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Miscellanea Herpetologica Gabonica XI

Olivier S. G. Pauwels¹, Jean-Jacques Braun², Andrea Brum³, Piero Carlino⁴, Laurent Chirio⁵, Olivier Glaizot⁶, Danny Meirte⁷, Stephan Morelle⁸ and Léa Royauté⁹

Abstract

We present new Gabonese locality records, ecological and morphological data or unpublished museum material for *Mecistops cataphractus* (Crocodylidae), *Chamaeleo cristatus* and *C. owenii* (Chamaeleonidae), *Hemidactylus fasciatus* and *H. muriceus* (Gekkonidae), *Feylinia currori*, *Trachylepis albilabris* (Scincidae), *Calabaria reinhardtii* (Boidae), *Grayia ornata*, *Hapsidophrys smaragdinus*, *Rhamnophis aethiopissa aethiopissa* (Colubridae), *Lycophidion laterale* (Lamprophiidae), *Hydraethiops melanogaster*, *Natriciteres fuliginoides* (Natricidae), *Bitis gabonica* and *B. nasicornis* (Viperidae). We document a predation case of *Lycophidion laterale* on *Feylinia currori*. Four reptile species are newly recorded from Arboretum Raponda Walker and two snake species are newly listed for Estuaire Province. We refute a recent record of *Natriciteres variegata* (Natricidae) from Gabon.

Keywords

Biodiversity, herpetofauna, Crocodylia, Squamata, conservation, protected areas, Gabon, Democratic Republic of Congo, Equatorial Africa.

Introduction

We pursue our series of miscellaneous contributions to improve the knowledge of the natural history and the geographic distribution of the reptiles of Gabon (see the tenth volume of the *Miscellanea Herpetologica Gabonica* by Pauwels, Albert et al., 2017), progressively completing the herpetological synthesis published by Pauwels and Vande weghe in 2008. The current volume includes new voucher material from the Arboretum Raponda Walker in Estuaire Province and from Ivindo National Park in Ogooué-Ivindo Province gathered by the herpetological team of the Natural History Museum of Salento. It includes also various observations opportunistically made in the course of field studies on soil dynamics in the Ogooué basin by the French *Institut de Recherche pour le Développement* (IRD), and during ecotourist expeditions. We also provide the inventory of a previously unpublished small collection of reptiles sent at the beginning of the 20th century from Gabon to the *Musée cantonal de Zoologie* in Lausanne, Switzerland.

Material and Methods

New photographic and voucher material was identified using the keys and morphological information provided by Pauwels and Vande weghe (2008). Newly collected specimens were injected with 90% ethanol, then preserved in 70% ethanol. Snake ventral scales were counted according to the method of

Dowling (1951). Snake dorsal scale rows were counted at one head length behind head, at midbody (above the ventral corresponding to half of the total number of ventrals), and at one head length before vent; subcaudal counts exclude the terminal pointed scale. Abbreviations: Dept = Department; MSNS = Museo di Storia naturale del Salento, Calimera, Italy; MZL = Museum of Zoology, Lausanne, Switzerland; NP = National Park; Prov. = Province; RBINS = Royal Belgian Institute of Natural Sciences, Brussels, Belgium; RMCA = Royal Museum for Central Africa, Tervuren, Belgium.

Results

Crocodylia
Crocodylidae

Mecistops cataphractus (Cuvier, 1824)

On 16 August 2017 at 12.25 one of us (SM) observed an individual near Akaka (ca. 2°14'0"S, 9°40'0"E) in Loango NP, Ogooué-Maritime Prov. It was basking in a grassy area along the water, then descended into the water when disturbed. It was missing a large part of its snout, including the whole nasal area. The upper jaw was however healed and the crocodile even seemed in good health at the time it was photographed (Figure 1). It measured about 2 m in total length. The local Gabonese guides informed SM that they have seen this crocodile for several years, but they do not know what caused this injury.

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Figure 1. Live *Mecistops cataphractus* photographed in Loango NP, Ogooué-Maritime Prov., southwestern Gabon. Note the large missing part of the snout. Photograph by S. Morelle.

Squamata

Chamaeleonidae

Chamaeleo cristatus Stutchbury, 1837

MZL 1198 (whole stuffed adult specimen): “Gabon, Mission L. Pelot.” See Discussion below and Figure 2.

Chamaeleo owenii Gray, 1831

MZL 1196 (whole stuffed adult male specimen): “Gabon, Mission L. Pelot.” It shows three well-developed horns. See Discussion and Figure 3.

Gekkonidae

Hemidactylus fasciatus Gray, 1831

MSNS 260: Arboretum Raponda Walker (ca. 0°35'41.2"N, 9°20'10.1"E), Komo-Mondah Dept, Estuaire Prov., 17 April 2017. Adult male (Figure 4). Snout–vent length (SVL) 73 mm; tail length 90 mm (tail original). Pupil vertical. Rostral divided from above for two-thirds of its height by a vertical suture; rostral surrounded on each side by 1st supralabial, nostril, the two enlarged internasals and three small scales separating the internasals. Differentiated supralabials 12/11; differentiated supralabials from rostral until mid-orbital position 9/9. Infralabials 11/11. Eighteen tubercle rows on dorsum across mid-body. On each side a row of enlarged femoral scales, in continuity with a patch of enlarged preloacal scales; on the left leg 16 pored, enlarged femoral scales + two poreless, enlarged femoral



Figure 3. Stuffed adult male *Chamaeleo owenii* from Gabon exhibited in the Museum of Zoology in Lausanne, Switzerland. Photograph by M. Krafft.



Figure 2. Stuffed adult *Chamaeleo cristatus* from Gabon exhibited in the Museum of Zoology in Lausanne, Switzerland. Photograph by M. Krafft.

scales + one pored, enlarged femoral scale; on the right a continuous series of 19 pored, enlarged femoral scales; the left and right series of pored, enlarged femoral scales separated by a diastema of five poreless, enlarged preloacal scales. Subcaudals strongly widened. Hands and feet with basal webbing. Found at 20:00 under tree bark on the ground in a forest. New record for the Arboretum (Pauwels, 2016).

Hemidactylus muriceus Peters, 1870

MSNS 262: Arboretum Raponda Walker (ca. 0°35'41.2"N, 9°20'10.1"E), Komo-Mondah Dept, Estuaire Prov., 15 April 2017. Adult male. SVL 52 mm, tail length 45 mm (only first 15 mm original). Pupil vertical. A vertical suture, beginning above, dividing the rostral for two-thirds of its height. Rostral surrounded laterally by 1st supralabial and nasals, and dorsally by two internasals and a scale between the internasals. Differentiated supralabials 11/12; differentiated supralabials from rostral till mid-orbital position 10/10. Infralabials 10/10. Twelve tubercle rows across dorsum between ventrolateral skin folds; the folds poorly marked and showing scattered pointed tubercles. Some pointed scales on the sides of the original part of the tail. Preloacal scales enlarged, including a series of four pored scales on the left side separated by a single poreless scale from a series of four pored scales on the right side; no femoral pores. Scales under original part of tail larger than supracaudals but not



Figure 4. Live adult male *Hemidactylus fasciatus* (MSNS 260) in Arboretum Raponda Walker, Estuaire Prov., northwestern Gabon. Photograph by L. Chirio.



