS*) *BASILISCUS TEESI SUBSP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:9E1D1901-DF4F-4D9D-BAA6-8842742265BC

Holotype: A preserved female specimen at the Natural History Museum of Los Angeles County, Los Angeles, USA, specimen number LACM Herps 104459, collected from north-west of La Aduana Sonora, Mexico, Latitude +27.05 N., Longitude -109.01 W. This facility allows access to its holdings.

Paratypes: 1/ A preserved female specimen at the Natural History Museum of Los Angeles County, Los Angeles, USA, specimen number LACM Herps 104461, collected from 8 miles west of Alamos, Sonora, Mexico, Latitude +27.0808 N., Longitude -109.0811 W.

2/ 4 preserved specimens at the California Academy of Sciences, San Francisco, California, USA, specimen numbers CAS HERP 24095, 95765, 159398, 159399, all collected from Sinaloa, Mexico.

3/ 32 preserved specimens at the Natural History Museum of Los Angeles County, Los Angeles, USA, specimen numbers LACM Herps 7197, 7198, 7200-7222, 59183, 104449, 104450, 104452, 104453, 104456, 115989, 115990 all collected from Sinaloa, Mexico.

Diagnosis: *Caudisona basiliscus teesi subsp. nov.* is found from southern Sonora in the north, through Sinaloa, to at least northern Nayarit in the south, all in western Mexico. Nominate *C. basiliscus basiliscus* Cope, 1864 is found from northern Nayarit south to include Jalisco and adjacent states in central western Mexico.

Caudisona basiliscus teesi subsp. nov. is readily separated from *C. basiliscus basiliscus* by the fact that the mid dorsal diamonds have uniformly brown scales forming the darker edge, being one scale in width. These scales in *C. basiliscus basiliscus* have obvious, well exposed lighter edges, the scales merely having a dark centre.

In *C. basiliscus teesi subsp. nov.* the half formed diamonds on the lower flanks at the posterior end of the body are well formed and obvious, versus not so in *C. basiliscus basiliscus*. In *C. basiliscus teesi subsp. nov.* the dark stripe running posterior to the eye is well defined versus only moderately so in *C. basiliscus basiliscus.*

Photos of *C. basiliscus teesi subsp. nov.* in life can be found online at:

https://www.flickr.com/photos/126304782@N02/48446133272/

and

https://www.flickr.com/photos/123633208@N05/20453320841/

C. basiliscus basiliscus in life are depicted in Campbell and Lamar (2004) in plates 785 and 786.

C. basiliscus of both subspecies are readily separated from all other species within the genus *Caudisona* Laurenti, 1768 by the following suite of characters: No paired dark dorsolateral stripes on the neck or if present, they are irregular and extend posteriorly less than one head length behind the head; no transverse bar in the prefrontal area; tail is usually grey with pale grey crossbars in evidence posteriorly; rattle matrix is usually grey or brown.

Snakes of the genus *Caudisona* as defined by Hoser (2009b and 2012b) are defined as follows:

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

Prenasals contact the rostral. The body pattern comprises diamonds, hexagons, rectangles or ellipses, or if bands, not made up of conspicuous dots; dorsoventral width of the proximial rattle in the head length more than two and a half times. The anterior subocular fails to reach any supralabial.

There are two internasals only. The upper preocular is not split vertically, or if split the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular, dorsal body blotches occupy more longitudinal space than the interspaces, and the pattern of diamonds, hexagons, rectangles or ellipses usually exceeds 24 in number.

There are more than 164 ventrals.

Tail rings are indistinct or absent. There are usually four or less often six or more large flat scales occupying the internasal/prefrontal area and not including the subcanthals or supraloreals.

Distribution: *Caudisona basiliscus teesi subsp. nov.* is found from southern Sonora in the north, through Sinaloa, to at least northern Nayarit in the south, all in western Mexico.

Diagnosis: Named in honour of Alex Tees, a human rights lawyer from Bondi in New South Wales, Australia, in recognition of his services to wildlife conservation in Australia, including successfully stopping several attempts through the courts to ban the best-selling book *Smuggled-2: wildlife trafficking, crime and corruption in Australia* (Hoser, 1996).

CAUDISONA* (*SMYTHUS*) *MOLOSSUS SMYTHI SUBSP. NOV.

LSIDURN:LSID:ZOOBANK.ORG:ACT:59E816B9-7CC5-4FE4-BE9F-4FEEA3B598E8

Holotype: A preserved specimen at the University of Texas at El Paso Biodiversity Collections. UTEP Herpetology Osteology collection, USA, specimen number UTEP:HerpOS:1263, collected from Bartlett Dam Road (Forest Rd 19), 4.8 road miles north west of the junction of Forest Rd 162, Maricopa County, Arizona, USA, Latitude +33.7087 N., Longitude -111.3649 W. The specimen is an adult male, snout-vent length of 1025 mm; tail length of 80 mm; weight

of about 604 grams. This facility allows access to its holdings.

Paratypes: 1/ A preserved specimen at the Museum of Vertebrate Zoology, University of California Berkeley. California, USA, MVZ Herp Collection, specimen number 26168, collected from 34 miles north west of Caborca, 8 miles south of San Luis, Sonora, Mexico, Latitude +31.0832 N., Longitude -112.4142 W. 2/ A preserved specimen at the Museum of Vertebrate Zoology, University of California Berkeley. California, USA, MVZ Herp Collection, specimen number 136787, collected from 6.7 miles north by road from Hermosillo, Sonora, Mexico, Latitude +29.1627 N., Longitude -110.9097 W.

Diagnosis: *Caudisona molossus smythi subsp. nov.* occurs in Arizona, USA and nearby northern Sonora in Mexico, while the nominate form of *Caudisona molossus molussus* Baird and Girard, 1853 is confined to New Mexico and Texas in the USA and immediately adjacent parts of northern Mexico.

Both *C. molossus smythi subsp. nov.* and *C. molossus* are separated from the more southern Mexican species *C. nigrescens* Gloyd, 1936 and *G. oaxacus* Gloyd, 1948 (both treated previously by authors such as Campbell and Lamar 2004 as synonymous) by being generally pale in dorsal colour, versus darkish in the other two.

C. nigrescens Gloyd, 1936 and *G. oaxacus* Gloyd, 1948 are further separated from the other species by the different markings on their head.
In those species, the top of the head is dark with a few pale longitudinal streaks or groups of scales; or alternatively the head is brown or grey with darker markings that include upper temporal or parietal stripes. Usually a dark postocular stripe is clearly evident, extending from beneath and behind the eye, where it is about 3-4 scales wide to a point above the rictus, where it narrows to a single scale. The lower margin of this line extends along the scale row above the supralabials. The dark postocular stripe is bordered by pale lines. The lower (anterior) pale line curves from the upper preocular downward under the eye to a point on the lip margin 3-5 supralabials anterior to the rictus and then continues to the ultimate supralabial. The upper posterior pale line extends diagonally from about the upper posterior corner of the eye to just behind or just above the rictus.

C. molossus smythi subsp. nov. and *C. molossus* are further separated from *C. nigrescens* and *C. oaxacus* by having a venter that is pale, white, yellow or grey with limited grey mottling, versus cream or yellow, with obvious dark mottling, especially on the lateral fringes of the ventrals and dark ventrals at the posterior end of the body (in *C. molossus smythi subsp. nov.* and *C. molossus*).

C. molossus smythi subsp. nov. and *C. molossus* have 27 mid-body rows, 2 intersupraoculars and 9-11 prefoveals, versus 25 mid-body rows, 3-5 intersupraoculars and 5-8 prefoveals for *C. nigrescens* and *C. oaxacus.* Campbell and Lamar (2004) at page 564 also discuss differences in hemipenal morphology between the relevant species (treated by them as regional variations in a single species).

C. molossus smythi subsp. nov. is separated from *C. molossus molossus* by their generally yellowish colour, versus grey or olive in *C. molossus molossus.* New Mexico and Mexico specimens of *C. molossus molossus* in particular have a strongly grey colouration, whereas olive and green colouration is seen in west Texas *C. molossus molossus*. *C. molossus molossus* has well spaced, well defined and prominent whitish vaguely diamond-shaped blotches running along the mid-dorsal line of the neck, each consisting of from 5-10 scales each and spread 5-10 scales apart running down the spine. These are not present in *C. molossus smythi subsp. nov.. C. molossus molossus* has numerous white scales on the lower flanks. This is not the case for *C. molossus smythi subsp. nov.*.

The taxon *C. estebanensis* Klauber1949 from San Esteban Island in the Gulf of Mexico is of similar colouration to *C. molossus smythi subsp. nov.* but is readily separated from *C. molossus smythi subsp. nov.* by the following characters: Having a higher number of dorsal blotches (39-43), that are smaller and paler than in the other species and fade out on the posterior part of the dorsum; white scales (spots) on the boundary of the dorsal diamond blotches; lack a conspicuously darkened internasal-prefrontal area; indistinct dark tail rings that remain evident on adults; rattles that are distinctively compressed longitudinally and transversally,

Campbell and Lamar (2004), have images of *C. molossus molossus* in plates 876 and 879, *C. molossus smythi subsp. nov.* in plates 877, 878, *C. nigrescens* in plates 882, 883, 884, *C. oaxacus* in plates 885, 886, 887, 888, and *C. estebanensis* in plate 881.

C. molossus molossus, *C. molossus smythi subsp. nov.*, *C. nigrescens*, *C. oaxacus*, and *C. estebanensis* are readily separated from all other species within the genus *Caudisona* Laurenti, 1768 by the following suite of characters: No paired dark dorsolateral stripes on the neck or if present, they are irregular and extend posteriorly less than one head length behind the head; no transverse bar in the prefrontal area; tail is usually black or very dark brown or grey with pale crossbars rarely in evidence

on the posterior of the tail; rattle matrix is usually black.

Snakes of the genus *Caudisona* Laurenti, 1768 as defined by Hoser (2009b and 2012b) are defined as follows:

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

Prenasals contact the rostral. The body pattern comprises diamonds, hexagons, rectangles or ellipses, or if bands, not made up of conspicuous dots; dorsoventral width of the proximial rattle in the head length more than two and a half times. The anterior subocular fails to reach any supralabial.

There are two internasals only. The upper preocular is not split vertically, or if split the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular, dorsal body blotches occupy more longitudinal space than the interspaces, and the pattern of diamonds, hexagons, rectangles or ellipses usually exceeds 24 in number.

There are more than 164 ventrals.

Tail rings are indistinct or absent. There are usually four or less often six or more large flat scales occupying the internasal/prefrontal area and not including the subcanthals or supraloreals.

Distribution: *C. molossus smythi subsp. nov.* occurs in Arizona, USA and nearby northern Sonora in Mexico, while the nominate form of *Caudisona molossus molussus* Baird and Girard, 1853 is confined to New Mexico and Texas in the USA and immediately adjacent parts of northern Mexico.

Etymology: Named after Australian wildlife demonstrator Michael Smyth, of Ringwood North, Victoria, Australia, more recently of Croydon, Victoria, Australia in honour of his conservation work with our wildlife education enterprise, Snakebusters: Australia's best reptiles shows, which leads the way in wildlife conservation in Australia. Michael's educational efforts brought countless people into contact with reptiles and created a whole generation of herpetologists, scientists and conservationists.

TAXONOMIC VANDALISM, RATTLESNAKES AND WOLFGANG WÜSTER

A group known as the Wolfgang Wüster gang of thieves, did via a document widely cited as Kaiser *et al*. (2013), but in fact written by Wüster and published in 2012 (cited below as Kaiser 2012b) falsely accused myself, Raymond Hoser of "taxonomic vandalism" and other crimes.

Taxonomic vandalism is the deliberate act of renaming a biological entity that one knows is already named (usually species or genus) combined with the reckless and deliberate promotion of the incorrect "synonym" name in favour of the earlier name that is known to be correct and in accordance with the *International Code of Zoological Nomenclature.*

Taxonomic Vandalism is anti-science and a direct attack on the *International Code of Zoological Nomenclature*. It also has serious negative consequences for wildlife conservation and public safety as detailed by Hoser (2015a-f) and Hoser (2019a-b).

I can state as a matter of fact, that I have never engaged in taxonomic vandalism in any way, shape or form. I thoroughly detest the act and any person who engages in it.

The Wolfgang Wüster gang of thieves, have after falsely accusing myself of taxonomic vandalism did at the same time (Hoser 2012a), prior (ICZN 2001) and since (Hoser 2015a-f, 2019a-b, Dubois *et al*. 2019), have themselves commited numerous despicable acts of taxonomic vandalism.

As of 2020, the number of species and genera illegally renamed by this gang of thieves is approaching 100!

The ICZN tried to put a stop to this gang's taxonomic vandalism with a ruling in 2001 (ICZN 2001), but it has not deterred the lawless Wolfgang Wüster gang of thieves.

Overuse of these illegal names and self-citation by the Wolfgang Wüster gang of thieves in the online PRINO (Peer reviewed in name only) journal "*Zootaxa*" that they control, led to that journal being blackballed by Clarivate, the company behind the widely touted "Impact Factor", widely used by academics to measure credibility of scientific journals (Oransky, 2020).

The Wolfgang Wüster gang of thieves have been at war against the rules of the *International Code of Zoological Nomenclature* (Ride *et al*. 1999) for decades (see Hoser 1989, 2007 and ICZN 2001).

Their more recent war cry manifesto known as "Kaiser *et al*. (2013)", although in fact written by Wolfgang Wüster (see Kaiser 2012a) as frequently amended (see also Kaiser 2012a, 2012b, 2013, 2014a and 2014b) has been discredited numerous times (e.g. Cogger (2014), Dubois (2014), Dubois *et al*. (2019), Eipper (2013), Hoser (2009a, 2012a, 2012c, 2013, 2015a-f, 2019a-b), Mutton (2014a, 2014b), Raw (2020), Shea (2013a-d), Thorpe (2013, 2014a, 2014b), Wellington (2013, 2014a, 2014b),

Wells (2013, 2014) and sources cited therein).

Notwithstanding these setbacks the Wolfgang Wüster gang described by Raw (2020) as the "Mafia", remain undeterred and continue to commit acts of internet trolling, running countless fake accounts online for peddling hatred and lies, as well as engaging in overt scientific fraud, property theft, assault, vandalism, money fraud, money laundering, rapes, child sex offences, trafficking of amphetamines, animal abuse and cruelty, wildlife smuggling, shooting people (yes, two of the group have been convicted of this), making unlawful threats and other serious crimes (Supreme Court of Western Australia 2009, Hobbs 2010, Goodman 2019).

Some members of the group have been charged and jailed for various crimes, including for example David John Williams, convicted and fined $7,500 for animal cruelty and wildlife smuggling at the Cairns Magistrates Court, Damien Mark Harding jailed for child sex offences, Seth Pywell fined for his role in the shooting two people, Matthew Gatt fined $8,000 for the theft of a snake and Andrew Browne jailed for child sex offences, but the group ring leaders Wolfgang Wüster, Mark O'Shea, Hinrich Kaiser and Wulf Schleip have managed to avoid criminal sanctions to date.

Wolfgang Wüster and Mark O'Shea even post images of themselves committing crimes online, including extreme animal abuse and cruelty, but have somehow managed to avoid criminal sanctions.