Figure 5. Live adult female *Trachylepis albilabris* (MSNS 261) in Arboretum Raponda Walker, Estuaire Prov., northwestern Gabon. Photograph by P. Carlino.

forming transverse plates. Digits unwebbed. Found active at 21:00 on a leaf 80 cm above the ground in forest. Bit repeatedly when caught. New record for the Arboretum (Pauwels, 2016).

Scincidae

Feylinia currori Gray, 1845

MSNS 259: Ipassa (ca. 0°30'44.14"N, 12°48'12.59"E), Ivindo NP, Ogooué-Ivindo Prov., 20 June 2016. See below under *Lycophidion laterale* and Figure 10.

Trachylepis albilabris (Hallowell, 1857)

MSNS 261: Arboretum Raponda Walker (ca. 0°35'41.2"N, 9°20'10.1"E), Komo-Mondah Dept, Estuaire Prov., 15 April 2017. Adult female (Figure 5). SVL 72 mm, tail length 115 mm (last 100 mm regenerated). Lower eyelid with transparent disk; dorsal scales with 3 keels; 30 scale rows around midbody; supranasals separated; prefrontals in wide contact; a single scale separating posterior supraocular and anterior supratemporal scale. Caught at 22.00 on the ground under wood debris. Dissection revealed two eggs at an early development stage. New record for the Arboretum (Pauwels, 2016).

Boidae

Calabaria reinhardtii (Schlegel, 1851)



Figure 7. Stuffed *Grayia ornata* from Gabon exhibited in the Museum of Zoology in Lausanne, Switzerland. Photograph by M. Krafft.



Figure 6. Posterior body of a live adult *Calabaria reinhardtii* near Ndènguilila, Nyanga Prov. Photograph by A. Brum.

On 11 June 2016 one of us (AB) encountered by day an adult specimen near Ndènguilila (ca. 2°39'20.8"S, 11°10'46.4"E) on the N.6 Road between Tchibanga and Ndendé, Doutsila Dept, Nyanga Prov. (Figure 6). New dept record (Pauwels and Vande weghe, 2008; Pauwels, Carlino et al., 2017; Pauwels, Chirio et al., 2017).

Colubridae

Grayia ornata (Barboza du Bocage, 1866)

MZL 29944 (whole stuffed adult specimen): “Couleuvre de Smyth, *Grayia smythi* [sic, see nomenclatural remark by Pauwels, Lenglet et al., 2000], Gabon, Mission L. Pelot.” Although entered in the MZL collections under *G. smithii*, its brown dorsum with furcated black bars leave no doubt about its identity as *G. ornata*. See Discussion and Figure 7.

Hapsidophrys smaragdinus (Schlegel, 1837)

MZL 28698: “Gabon, Mission L. Pelot.” This stuffed specimen is mounted with another conspecific individual from “Congo” on a branch fixed to a pedestal. Although they come from two distinct countries, the label on the pedestal mentions “Congo” for both specimens. See Discussion and Figure 8.

Rhamnophis aethiopissa aethiopissa Günther, 1862

In September 2017, one of us (JJB) photographed an adult individual crossing a laterite road in secondary forest in Mela (ca. 0°36'48.9"N, 10°15'39.6"E), on the N.5 Road to Medouneu, Noya Dept, Estuaire Prov. (Figure 9). New prov. record (Pauwels and Vande weghe, 2008; Pauwels, Carlino et al., 2016; Pauwels, Le Garff et al., 2016; Pauwels, Chirio et al., 2017). Within the Monts de Cristal, the species had already been recorded further north along the same road, in Nzogbour, Haut-Komo Dept, Woleu-Ntem Prov., by Pauwels et al. (2002).

Lamprophiidae

Lycophidion laterale Hallowell, 1857

The young individual MSNS 258 was caught in Ipassa (ca. 0°30'44.14"N, 12°48'12.59"E), Ivindo NP, Ogooué-Ivindo Prov., on 20 June 2016. It shows a SVL of 165 mm, a tail length of 20 mm; 1/1 loreal, 1/1 preocular, 2/2 postoculars, 1/1 anterior temporal; on each side 8 supralabials whose 4th and 5th contact the orbit, and 8 infralabials whose 5 first contact the anterior sublingual; 17-17-17 smooth dorsal scale rows, each dorsal bearing up to six apical pits; the vertebral row not widened; 2 preventrals + 190 unkeeled ventrals, a single anal, and 34 di-



Figure 8. Stuffed adult *Hapsidophrys smaragdinus* from Gabon (MZL 28698) exhibited in the Museum of Zoology in Lausanne, Switzerland. Photograph by O. Glairot.

vided subcaudals. Dissection of its stomach revealed a small legless skink (MSNS 259; Figure 10). The skink's SVL is difficult to determine, as the body is broken into two parts behind the neck, the sum of both parts being approximately 56 mm (but possibly a small body fraction is missing); its tail length is 17 mm; it has two supranasals and 22 smooth dorsal scale rows around midbody; its ocular scale is in contact with the 3rd supralabial. Both *Lycophidion laterale* and *Feylinia currori* were already recorded from Ipassa (Carlino and Pauwels, 2015), but this skink represents a new prey record for this snake.

At about 9:30 on 23 August 2017, along an abandoned



Figure 10. Preserved young *Lycophidion laterale* (MSNS 258) from northern Ivindo NP, Ogooué-Ivindo Prov., and the juvenile legless skink *Feylinia currori* (MSNS 259) found in its stomach. Photograph by O. S. G. Pauwels.



Figure 9. Live adult *Rhammophis a. aethiopissa* in Crystal Mounts, Estuaire Prov. Photograph by J.-J. Braun.

logging road, one of us (LR) photographed an adult individual between the *Chutes de la Djidji* (Djidji Falls, ca. 0°01'46.4"N, 12°26'40.2"E) and Massouna 2000 (ca. 0°08'45.4"N, 12°31'27.4"E), in the western part of Ivindo NP, in the Lopé Dept of Ogooué-Ivindo Prov. (Figure 11). It was crossing the laterite road in secondary forest. It showed the characteristic stout body with a depressed head and a short tail, light lateral stripes on the head, uniformly brown body (dorsally and ventrally) with paravertebral lines of black dots, 17 smooth dorsal scale rows at midbody, a single anal scale and divided subcaudals. New dept record (Pauwels and Vande weghe, 2008).

Natricidae

Hydraethiops melanogaster Günther, 1872

On 15 November 2012 LC photographed a young individual in Arboretum Raponda Walker (ca. 0°36'49.1"N, 9°19'10.7"E; alt. 15 masl), Komo-Mondah Dept, Estuaire Prov. (Figure 12). New record for the Arboretum and new prov. record (Pauwels and Vande weghe, 2008; Pauwels, 2016).

Natriciteres fuliginoides (Günther, 1858)

Pauwels and Sallé (2009) analyzed the existing records of *Natriciteres variegata* (Peters, 1861) from Gabon. Since no voucher specimens undoubtedly originating from Gabon could be traced, they concluded that there was not enough evidence to include this snake in the country's herpetofaunal list. Hughes



Figure 11. Live adult *Lycophidion laterale* from southern Ivindo NP, Ogooué-Lolo Prov. The snake, found on the ground, was placed on the tree for the photograph. Photograph by L. Royauté.



Figure 12. Live young *Hydraethiops melanogaster* in Arboretum Raponda Walker, Estuaire Prov. Photograph by L. Chirio.

(2017) claimed to have discovered a specimen (RMCA R.28316) in the collections of the Royal Museum for Central Africa, and hence confirmed the presence of this species in the country. The individual was collected in 1966 by J. Collot in “Oyem (01°35'N, 11°33'E, c. 600 m),” thus in Woleu Dept, Woleu-Ntem Prov., and identified by Patrick Derleyn as *N. variegata*. This locality is about 100 km SW of the southernmost locality on the dotted map showing *N. variegata*'s distribution in Cameroon provided by Chirio and LeBreton (2007). Neither morphological data nor a photograph for this Gabonese specimen were provided by Hughes (2017). One of us (DM) re-examined this specimen. This male shows a whitish neck band (Figure 13), partly everted hemipenes, a SVL of 264 mm, a tail length of 99 mm (tail incomplete, healed), a round pupil, 2 internasals, 2 prefrontals, 8/8 supralabials of which the 4th and 5th contact the orbit, 9/9 infralabials, 1/1 loreal, 2/2 preoculars, 3/3 postoculars, 0/0 subocular, 1/1 supraocular, 1+2 / 1+2 temporals, 0 prefrontal + 122 ventrals, a single anal scale, > 51 divided subcaudals, and 17-17-15 smooth dorsal scale rows with a non-enlarged vertebral row. Its single anal scale combined with 17 dorsal scale rows at midbody prevents identifying it as *N. olivacea* or *N. variegata*. All its characters are typical of *N. fuliginoides* to which we hence refer this specimen, and we consequently refute the listing of *N. variegata* from Gabon until evidence is available. *Natriciteres fuliginoides* had already been recorded from Oyem by Knoepffler (1966).

For comparison, OSGP examined another specimen men-



Figure 14. Stuffed adult *Bitis gabonica* (MZL 1340) from Gabon exhibited in the Museum of Zoology in Lausanne, Switzerland. Photograph by M. Krafft.



Figure 13. Preserved adult male *Natriciteres fuliginoides* (RMCA R.28316) from Oyem, Woleu-Ntem Prov., northern Gabon. Photograph by D. Meirte.

tioned by Hughes (2017) and identified by him as a *Natriciteres variegata*: RBINS 3765, from “Ibembo, Uele, Congo Belge [“Belgian Congo,” now Democratic Republic of Congo].” The only morphological characteristics provided by Hughes (2017) for this specimen are: presence of a neck band, incomplete tail, and ‘no more than 15 body scale rows’. It shows a SVL of 243 mm, a tail length > 36 mm (tail incomplete, healed), a round pupil, 2 internasals, 2 prefrontals, 8/8 supralabials of which the 4th and 5th contact the orbit, 9/8 infralabials of which the first four on each side contact the anterior sublinguals, 1/1 loreal, 2/2 preoculars, 3/3 postoculars, 0/0 subocular, 1/1 supraocular, 1+2 / 1+2 temporals, 3 prefrontals + 130 ventrals, a divided anal scale, > 22 divided subcaudals, and 15-15-15 smooth dorsal scale rows with a non-enlarged vertebral row. Contrary to the specimen RMCA R.28316, this individual agrees in all respects with the definition of *N. variegata*.

Viperidae

Bitis gabonica (Duméril, Bibron & Duméril, 1854)

MZL 1340 (whole stuffed specimen): “Gabon.” This individual was given in 1964 to the MZL by the former director of the *Vivarium de Lausanne* (Lausanne Vivarium). Unfortunately no precise locality is available. It was repainted based on its colors in life (Figure 14), and the two black suborbital triangles which allow to easily distinguish *B. gabonica* from the West African *Bitis rhinoceros* (Schlegel, 1855). are well visible.



Figure 15. Stuffed adult *Bitis nasicornis* (MZL 1342) from Gabon exhibited in the Museum of Zoology in Lausanne, Switzerland. Photograph by M. Krafft.

Bitis nasicornis (Shaw, 1802)

MZL 1342 (whole stuffed specimen): “Gabon, Mission L. Pelot.” See Figure 15 and Discussion.

Discussion

Louis Pelot (1868-1939) was an artisan assisting the protestant missionary Ernest Haug (1871–1915) at the *Scierie de N’Gómo* (Ngomo sawmill) that Haug, based in Gabon since 1895, created in 1912 (Zorn, 2005: 423). Pelot sent an important ichthyological material to the Museum of Zoology in Lausanne, that he collected between 1909 to 1914 during his stay at Ngomo (Blanc, 1915), where he lived from 1900 to 1926. Haug himself collected much herpetological material at this locality and its surroundings in Moyen-Ogooué Prov. and sent it to the Paris Museum of Natural History (Mocquard, 1897a-b; Pauwels, 2017). Although no mention is made by Blanc (1915) of a herpetological collection, Pelot’s reptile specimens were sent to the MZL in 1914, probably along his ichthyological material, and most probably collected in the same area, i.e., in Ngomo (Ogooué & Lacs Dept, Moyen-Ogooué Prov.) and possibly other nearby localities along the lower Ogooué River. As an interesting anecdote, Albert Schweitzer, then based in Lambaréné, mentioned that he paid a visit in Ngomo to Pelot’s ailing wife in September 1915 (Schweitzer, 2005:115). Schweitzer himself constituted a modest collection of local snakes, housed at the nearby

Lambaréné Hospital Museum (Pauwels, Albert et al., 2017).

Although all species included in the present small collection sent by Pelot to the MZL were already mentioned from the same area by Mocquard (1897b), it presents a historical interest, being one of the earliest preserved reptile collections made in Gabon.

Including our new present records, the Arboretum Raponda Walker and its buffer zone are currently known to house 18 reptile species. No systematic herpetological inventory of this site has been undertaken so far, but it is expected that it includes a much higher herpetodiversity. For instance, Mondah forest is the only site in Gabon where *Lygodactylus conraui* was recorded (Pauwels, Carlino et al., 2016).

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Identification Keys for the Eggs of South Dakota Amphibians

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Abstract

Fifteen species of amphibians (two salamanders and 13 frogs) have been recorded in South Dakota. The physical characteristics of their eggs/egg masses, mating phenology, geographic distribution of the species, and habitats occupied facilitate the identification of the eggs of these species. Dichotomous and tabular keys using combinations of these traits are presented as an aid to field identification. Since the species assemblage largely overlaps that of species occurring in neighboring North Dakota, the keys may be of use in that state as well.

Introduction

Due to its geographic location and predominate climate/weather patterns, South Dakota has a relatively low herpetofauna diversity with only 15 species of amphibians occurring in the state (Table 1) (Over, 1923; Fishbeck and Underhill, 1959; Del Fosse, 1973; Ballinger et al., 2000, Naugle et al., 2005). Recent field guides (Fischer et al., 1999; Kiesow, 2006) facilitate identification of the adult life stages of these species through the inclusion of descriptions, keys and photographs, but biologists have yet to produce state-specific resources for other amphibian life stages. To help remedy this situation, I developed dichotomous and tabular keys to enable field identification of the eggs of species occurring in South Dakota. Since the species assemblage in this state largely overlaps that of species occurring in neighboring North Dakota (Wheeler and Wheeler, 1966; Hoberg and Gause, 1992; Johnson and Batie, 2001; Johnson, 2015), the keys may facilitate identification of egg masses encountered in that state as well.