As of 2020, members of the Wolfgang Wüster gang of thieves had plagiarised works of other scientists and in breach of the *International Code of Zoological Nomenclature* illegally renamed nearly 100 species and genera previously formally named by other ethical scientists, including greats from the 1800's like Leopold Joseph Franz Johann Fitzinger, John Edward Gray and Wilhelm Karl Hartwich Peters.

Those men are not in a position to launch a defence from the cowardly attacks by the Wolfgang Wüster gang of thieves.

Keeping count of the Wolfgang Wüster gang's acts of taxonomic vandalism and theft is an extremely difficult task, but lists of these acts are regularly published!

The gang have then by use of countless false accounts and false identities, created a false veneer online that their illegal names are the correct names and that the earlier proper names should not be used.

Noting that Wolfgang Wüster as recently as 18 July 2020 Wüster posted to more than 5,000 people a plea to others to illegally rename Rattlesnakes named in Hoser (2009b, 2012b, 2016 and 2018) telling people to "to suspend the Code for Hoser names, and exclude his names from consideration for these purposes" (Wüster 2020), people should be mindful of almost certain further acts of taxonomic vandalism by this gang of thieves in PRINO journals they control, including the PRINO Online journal *Zootaxa*, in terms of new names erected in this paper.

PRINO is an acronym for "Peer reviewed in name only" which is the term best described for the online journals that that Wolfgang Wüster gang of thieves members publish their fraudulent papers in.

The journals such as the predatory PRINO journal "*Zootaxa*" have near zero respect for the principles of science, or ethics and significantly papers published in them are either not peer reviewed in any way, or alternatively the process is so shambolic as to be non-existent in any meaningful way.

See also Oransky (2020).

While peer review is not a mandatory requirement of the *International Code of Zoological Nomenclature*, it is regarded as the gold standard in scientific publishing and therefore is generally expected in such publications.

I (Raymond Hoser) have worked with the Crotalinae for decades and was due to publish a major monograph on the entire Crotalinae in 2010. It and a number of other major publications constituting the major part of three decades of full-time work was delayed due to several factors.

On 17 August 2011, our facility was subjected to an illegal armed raid by the Australian State Police (Victoria) and the State Wildlife Department. This raid was initiated by a cohort including members of the Wolfgang Wüster gang of thieves.

The draft manuscript of the Crotalinae monograph, dozens of drafts of other major papers, three near comple book manuscripts, production materials for a series of wildlife documentaries, that were in the final edit stage, data, slides and almost all other relevant materials were stolen.

I also note that, notwithstanding the theft of relevant materials from this author in the illegal armed raid on 17 August 2011, which were not returned in breach of undertakings to the court (Court of Appeal Victoria 2014 and VCAT 2015), I have made a decision to publish this paper.

I note that papers postdating the illegal armed raid of 2011 have continued to identify known putative species, but as a rule, not been naming them (e.g. Watson *et al.* 2019 and sources cited therein).

The publishing of the new names herein, to make them available to other scientists is also done in view of the conservation significance attached to the formal recognition of unnamed taxa at all levels and

on the basis that further delays may in fact put these presently unnamed or potentially improperly assigned taxa at greater risk of extinction as outlined by Hoser (2019a, 2019b).

REFERENCES CITED

Abalos, J. W., Baez, E. C. and Nader, R. 1964. Serpientes de Santiago del Estero. *Acta Zoologica* Lilloana 20:211-283.

Aeberhard, R. 2010. Interessante Beobachtungen zur Tragzeit der Tropischen Klapperschlange, *Crotalus durissus durissus. Reptilia* (Münster) 15(81):7-9.

Akeret, B. 2010. Sukkulenten und andere Pflanzen für das Trockenterrarium. *Draco* 11(41):44-53.

Akeret, B. 2015. Sukkulenten als Terrarienpflanzen. *Draco* 16(62):28-38.

Almeida-Santos, S. M., da Graca Salomão, M., Peneti, E. A., Sérgio de Sena, P. and Guimaraes, E. S. 1999. Predatory combat and tail wrestling in hierarchical contests of the Neotropical rattlesnake *Crotalus durissus terrificus* (Serpentes: Viperidae). *Amphibia-Reptilia* 20(1):88-96.

Alvarado-Diaz, J. and Campbell, J. A. 2004. A new montane rattlesnake (Viperidae) from Michoacán, Mexico. *Herpetologica* 60(2):281-286.

Amaral, A. do. 1927. Studies of nearctic ophidia I. *Crotalus goldmani* Schmidt, 1922, a synonym of *C. mitchelli* Cope, 1861. *Bull. Antivenin Inst. America* 1(2):47-48.

Amaral, A. do. 1929. Studies of Nearctic Ophidia. V. On *Crotalus confluentus* Say, 1823 and its allied forms. *Bulletin of the Antivenin Institute America* 2(4):86-97.

Anderson, C. G. and Greenbaum, E. 2012. Phylogeography of Northern Populations of the Black-Tailed Rattlesnake (*Crotalus molossus* Baird And Girard, 1853), With the Revalidation of *C. ornatus* Hallowell, 1854. *Herpetological Monographs* 26(1):19-57.

Arenas, C. Y., Townsend Peterson, A., Mokondoko, P., Rojas-Soto, O. and Martínez-Meyer, E. 2014. The Use of Ecological Niche Modeling to Infer Potential Risk Areas of Snakebite in the Mexican State of Veracruz. *PLoS One* 9(6):e100957.

Armstrong, B. L. and Murphy, J. B. 1979. The natural history of Mexican rattlesnakes. *Univ. Kansas Mus. Nat. Hist. Spec. Publ.* 5:1-88.

Augstenová, B., Orcid, S. M., Orcid, L. K. and Rovatsos, M. 2017. Evolutionary Dynamics of the W Chromosome in Caenophidian Snakes. *Genes* 2018:9(1):5.

Axtell, R. W. 1939. Amphibians and reptiles of the Black Gap Wildlife Management Area, Brewster County, Texas. *Southwestern Naturalist* 4(2):88-109.

Axtell, R. W. and Sabath, M. D. 1963. *Crotalus pricei miquihuanus* from the Sierra Madre of Coahuila, Mexico. *Copeia* 1963(1):161-164.

Baird, S. F. 1859. Reptiles of the Boundary. in: *United States and Mexican Boundary Survey under the Order of Lieut. Col. W. H. Emory, Major First Cavalry, and United States Commisioner. 2, Reptiles, Part 2*. Department of the Interior, Washington, DC, USA:35 pp.

Baird, S. F. and Girard, C. 1853. *Catalogue of North American Reptiles in the Museum of the Smithsonian Institution. Part 1.-Serpents.* Smithsonian Inst., Washington, DC, USA:xvi+172 pp.

Banda-Leal, J., Lazcano, D., Nevárez-De Los Reyes, M. and Huereca-Delgado, A. 2015. *Crotalus lepidus* (rock rattlesnake) diet. *Herpetological Review* 46(1):102.

Barbosa, V. do N., Amaral, J. M. da S., Alcantara, E. do N. P. and dos Santos, E. M. 2018. Herpetofauna de uma área de caatinga em Taquaritinga do Norte, agreste de Pernambuco, Brasil. *Cuad. herpetol.* 32(2):109-115.

Barbour, T. and Cole, L. J. 1906. Vertebrata from Yucatan. Reptilia, Amphibia and Pisces. *Bull. Mus. Comp. Zool.* Harvard 50:146-159.

Beaman, K. R. and Grismer, L. L. 1994. *Crotalus enyo* (Cope), Baja California rattlesnake. *Catalogue of American Amphibians and Reptiles* 589:1-6.

Beaman, K. R. and Hayes, W. K. 2008. Rattlesnakes: Research Trends and Annotated Checklist. pp. pp. 5-16 in: Hayes *et al.* (eds.), *The biology of rattlesnakes*. Loma Linda University Press.

Beauvois, P. de 1799. Memoir on amphibia. Serpents. *Trans American Philos. Soc.* 4:362-381.

Benabib, M., Kjer, K. M. and Sites, J. W. Jnr. 1997. Mitochondrial DNA sequence-based phylogeny and the evolution of viviparity in the *Sceloporus scalaris* group (Reptilia, Squamata). *Evolution* 51(4):1262-1275.

Benício, R. A. 2016. *Crotalus durissus* (South American Rattlesnake) arboreal habitat use. *Herpetological Review* 47(3):477.

Benício, R. A. 2018. Notes on habitat use of *Crotalus durissus* (South American Rattlesnake). *Herpetology Notes* 11:645-646.

Benicio, R. A. and Martins, M. 2018. Defensive behavior of a juvenile *Crotalus durissus* Linnaeus, 1758. *Herpetozoa* 30(3/4):217.

Benyr, G. 2016. Eine Checkliste von Sicherheitsvorkehrungen bei der Haltung von Giftschlangen. *Terraria-Elaphe* 2016(2):66-70.

Bezy, R. L. and Cole, C. J. 2014. Amphibians and

Reptiles of the Madrean Archipelago of Arizona and New Mexico. *American Museum Novitates* (3810):1-24.

Blair, C., Bryson, R. W., Linkem, C. W., Lazcano, D., Klicka, J. and McCormack, J. E. 2018. Cryptic diversity in the Mexican highlands: Thousands of UCE loci help illuminate phylogenetic relationships, species limits and divergence times of montane rattlesnakes (Viperidae: *Crotalus*). *Mol. Ecol. Resour*. 2018;00:1-17.

Beolens, B., Watkins, M. and Grayson, M. 2011. *The Eponym Dictionary of Reptiles*. Johns Hopkins University Press, Baltimore, USA.

Bernarde, P. S., Albuquerque, S., Barros, T. O. and Turci, L. C. B. 2012. Serpentes do Estado de Rondônia, Brasil. *Biota Neotrop*. 12(3):1-29.

Bérnils, R. S., Batista, M. A. and Bertelli, P. W. 2001. Cobras e lagartos do Vale: levantamento das espécies de Squamata (Reptilia, Lepidosauria) da Bacia do Rio Itajai, Santa Catarina, Brasil. *Rev. Est. Ambientais* (Blumenau) 3(1):69-79.

Bezy, R. L. and Cole, C. J. 2014. Amphibians and Reptiles of the Madrean Archipelago of Arizona and New Mexico. *American Museum Novitates* (3810):1-24.

Blanco-Torres, A., Lina Báez, S., Patiño-Flores, E. and Renjifo-R, J. M.. 2013. Herpetofauna from the middle valley of the Ranchería river, La Guajira, Colombia. *Rev. Biodivers. Neotrop*. 3(2):113-22.

Borja, M., Lazcano, D., Martínez-Romero, G., Morlett, J., Sánchez, E., Cepeda-Nieto, A. C., Garza-García, Y. and Zugasti-Cruz, A. 2013. Intra-specific Variation in the Protein Composition and Proteolytic Activity of Venom of *Crotalus lepidus morulus* from the Northeast of Mexico. *Copeia* 2013, (4):707-716.

Boulenger, G. A. 1896. *Catalogue of the snakes in the British Museum, Vol. 3*. London (Taylor and Francis), xiv+727 pp.

Brattstrom, B. H. 1954. The fossil pit-vipers of North America. *Trans. San Diego Soc. Natur. Hist*. 12(3):31-46.

Bryson, R. W. 2007. Fotopirsch auf Gebirgsklapperschlangen. *Reptilia* (Münster) 12(66):32-37.

Bryson, R. W. and Lazcano, D. 2003. *Crotalus pricei miquihuanus. Reptilia* (UK) (28):43-46.

Bryson, R. W. and Lazcano, D. 2005. *Gerrhonotus parvus*. *Reptilia* (GB) (39):69-72.

Bryson R. W., Murphy, R. W., Lathrop, A. and Lazcano-Villareal, D. 2011a. Evolutionary drivers of phylogeographical diversity in the highlands of Mexico: a case study of the *Crotalus triseriatus* species group of montane rattlesnakes. *Journal of Biogeography* 38:697-710.

Bryson, R. W., Jones, J. M. and Grünwald, C. 2011b. Geographic Distribution: *Crotalus ravus ravus* (central plateau pygmy rattlesnake). *Herpetological Review* 42(3):393.

Bryson, R. W., Murphy, R. W., Graham, M. R., Lathrop, A. and Lazcano, D. 2011c. Ephemeral Pleistocene woodlands connect the dots for highland rattlesnakes of the *Crotalus intermedius* group. *Journal of Biogeography* 38(12):2299-2310.

Bryson, R. W., Linkem, C. W., Dorcas, M. E., Lethrop, A., Jones, J. M., Alvarado-Diaz, J., Christophi, G. and Murphy, R. W. 2014. Multilocus species delimitation in the *Crotalus triseriatus* species group (Serpentes: Viperidae: Crotalinae), with the description of two new species. *Zootaxa* (PRINO) (online) 3826(3):475-496.

Bucio-Jiménez, L. E. and Pérez-Mendoza, H. A. 2016. *Crotalus ravus* (Cope, 1865). Predation. *Mesoamerican Herpetology* 3(4):1019-1020.

Bush, S. P. and Cardwell, M. D. 1999. Mojave rattlesnake (*Crotalus scutulatus scutulatus*) identification. *Wilderness and Environmental Medicine* 10(1):6-9.

Cadle, J. E. 1988. Phylogenetic relationships among advanced snakes. *Univ. Calif. Publ. Zool*. 119:1-77.

Cacciali, P., Scott, N. J., Ortíz, A. L. A., Fitzgerald, L. A. and Smith, P. 2016. The Reptiles of Paraguay: Literature, Distribution, and an Annotated Taxonomic Checklist. *Special publication of the Museum of Southwestern Biology*, 11:373 pp.

Calzada-Arciniega, R. A., Recuero, E., Garcia-Castillo, M. G. and Parra-Olea, G. 2017. New records and an updated list of Herpetofauna from Cerro Piedra Larga, an isolated mountain massif in Oaxaca, Mexico. *Herpetology Notes* 10:651-658.

Camarillo Rangel, J. L. 1983. New herpetological records from the state of Mexico. *Bulletin of the Maryland Herpetological Society* 19(2):39-46.

Campbell, J. A. 1979a. A new rattlesnake (Reptilia, Serpentes, Viperidae) from Jalisco, Mexico. *Transactions of the Kansas Academy of Science*, 81(4):365-370.

Campbell, J. A. 1979b. *Crotalus scutulatus* (Viperidae) in Jalisco, Mexico. *Southwestern Naturalist* 24(4):683-714.

Campbell, J. A. 1998. *Amphibians and reptiles of northern Guatemala, the Yucatán, and Belize*. Norman: University of Oklahoma Press, xiii+380 pp.

Campbell, J. A. and Armstrong, B. L. 1979. Geographic variation in the Mexican Pygmy rattlesnake, *Sistrurus ravus*, with the description of a new subspecies. *Herpetologica* 35(4):304-317.

Campbell, J. A. and Lamar, W. W. 1989. *The Venomous Reptiles of Latin America*. Comstock Publishing/Cornell University Press, Ithaca.

Campbell, J. A. and Lamar, W. W. 2004. *Venomous Reptiles of the Western Hemisphere*. Comstock Publishing, USA (2 vols).