Characteristics of Amphibian Eggs and Egg Masses

Amphibian eggs have a moderate sized yolk ('mesolecithal': Goin and Goin, 1971) with the ovum enclosed in a thin, tough, semipermeable vitelline membrane, which is produced by the ovary (Townes, 1953). Glands in the walls of the oviduct secrete a gelatinous substance around the eggs as they pass down to the cloaca, forming a series of concentric capsules (Lofts, 1974). The sizes of the ova and the surrounding gelatinous capsules are highly variable. The number of capsules varies interspecifically, ranging from one to eight (Salthe, 1963; Duellman and Trueb, 1986). The eggs of South Dakota amphibians, however, have no more than three capsules. Upon deposition the capsules swell, the outermost forming the protective jelly characteristic of amphibian eggs.

The manner of egg deposition varies among species. Many eggs are enclosed in a single jelly mass, which represents the entire ovarian complement in some species (e.g., *Rana pipiens*). In other species, the eggs are deposited singly (e.g., *Acris crepitans*) or in several smaller packets representing only portions of the ovarian complement (e.g., *Hyla versicolor*). Egg masses are commonly attached to submerged sticks or vegetation, thus maintaining their position in the water column (Porter, 1972; Duellman and Trueb, 1986). A few species attach their eggs to the undersurface of rocks or logs (e.g., *Necturus maculosus*). Egg masses in the form of a film at the surface of the water are characteristic of frogs that deposit them in still, shallow water (e.g., *R. catesbeiana*) and are adaptive with respect to meeting the oxygen needs of the developing embryos (Moore, 1940; Porter, 1972). In *Anaxyrus*, the jelly is in the shape of paired, long strings.

The number of eggs laid also varies interspecifically. In general, larger species have more eggs than smaller ones, and salamanders lay fewer eggs than anurans do (Goin and Goin, 1971; Duellman and Trueb, 1986). For example, the relatively small *Hyla versicolor* generally produce < 40 eggs, while large *R. catesbeiana* can produce as many as 20000.

Identification Keys

The following key presents paired choices that direct the user to the proper identification, which is facilitated by the physical characteristics of the eggs/egg masses, mating phenology, geo-

Table 1. Amphibians reported from South Dakota.

Mudpuppies (Proteidae) Mudpuppy (<i>Necturus maculosus</i>)
Mole Salamanders (Ambystomatidae) Tiger Salamander (<i>Ambystoma tigrinum</i>)
True Toads (Bufonidae) Great Plains toad (<i>Anaxyrus cognatus</i>) American toad (<i>Anaxyrus americanus</i>) Canadian toad (<i>Anaxyrus hemiophrys</i>) Woodhouse's toad (<i>Anaxyrus woodhousii</i>)
Treefrogs (Hylidae) Eastern gray treefrog (<i>Hyla versicolor</i>) Cope's gray treefrog (<i>Hyla chrysoscelis</i>) Chorus frog (<i>Pseudacris maculata</i>) Cricket frog (<i>Acris crepitans</i>)
Spadefoots (Scaphiopodidae) Plains spadefoot (<i>Spea bombifrons</i>)
True Frogs (Ranidae) Northern leopard frog (<i>Rana pipiens</i>) Wood frog (<i>Rana sylvatica</i>) Bullfrog (<i>Rana catesbeiana</i>) Plains leopard frog (<i>Rana blairi</i>)

graphic distribution of the species, and habitats typically occupied. Tabular keys (Tables 2–5) present similar choices graphically to further facilitate identification. Features of the eggs of *Spea bombifrons* are included in the key, but are omitted from the tables. The eggs of this species develop quickly, hatching in less than 1 or 2 days, and the larvae reach metamorphosis in as little as 2–3 weeks (King, 1960; Justus et al., 1977; Kiesow, 2006).

1a. Eggs suspended under a cover object, generally a large, flat stone; laid separately, but in small clusters of individual eggs; restricted to permanent lakes and streams in northeastern South Dakota-----*Necturus maculosus*¹

1b. Eggs not under a cover object; laid individually, in long strings, or in globular masses------(2)

2a. Eggs laid in long, paired strings; frequently entangled around submerged vegetation-----Bufonidae (3)
See also Table 3

2b. Eggs laid individually or in a floating surface film or submerged clustered masses------(6)

3a. Eggs with a single gelatinous envelope; eggs with no partitions between vitelli------(4)

3b. Eggs with two gelatinous envelopes; eggs with partitions between vitelli------(5)

4a. Vitelli in a single row; often along margins of larger permanent water bodies; restricted to eastern South Dakota-----
-----*Anaxyrus hemiophrys*

4b. Vitelli in one or two rows; occurring in a variety of wetland habitats; found statewide-----*Anaxyrus woodhousii*

5a. Envelope straight along sides; eggs laid in mid-May to mid-June; occupying a variety of habitats, including small, temporary water bodies, ditches, etc.; restricted to eastern South Dakota-----*Anaxyrus americanus*

5b. Envelope scalloped along sides; generally occurring in seasonally flooded wetlands with minimal vegetation; found statewide-----*Anaxyrus cognatus*

6a. Eggs laid individually or in small globular masses < 5 cm in diameter-----Hylidae (7)
See also Table 4

6b. Eggs laid in floating sheets or globular masses > 5 cm in diameter-----Ambystomatidae, Ranidae and Scaphiopodidae (9)
See also Table 5

7a. Eggs laid individually, occasionally in small, loose clusters, but not in a cohesive mass; vitelli brown and buff; eggs laid in late May to mid-July; restricted to extreme southeastern South Dakota-----*Acris crepitans*²

7b. Eggs laid in small, loose masses, usually with < 35–40 eggs------(8)

8a. Two gelatinous envelopes surrounding vitelli; eggs laid in late May through June; restricted to northeastern and southeastern counties, in suitable habitats; a small remnant population of *H. chrysozelis* occurs below the Oahe Dam in the central part of the state (Kiesow, 2006)----*Hyla versicolor* / *H. chrysozelis*³

8b. One gelatinous envelope surrounding vitelli; eggs laid in mid-April to late May; occurs statewide----*Pseudacris maculata*

9a. Eggs in floating sheets with a single gelatinous envelope; masses can be > 1 m in diameter, with as many as 20000 eggs; eggs laid from mid-June to mid-July; found in permanent waters; restricted to southern South Dakota, primarily along the Missouri River-----*Rana catesbeiana*

9b. Eggs in globular masses with two or three gelatinous envelopes; usually attached to submerged vegetation------(10)

10a. Three gelatinous envelopes surrounding vitelli; vitelli large (2–3 mm); masses firm, usually with about 50 eggs, but as many as 100+ have been reported; occurs statewide-----
-----*Ambystoma tigrinum*

10b. Eggs with two gelatinous envelopes------(11)

11a. Egg masses linear/cylindrically shaped, with 10–250 eggs; eggs hatch in < 1–2 days; found in small ponds in areas with sandy or loose soils after heavy rains; most often attached to vegetation; eggs laid in mid-June; restricted to western and southeastern South Dakota---(Scaphiopodidae) *Spea bombifrons*

11b. Egg masses globular, often with > 500 eggs------(12)

12a. Egg masses cohesive, with as many as 1000 eggs; laid communally, in bottom of temporary ponds; eggs laid in April; in semi-permanently flooded woodlands or wetlands; restricted to coulees in Roberts County in extreme northeastern South Dakota-----*Rana sylvatica*

12.b Egg masses not cohesive, tending to separate when removed from water, with as many as 6000 eggs; eggs laid in mid-April to early June; in permanent water bodies, often attached to vegetation-----*Rana pipiens* (statewide) / *R. blairi* (restricted to the extreme southeast)⁴

1. Although there are historic records of mudpuppies in northeastern counties (e.g., Over, 1923; O’Roke, 1924), little information is available on the current distribution and status of this species in South Dakota (Nixon, 2014).

2. Historical records of cricket frogs from four counties in south-central and southeastern South Dakota exist (Over, 1923; Fishbeck and Underhill, 1959, 1960; Dunlap, 1967; Ballinger et al., 2000; McCallum and Trauth, 2004). More recent survey efforts, however, have either failed to find evidence of breeding populations and turned up only a small number of isolated individuals (Naugle et al., 2005) or found this species to be only seasonally common and occupying only portions of its former range (Burdick and Swanson, 2010).

3. It is not possible to distinguish between the eggs of these two treefrogs without genetic information. Both species are relatively rare in South Dakota.

4. The eggs of these two leopard frogs are difficult to distinguish. There are historical records of plains leopard frogs from southeastern South Dakota, but recent survey efforts (e.g., Naugle et al., 2005) have failed to find any evidence of significant breeding populations of this species.

Table 2. Tabular key for identifying the eggs of South Dakota amphibian families.

Eggs suspended under a cover object	Eggs not suspended under a cover object		
In permanent lakes and streams in northeastern counties (Proteidae) – <i>Necturus maculosus</i>	Eggs laid in long, paired strings (Bufonidae) – See Table 3	Eggs laid individually or in loose masses < 5 cm in diameter (Hylidae) – See Table 4	Eggs laid in globular masses or floating sheets > 5 cm in diameter (Ambystomatidae and Ranidae) – See Table 5

Table 3. Tabular key for identifying the eggs of South Dakota true toads (Bufonidae).

Eggs laid in long strings			
Eggs enclosed in a single gelatinous envelope, with no partitions between vitelli		Eggs enclosed in two gelatinous envelopes, with partitions between vitelli	
Vitelli in a single row; restricted to eastern South Dakota – <i>Anaxyrus hemiophrys</i>	Vitelli sometimes in 1 but generally in 2 rows – <i>Anaxyrus woodhousii</i>	Envelope with relatively straight sides – <i>Anaxyrus americanus</i>	Envelope with scalloped sides – <i>Anaxyrus cognatus</i>

Table 4. Tabular key for identifying the eggs of South Dakota treefrogs (Hylidae).

Eggs laid individually or in loose masses < 5 cm in diameter		
Eggs laid individually, or occasionally in loose clusters	Eggs laid in loose masses < 5 cm in diameter, usually < 35–40 eggs	
Vitelli brown and buff – <i>Acris crepitans</i>	Eggs surrounded by one gelatinous envelope – <i>Pseudacris maculata</i>	Eggs surrounded by two gelatinous envelopes; restricted to northeastern and southeastern counties – <i>Hyla</i> spp.

Table 5. Tabular key for identifying the eggs of South Dakota true frogs (Ranidae) and tiger salamanders (Ambystomatidae).

Eggs laid in globular masses or floating sheets > 5 cm in diameter			
Eggs laid in a floating sheet; a single gelatinous envelope	Submerged, globular masses of 1,000 or more eggs; two gelatinous envelopes		Submerged, globular masses of ~50 eggs
Restricted to southern South Dakota – <i>Rana catesbeiana</i>	Eggs laid communally, in temporary ponds; restricted to Roberts County – <i>Rana sylvatica</i>	Not laid communally, usually in permanent water bodies – <i>Rana pipiens</i> / <i>Rana blairi</i>	Eggs with three gelatinous envelopes – <i>Ambystoma tigrinum</i>

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Flipping Pages: Appreciations of Herpetological Literature *The Frog Book* (1906) by Mary C. Dickerson

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My childhood interest in amphibians and reptiles was nurtured largely by books. Dime store turtles and an occasional Green Anole pretty much were the only herps I had direct contact with—my mother probably said “You’re not bringing that in here!” and “You can’t have a snake!” dozens of times over the course of any summer. However, she approved of literacy, so I would walk two miles to the nearest pet store that stocked TFH pamphlets and read about snakes and iguanas and turtles (I still remember the phrase “maggots of the bot fly” from the turtle book), or I would scrape together fifty cents, which was round-trip bus fare (plus a hot dog) downtown to the Minneapolis library to read every herp-themed book on its shelves. To this day I believe my perfect score on the vocabulary portion of the SAT was due more to my exposure to “big words” in the scientific literature I read than to my English classes (spoiler alert: I am now a professor of English).

One of the books that held my interest was *The Frog Book* by Mary C. Dickerson. The library would have had a copy of the original 1906 edition; it wasn’t until the early 1980s that I found and purchased the 1969 reprint that I still own. Although the book’s intended audience was not “professional” scientists (a lot of early criticism faulted its lack of treatment of several arcane topics), it did attempt to discuss what was known about every species of frog and toad in North America, including *Ascaphus truei*, of which there was a single specimen known at the time.

Dickerson’s organization of material was pretty straightforward. The “Introduction” covered topics such as development and metamorphosis, voice, behavior, and distribution. The book was illustrated with many photographs that Dickerson took herself, and there were 16 color plates, which were based on photographs that were then hand colored for the printer. There was a key to the adults. The rest of the book included accounts of the various species, presented in taxonomic order.

None of this serves to distinguish *The Frog Book* from many other books, before or since. Even the individual species accounts cover familiar topics: color, measurements, and range. It is when Dickerson discusses the life histories of individual species (we might call it the ecology today), that the exceptional quality of this book is evident. Here is the opening paragraph of her account of *Anaxyrus* (as *Bufo*) *americanus*:

It is the first of May, late in the afternoon. We stand at the edge of a pond, under a maple brilliant with its fringes of red keys. A marshy place at our left is yellow with “cowslips.” Farther back from the water are the broad spreading leaves of the skunk cabbage and the unrolling fronds of the cinnamon fern. Everywhere about the margin of the pond . . .

Dickerson goes on to describe the sounds, eventually focusing on the toads. In fact, she devotes 39 pages to this one species, including 34 illustrations. This is no mere data-driven account of the species: it is a lyrical celebration of an animal that, when

not being ignored, would be loathed (“Handling a toad gives you warts”—Mother Cebula, circa 1961). Each species account is a fine example of an essay.

Other species are given similar treatment. In her account of *Pseudacris crucifer* (as *Hyla pickeringii*), Dickerson writes:

After we have heard the chorus every spring for years, the Peeper is still merely a voice to us. Let us solve the mystery . . . We search among the leaves and moss. No amount of looking reveals the shelter of this atom of a frog so eager for spring. The Peeper is still but a voice.