Canseco-Márquez, L. and Gutiérrrez-Mayén, M. G. 2010. *Anfibios y reptiles del Valle de Tehuacán-Cuicatlán. Comisión Nacional para el conocimiento y uso de la biodiversidad, México D.F.*, Mexico, 302 pp.

Carbajal-Márquez, R. A. and Cedeño-Vázquez, J. R. 2017. The swimming behaviour of Tzabcan Rattlesnake, *Crotalus tzabcan* Klauber, 1952 (Squamata: Viperidae). *Herpetology Notes* 10:673-674.

Carbajal-Marquez, R. A. and Quintero-Diaz, G. E. 2015. Diet of *Crotalus lepidus* (Serpentes: Viperidae) in Mesa Montoro, Aguascalientes, México. *Revista Mexicana de Herpetología* 1(1):18-21.

Carbajal-Márquez, R. A. and Quintero-Díaz, G. E. 2016. The Herpetofauna of Aguascalientes, México. *Revista Mexicana de Herpetología* 2(1):1-30.

Carbajal-Márquez, R. A., Quintero-Diaz, G. E., González-Saucedo, Z. Y. and Sigala-Rodriguez, J. J. 2012. *Crotalus lepidus* (rock rattlesnake) diet. *Herpetological Review* 43:658.

Carbajal-Márquez, R. A., González-Saucedo, Z. Y. and Arenas-Monroy, J. C. 2015a. *Crotalus aquilus* (Squamata: Viperidae), a New State Record for Zacatecas, Mexico. *Acta Zoologica Mexicana* (n.s.) 31(1):131-133.

Carbajal-Màrquez, R. A., Quintero-Dìaz, G. E. and Rivas-Mercado, E. A. 2015b. Geographic Distribution: *Crotalus basiliscus* (Mexican West Coast rattlesnake). *Herpetological Review* 46(2):219.

Carbajal-Márquez, R. A., Quintero-Díaz, G. E. and Martínez-De La Vega, G. 2017. *Crotalus totonacus* Gloyd and Kauffeld, 1940. Diet. *Mesoamerican Herpetology* 4(3):649-650.

Carbajal-Márquez, R. A., González-Solís, D. and Cedeño-Vázquez, Y. R. 2018a. Endoparasites of *Crotalus tzabcan* (Serpentes: Viperidae), with a checklist in rattlesnakes. *Journal of Parasitic Diseases* 42(2):303-314.

Carbajal-Márquez, R. A., Cedeño-Vázquez, J. R., García-Balderas, C. M., Ramírez-Valverde, T. and Quintero-Díaz, G. E. 2018b. The Defensive Behaviour of Tzabcan Rattlesnake, *Crotalus tzabcan* Klauber, 1952 (Squamata: Viperidae). *Herpetology Notes* 11:429-431.

Carbajal-Márquez, R. A., Cedeno-Vazquez, J. D., Martinez-Arce, A., Neri-Castro, E. and Machkour-M'Rabet, S. C. 2020. Accessing cryptic diversity in Neotropical rattlesnakes (Serpentes: Viperidae: *Crotalus*) with the description of two new species. *Zootaxa* (PRINO) online 4729(4):451-481.

Cardwell, M. D. 2006. *Crotalus scutulatus scutulatus* (Mohave Rattlesnake). Morphology. *Herpetological Review* 37(4):477.

Cardwell, M. D., Gotte, S. W., McDiarmid, R. W., Gilmore, N. and Poindexter, J. A. 2013. Type specimens of *Crotalus scutulatus* (Chordata: Reptilia: Squamata: Viperidae) re-examined, with new evidence after more than a century of confusion. *Proceedings of the Biological Society of Washington* 126(1):11-16.

Carreira Vidal, S. 2002. Alimentación de los ofidios de Uruguay. *Asoc. Herp. Esp., Monograf. Herp.* 6:127 pp.

Carreira Vidal, S., Brazeiro, A., Camargo, A., da Rosa, I., Canavero, A. and Maneyro, M. 2012. Diversity of reptiles of Uruguay: Knowledge and information gaps. *Bol. Soc. Zool. Uruguay* (2a eìpoca) 21(1-2):9-29.

Casas-Andreu, G., Méndez-De la Cruz, F. R. and Aguilar-Miguel, X. 2004. Anfibios y Reptiles. pp. 375-390, in García-Mendoza, A. J. M., Ordoñez, J. and Briones-Salas, M. (ed.). *Biodiversidad de Oaxaca.* Instituto de Biología, UNAM-Fondo Oaxaqueño para la Conservación de la Naturaleza-World Wildlife Fund, México, D. F.

Castro-Franco, R. and Bustos-Zagal, M. G. 1994. List of reptiles of Morelos, Mexico, and their distribution in relation to vegetation types. *Southwestern Naturalist* 39(2):171-175.

Cei, J. M. 1993. Reptiles del noroeste, nordeste y este de la Argentina. *Museo Regionale Sci. Naturale Torino, Monografie* 14:1-949.

Christman, B. L. and Painter, C. W. 1998. Geographic distribution. *Crotalus molossus. Herpetological Review* 29(4):249.

Christman, B. L., Barkalow, A., Jennings, R. D., Hamilton, G. L. and Bain, J. 2016. *Crotalus lepidus klauberi* (Banded Rock Rattlesnake) diet / mortality. *Herpetological Review* 47(3):477.

Christman, S. 1975. The Status of the Extinct Rattlesnake, *Crotalus giganteus. Copeia* 1:43-47.

Claessen, H. 2006. De Slangen van de Guyana's. Deel XI. *Lacerta* 64(4):136-146.

Cliff, F. S. 1954. Snakes of the islands in the Gulf of California, Mexico. *Transactions of the San Diego Society of Natural History* 12(5):67-98.

Cobarrubias, E. F., Cruz-Saìenz, D. and Lazcano, D. 2012. Notes on the Herpetofauna of Western Mexico 6: Amphibians and Reptiles of Hostotipaquillo, Jalisco, Mexico. *Bulletin of the Chicago Herpetological Society* 47(2):21-26.

Cochran, C., Steagall, A. I. and Clarkson, M. 2014. Geographical Distribution: *Crotalus molossus*

molossus (northern black-tailed rattlesnake). *Herpetological Review* 45(4):663.

Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh Edition). CSIRO Publishing, Collingwood, Victoria, Australia:1033 pp.

Cole, C. J., Townsend, C. R., Reynolds, R. P., MacCulloch, R. D. and Lathrop, A. 2013. Amphibians and reptiles of Guyana, South America: illustrated keys, annotated species accounts, and a biogeographic synopsis. *Proceedings of the Biological Society of Washington* 125(4):317-578; plates: 580-620.

Conant, R. 1955. Notes on three Texas reptiles, including an addition to the fauna of the state. *American Museum Novitates* (1726):1-6.

Conant, R. and Collins, J. T. 1991. *A Field Guide to Reptiles and Amphibians of Eastern/Central North America*, 3rd ed. Houghton Mifflin (Boston/New York), xx+450 p.

Cope, E. D. 1861. Contributions to the ophiology of Lower California, Mexico and Central America. *Proc. Acad. Nat. Sci. Philadelphia* 13:292-306.

Cope, E. D. 1864. Contributions to the herpetology of tropical America. *Proc. Acad. Nat. Sci. Philadelphia* 16:166-181.

Cope, E. D. 1866. Third contribution to the herpetology of tropical America. *Proc. Acad. Nat. Sci. Philadelphia* 17 [1865]:185-198.

Cope, E. D. 1875. Report upon the collections of batrachians and reptiles made in portions of Nevada, Utah, California, Colorado, New Mexico, and Arizona, during the years 871, 1872, 1873, and 1874, Chapter IV, L, pp. 509-584, in: Yarrow, H. C. (ed.), *Report upon geograph*. Government Printing Office, Washington DC, USA.

Cope, E. D. 1885. Twelfth contribution to the herpetology of tropical America. *Proc. Amer. Philos. Soc.* 22:167-194 [1884].

Costa, T. B., Laranjeiras, D. O., Caldas, F. L. S., Santana, D. O., da Silva, C. F., de Alcântara, E. P., Brito, S. V., Galdino, J. Y., Mesquita, D. O., Renato Gomes Faria, F. 2018. Herpetofauna of protected areas in the Caatinga VII: Aiuaba Ecological Station (Ceará, Brazil). *Herpetology Notes* 11:929-941.

Coues, E. 1875. Synopsis of the Reptiles and Batrachians of Arizona; with critical and field notes, and an extensive synonymy. Chapter IV. *Reports upon the Collections Obtained from Portions of Nevada, Utah, California, Colorado, New Mexico, and Arizona, during the Report upon Geographical and Geological Explorations and Surveys West of the One Hundredth Meridian*. Volume V. Zoology: 509-633+10 lithographic plates (3 are chromolithographs).

Court of Appeal Victoria. 2014. *Hoser v Department of Sustainability and Environment* [2014] VSCA 206 (5 September 2014).

Cozendey, P., Novelli, I. A., Do Nascimento, A. A., Peters, V. M. and De Sousa, B. M. 2017. Study of the renal sexual segment of *Crotalus durissus terrificus* (Linnaeus, 1758) (Viperidae: Crotalinae). *Herpetological Review* 48(4):743-746.

Crother, B. I. (ed.) 2012. Standard Common and Current Scientific Names for North American Amphibians, Turtles, Reptiles, and Crocodilians, Seventh Edition. *Herpetological Circular* 39:1-92.

Cruz-Sáenz, D., Muñoz-Nolasco, F. J., Mata-Silva, V., Johnson, J. D., García-Padilla, E. and Wilson, L. D. 2017. The herpetofauna of Jalisco, Mexico: composition, distribution, and conservation status. *Mesoamerican Herpetology* 4(1):23-118.

Cruz Centeno, F. da Sawaya, R. J. and Marques, O. A. V. 2008. Snake assemblage of Ilha de São Sebastião, southeastern Brazil: comparison to mainland. *Biota Neotrop.* 8(3):63-68.

Cunningham, J. D. 1966. Field Observations on the Thermal Relations of Rattlesnakes. *Southwestern Naturalist* 11(1):140-142.

Daan, S. and Hillenius, D. 1966. Catalogue of the type specimens of amphibians and reptiles in the Zoological Museum, Amsterdam. *Beaufortia* 13:117-144.

Dainesi, R. L. S., Abegg, A. D., Bernarde, P. S., Correa, B. P., Machado, L. P. C., de Oliveira Meneses, A. F. and de Sena Santos, A. 2019. Integrative overview of snake species from Londrina, State of Paraná, Brazil. *Herpetology Notes* 12:419-430.

Davis, D. R. and Cardwell, M. D. 2017. *Crotalus scutulatus* (Mohave Rattlesnake) Arboreality and climbing behavior. *Herpetological Review* 48(3):670-671.

Davis, D. R. and La Duc, T. J. 2018. Amphibians and reptiles of C. E. Miller Ranch and the Sierra Vieja, Chihuahuan Desert, Texas, USA. *ZooKeys* 735:97-130.

Davis, W. B. and Smith, H. M. 1953. Snakes of the Mexican state of Morelos. *Herpetologica* 8:133-149.

Degenhardt, W. G., Painter, C. W. and Price, A. H. 1996. *Amphibians and reptiles of New Mexico*. University of New Mexico Press, New Mexico, USA:431 pp.

Deloya, E. M. and Setser, K. 2007. *Crotalus aquilus* (Queretaran Dusky Rattlesnake). Maximum Size. *Herpetological Review* 38(2):204.

Desantis, D. L., Mata-Silva, V. and Johnson, J. D. 2015. *Crotalus lepidus* (rock rattlesnake) diet / scavenging. *Herpetological Review* 46(2):268-269.

Díaz de la Vega-Pérez, A. H., Jimenez-Arcos, V. H.,

Lara-Resendiz, R. A., Méndez-de la Cruz, F. R. and Rabatsky, A. 2016a. *Crotalus estebanensis*. Activity and thermoregulation. *Mesoamerican Herpetology* 3(3):739-741.

Díaz de La Vega-Pérez, A. H., Millán, L., Cervantes-Badillo, R., Gómez-Campos, J. E. and Ancona, S. 2016b. Nature Notes. *Crotalus ravus*. Diet. *Mesoamerican Herpetology* 3(3):742-743.

Diìaz-Ricaurte, J. C., Ferreto Fiorillo, B. and Maciel, J. H. 2018. *Crotalus durissus* Linnaeus, 1758. *Cataìlogo de Anfibios y Reptiles de Colombia* 4(3):29-36.

Ditmars, R. L. 1905. Ninth Ann. Rep. N.Y. *Zool. Soc.* 9:197-200 [1904].

Dixon, J. R. 2000. *Amphibians and reptiles of Texas*, (Second edition). Texas A&M University Press, 421 pp.

Dixon, J. R. and Lemos-Espinal, J. A. 2010. *Amphibians and reptiles of the state of Queretaro, Mexico*. Tlalnepantla UNAM:428 pp.

Dixon, J. R., Ketchersid, C. A. and Lieb. C. S. 1972. The herpetofauna of Queretaro, Mexico, with remarks on taxonomic problems. *The Southwestern Naturalist* 16:225-237.

Domínguez-Godoy, M. A., Barrios-Montiel, R., Bautista, A. and Díaz de La Vega-Pérez, A. H. 2017. *Crotalus ravus*. Diet and accidental mortality involving a *Sceloporus spinosus. Mesoamerican Herpetology* 4(2):426-428.

Domínguez-Guerrero, S. F. and Fernández-Badillo, L. 2016. *Crotalus triseriatus* (Mexican Dusky Rattlesnake) Diet. *Herpetological Review* 47(1):144-145.

Dorcas, M. E. 1992. Relationships among montane populations of *Crotalus lepidus* and *Crotalus triseriatus*. pp. 71-88 in: Campbell, J. A. and Brodie, E. D. (eds.) *Biology of the Pitvipers*. Selva, Tyler, Texas, USA.

Douglas, M. E., Douglas, M. R., Schuett, G. W. and Porras, L. W. 2006. Evolution of rattlesnakes (Viperidae; *Crotalus*) in the warm deserts of western North America shaped by Neogene

vicariance and Quaternary climate change. *Molecular Ecology* 15:3353-3374.

Douglas, M. E., Douglas, M. R., Schuett, G. W., Porras, L. W. and Thomason, B. L. 2007. Genealogical concordance between mitochondrial and nuclear DNAs supports species recognition of the Panamint Rattlesnake (*Crotalus mitchelli stephensi*). *Copeia* 2007(4):920-932.

Duarte, M. R. 2003. Prickly food: snakes preying upon porcupines. *Phyllomedusa* 2(2):109-112.

Dubois, A. 2014. Email to Raymond Hoser, 14 May.

Dubois, A., Bauer, A. M., Ceriaco, L. M. P.,

Dusoulier, F., Fretey, T., Lobl, I., Lorvelec, O., Ohler, A., Stopiglia, R. and Aescht, E. 2019. The Linz Zoocode project: a set of new proposals regarding the terminology, the Principles and Rules of zoological nomenclature. First report of activities (2014-2019). *Bionomina* (online), 17:1-111.

Duméril, A. M. C., Bibron, G. and Duméril, A. H. A., 1854. *Erpétologie générale ou histoire naturelle complète des reptiles. Tome septième. Deuxième partie, comprenant l'histoire des serpents venimeux.* Paris, Librairie Encyclopédique de Roret: i-xii+781-1536.