As she does throughout the book, Dickerson presents the animals based on her own direct experience.

Another feature of Dickerson’s accounts that I appreciate more with each rereading is her placement of the toad or frog in its environment with other animals and plants. For example, in her account of *Hyla versicolor* she includes a photograph (Plate XLV) with the caption “The COMMON TREE FROG (*Hyla versicolor*) makes his home in the trees along forest paths as well as in those about the house and in the orchard.” She gives a month-by-month dissertation, starting with “Some June morning when we are admiring the blue flowers of the clematis that climbs the porch, we see what looks like a yellowish white oval of putty plastered against the white pillar . . . It is our Common Tree Frog . . . sound asleep.” Later, “In September, when we climb the apple tree to get more perfect apples than those which have fallen to the ground, we put our hand on a lichen-covered branch only to find it soft and alive under our touch.” It is this attention to the humblest detail that enlivens Dickerson’s writing and gives her book its charm.

All of this inspired at least one neophyte herper. Dickerson’s accounts—always in the reader-friendly first person rather than the skeptical, objective, and neutral scientific third person—made the exotic familiar. I would read more technical and learned accounts of essentially the same material in other books (Dickerson protégée G. K. Noble’s *The Biology of the Amphibia*, for instance), but none of them were more factual and more accessible than hers. When I finally located breeding toads and collected some eggs and raised some tadpoles (I think Mother was dimly aware that I had something other than goldfish in my aquarium), Dickerson’s account served as my template.

Mary C. Dickerson deserves more credit and appreciation than she receives. Among other things, she described more than 20 new species of reptiles. The preface to the 1969 edition by James D. Anderson presents a biographical sketch: born in 1866, she struggled to acquire a formal education which most women born in her circumstances at the time could not obtain. By 1891, she was teaching high school biology in Illinois and Michigan, and taking classes at the University of Michigan and the University of Chicago. In 1911 she became a curator at the American Museum of Natural History, becoming the museum’s

first Curator of Herpetology when that department was created in 1920, and was the editor of the magazine that would become *Natural History*. She worked with such notables as G. K. Noble and Karl P. Schmidt (who would later come to Chicago's Field Museum).

Anderson concludes his brief biography noting that Dickerson "died in 1923, two years after sustained illness forced her to leave the museum." The complete story, though, reveals more about this remarkable woman and her drive. As early as 1919, her friends and associates began noticing her behavior was becoming erratic, and she showed signs of experiencing hallucinations. Her dual roles as editor and curator probably were creating stress. Charles W. Myers, in *A History of Herpetology at the American Museum of Natural History*, writes "Dickerson had been losing a perilous grip on her sanity and, on Christmas

Eve of that year, was committed to an asylum, where she died three years later at age 57."

Finding a copy of Dickerson's book may be something of a challenge. My local library and the libraries it works with do not have a copy (also, the books about frogs all seem to be in the children's section, which merits comment from which I will refrain). However, several college libraries in Illinois have copies, although apparently in storage and not on the shelves. [Editor's note: CHS members can check out a copy from our library at the monthly meetings.] Checking on Amazon, I was surprised to see that copies of *The Frog Book* are still available! A new one will set you back about \$50 (I paid five for mine, back in the day), but there are used ones for as little as eight. The book is worth looking for, though, and reading it is an inspiring way to prepare for fieldwork in the spring.

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Whitewater Herping

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Those familiar with these columns might remember several mentions of a place called "The 'Winder Spot." The area is a magnificent stretch of flat Sonoran Desert uplands roughly 30 miles north of Tucson. The saguaros grow to massive heights here, as do the chain-fruited cholla. The sandy washes that crisscross the landscape have berms that are lined with some of the most massive ironwood trees in the world. The area is also home to the easternmost population of Sidewinders (*Crotalus cerastes*) at that latitude. There are basically two ways to get there. One can approach from a paved road to the north, hook south, drive half a mile and park. Or one can follow a network of dirt roads—the roads less traveled—and slug one's way northward in a more leisurely fashion. This southern route has always been a favored way to go for this author. There is less traffic, which in turn allows time to stop and photograph or admire a find with less chance of becoming a DOR human. For the most part, the southern route is smooth sailing, and can be done in any type of vehicle. But there is a two-mile stretch of road that after any substantial rainstorm morphs into a deep, sandy wash. This two-mile stretch of road follows a double-barreled swath of towering power lines. As it is an unnamed road, my notes call it simply "Powline Rd." Until the evening about to be described, this author never witnessed Powline Rd. during a powerful rain event. But this author *did* observe the aftermath of such storms several times. We go directly to my field journals for a few foreshadowing notes on Powline Rd:

"Must have rained ~3 inches minimally on 8/27, Powline Rd was deep sand—hairly."

"Nearly got stuck three times in deep sand on Powline Rd."

"To Suizos via Estancia to Powline, road impassable . . ."

On September 5 of 2007, your author reacted to cloudy skies, the threat of heavy rains, and cooling temperatures. For eons, such weather patterns have inspired the primeval urge to go

herping in at least a dozen people. The unfortunate aspect of these perfect conditions on September 5 was that this day was in the middle of what is commonly known as "the work week." This is the wont of perfect weather conditions. With a heavy heart, your author glanced skyward to note the presence of Hurricane Henriette blocking all vestiges of blue. Knowledge of Wednesdays, the importance of paychecks, and a busy work schedule began to cloud the thinking patterns of this herper.

Moments later, your author got his priorities right, and his mighty Tot Coma (this was after the 'Winder Spot cattle had devoured some of the letters off the tailgate of his Toyota Tacoma pickup—see the September 2017 issue of the *Bulletin*) was whistling northward to a destination best described as "home." Upon arrival there, the cooler was packed with ingredients conducive to surviving the rigors of a four-beer transect, and he jetted northward in hopes of taking four bottles of beer on a hike. A driving rainstorm began just as he swung north off the Powline Rd., and began to ease up just as he arrived at this usual parking place. Air temp was 22°C (71.5°F), a light rain was falling, and the murky skies were ablaze with a sizzling, crackling display of high voltages. The ground was quaking non-stop from the repercussions of millions of volts of Simon-pure electricity smiting it relentlessly. The crispy smell of burnt ozone was too heavy for the howling winds to carry off. Maybe it would have been better to stay at work?

Your author huddled fearfully in his vehicle for the first 15 minutes after arriving. Heavy mewling sounds began to emanate from the orifice under his nose. Sage thoughts of getting out of Dodge began to enter the primitive thinking processes. But once again, he got his priorities right. Rain gear was donned, and a terror-stricken herper blundered about the soggy countryside. The one herp highlight occurred one half-hour into the hike. A large (~1.1 meter snout-vent) Coachwhip, bedecked in light tan and pink rain colors, was viewed wiggling its way through the

muck, puddles, and vegetation. In all, it was a 10-second spectacle that ended with the wary snake evaporating into the thorny confines of a packrat midden.

The light-to-moderate rain did not let up during the entire 1.5-hour hike. The massive storm had remained stationary during this time period. The clouds to the south revealed that the torrential downpour experienced en route had not abated. Upon arrival back at the truck, it was ascertained that 22°C and 50 mph winds were not going to bring on the perfect herp conditions expected previously. And darkness had already descended on the landscape. Hence, it was time to leave. There were two routes out. One would lead to safe, paved roads to the north. The other route—the stupid route—led southward, into the teeth of the storm. Without hesitation, the stupid route was chosen, with the intent of turning around if things got too dangerous.

The first indication of trouble became apparent at the south end of a road known to a few of us as “Old Faithful.” About a half-mile from the south end of Old Faithful, the road morphed to gummy mud, and the waterline was consistently at the center of the wheel axles. At this point there was no turning around. One tap on the brakes, and this author would have sunk out of sight. Throughout the tears and mewling sounds that followed, the driver maintained high hopes for the passability of the road that Old Faithful tees upon—which was good old Powline Rd. Once there, he would hook a right turn, and have a mere 2 miles to drive until safe ground was reached.

At 30 miles per hour, the right turn onto Powline Rd. transpired. It was at this point the driver realized that the road was in actuality no longer the Powline Rd. It was now the Powline River! The mighty Tot Coma was immediately immersed in raging flash flood waters. Up to the top of its tires went the frothing water. The one saving grace was that the torrent was flowing downstream at maybe 10 knots. However the hell fast the water was raging allowed for some extra push to assist the little fuel-injected four-banger in its efforts to keep moving. Chance glances to the right and left revealed rooster tails of water curling six feet above the churning surface of the waters to either side. At thirty miles per hour, (which was read off the speedometer, which in turn does *not* measure knots), pedal-to-the-metal in second gear, the brave little Japanese wonder car did not waver.

The driver, on other hand, was wavering plenty. Perhaps quivering would be a better way to phrase it.

“Two miles of *this*? I’m **SCREWED**,” shouted the driver to nobody in particular.

The situation was bad to start with. But with each hundred feet the vehicle progressed, there were more side washes to either side of Powline River gaily gushing water into the torrent with the force of enormous fire hoses. The raging, turbulent waters were soon beyond the quarter-panels of the truck in depth. But still undaunted, the spunky little warrior of a truck maintained speed. One mile into the ride, halfway to safety, the driver grew haughty.

“**HA!** Is this the best you can do, you little *pissant* storm? C’mon, you little *pussy!* I want *more!* **BRING IT ON!**”

For the next half-mile, the driver merrily alternated between lustily defying the storm, shouting accolades at his own “fearless” driving techniques, and heaping loving praise on the mighty little warrior that he was piloting. Such revelry continued **UNTIL . . .**

Two sets of taillights appeared ahead. They were two vehicles that were obviously stuck, and the first distant view indicated that they were blocking the channel. That ought to about do it! What followed next can best be elucidated by good news/bad news scenarios.

Good news: As the driver got closer, it was noted that the stuck vehicles were staggered, leaving a slight gap between them.

Bad news: Said gap was only wide enough to allow one inch clearance total for the mighty Tot Coma to get through.

Good news: One inch clearance at thirty miles per hour during this white-knuckle whitewater herp cruise from hell wasn’t about to stop this driver.

Really bad news: One of the occupants of the vehicle to the left was taking it upon himself to wade crotch-deep into the gap, while thrusting his right arm out, hand splayed upward, in the universal “Stop in the name of the law” gesture.

This really bad news was ensuing as the driver was about 50 meters away, bearing toward that gap in a most purposeful manner. It was determined that perhaps a problem-solving voice of reason needed to be added to this equation:

“GET OUT OF THE WAY YOU EFFING IDIOT, OR I WILL SURELY MOW YOU DOWN!”

It is said these words were heard as far south as Nogales, and as far north as Flagstaff. Your author cares nothing about that, as they were not communicated to anybody in those locales. What *is* more important is that the abrupt diplomacy had the desired effect with the idiot who was trying to stop him. He backpedaled out of the way, flailing backwards in front of his van. The speed-bump dude struggled to stay on his feet, while the Tot Coma hit that gap like a PT boat at full throttle. As the driver blew safely through, a glance to the left revealed the left side Tsunami-like tidal wave rooster tail completely engulfing the hapless, wannabe speed-bump. He was washed about ten feet upslope, over the top of the embankment, and was last viewed floundering about in the muck, creating a mud angel in the process.

A hearty belly laugh began to ensue, but was suddenly cut short. “Har-DE-har-----**OH NO!**”

The “OH NO!” part of the discussion was uttered when a very wide open set of eyes observed whitecaps coming off the tops of massive, frothy waves before him. The poor speed-bump dude had been trying to warn the driver that the worst was ahead. (Nice guys *always* finish last). Two major gullies converged from both the north and south side of the road here, each making their own major contribution to the raging fray.

Less than a split-second after “OH NO!,” the driver was at eye-level with a flash flood. The waters were boiling over the

windshield! The headlights sputtered off, and the truck was now afloat. The next thing to happen to the gritty little truck was that it bobbed upward, and became a water-borne vessel. HMS Tot Coma performed admirably as a PT boat in the king's navy. It navigated the 100 meters or so of whitewater much better than any canoe the driver has ever managed. Turning the steering wheel to the right caused the vehicle to adjust left, and turning it to the left allowed correction to the right. The headlights came back to life just as the HMS Tot Coma's tires connected with ground again. But momentum had been lost during the floating phase. The driver had not downshifted during the maiden voyage of his craft, hence the river bottom was contacted at ten miles per hour in second gear. Just as the vehicle began to slowly bog down, it passed a group of four mighty 4WD trucks parked on either side of the road embankments. These people were no doubt out for the sport of it all, perhaps even ready to be good citizens by offering riverside assistance if needed. At this point in the cruise, the driver was approaching civilization, and these people were basically parked at the end of their drive-ways.

As the Tot Coma continued to bog down, the driver floored the pedal. Nothing but a series of groans from the engine, followed by continued boggage. A lusty series of jeers and cajoling began to emanate from the jowls of the spectators to either side. Just as it seemed the end was near, the driver found first gear. The near-dead Tot Coma suddenly reared back and roared to life, surging powerfully forward like a thoroughbred racehorse urged on by a whipping crop. The jeers morphed to cheers, and the Tot Coma fed off the accolades of the peanut gallery like a frenzied shark at feeding time. In no time flat, mighty rooster tails flanked the brave little warrior again, and the driver beheld the safety of a paved road approaching.

As the left turn was negotiated onto pavement, the ecstatic and very jacked-up driver went wild. **“Yeah baby yeah baby yeah baby yeah! A-L-L R-R-I-I-G-G-H-H-T!”** And then . . . **” OHHHHHHHHHHHHHHHHH NOOOOOOOOOOOOOOOO!”**

He went from the frying pan—and into the fire. The pavement lasted all of fifty feet, and then plunged into a major dip in the road. The flow was now surging powerfully across the port side of the vehicle. And many stuck vehicles set up an obstacle course to navigate. The Tot Coma felt powerful forces trying to push it starboard. To make matters worse, off in the distance, the



Figure 1. Powline Rd. after a flash flood. All images by the author.

whirling red lights of at least ten cop cars could be observed. Thoughts of dealing with cops shortly after a beer transect entered the brain of the driver just as, once again, he was viewing a flash flood at eye level. The lights flickered off again, and even first gear was only producing hints of “I-think-I-Can” from the water-logged engine.