Eipper, S. 2013. Post on Facebook 16 December 2013.

Enderson, E. F. 1999. Predation of *Crotalus molossus molossus* (Black-tail Rattlesnake) by *Masticophis bilineatus bilineatus* (Sonoran Whipsnake), Whetstone Mountains, Arizona. *Sonoran Herpetologist* 12(7):72-73.

Enderson, E. F., Van Devender, T. R. and Bezy, R. L. 2014. Amphibians and reptiles of Yécora, Sonora and the Madrean Tropical Zone of the Sierra Madre Occidental in northwestern Mexico. *Check List* 10(4):913-926.

Enderson, E. F., Quijada-Mascareñas, A., Turner, D. S., Rosen, P. C. and Bezy, R. L. 2009. The herpetofauna of Sonora, Mexico, with comparisons to adjoining states. *Check List* 5(3):632-672.

Enderson, E. F., Van Devender, T. R. and Bezy, R. L. 2014. Amphibians and reptiles of Yécora, Sonora and the Madrean Tropical Zone of the Sierra Madre Occidental in northwestern Mexico. *Check List* 10(4):913-926.

Entiauspe-Neto, O. M., Perleberg, T. D. and de Freitas, M. A. 2016. Herpetofauna from an urban Pampa fragment in southern Brazil: composition, structure and conservation. *Check List* 12(5):1964.

Esqueda, L. F., La Marca, E., Natera, M. and Battiston, P. 2001. Noteworthy reptilian state records and a lizard species new to the herpetofauna of Venezuela. *Herpetological Review* 32(3):198-200.

Farallo, V. R. and Forstner, M. R. J. 2012. Predation and the Maintenance of Color Polymorphism in a Habitat Specialist Squamate. *PLoS One* 7(1):e30316.

Farr, W. L., Nevárez-De Los Reyes, M., Lazcano, D. and Ortiz-Hernández. S. E. 2015. *Crotalus totonacus* (Totonacan rattlesnake) diet. *Herpetological Review* 46(1):103.

Farr, W. L., Nevárez de los Reyes, M., Banda-Leal, J. and Lazcano, D. 2015. The distribution of *Crotalus totonacus* in Nuevo León, Mexico. *Mesoamerican Herpetology* 2(3):243-251.

Feoktistow, A. E. 1893. On the physiology of the rattle of *Crotalus durissus. Ann. Mag. Nat. Hist.*

(6)11:54-58.

Fernaìndez-Badillo, L. and Goyenechea-Mayer, G. I. 2010. Anfibios y reptiles del valle del Mezquital, Hidalgo, Meìxico. *Revista Mexicana de Biodiversidad* 81:705-712.

Fernández-Badillo, L., Morales-Capellán, N. and Goyenechea-Mayer, G. I. 2012. *Crotalus aquilus* (Queretaran dusky rattlesnake) diet. *Herpetological Review* 43:658.

Fernaìndez-Badillo, L., Manrìquez-Moraìn, N. L., Castillo-Ceroìn, J. M. and Goyenechea, I. 2016a. Anaìlisis herpetofauniìstico de la zona aìrida del estado de Hidalgo. *Revista Mexicana de Biodiversidad* 87:156-170.

Fernández-Badillo, L., Aguillón-Gutiérrez, D. R., Valdez-Rentería, S. Y., Hernández-Melo, J. A., Olvera, C. R., Callejas-Jiménez, F. J., Hernández-Ramos, M., Iturbe-Morgado, J. C. and Torres, F. 2016b. First records for amphibians and reptiles from the municipality of Atotonilco el Grande, Hidalgo, México. *Herpetological Review* 47(1):91-93.

Ferrante, L., Menegucci, R. and Machado, I. F. 2015. *Crotalus durissus* (South American rattlesnake) swimming behavior to cross geographical barrier. *Herpetological Review* 46(4):640.

Flores-Guerrero, U. S. and Sánchez-González, J. S. 2016. *Crotalus campbelli* Bryson Jr, Linkem, Dorcas, Lathrop, Jones, Alvarado-Díaz, Grünwald, and Murphy, 2014. *Mesoamerican Herpetology* 3(2):524-525.

Fernández-Badillo, L., Jiménez-Villegas, J. L., González-Bonilla, G. T., Morales-Capellán, N., Ramírez-Cruz, M. B. and Hernández-Silva, D. A. 2017. *Crotalus triseriatus* Wagler, 1830. Mexico, Hidalgo. *Mesoamerican Herpetology* 4(4):969-971.

Filogonio, R., Wang, T., Abe, A. S. and Leite, C. A. C. 2019. Cooling and Warming Rates are Unaffected by Autonomic Vascular Control in the South American Rattlesnake (*Crotalus durissus*). *South American Journal of Herpetology* 14(3):242-249.

Franca, F. G. R., Mesquita, D. O. and Colli, G. R. 2006. A Checklist of snakes from Amazonian Savannas in Brazil housed in the colecao Herpetologica Da Universidade De Brasilia, with new distribution records. *Occasional Papers of the Oklahoma Natural History Museum,* University of Oklahoma 17:1-13.

Freitas, M. A. 2014. Squamate reptiles of the Atlantic Forest of northern Bahia, Brazil. Check List 10 (5): 1020-1030.

Freitas, M. A., Veríssimo, D. and Uhlig, V. 2012. Squamate Reptiles of the central Chapada Diamantina, with a focus on the municipality of Mucugê, state of Bahia, Brazil. *Check List* 8(1):16-22.

Freitas, M. A., Abegg, A. D., Dias, I. R. and de Figueiredo Moraes, E. P. 2018. Herpetofauna from Serra da Jibóia, an Atlantic Rainforest remnant in the state of Bahia, northeastern Brazil. *Herpetology Notes* 11:59-72.

Freitas, M. A., Abegg, A. D., da Silva Araújo, D., de Almeida Coelho, H. E., dos Santos Azevedo, W., Chaves, M. F. and de Moura, G. J. B. 2019. Herpetofauna of five “Brejos de Altitude” of the interior of the state of Pernambuco, Northeastern Brazil. *Herpetology Notes* 12:591-602.

Frías, J. R., Fernández-Badillo, L., Aguilar López, M. and Ángeles Escudero, J. I. 2015. Geographic Distribution: *Crotalus totonacus* (Totonacan rattlesnake). *Herpetological Review* 46(2):219.

García-Padilla, E. and Mata-Silva, V. 2014. Noteworthy distributional records for the herpetofauna of Chiapas, Mexico. *Mesoamerican Herpetology* 1(2):293.

Garcia-Padilla, E., Valdez, J. H. and Villavicencio, A. P. G. 2018. Las Serpientes de Cascabel maìs allaì del continente. *Especies*. July/September:1-15.

Garman,S. 1884. The reptiles and batrachians of North America. *Mem. Mus. comp. Zool, Cambridge* (Massachusetts), 8(3):xxxiv+185.

Gatica-Colima, A., Cordova-Reza, N. and Marcias-Rodríguez, E. 2011. Geographic Distribution: *Crotalus molossus* (blacktail rattlesnake). *Herpetological Review* 42(3):393.

Gehlbach, F. R. and Collette, B. B. 1957. A contribution to the herpetofauna of the highlands of Oaxaca, Mexico. *Herpetologica* 13:227-232.

Gibbs, H. L., Prior, K. A., Weatherhead. P. J. and Johnson, G. 2003. Genetic structure of populations of the threatened eastern massasauga rattlesnake, *Sistrurus c. catenatus*: evidence from microsatellite DNA markers. *Molecular Ecology* 6(12):1123-1132.

Glenn, J. L., Straight, R. C., Wolfe, M. C. and Hardy, D. L. 1983. Geographical variation in *Crotalus scutulatus scutulatus* (Mojave rattlesnake) venom properties. *Toxicon* 21(1):119-130.

Gloyd, H. K. 1936a. A mexican subspecies of *Crotalus molossus* Baird and Girard. *Occasional Papers of the Museum of Zoology*, University of Michigan (325):1-5.

Gloyd, H. K. 1936b. The subspecies of *Crotalus lepidus. Occasional Papers of the Museum of Zoology*, *University of Michigan* (337):1-5+1 plate.

Gloyd, H. K. 1936c. The status of *Crotalus unicolor* Van Lidth de Jeude and *Crotalus pulvis* Ditmars. *Herpetologica* 1(2):65-68.

Gloyd, H. K. 1940. The rattlesnakes, genera *Sistrurus* and *Crotalus*. A study in zoogeography and evolution. *Special Publications of the Chicago Academy of Sciences* (4)1-270.

Gloyd, H. K. 1948. Description of a neglected subspecies of rattlesnake from Mexico. *Natural History Miscellanea* (17):1-4.

Gloyd, H. K. and Kauffeld, C. F. 1940. A new rattlesnake from Mexico. *Bulletin of the Chicago Academy of Sciences* 6(2):11-14+1 plate.

Gloyd, H. K. and Smith, H. M. 1942. Amphibians and reptiles from the Carmen Mountains, Coahuila. *Bulletin of the Chicago Academy of Sciences* 6(13):231-235.

Goldberg, S. R. 2000. Reproduction in the Rock Rattlesnake, *Crotalus lepidus* (Serpentes: Viperidae). *Herpetological Natural History* 7(1):83-86.

Goodman, R. 2019. Snake snatcher cops hefty fine for taking python. *Age*, 21 March 2019, posted online at: https://www.theage.com.au/national/victoria/snake-snatcher-cops-hefty-fine-for-taking-the-python-20190321-p51696.html

González-Sánchez, V. H., Johnson, J. D., García-Padilla, E., Mata-Silva, V., DeSantis, D. L. and Wilson, L. D. 2017. The Herpetofauna of the Mexican Yucatan Peninsula: composition, distribution, and conservation status. *Mesoamerican Herpetology* 4(2):264-380

Gorzula, S. and Senaris, J. C. 1999. In: *Contribution to the herpetofauna of the Venezuelan Guayana. I: a data base.* Scientia Guaianae, Caracas, No. 8 [1998]:269+ pp.

Grismer, L. L. 1999. An evolutionary classification of reptiles on islands in the Gulf of California, México. *Herpetologica* 55(4):446-469.

Grismer, L. L. 2002a. A re-evaluation of the evidence for a mid-Pleistocene mid-peninsular seaway in Baja California: a reply to Riddle *et al. Herpetological Review* 33:15-16.

Grismer, L. L. 2002. *Amphibians and reptiles of Baja California, including its Pacific islands and the islands in the Sea of Cortés*. Univ. California Press, *Berkeley*:399 pp.

Gual-Diaz, M. and Rendón-Correa, A. 2014. *Bosques mesófilos de Montaña de México*. CONABIO (Comisioìn Nacional para el Conocimiento y Uso de la Biodiversidad), Meìxico:352 pp.

Guerra Centeno, D., Rousselin, H. F. and Villatoro, D. M. 2012. *Serpientes de Guatemala: Guía para didentificación de especies.* Universidad de San Carlos de Guatemala:186 pp.

Güizado-Rodríguez, M. A., Duifhuis-Rivera, C., Maceda-Cruz, R. J., Solano-Zavaleta, I. and García-Vázquez, U. O. 2016. Notes on the diet of the Mexican Dusky Rattlesnake, *Crotalus triseriatus* (Viperidae). *Mesoamerican Herpetology* 3(3):743-746.

Günther, A. C. L. G. 1895. *Biologia Centrali-Americana: Reptilia and Batrachia*. London. Xx+326 p.,

76 pl.

Hamdan, B. and Lira-da-Silva, R. M. 2012. The snakes of Bahia State, northeastern Brazil: species richness, composition and biogeographical notes. *Salamandra* 48(1):31-50.

Hardy, D. L. and Greene, H. W. 1995. *Crotalus molossus molossus* (Blacktail rattlesnake). Maximum length. *Herpetological Review* 26(2):101.

Hardy, L. M. and McDiarmid, R. W. 1969. The amphibians and reptiles of Sinaloa, Mexico. *Univ. Kansas Publ. Mus. Nat. Hist.* 18(3):39-252.

Harris, H. S. and Simmons, R. S. 1978a. A new subspecies of *Crotalus durissus* (Serpentes: Crotalidae) from the rupununisavana of Southwestern Guyana. *Mem. Inst. Butantan* 40/41: 305-311 [1976].

Harris, H. S. and Simmons, R. S. 1978b. A preliminary account of the rattlesnakes with the descriptions of four new subspecies. *Bulletin of the Maryland Herpetological Society* 14(3):105-211 [1977].

Harrison, C. R. and LaDuc, T. J. 1998. Geographic distribution. *Crotalus molossus molossus. Herpetological Review* 29(3):176.

Hedges, S. B., Powell, R., Henderson, R. W., Hanson, S, and Murphy, J. C. 2019. Definition of the Caribbean Islands biogeographic region, with checklist and recommendations for standardized common names of amphibians and reptiles. *Caribbean Herpetology* 67:1-53.

Heimes, P. 2016. *Snakes of Mexico.* Chimaira, Frankfurt, 572 pp.

Hellebuyck, T. 2012. Captive breeding characteristics of the Uracoan rattlesnake (*Crotalus durissus vegrandis*). *Litteratura Serpentium* 32(4):181-186.

Henderson, C. L. 2010. *Mammals, Amphibians, and Reptiles of Costa Rica - A field guide*. University of Texas Press, Austin, Texas, USA:198 pp.

Hernandez, T., Herr, M. W., Stevens, S., Cork, K., Medina-Nava, C., Vialpando, C. J., Warfel, T., Fields, N., Brodie, C. and Graham, S. P. 2019. New distribution records for amphibians and reptiles in eastern Chihuahua, Mexico. *Check List* 15(1):79-86.

Henriques E. Souza, F and Bocchiglieri, A. 2019. *Crotalus durissus* (Neotropical Rattlesnake) Predation. *Herpetological Review* 50(1):153.

Herrera-Enríquez, G. J., García-Padilla, E., Mata-Silva, V., DeSantis, D. L. and Wilson, L. D. 2016. *Crotalus aquilus* Klauber, 1952. Arboreality. *Mesoamerican Herpetology* 3(3):738-739.

Herrmann, H. W. 2016. A Molecular Perspective on Conservation: Rattlesnakes as Models. pp. 461-485 in Schuett, G. W., Feldner, M. J., Smith, C. F. and Reiserer, R. S. (eds.), *Rattlesnakes of Arizona Volume 2*; Eco Publishing.

Hidalgo, V. 2016. Diversidad y riqueza herpetofauniìstica asociada al bosque de manejo forestal y aìreas de cultivo, en Ixtlaìn de Juaìrez, Oaxaca. *Acta Zoolοìgica Mexicana* (n.s.) 32(3):359-369.

Hobbs, K. 2010. Truckie jailed for having sex with 14 year old girl. *Geelong Advertiser*, 7 August, posted online at:

http://www.geelongadvertiser.com.au/article/2010/08/07/198431_news.html

Hoge, A. R. 1966. Preliminary account on Neotropical Crotalinae (Serpentes: Viperidae). *Mem. Inst. Butantan* 32 [1965]:109-184.

Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Sydney, NSW, Australia:238 pp.

Hoser, R. T. 1991. *Endangered Animals of Australia.* Pierson and Co., Mosman, NSW, 240 pp.

Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Moss Vale, NSW. 160 pp.

Hoser, R. T. 1995. Release into hell. *Monitor:Journal of the Victorian Herpetological Society Incorporated* 7(2):77-88.

Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia.* Kotabi Publishing, Doncaster, Victoria, 3108, Australia:280 pp.

Hoser, R. T. 1998. Comments on the proposed conservation of the specific name of *Varanus teriae* Sprackland, 1991 (Reptilia, Squamata) (Case 3043; see BZN 54: 100-103, 250-251; 55: 37-39). *Bulletin of Zoological Nomenclature* 55(2):113-114.

Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* Supplementary Paper 1:1-9.

Hoser, R. T. 2009a. Creationism and contrived science: A review of recent python systematics papers and the resolution of issues of taxonomy and nomenclature. *Australasian Journal of Herpetology* 2:1-34. (3 February).

Hoser, R. T. 2009b. A reclassification of the rattlesnakes; species formerly exclusively referred to the genera *Crotalus* and *Sistrurus*. *Australasian Journal of Herpetology* 6:1-21.

Hoser, R. T. 2012a. Exposing a fraud! *Afronaja* Wallach, Wüster and Broadley 2009, is a junior synonym of *Spracklandus* Hoser 2009! *Australasian Journal of Herpetology* 9 (3 April 2012):1-64.

Hoser, R. T. 2012b. A reclassification of the Rattlesnakes; species formerly exclusively referred to the Genera *Crotalus* and *Sistrurus* and a division of the elapid genus *Micrurus*. *Australasian Journal of Herpetology* 11:2-24.

Hoser, R. T. 2012c. Robust taxonomy and nomenclature based on good science escapes harsh fact-based criticism, but remains unable to escape an attack of lies and deception. *Australasian Journal of Herpetology* 14:37-64.

Hoser, R. T. 2013. The science of herpetology is built on evidence, ethics, quality publications and strict compliance with the rules of nomenclature. *Australasian Journal of Herpetology* 18:2-79.

Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.

Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.

Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-52.

Hoser, R. T. 2015d. PRINO (Peer reviewed in name only) journals: When quality control in scientific publication fails. *Australasian Journal of Herpetology* 26:3-64.

Hoser, R. T. 2015e. Rhodin *et al*. 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.

Hoser, R. T, 2015f. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). (unedited version) *Australasian Journal of Herpetology* 27:37-42.

Hoser, R. T. 2015g. Two hitherto overlooked subspecies of Papuan Python *Liasis* (*Apodora*) *papuana* Peters and Doria, 1878 from New Guinea. *Australasian Journal of Herpetology* 30:18-20.

Hoser, R. T. 2016. New Rattlesnakes in the *Crotalus*

viridis Rafinesque, 1818 and the *Uropsophus triseriatus* Wagler, 1830 species groups (Squamata:Serpentes:Viperidae:Crotalinae). *Australasian Journal of Herpetology* 33:34-41.

Hoser, R. T. 2018. A new species-level classification for the *Aechmophrys cerastes* (Hallowell, 1854) species group of Rattlesnakes (Squamata: Viperidae). *Australasian Journal of Herpetology* 37:14-17.

Hoser, R. T. 2019a. 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus *Tympanocryptis* Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.

Hoser, R. T. 2019b. Richard Shine *et al*. (1987), Hinrich Kaiser *et al*. (2013), Jane Melville *et al*. (2018 and 2019): Australian Agamids and how rule breakers, liars, thieves, taxonomic vandals and law breaking copyright infringers are causing reptile species to become extinct. *Australasian Journal of Herpetology* 39:53-63.

Humboldt, A. 1811. Sur deux nouvelles espèces de Crotles. in: Humboldt and Bonpland, 1813. *Recuil Obs. Zool. Anat. Compo* 2:1-8.

ICZN 2001. Opinion 1970: *Odatria keithhornei* Wells and Wellington, 1985 (Reptilia, Sauria): specific name placed on Official List. *Bulletin of Zoological Nomenclature* 58(1):74.

Illescas-Aparicio, M., Clark-Tapia, R., Gonzaìlez-Hernaìndez, A., Vaìsquez-Diìaz, P. R. and Aguirre-

Ivanyi, C. 2001. Cannibalism by *Crotalus pricei* (Twin-spotted Rattlesnake). *Sonoran Herpetologist* 14(5):52.

Illescas-Aparicio, M., Clark-Tapia, R., Gonzaìlez-Hernaìndez, A., Vaìsquez-Diìaz, P. R. and Aguirre-Hidalgo, V. 2016. Diversidad y riqueza herpetofauniìstica asociada al bosque de manejo forestal y aìreas de cultivo, en Ixtlaìn de Juaìrez, Oaxaca. *Acta Zoolòigica Mexicana* (n.s.) 32(3):359-369.

Jadin, R. C., Mihaljevic, J. R. and Orlofske, S. A. 2019. Do New World pitvipers “scale-down” at high elevations? Macroecological patterns of scale characters and body size. *Ecology and Evolution*. 9:9362-9375.

Johnson, J. D., Mata-Silva, V., Padilla, E. G. and Wilson, L. D. 2015. The Herpetofauna of Chiapas, Mexico: composition, distribution, and conservation. *Mesoamerican Herpetology* 2(3):272-329.

Johnson, J. D., Wilson, L. D., Mata-Silva, V., Garciìa-Padilla, E. and DeSantis, D. L. 2017. The endemic herpetofauna of Mexico: organisms of global significance in severe peril. *Mesoamerican Herpetology* 4(3):544-620.

Jones, T. R., Babb, R. D., Hensley, F. R., LiWanPo, C. and Sullivan, B. K. 2011. Sonoran Desert Snake Communities at Two Sites: Concordance and Effects of Increased Road Traffic. *Herp. Cons. Biol.* 6(1):61-71.

Juliá-Zertuche, J. and Treviño Saldaña, C. H. 1978. Una nueva subespecie de *Crotalus lepidus* encontrada en Nuevo León. pp. 286-293 in *Resúmenes del Segundo Congreso Nacional de Zoología*, Monterrey, Nuevo León, Mexico.

Kacoliris, F. P., Berkunsky, I. and Williams J. 2006. Herpetofauna of Impenetrable, Argentinean Great Chaco. *Phyllomedusa* 5(2):149-158.

Kaiser, H. 2012a. SPAM email sent out to numerous recipients on 5 June 2012.

Kaiser, H. 2012b. Point of view. Hate article sent as attachment with SPAM email sent out on 5 June 2012.

Kaiser, H. 2013. The Taxon Filter, a novel mechanism designed to facilitate the relationship between taxonomy and nomenclature, vis-à-vis the utility of the Code’s Article 81 (the Commission’s plenary power). *Bulletin of Zoological Nomenclature* 70(4) December 2013:293-302.

Kaiser, H. 2014a. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published. *Bulletin of Zoological Nomenclature*, 71(1):30-35.

Kaiser H. 2014b. Best Practices in Herpetological Taxonomy: Errata and Addenda. *Herpetological Review*, 45(2):257-268.

Kaiser, H., Crother, B. L., Kelly, C. M. R., Luiselli, L., O’Shea, M., Ota, H., Passos, P., Schleip, W. D. and Wüster, W. 2013. Best practices: In the 21st Century, Taxonomic Decisions in Herpetology are Acceptable Only When supported by a body of Evidence and Published via Peer-Review. *Herpetological Review* 44(1):8-23.

Kalki, Y., Schramer, T. D., West, T. R. and Wylie, D. B. 2019. *Crotalus triseriatus* (Mexican Dusky Rattlesnake) Diet. *Herpetological Review* 50(3):590.

Katti, C., Stacey-Solis, M., Coronel-Rojas, N. A. and Davies, W. 2019. The Diversity and Adaptive Evolution of Visual Photopigments in Reptiles. *Front. Ecol. Evol*. 7:352.

Kauffeld, C. F. and Gloyd, H. K. 1939. Notes on the Aruba rattlesnake, *Crotalus unicolor*. *Herpetologica* 1:156-160.

Kennicott, R. 1861. On three new forms of rattlesnakes. *Proc. Acad. Nat. Sci. Philadelphia* 13: 206-207.

Kisser, P. 1980. Zur Kernntnis der Klapperschlangen. *Herpetofauna* (Münster) 2(5):6-

10.

Klauber, L. M. 1930. New and renamed subspecies of *Crotalus confluentus* Say, with remarks on related species. *Trans. San Diego Soc. Nat. Hist.* 6(3):95-144.

Klauber, L. M. 1936a. *Crotalus mitchellii*, the speckled rattlesnake. *Transactions of the San Diego Society of Natural History* 8(19):149-184.

Klauber, L. M. 1936b. A key to the rattlesnakes with summary of characteristics. *Transactions of the San Diego Society of Natural History* 8(20):185-276+1 foldout table.

Klauber, L. M. 1938. Notes from a herpetological diary, I. *Copeia* 1938 (4):191-197.

Klauber, L. M. 1940. Notes from a herpetological diary, II. *Copeia* 1940 (1):15-18.

Klauber, L. M. 1941. A new species of rattlesnake from Venezuela. *Transactions of the San Diego Society of Natural History* 9(30):333-336.

Klauber, L. M. 1949. Some new and revived subspecies of rattlesnakes. *Transactions of the San Diego Society of Natural History* 11(6):61-116.

Klauber, L. M. 1952. Taxonomic studies on rattlesnakes of Mainland Mexico. *Bulletins of the Zoological Society of San Diego* (26):1-143.

Klauber, L. M. 1963. A new insular subspecies of the speckled rattlesnake. *Transactions of the San Diego Society of Natural History* 13:73-80.

Klauber, L. M. 1972. *Rattlesnakes: Their Habits, Life Histories and Influence on Mankind*, (2 vols). (second edition), University of California Press, Berkeley and Los Angeles, USA:1533 pp.

Kornacker, P. M. 1999. *Checklist and key to the snakes of Venezuela*. PaKo-Verlag, Rheinbach, Germany:270 pp.

Kornacker, P. M. and Dederichs, U. 1997. Herpetologische Eindrücke einer Venezuelareise. *Elaphe* 5 (3):87-96.

Kornacker, P. M. and Dederichs, U. 2009. Der Big-Bend-Nationalpark und seine Reptilien. Teil 2: Schlangen. *Reptilia* (Münster) 14(75):51-57.

Laita, M. 2013. *Serpentine*. Abrams and PQ Blackwell, Auckland, New Zealand, 200 unnumbered pages.

Langner, C. 2014. Herpetologische Beobachtungen im Lebensraum von *Abronia deppii* im Valle de Bravo, Estado de México, Mexiko. *Terraria-Elaphe* 2014(2):46-55.

Larreal, J. T., Rivas, G. A., Portillo-Quintero, C. and Barros, T. R. 2012. Squamata reptiles of a fragment of tropical dry forest in northwestern Venezuela (Lake Maracaibo region). *Check List* 8(6):1220-1224.

Laurenti, J. N. 1768. *Specimen medicum, exhibens synopsin reptilium emendatam cum experimentis circa venena et antidota reptilium austracorum, quod authoritate et consensu*. Vienna, Joan. Thomae:217 pp.

Lazcano, D., Jacobo Galván, R. D., de la Peña, C. G. and Castañeda, G. 2007. Terrarienhaltung von Gebirgsklapperschlangen. *Reptilia* (Münster) 12(66):38-41.

Lazcano, D., Nevaìrez-de los Reyes, M., Garciìa-Padilla, E., Johnson, J. D., Mata-Silva, V., DeSantis, D. L. and Wilson, L. D. 2019. The herpetofauna of Coahuila, Mexico: composition, distribution, and conservation status. *Amphibian and Reptile Conservation* 13(2) [General Section]: 31-94 (e189).

Lee, J. C. 1996. *The amphibians and reptiles of the Yucatán Peninsula*. Comstock, Cornell University Press, Ithaca:500 pp.

Lee, J. C. 2000. *A field guide to the amphibians and reptiles of the Maya world.* Cornell University Press, Ithaca,

Lemos-Espinal, J. A. and Dixon, J. R. 2013. *Amphibians and Reptiles of San Luis Potosí.* Eagle Mountain Publishing, USA:xii+300 pp.

Lemos-Espinal, J. A. and Smith, G. R. 2015. Amphibians and reptiles of the state of Hidalgo, Mexico. *Check List* 11(3):1642.

Lemos-Espinal, J. A., Smith, G.R. and Cruz, A. 2016. Amphibians and Reptiles of the state of Nuevo León, Mexico. *ZooKeys* 594:123-141.

Lemos-Espinal, J. A., Smith, G. R., Gadsden-Esparza, H., Valdez-Lares, R. and Woolrich-Piña, G. A. 2018a. Amphibians and reptiles of the state of Durango, Mexico, with comparisons with adjoining states. *ZooKeys* 748:65-87.

Lemos-Espinal, J. A., Smith, G. R. and Woolrich-Piña, G. A. 2018b. Amphibians and reptiles of the state of San Luis Potosí, Mexico, with comparisons with adjoining states. *ZooKeys* 753:83-106.

Lemos-Espinal, J. A., Smith, G. R. and Rorabaugh, J. C. 2019. A conservation checklist of the amphibians and reptiles of Sonora, Mexico, with updated species lists. *ZooKeys* 829:131-160.

Leynaud, G. C. and Bucher, E. H. 1999. La fauna de serpientes del Chaco Sudamericano: diversidad, distribución geografica y estado de conservación. *Academia Nacional de Ciencias Miscelanea* (98):1-46.

Leyte-Manrique, A., Hernández Navarro y Luis, E. M. and Escobedo-Morales, A. 2015. Herpetofauna de Guanajuato: Un análisis histórico y contemporáneo de su conocimiento. *Revista Mexicana de Herpetología* 1(1):1-14.

Leyte-Manrique, A., Berriozabal-Islas, C., Mata-Silva, V. and Morales-Castorena, J. P. 2018. Herpetofaunal diversity in Área Natural Protegida

Las Musas, Guanajuato, Mexico. *Mesoamerican Herpetology* 5(1):122-136.

Lidth de Jeude, Th. W. van. 1887. On a collection of reptiles and fishes from the West-Indies. *Notes from the Leyden Museum* 9:129-139.

Lillywhite, H. B. 2014. *How Snakes Work: Structure, Function and Behavior of the World's Snakes*. Oxford University Press, New York, USA:256 pp.

Linares, A. M. and Eterovick, P. C. 2013. Herpetofaunal Surveys Support Successful Reconciliation Ecology in Secondary and Human-Modified Habitats at the Inhotim Institute, Southeastern Brazil. *Herpetologica* 69(2):237-256.

Lind, C. M., Clark, A., Smiley-Walters, S. A., Taylor, D. R., Isidoro-Ayza, M., Lorch, J. M. and Farrell, T. M. 2019. Interactive Effects of Food Supplementation and Snake Fungal Disease on Pregnant Pygmy Rattlesnakes and Their Offspring. *Journal of Herpetology* 53(4):282-288.

Lindell, J., Ngo, A. and Murphy, R. W. 2006. Deep genealogies and the mid-peninsular seaway of Baja California. *Journal of Biogeography*, 33(8):1327-1331.

Liner, E. A. 1994. Scientific and common names for the Amphibians and Reptiles of Mexico in English and Spanish. *Herpetological Circular* 23:1-113.

Linnaeus, C. 1758. Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima, reformata. Laurentii Salvii, Holmiae. 10th Edition:824 pp.

Loc-Barragán, J. A., Carbajal-Márquez, R. A., Woolrich-Piña, G. A. and Navarro-Orozco, R. R. 2016. *Crotalus basiliscus*. Arboreal habitat use/ Litter size. *Mesoamerican Herpetology* 3(2):494-496.

Loc-barragán J. A., Lazcano, D. and Woolrich-Piña, G. A. 2018. Notes on the Herpetofauna of Nayarit, Mexico 2: Amphibians and Reptiles of the Municipality of Compostela. *Bulletin of the Chicago Herpetological Society* 53(10):205-212.

Loc-Barragaìn, J. A., Sosa-Hernaìndez, Z. I., Gru¨nwald, C. I., Miramontes-Medina, E., BanÞuelos-Alamillo, J. A., Woolrich-PinÞa, G. A. and Lazcano, D. 2019. Notes on the Herpetofauna of Nayarit, Mexico 3: Amphibians and Reptiles of the Municipality of Huajicori. *Bulletin of the Chicago Herpetological Society* 54(10):205-213.

Love, B. 2011. Klapperschlangenparadies. *Reptilia* (Münster) 16(91):14-15.

Love, B. 2012. Heimliche Orte. *Reptilia* (Münster) 17(96):20-21.

Lowe, C. H. Jnr. and Norris, K. S. 1954. Analysis of the herpetofauna of Baja California, Mexico. *Transactions of the San Diego Society of Natural History* 12(4):47-64.

Luja, V. H., López, J. A., Cruz-Elizalde, R., Ramírez-Bautista, A. 2017. Herpetofauna inside and outside from a natural protected area: the case of Reserva Estatal de la Biósfera Sierra San Juan, Nayarit, Mexico. *Nature Conservation* 21:15-38.

Madella-Auricchio, C. R. and Soares, P. A. E. A. 2017. Reptile species composition in the Middle Gurguéia and comparison with inventories in the eastern Parnaíba River Basin, State of Piauí, Brazil. *Papéis Avulsos de Zoologia* 57(28):375-386.

Maritz, B., Penner, J., Martins, M., Crnobrnja-Isailoviæ, J., Spear, S., Alencar, L. R. V., Sigala-Rodriguez, J., Messenger, K., Clark, R. W., Soorae, P., Luiselli, L., Jenkins, C. and Greene, H. W. 2016. Identifying global priorities for the conservation of vipers. *Biological Conservation*:94-102.

Markezich, A. L. 2002. New distribution records of reptiles from Western Venezuela. *Herpetological Review* 33(1):69-74.

Marques, R., Tino^co, M. S., Couto- Ferreira, D., Fazolato, C. P., Browne-Ribeiro, H. C., Travassos, M. L. O., Dias, M. A. and Mota, J. V. L. 2011. Reserva Imbassaiì Restinga: inventory of snakes on the northern coast of Bahia, Brazil. *Journal of Threatened Taxa* 3(11):2184-2191.

Marques, R, Mebert, K., Fonseca, É., Rödder, D., Solé, M. and Tinôco, M. S. 2016. Composition and natural history notes of the coastal snake assemblage from Northern Bahia, Brazil. *ZooKeys* 611:93-142.

Marques, R., Rödder, D., Solé, M. and Tinôco, M. S. 2017. Diversity and habitat use of snakes from the coastal Atlantic rainforest in northeastern Bahia, Brazil. *Salamandra* 53(1):34-43.

Martin, P. S. 1958. A biogeography of reptiles and amphibians in the Gomez Farias Region, Tamaulipas, Mexico. *Miscellaneous publications, Museum of Zoology, University of Michigan* (101):1-102+7 plates.

Mata-Silva, V., Johnson, J. D. and Rocha, A. 2011. *Crotalus lepidus* (rock rattlesnake) feeding behavior. *Herpetological Review* 42(3):439.

Mata-Silva, V., Johnson, J. D., Rocha, A. and Dilks, S. 2014. Rainwater-harvesting by the rock rattlesnake, *Crotalus lepidus*, in the Chihuahuan Desert of western Texas. *Southwestern Naturalist* 59(2):303-304.

Mata-Silva, V., Johnson, J. D., Wilson, L. D. and García-Padilla, E. 2015. The herpetofauna of Oaxaca, Mexico: composition, physiographic distribution, and conservation status. *Mesoamerican Herpetology* 2(1):6-62.

Mata-Silva, V., E. García-Padilla, D. L., DeSantis, A., Rocha, L. D., Wilson, P. R., Simón-Salvador, C.,

Mayoral-Halla, B., Montiel-Altamirano, F. and Ramírez-Bautista, A. 2017. New herpetofaunal distribution records for the state of Oaxaca, Mexico. *Mesoamerican Herpetology* 4(3):679-683.

Mata-Silva, V., DeSantis, D. L., Wagler, A. E. and Johnson, J. D. 2018. Spatial Ecology of Rock Rattlesnakes (*Crotalus lepidus*) in Far West Texas. *Herpetologica* 74(3):245-254.

Mata-Silva, V., Rocha, A., Mata-González, S., Ramírez-Bautista, A., Berriozabal-Islas, C., García-Padilla, E., Johnson, J. D. and Wilson, L. D. 2019. First municipality records and additional information on the herpetofauna of Oaxaco, Mexico. *Herpetological Review* 50(3):533-536.

Mattison, C. 2007. *The New Encyclopedia of Snakes*. Princeton University Press.

McCranie, J. R. 1981a. *Crotalus pricei* van Denburgh. Twin spotted rattlesnake. *Catalogue of American Amphibians and Reptiles* (266) 1980 [1981]:1-2.

McCranie, J. R. 1981b. *Crotalus basiliscus* (Cope). Mexican west coast rattlesnake. *Catalogue of American Amphibians and Reptiles* 283:1-2.

McCranie, J. R. 1983. *Crotalus pusillus* Klauber. Southwestern Mexico dusky rattlesnake. *Catalogue of American Amphibians and Reptiles* 313:1-2.

McCranie, J. R. 1984. *Crotalus vegrandis* Klauber. Uracoan rattlesnake. *Catalogue of American Amphibians and Reptiles* 350:1-2.

McCranie, J. R. 1986. *Crotalus unicolor* Lidth van de Jeude. Aruba Island rattlesnake. *Catalogue of American Amphibians and Reptiles* 389:1-2.

McCranie, J. R. 1993. *Crotalus durissus* Linnaeus, Neotropical rattlesnake. *Catalogue of American Amphibians and Reptiles* 577:1-11.

McCranie, J. R. 2011. *The snakes of Honduras*. SSAR, Salt Lake City, Utah, USA:725 pp.

McCranie, J. R. 2015. A checklist of the amphibians and reptiles of Honduras, with additions, comments on taxonomy, some recent taxonomic decisions, and areas of further studies needed. *Zootaxa* 3931(3):352-386.

McCranie, J. R. and Wilson, L. D. 1979. Commentary on taxonomic practice in regional herpetological publications: a review of the rattlesnakes with the description of four new subspecies [by Harris and Simmons, 1978]. *Herpetological Review* 10(1):18-21.

McCranie, J. R. and Wilson, L. D. 2001. The herpetofauna of the Mexican State of Aguascalientes. Courier Forschungsinstitut Senckenberg 230:1-57.

McCrystal, H. K. and McCoid, M. J. 1986. *Crotalus mitchellii* (Cope). Speckled rattlesnake. *Catalogue of American Amphibians and Reptiles* 388:1-4.

McDiarmid, R. W., Campbell, J. A. and Touré, T. A. 1999. *Snake species of the world*. Vol. 1. Herpetologists League, USA:511 pp.

Meik, J. M. and Pires-daSilva, A. 2009. Evolutionary morphology of the rattlesnake style. *BMC Evolutionary Biology* 9(1):35.

Meik, J. M., Mociño Deloya, E. and Setser, K. 2007. New distribution records for the Queretero Dusky Rattlesnake *Crotalus aquilus* (Viperidae), with comments on morphology and habitat use. *Western North American Naturalist* 67(4):601-604.

Meik, J. M., Lawing, A. M. and Pires-da Silva, A. 2010. Body Size Evolution in Insular Speckled Rattlesnakes (Viperidae: *Crotalus mitchellii*). *PLoS One* 5:e9524.

Meik, J. M., Schaack, S., Ingrasci, M. J., Lawing, A. M., Setser, K., MocinÞo-Deloya, E. or Flores-Villela, O. 2012. Notes on activity, body size variation and diet in insular speckled rattlesnakes from the western Sea of Corteìs, Mexico. *Herpetological Review* 43:556-560.

Meik, J. M., Streicher, J. W., Lawing, A. M., Flores-Villela, O. and Fujita, M, K. 2015. Limitations of Climatic Data for Inferring Species Boundaries: Insights from Speckled Rattlesnakes. *PLoS One* 10(6):e0131435.

Meik, J. M., Schaack, S., Flores-Villela, O. and Streicher, J. W. 2018. Integrative taxonomy at the nexus of population divergence and speciation in insular speckled rattlesnakes. *Journal of Natural History* 52: 989-1016.

Mertens, R. 1952. Die Amphibien und Reptilien von El Salvador. *Abh. senckenb. naturf. Ges*. (Frankfurt) (487):120 pp.

Miranda, J. Jnr., Mata-Silva, V., Dilks, S., Riveroll, H. Jnr. and Johnson, J. D. 2008. *Crotalus molossus* (Blacktail Rattlesnake). Morphology. *Herpetological Review* 39(1):97.

Moll, E. O. 2004. *Crotalus pricei*, Van Denburgh, 1895 - Twin-spotted rattlenake. Patronyms of the Pioneer West. *Sonoran Herpetologist* 16(12):110-112.

Monzel, M. M. 2008. Bissunfälle durch Lanzenottern - Gifte, Epidemiologie und Schlangenbiss-Management. *Draco* 8(33):57-65.

Monzel, M. M. 2012. Gifte, Gifttiere, Menschen - eine Geschichte voller (Miss) Verständnisse. *Draco* 13(51):4-25.

Monzel, M. and Wüster, W. 2008. Neotropische Grubenottern - Evolution, Biogeographie und Ökologie. *Draco* 8(33):4-27.

Montiel-Canales, G., Lara-Tufiño, J. D. and Mayer-Goyenechea, I. G. 2017. Geographic Distribution:

Crotalus triseriatus (Mexican Dusky Rattlesnake). *Herpetological Review* 48(4):813.

Mocquard, M. F. 1899. Contribution a la faune herpétologique de la Basse-Californie. *Nouv. Arch. Mus. Hist. Natur. Paris*, (Fourth Series), 1:297-343+plates XI-XIII.

Muñoz-Nolasco, F. J., Cruz-Sáenz, D., Rodríguez-Ruvalcaba, O. J. and Terrones-Ferreiro, I. E. 2015. Notes on the Herpetofauna of Western Mexico 12: Herpetofauna of a Temperate Forest in Mazamitla, Southeastern Jalisco, Mexico. *Bull. Chicago Herp. Soc*. 50(4):45-50.

Murphy, R. W. and Crabtree, C. B. 1988. Genetic identification of a natural hybrid rattlesnake: *Crotalus scutulatus scutulatus* x *C. viridis viridis. Herpetologica* 44(1):119-123.

Murphy, R. W., Fu, J., Lathrop, A., Feltham, J. V. and Kovac, V. 2002. Phylogeny of the rattlesnakes (*Crotalus* and *Sistrurus*) inferred from sequences of five mitochondrial DNA genes. pp. 69-92 in Schuett, G. W., Hoggren, M., Douglas, M. E. and Greene, H. W. (eds.) *Biology of the Vipers* Eagle Mountain Press, Salt Lake City, Utah, USA.

Mutton, N. 2014a. Private email (via Facebook) to Raymond Hoser. 6.31 AM, 30 May.

Mutton, N. 2014b. Two emails to Raymond Hoser, 9 June.

Myers, E. A., Hickerson, M. J. and Burbrink, F. T. 2016. Asynchronous diversification of snakes in the North American warm deserts. *Journal of. Biogeography* 44(2):461-474.

Nacimento, V. and Dos Santos, E. M. 2016. Geographic Distribution: *Crotalus molossus* (Black-tailed Rattlesnake). *Herpetological Review* 47(1):83.

Natera-Mumaw, M., Esqueda-González, L. F. and Castelaín-Fernández, M. 2015. *Atlas Serpientes de Venezuela*. Santiago de Chile, Dimacofi Negocios Avanzados S.A.:456 pp.

Neill, W. T. and Ross Allen, E. 1959. Studies on the amphibians and reptiles of British Honduras. *Publications of the Research Division Ross Allen's Reptiles Institute*. 2(1):1-76.

Nevárez-de los Reyes, M., Lazcano, D., Banda-Leal, J. and Recchio, I. 2014. Notes on Mexican Herpetofauna 22: Herpetofauna of the Continental Portion of the Municipality of Hermosillo, Sonora, Mexico. *Bulletin of the Chicago Herpetological Society* 49(8):105-115.

Nevárez-de-los-Reyes, M., Lazcano, D., García-Padilla, E., Mata-Silva, V., Johnson, J. D. and Wilson, L. D. 2016. The Herpetofauna of Nuevo León, Mexico: Composition, Distribution, and Conservation. *Mesoamerican Herpetology* 3(3):558-638.

Neves, M. O., Yves, A., Pereira, E. A., Alves, L., Vasques, J. B., Coelho, J. F. T. and Silva, P. S. 2019. Herpetofauna in a highly endangered area: the Triângulo Mineiro region, in Minas Gerais State, Brazil. *Herpetozoa* 32:113-123.

Olivier, R. 2008a. Da Baja California ratelslang, *Crotalus enyo* en een kweekverslag van de Rosario ratelslang, *Crotalus enyo furvus. Lacerta* 66(1-3):30-39.

Olivier, R. 2008b. Kleine gifslangengalerij. *Lacerta* 66(1-3):47-57.

Olvera, C. R. O. and Badillo, L. F. 2016. Geographic Distribution: *Crotalus molossus* (Black-tailed Rattlesnake). *Herpetological Review* 47(1):83.

Oransky, I. 2020. Major indexing service sounds alarm on self-citations by nearly 50 journals. Media release at: https://retractionwatch.com/2020/06/29/major-indexing-service-sounds-alarm-on-self-citations-by-nearly-50-journals/

Palacios-Aguilar, R. and Flores-Villela, O. 2018. An updated checklist of the herpetofauna from Guerrero, Mexico. *Zootaxa* (PRINO) (online) 4422(1):1-24.

Palacios-Aguilar, R., Cruz-Machuca, T. E. and Arias-Montiel. J. D. 2016. *Crotalus culminatus* (Klauber, 1952). Mexico, Estado de México. *Mesoamerican Herpetology* 3(4):1067-1068.

Parkinson, C. L. 1999. Molecular systematics and biogeographical history of pitvipers as determined by mitochondrial ribosomal DNA sequences. *Copeia* 1999(3):576-586.

Pérez-Mendoza, H. A., Sanabria-Tobón, S. R., Jaramillo-Alba, J. L., Solano-Zavaleta, I., Vázquez-Vega, L. F. and Díaz de la Vega-Pérez, A. H. 2017. Reproductive Traits of Dusky Rattlesnakes (*Crotalus triseriatus*) in Central Mexico. *Journal of Herpetology* Mar 2018, 52(1):6-11.

Pérez-Santos, C. and Moreno, A. G. 1988. *Ofidios de Colombia*. Museo reegionale di Scienze Naturali, Torino, Monographie VI:517 pp.

Peña-Peniche, A., Lazcano, D., Ruvalcaba-Ortega, I and Wilson. L. D. 2017. *Crotalus scutulatus* (Kennicot, 1861). Diet. *Mesoamerican Herpetology* 4(3):644-648.

Peralta-Fonseca, Z. A. and García-Padilla, E. 2015. *Crotalus culminatus* (Klauber, 1952). *Mesoamerican Herpetology* 2(2):208.

Percino-Daniel, R., Cruz-OcanÞa, E., Pozo-Ventura, W. and Velaìzquez-Velaìzquez, E. 2013. Diversidad de reptiles en dos microcuencas del riìo Grijalva, Chiapas, Meìxico. *Revista Mexicana de Biodiversidad* 84:938-948.

Peterson, A. T., Canseco-Márquez, L., Contreras-Jiménez, J. L., Escalona-Segura, G., Flores-Villela, O., García-López, J., Hernández-Baños, B., Jiménez-Ruiz, C. A., León-Paniagua, L., Mendoza-

Amaro, S., Navarro-Sigüenza, A. G., Sánchez-Cordero, V. and Willard, D. E. 2004. A preliminary biological survey of Cerro Piedra Larga, Oaxaca, Mexico: Birds, mammals, reptiles, amphibians, and plants. *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología* 75(2):439-466.

Philippen, H. P. 2014. Vielfalt ist Trumpf. *Draco* 16(57):6-15.

Platt, S. G. and Rainwater, T. R. 2009. A new maximum size record for *Crotalus molossus* (Baird and Girard, 1853). *Journal of Kansas Herpetology* 29:11.

Platt, S. G., Rainwater, T. R., Meerman, J. C. and Miller, S. M. 2016. Nature Notes. Notes on the diet, foraging behavior, and venom of some snakes in Belize. *Mesoamerican Herpetology* 3(1):162-170.

Porras, L. W. 2006. Costa Rican snakes of the tropical dry forest. *Reptilia* (UK) (48):18-23.

Porras, L. W. and Solórzano, A. 2006. Costa Rica's venomous snakes. *Reptilia* (UK) (48):11-17.

Porto, M., de Oliveira, M. A., Pissinatti, L. P. Rodrigues, R. L., Rojas-Moscoso, J. A., Cogo, J. C., Metze, K., Antunes, E., Nahoum, C., Mónica, F. Z. and De Nucci, G. 2013. The Evolutionary Implications of Hemipenial Morphology of Rattlesnake *Crotalus durissus terrificus* (Laurent, 1768) (Serpentes: Viperidae: Crotalinae). PLoS One 8(6):e66903.

Powell, R., Inboden, M. and Smith, D. B. 1990. Erstnachweis von Hybriden zwischen den Klapperschlangen *Crotalus cerastes laterorepens* Klauber, 1944 und *Crotalus scutulatus scutulatus* (Kennicott, 1861). *Salamandra* 26(4):319-320.

Price, A. H. 1980. *Crotalus molossus* Baird and Girard. Black-tailed rattlesnake. *Catalogue of American Amphibians and Reptiles* 242:1-2.

Price, A. H. 1982. *Crotalus scutulatus* (Kennicott). Mojave rattlesnake. *Catalogue of American Amphibians and Reptiles* (29)(1):1-2.

Price, M. S. 2010. *A Guide to the rock rattlesnakes of the United States*. Eco Herpetological Publishing, Rodeo, New Mexico, USA:160 pp.

Prigioni, C., Borteiro, C. and Kolenc, F. 2011. Amphibia and Reptilia, Quebrada de los Cuervos, Departamento de Treinta y Tres, Uruguay. *Check List* 7(6):763-767.

Prigioni, C., Borteiro, C., Kolenc, F., Colina, M. and González, E. M. 2013. Geographic distribution and apparent decline of *Crotalus durissus terrificus* (Laurenti 1768; Serpentes, Viperidae) in Uruguay. *Cuadernos de Herpetología* 27(2):163-165.

Prival, D. B. and Schroff, M. J. 2012. A 13-Year Study of A Northern Population of Twin-Spotted Rattlesnakes (*Crotalus pricei*): Growth, Reproduction, Survival, and Conservation. *Herpetological Monographs* 26(1):1-18.

Prival, D. B., Goode, M. J., Swann, D. E., Schwalbe, C. R. and Schroff, M. J. 2002. Natural history of a northern population of Twin-spotted Rattlesnake, *Crotalus pricei. Journal of Herpetology* 36(4):598-607.

Pyron, R. A., Burbrink, F. T. and Weins, J. J. 2013. A phylogeny and revised classification of Squamata, including 4161 species of lizards and snakes. Published online at: http://www.biomedcentral.com/1471-2148/13/93.

Quelch, J. J. 1899. The poisonous snakes of British Guiana. *Ann. Mag. Nat. Hist.* (7)3:402-409.

Quijada-Mascareñas, J. and Wüster, W. 2006a. *Crotalus durissus* complex: from Yucatan to Patagonia: the natural history of the Neotropical rattlesnake. *Reptilia* (UK) (49):66-73.

Quijada-Mascareñas, J. and Wüster, W. 2006b. On the Origins and Dispersal of Neotropical Rattlesnakes in South America. *CAH/ACH Bulletin* 14(1):6-12.

Quijada-Mascarenas, J., Ferguson, A., Pook, J. E., Salomao, C. E., Da Graca, M., Thorpe, R. S. and Wuster, W. 2007. Phylogeographic patterns of trans-Amazonian vicariants and Amazonian biogeography: the Neotropical rattlesnake (Crotalus durissus complex) as an example. Journal of Biogeography 34(8):1296-1312

Rael, E. D., Knight, R. A. and Zepeda, H. 1984. Electrophoretic variants of Mojave rattlesnake (*Crotalus scutulatus scutulatus*) venoms and migration differences of Mojave toxin. *Toxicon* 22(6):980-984.

Raw, L. 2020. Email to Raymond Hoser. 20 May at 11.59 PM.

Reiserer, R. S. and Schuett, G. W. 2016. The Origin and Evolution of the Rattlesnake Rattle: Misdirection, Clarification, Theory, and Progress. 245-274 in Schuett, G. W., Feldner, M. J., Smith, C. F. and Reiserer, R. S. (eds.), *Rattlesnakes of Arizona Volume 2*; Eco Publishing.

Reynolds, R. P. and Scott Jr., N. J. 1982. Use of a Mammalian Resource by a Chihuahuan Snake Community. in: Scott, N. J. (ed.) Herpetological communities [an SSAR symposium]. US Fish and Wildlife Service, *Wildl. Res. Rep.* 13:99-118.

Riaño-García, M., García-Padilla, E., Mata-Silva, V., DeSantis, D. L. and Wilson, L. D. 2017. *Crotalus culminatus* Klauber, 1952. Mexico, Oaxaca. *Mesoamerican Herpetology* 4(1):202-203.

Ribeiro, S. C., Roberto, I. J., Sales, D. L., Ávila, R. W. and Almeida, W. O. 2012. Amphibians and reptiles from the Araripe bioregion, northeastern Brazil. *Salamandra* 48(3):133-146.

Ride, W. D. L. (ed.) *et. al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK.

Rivas Fuenmayor, G., and Amorós, C. L. B. 2005. New Amphibian and Reptile records from Cojedes State, Venezuela. *Herp. Review* 36(2):205-209.

Rivas Fuenmayor, G., Ugueto, G., Rivero, R. and Miralles, A. 2005. The Herpetofauna of Isla de Margarita, Venezuela: New Records and Comments. *Carib. J. Sci.* 41(2):346-351.

Rodríguez-Robles, J. A., Good, D. A. and Wake, D. B. 2003. *Brief History of Herpetology in the Museum of Vertebrate Zoology, University of California, Berkeley, with a List of Type Specimens of Recent Amphibians and Reptiles.* UC Publications in Zoology:119 pp.

Rorabaugh, J. C., Turner, D., van Devender, T. R., Hugo-Cabrera, V., Maynard, R. J., Van Devender, R. W., Villa, R. A., Hamilton, P., Hale, S. F., Aguilar-Morales, C., Blanco-Gutiérrez, A., Wallace, E. and Hedgcock, C. 2019. Herpetofauna of the Mesa Tres Ríos area in the Northern Sierra Madre Occidental of Sonora, Mexico. *Herp. Review* 50(2):251-259.

Roth-Monzón, A. J., Mendoza-Hernández, A. A., Flores-Villela, O. 2018. Amphibian and reptile biodiversity in the semi-arid region of the municipality of Nopala de Villagrán, Hidalgo, Mexico. *PeerJ* 6:e4202.

Carbajal-Márquez, R. A., Cedeño-Vázquez, J. R., Martínez-Arce, A., Neri-Castro, E., Machkour-rabet, S. C. 2020. Accessing cryptic diversity in Neotropical rattlesnakes (Serpentes: Viperidae: *Crotalus*) with the description of two new species. *Zootaxa* 4729(4):451-481.

Rojo-Gutieìrrez, J. R., Jaimes-Rodriìgue, D., Cruz-Saìenz, D., Loìpez-Fernaìndez, L., Chaìvez-Uribe, E. and Lazcano, D. 2018. Notes on the Herpetofauna of Western Mexico 19: An Update to the Herpetofauna of Volcaìn de Tequila in Jalisco, Mexico. *Bulletin of the Chicago Herpetological Society* 53(8):165-169.

Rorabaugh, J. C., Turner, D. van Devender, T. R., Hugo-Cabrera, V., Maynard, R. J., Van Devender, R. W., Villa, R. A., Hamilton, P., Hale, S. F., Aguilar-Morales, C., Blanco-Gutiérrez, A., Wallace, E. and Hedgcock, C. 2019. Herpetofauna of the Mesa Tres Ríos area in the Northern Sierra Madre Occidental of Sonora, Mexico. *Herpetological Review* 50(2):251-259.

Roth-Monzón, A. J., Mendoza-Hernández, A. A. and Flores-Villela, O. 2018. Amphibian and reptile biodiversity in the semi-arid region of the municipality of Nopala de Villagrán, Hidalgo, Mexico. *PeerJ* 6:e4202.

Sage, R. D. and Capredon, E. E. 1971. La distribucion de la cascabel (*Crotalus durissus terrificus* (Laurentius) en Argentina y su significado zoogeographico. *Neotropica* 17(54):133-136.

Salta, Tucumán, Catamarca, La Rioja, Santiago del Estero]. Fundación Miguel Lillo, Tucumán:178 pp.

Senþaris, J. C., Padroìn, M. M. A., Rojas, H., Fernando, G. y. and Rojas-Runjaic, J. M. 2018. *Guía ilustrada de los anfibios y reptiles del valle de Caracas, Venezuela*. Ediciones IVIC, Instituto Venezolano de Investigaciones Cientiìficas (IVIC). Caracas, Venezuela:348 pp.

Santos, D. L., Andrade, S. P., Victor-Jr., E. P. and Vaz-Silva, W. 2014. Amphibians and reptiles from southeastern Goiás, Central Brazil. *Check List* 10(1):131-148.

Savage, J. M., Campbell, J. A. and Lamar, W. W. 2005. On names for neotropical rattlesnakes. *Herpetological Review*, 36:369-371.

Savary, B. 1998. Brood defense in Northern Blacktail Rattlesnakes (*Crotalus molossus molossus*) - a field observation. *Sonoran Herpetologist* 11(7):80.

Schmidt, D. and Kunz, K. 2005. *Ernährung von Schlangen*. Natur und Tier Verlag, Münster:159 pp.

Schmidt, K. P. and Shannon, F. A. 1947. Notes on amphibians and reptiles of Michoacan, Mexico. *Zoological Series of Field Museum of Natural History* 31(9):63-85.

Schield, D. R., Adams, R. H., Card, D. C., Corbin, A. B., Jezkova, T., Hales, N. R., Meik, J. M., Perry, B. W., Spencer, C. L., Smith, L. L., García, G. C., Bouzid, N. M., Strickland, J. L., Parkinson, C. L., Borja, M., Castañeda-Gaytán, G., Bryson, R. W., Flores-Villela, O. A., Mackessy, S. P. and Castoe, T. A. 2018. Cryptic genetic diversity, population structure and gene flow in the Mojave rattlesnake (*Crotalus scutulatus*). *Molecular Phylogenetics and Evolution*, 127:669-681.

Scott, N. J. and Lovett, J. W. 1975. A collection of reptiles and amphibians from the Chaco of Paraguay. *The University of Connecticut Occasional Papers, Biological Series* 2(16):257-266.

Scrocchi, G. J., Moreta, J. C. and Kretzschmar, S. 2006. *Serpientes del Noroeste Argento* [Jujuy,

Shea, G. 2013a. Email to Raymond Hoser dated Fri, 8 Mar 2013 04:29:39 +0000.

Shea, G. 2013b. Post on facebook on 8 March at 7.51 AM at: http://www.facebook.com/glenn.shea.73?ref=ts&fref=ts

Shea, G. 2013c. Post on facebook on 20 March at: http://www.facebook.com/lenn.shea.73?ref=ts&fref=ts#!/bryangrieg.fry?fref=ts

Shea, G. 2013d. Second post on facebook on 20

March at: http://www.facebook.com/glenn.shea.73?ref=ts&fref=ts#!/bryangrieg.fry?fref=ts

Skubowius, B. 2012. Auf Schlangensuche in Arizona. *Draco* 13(50):62-69.

Smith, H. M. 1944. Additions to the list of Mexican amphibians and reptiles in the Carnegie Museum. *Annals of the Carnegie Museum* 30:87-92.

Smith, H. M. 1946. Preliminary notes and speculations on the *triseriatus* group of rattlesnakes in Mexico. *Univ. Kansas Sci. Bull.* 31(3):75-101.

Smith, H. M. and Taylor, E. H. 1945. An annotated checklist and key to the snakes of Mexico. *Bull. US Natl. Mus.* (187): iv+1-239.

Smith, H. M. and Taylor, E. H. 1950. Type localities of Mexican reptiles and amphibians. *Univ. Kansas Sci. Bull.* 33(8):313-380.

Smith, H. M., Pérez-Higareda, G. and Chiszar, D. 1993. A review of the members of the *Sceloporus variabilis* lizard complex. *Bulletin of the Maryland Herpetological Society* 29(3):85-125.

Soliìs, J. M., Wilson, L. D. and Townsend, J. H. 2014. An updated list of the amphibians and reptiles of Honduras, with comments on their nomenclature. *Mesoamerican Herpetology* 1:123-144.

Sonnini de Manoncourt, C. S. and Latreille, P. A. 1801. *Histoire Naturelle des Reptiles, avec Figures Dessinees d'Apres Nature. 3*. Paris, Librairie encyclopédique de Roret:332 pp.

Spinner, L. 2017. Die Klapperschlangen der USA in Natur und Terrarium. *Reptilia* (Münster) 22(124): 18-33.

Spranger, T. M. 2015. Anmerkungen zum geplanten Gefahrtierverbot in NRW. *Terraria-Elaphe* 2015 (1):8-10 [2014].

Starace, F. 1998. *Guide des Serpents et Amphisbènes de Guyane*. IBIS Rouge Editions, Guadeloupe, Guyane:450 pp.

Starace, F. 2013. *Guide des Serpents et Amphisbènes de Guyane*. Ibis Rouge Editions, Matoury, Guyane.

Starrett, B. L. 1999. Metropolitan pitvipers, notes on the ecology, systematics and husbandry of two urban rattlesnakes, *Crotalus mitchelli pyrrhus* and *Crotalus tigris. Litteratura Serpentium* 19(2):36-41.

Stebbins, R. C. 1985. *A Field Guide to Western Reptiles and Amphibians*, (Second edition), Houghton Mifflin, Boston, USA.

Stille, B. 1987. Dorsal scale microdermatoglyphics and rattlesnake (*Crotalus* and *Sistrurus*) phylogeny (Reptilia: Viperidae: Crotalinae). *Herpetologica* 43:98-104.

Strimple, P. 1992. *Crotalus mitchelli*, the Speckled rattlesnake. *Litteratura Serpentium* 12(2):26-31.

Strimple, P. 1993a. Report on the feeding and growth of a juvenile Mottled rock rattlesnake, *Crotalus lepidus lepidus*, during three years in captivity. *Litteratura Serpentium* 13(3):89-94.

Strimple, P. 1993b. *Crotalus molossus*, the black-tailed rattlesnake. *Litteratura Serpentium* 13(4):132-136.

Strimple, P. 1993c. Captive birth of Mojave rattlesnakes, *Crotalus scutulatus scutulatus. Litteratura Serpentium* 13(5):166-168.

Strimple, P. 1994a. *Crotalus pricei*, the Twin-spotted rattlesnake. *Litteratura Serpentium* 14(4):98-101.

Strimple, P. 1994b. Captive birth of Southwestern speckled rattlesnakes, *Crotalus mitchelli pyrrhus* (Cope). *Litteratura Serpentium* 14(5):142-144.

Strimple, P. 1996. *Crotalus scutulatus* (Kennicott), the Mojave rattlesnake. *Litteratura Serpentium* 16 (2):36-38.

Stoll, N. R. *et al.* 1964. *International Code of Zoological Nomenclature*, (Second Edition). for the International Commission of Zoological Nomenclature, by the International Trust for Zoological Nomenclature, London, 1961.

Stuart, L. C. 1935. A contribution to a knowledge of the herpetology of a portion of the savanna region of Central Peten, Guatemala. *University of Michigan Museum of Zoology Miscellaneous Publications* 29:1-56.

Sunny, A., Gandarilla-Aizpuro, F. J., Monroy-Vilchis, O. and Zarco-Gonzalez, M. M. 2019. Potential distribution and habitat connectivity of *Crotalus triseriatus* in Central Mexico. *Herpetozoa* 32:139-148.

Sunyer, J. 2014. An updated checklist of the amphibians and reptiles of Nicaragua. *Mesoamerican Herpetology* 1(2):186-202.

Tanner, W. W. 1985. Snakes of Western Chihuahua. *Great Basin Naturalist* 45(4):615-676.

Tanner, W. W., Dixon, J. R. and Harris, H. S. 1972. A new subspecies of *Crotalus lepidus* from western Mexico. *Great Basin Naturalist* 32(1):16-24.

Taylor, E. H. 1938. Notes on the herpetological fauna of the Mexican state of Sonora. *Univ. Kansas Sci. Bull.* 24(19):475-503 [1936].

Taylor, E. H. 1944. Two new species of Crotalid snakes from Mexico. *Univ. Kansas Sci. Bull.* 30(4):47-56.

Taylor, E. H. 1949. A preliminary account of the herpetology of the state of San Luis Potosi, Mexico. *Univ. Kansas Sci. Bull.* 33(2):169-215.

Taylor, E. H. 1950. Second contribution to the herpetology of San Luis Potosi. *Univ. Kansas Sci. Bull.* 33(11):441-457.

Tennant, A. 2003. *Snakes of North America* -

Eastern and Central Regions, (Revised edition). Lone Star Books:605 pp.

Tennant, A. and Bartlett, R. D. 2000. *Snakes of North America - Eastern and Central Regions*. Gulf Publishing, Houston, Texas, USA:588 pp.

Terán-Juárez, S. A., García-Padilla, E., Leyto-Delgado, F. E. and García-Morales, L. J. 2015. New records and distributional range extensions for amphibians and reptiles from Tamaulipas, Mexico. *Mesoamerican Herpetology* 2(2):208-214.

Terán-Juárez, S. A., Padilla, E. G., Mata-Silva, V., Johnson, J. D. and Wilson, L. D. 2016. The herpetofauna of Tamaulipas, Mexico: composition, distribution, and conservation status. *Mesoamerican Herpetology* 3(1):43-113.

Teskey, A., Walsh, L., Parker, M. R. and Goode, M. 2015. *Crotalus molossus* (black-tailed rattlesnake) reproduction. *Herpetological Review* 46(1):102.

Thorpe, S. 2013. Post to the Taxacom listserver, 21 May 2014.

Thorpe, S. 2014a. Post on Taxacom forum dated 13 April.

Thorpe, S. 2014b. Email to ICZN. 29 April.

Tipton, B. L. 2005. *Snakes of the Americas: Checklist and Lexicon*. Krieger Publishing Co., Malabar, Florida, USA.

Travaglia Cardoso, S. R. and Parpinelli, A. C. 2006. *Crotalus durissus terrificus*. A case of xanthism. *Herpetological Bulletin* 97:38-39.

Trutnau, L. 2002. Bemerkungen zur Verbreitung, Biologie und Taxonomie der Tropischen Klapperschlange *Crotalus durissus* sowie zur Pflege und Zucht der Unterart *C. d. terrificus*. *Herpetofauna* (Münster) 24(140):13-24.

Valdez-Lares, R., Muñiz-Martínez, R., Gadsden, E., Aguirre-León, G., Castañeda-Gaytán, G. and Gonzalez-Trápaga, R. 2013. Checklist of amphibians and reptiles of the state of Durango, México. *Check List* 9(4):714-724.

Valencia-Hernandez, Aì. A., Goyenechea, I. and Castillo-Ceron, J. M. 2007. Notes on scutellation, length and distribution of rattlesnakes (Serpentes: Viperidae: *Crotalus*) in the State of Hidalgo, Mexico. *Acta Zoològica Mexicana* (n.s.) 23(3):29-33.

Van Denburgh, J. 1895a. A review of the herpetology of Lower California. Part I - Reptiles. *Proceedings of the California Academy of Sciences* (2)5:77-163.

Van Denburgh, J. 1895b. Description of a new rattlesnake (*Crotalus pricei*) from Arizona. *Proceedings of the California Academy of Sciences* (2)5:856-857.

Van Denburgh, J. and Slevin, J. R. 1921. Preliminary diagnoses of more new species of reptiles from islands in the gulf of California, Mexico. *Proc. Cal. Acad. Sci.* (4)11(17):395-398.

Van Devender, T. R. and Lowe, C. H. 1977. Amphibians and reptiles of Yepomera, Chihuahua, Mexico. *Journal of Herpetology* 11(1):41-50.

Vanzolini, P. E. 1947. Notas sobre um derodimo de *Crotalus durissus terrificus* (Laur.) Nota nomenclaural sobre *Leimadophis almada* (Wagler, 1824)(= *Leimadophis almadensis* Auct.). *Papéis Avulsos de Zoologia* (São Paulo) 8(24):273-283.

Vanzolini, P. E. and Calleffo, E. V. 2002. A taxonomic bibliography of the South American snakes of the *Crotalus durissus* complex (Serpentes, Viperidae). *Anais da Academia Brasileira de Ciências* 74(1):37-83.

Vázquez Díaz, J. and Quintero Díaz, G. E. 2005. Anfibios y Reptiles de Aguascalientes (Second edition). Conabio, Ciema:318 pp.

Velde, H. v. d. 1995a. Breeding results: *Crotalus mitchelli mitchelli* - Speckled rattlesnake. *Litteratura Serpentium* 15(3):78-79.

Velde, H. v. d. 1995b. Breeding results: *Crotalus lepidus klauberi*. *Litteratura Serpentium* 15(5):134.

Vences M., Franzen, M., Flaschendräger, A., Schmitt, R. and Regös, J. 1998. Beobachtungen zur Herpetofauna von Nicaragua: kommentierte Artenliste der Reptilien. *Salamandra* 34(1):17-42.

Vite-Silva, V. D., Ramiìrez-Bautista, A. and Hernaìndez-Salinas, U. 2010. Diversidad de anfibios y reptiles de la Reserva de la Biosfera Barranca de Metztitlaìn, Hidalgo, Meìxico Diversity of amphibians and reptiles from the Barranca de Metztitlaìn Biosphera Reserve in Hidalgo, Mexico. *Revista Mexicana de Biodiversidad* 81:473-485.

Vitt, L. J., Caldwell, J. P., Colli, G. R., Garda, A. A., Mesquita, D. O., França, F. G. R. and Balbino, S. F. 2002. *Um guia fotográfico dos répteis e anfíbios da região do Jalapão no Cerrado brasileiro*. Norman, Oklahoma: Special Publications in Herpetology. San Noble Oklahoma Museum of Natural History.

Wagler, J. G. 1830. *Natürliches System der Amphibien, mit vorangehender Classification der Säugetiere und Vögel. Ein Beitrag zur vergleichenden Zoologie*. 1.0. Cotta, München, Stuttgart, and Tübingen:354 pp.

Wallach, V., Williams, K. L. and Boundy, J. 2014. *Snakes of the World: A Catalogue of Living and Extinct Species*. Taylor and Francis, CRC Press, USA:1237 pp.

Wartenberg, L. 2004. Infrarotdetektion bei Schlangen. *Draco* 5(17):68-72.

Watson, J. A., Spencer, C. L., Schield, D. R., Butler, B. O., Smith, L. L., Flores-Villela, O., Campbell, J. A., Mackessy, S. P., Castoe, T. A. and Meik, J. M. 2019. Geographic variation in morphology in the

Mohave Rattlesnake (*Crotalus scutulatus* Kennicott 1861) (Serpentes: Viperidae): implications for species boundaries. *Zootaxa* (PRINO) (online) 4683(1):129-143.

Webb, R. G. 1984. Herpetogeography in the Mazatlán-Durango Region of the Sierra Madre Occidental, Mexico. Vetrebrate Ecology and Systematics pp. 217-241 in *A tribute to Henry S. Fitch*. Museum of Natural History, University of Kansas, Lawrence, Kansas, USA.

Weima, A. 1992. *Crotalus durissus vegrandis* in captivity. *Litteratura Serpentium* 12(5):81-85.

Weima, A. 2013. Giftschlangen verantwortungsvoll pflegen. *Terraria-Elaphe* 2013(6):18-23.

Welch, K. R. G. 1994. *Snakes of the World. A Checklist. I. Venomous snakes*. KCM Books, Somerset, England.

Wellington, C. R. 2013. Post on Facebook 26 December 2013.

Wellington, C. R. 2014a. Post on Facebook wall of Scott Eipper 6 April.

Wellington, C. R. 2014b. Email to ICZN List and others on 9 July 2014.

Wells, R. W. 2013. Post on Facebook dated 18 December.

Wells, R. W. 2014a. Post on Facebook wall of Scott Eipper 6 April.

Wells, R. W. and Wellington, C. R. 1984. A synopsis of the class Reptilia in Australia. *Australian Journal of Herpetology* 1(3-4):73-129.

Wells, R. W. and Wellington, C. R. 1985. A classification of the Amphibia and Reptilia in Australia. *Australian Journal of Herpetology*, (Supplementary Series), 1:1-61.

Werler, J. E. and Dixon, J. R. 2000. *Texas Snakes*. University of Texas Press:544 pages.

Werning, H. 2009. Das Serpentarium des Snakeparadise in Eschlikon in der Schweiz. *Reptilia* (Münster) 14(79):76-82.

Werning, H. 2011. Tage im Frühjahr auf der Suche ach dem Baja-California-Halsbandleguan im Süden Kaliforniens. *Iguana Rundschreiben* 24(1):12-16.

Werning, H. 2012. Die Reptilien und Amphibien des Südwestens. *Draco* 13(50):18-60.

Werning, H. 2017. Der grosse Treck - Teil 5. Don't mess with Texas. *Reptilia* (Münster) 22(128):68-79.

Winchell, S. 2007. Klapperschlangen! Die Gattung *Crotalus*. *Reptilia* (Münster) 12(66):18-25.

Wirth, M. 2011. Lohnende Reiseziele für Amphibien- und Reptilienfreunde in Costa Rica. *Draco* 12(45):22-39.

Woodbury, A. M. and Hardy, R. 1947. The Mohave rattlesnake in Utah. *Copeia* 1947(1):66.

Woolrich-Piña, G. A., Ponce-Campos, P., Loc-Barragán, J., Ramírez-Silva, J. P., Mata-Silva, V., Johnson, J. D., García-Padilla, E. and Wilson, L. D. 2016. The herpetofauna of Nayarit, Mexico: composition, distribution, and conservation status. *Mesoamerican Herpetology* 3(2):376-448.

Woolrich-Piña, G. A., García-Padilla, E., DeSantis, D. L., Johnson, J. D., Mata-Silva, V. and Wilson, L. D. 2017. The herpetofauna of Puebla, Mexico: composition, distribution, and conservation status. *Mesoamerican Herpetology* 4(4):791-884.

Wong, H. 1997. Comments on the snake records of *Chilomeniscus cinctus*, *Crotalus exsul*, and *C. miitchelli* from Islas Magdalena and Santa Margarita, Baja California, México. *Herpetological Review* 28(4):188-189.

Wüster, W. 2020. Post to "Hoserea Facebook Group" (5.6K members as of 18 July 2020), posted 18 July 2020.

Wüster, W. and Bérnils, R. S. 2011. On the generic classification of the rattlesnakes, with special reference to the Neotropical *Crotalus durissus* complex (Squamata: Viperidae). *Zoologia* 28(4):417-419.

Wüster, W., Ferguson, J. E., Quijada-Mascarenas, A., Pook, C. E., Graca Salamao, M. D. and Thorpe, R. S. 2005. Tracing an invasion: landbridges, refugia, and the phylogeography of the Neotropical rattlesnake (Serpentes: Viperidae: *Crotalus durissus*). *Molecular Ecology* 14:1095-1108.

Zaher, H., Murphy, R. W., Arredondo, J. C., Graboski, R., Machado-Filho, P. R., Mahlow, K., Montingelli, G. G., Quadros, A. B., Orlov, N. L., Wilkinson, M., Zhang, Y. and Grazziotin, F. G. 2019. Large-scale molecular phylogeny, morphology, divergence-time estimation, and the fossil record of advanced caenophidian snakes (Squamata: Serpentes). PLoS ONE 14(5): e0216148.

Zweifel, R. G. 1959. Additions to the herpetofauna of Nayarit, Mexico. *American Museum Novitates* (1953):1-13.

CONFLICT OF INTEREST

None.

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