And then, it was over. The truck surged out of the abyss of the cross flowing wash, and found a patch of pavement on high ground. As the ignition switch was turned counter-clockwise, geysers of steam hissed skyward off the overworked engine. The driver kissed his steering wheel fondly, lightly patted the dashboard affectionately, and stepped out to give his brave little steed a rest.

You made it, Tot Coma. Good show!

I am glad that the event described above happened to me. That being said, I would not have deliberately put myself into that situation in a million years. It just happened so fast that I was in trouble before I knew I was in trouble, and there was no recourse but to keep going. Even though I now drive a much more powerful Toyota Tacoma, with four-wheel drive, I will never again put myself anywhere near Powline Rd. in any kind of rain event. Hence, I will never be able to photograph what it was like. What I *can* do is show you what the road looks like just after a flooding event (see Figure 1). The image in Figure 2 shows something similar to what the mighty Tot Coma navigated during the evening under discussion. Figure 3 depicts the track that a smallish snake left in the muck of the road we call “Old Faithful” during a different rain event. The deep muck at the south end of this road made flipping a U-turn impossible.

This author has just burned over two hours seeking more information on when his Tot Coma was purchased. I wanted to pass that information on, in the event that any readers of these columns might want to purchase a gritty and dependable little used pickup truck. Were the Tot Coma a tortoise, Gila Monster, or rattlesnake, we would know the exact date that it came into my life—most likely down to the minute. I could have sworn that I recently saw the date I bought it written down on top of a



Figure 2. Your older and wiser author will never go anywhere near Powline Rd. under rainy circumstances again. But this image captures something similar to what was seen through the windshield of the Tot Coma during the evening under discussion.



Figure 3. The last chance at turning around before hitting the Powline River was at the south end of Old Faithful. This image shows what happens to that road when it gets wet. This is most likely the track of a Variable Sandsnake (*Chilomeniscus stramineus*). Note that the viscosity of the mud is such that even a tiny snake that weighs less than an ounce was sinking as it crawled!

page, but alas, I can't waste another second looking for it. Poof—it's gone! My best recollection is that it was purchased brand new in November of 2000. I did buy off-road tires for it, which were an inch larger in diameter than what it came with. But other than that, it was a stock two-wheel drive little pickup with a five-speed stick shift on the floor. *All* who got to know this truck were amazed by its ability to go virtually anywhere. But until this night, I was unaware that she floated!

When I first got out of the situation described above, I didn't actually park until just before the next dip/stream crossing. This left about 50 meters of safe ground between my truck and two

raging streams, with a road leading to that safe patch of ground from out of the west. Eventually, six more vehicles came down that road and pulled in behind me. These vehicles were mostly big, badass four-wheel drive machines, but the woman who parked directly behind me was driving a Subaru all-wheel drive station wagon. About the time I parked here a fire truck came at the progress-blocking torrent from the other direction. A fireman roped himself to his truck, and started wading across the stream in my direction. I did not rope myself off, but also started to cross, and was immediately shouted back by the fireman wading across. He got about halfway across, and the water was about belly-button high when he retreated. With an abrupt warning to me to not attempt to cross until he came back to announce an all clear, they turned around and headed the other direction. There were also lots of people in trouble to the south of this flooded dip for them to deal with.

I waited about 15 minutes, at which point the woman who was parked behind me approached and said she was in a hurry to go. Would I mind wading across this stream with her to ascertain if it was safe? This I agreed to do, and we spread out at about the width of the Tot Coma's tires and waded across and back again. The waters were at this point about mid-thigh to me—perhaps 30 inches deep. Meanwhile, there were five other vehicles parked behind us, all in the Ford F150 class and larger. They didn't even get out of their vehicles. Chivalry is not to be expected from those who drive over-priced and over-powered chariots. I'm surprised they were willing to get them wet!

And so, my little Tot Coma led the way for the entire last two-mile stretch. The woman and I stopped at several other crossings in the process, and waded across to make sure there were no hidden obstacles. The whole time, these people in their bigger vehicles stayed behind us. I was fully expecting somebody in one of these gas-guzzling hogs to lead the charge, or at least offer, but they seemed content to let us run the risks. Needless to say, everybody got out of the situation unscathed. As for the mighty Tot Coma—she willingly led the lot of us to safety. Who could ask for anything more?

This here is Roger Repp, signing off from beautiful southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

What You Missed at the November Meeting: David Mifsud

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I sometimes feel like a stalker when I'm researching our speakers. Not that I'm into anything nefarious. It's just that I like to provide you with some background that their bio on our website may not cover. The problem is that the internet is often a black hole that sucks me in and doesn't spit me out until our editor is sending me not-so-subtle emails implying that my article, while far from the most important work in the bulletin, takes up space that needs to be considered when designing. Out, in, and if in, how long is all he wants to know. I always answer him as soon as I pull myself away from my research. Usually it's "I don't know." The life of an editor is never easy.

But there are certainly worse ways to discover interesting facts than researching our speakers. Go ahead, try googling our November speaker David Mifsud. Add "herpetologist" to your search because there is more than one David Mifsud. There are a lot of citations and where they take us is most interesting. From radio shows to a *Phragmites* action group, from Michigan PARC meetings to rescuing turtles from oil spills. David doesn't seem to be a person to take half measures. Here's a brief bio:

David A. Mifsud, owner of Herpetological Resource and Management, is a Certified Wildlife Biologist, Certified Professional Ecologist, and a Professional Wetland Scientist. He has been working for 20 years in conservation field with expertise in amphibians and reptiles and has spent his career advocating for the protection and best management of herpetofauna in Michigan and the Great Lakes. He developed Michigan's only salamander monitoring program and has served as an expert on vernal pools conservation in Michigan for over 15 years. He is the co-chair of Michigan's Amphibian and Reptile Technical Advisory Board and administers the Michigan Herp Atlas. David also serves as an expert on Great Lakes turtles and African tortoises for the International Union for Conservation of Nature (IUCN) Tortoise and Freshwater Turtle Specialist Group and is also active in global turtle and tortoises conservation. Mifsud is the author of *Michigan Amphibian and Reptile Best Management Practices* and co-author, with James H. Harding, of the *Kinixys Conservation Blueprint*. Mifsud is also the co-author of the recently released revised edition of *Amphibians and Reptiles of the Great Lakes Region*.

And that leaves out much else that he does. Out of the many areas of expertise David has, he chose to speak to us about the little known hinge-backed tortoises of the genus *Kinixys* (which still sounds to me like the next Mattel toy).

David gave us descriptions of each of the eight species and one subspecies in that genus accompanied by pictures and range maps. The largest, *K. erosa*, is semiaquatic, often collected for food, and inhabits lowland evergreen forests, gallery forests, and marshy areas of West and Central Africa. *Kinixys homeana* ranges over a smaller area of the same territory in West Africa and has many of the same traits. *Kinixys belliana* has the most diverse and largest home range. David thinks this species might be split further than it already has been. It prefers grasslands but



David Mifsud. Photograph by Dick Buchholz.

can occur in very dry or very wet habitats. *Kinixys nogueyi* is unique in having only four claws on each front limb and has notable color variations. This species is the most heavily traded internationally, though not in the U.S. *Kinixys spekii* is a medium sized *Kinixys* with a well-developed hinge and a flat carapace. The smallest hingeback, *K. natalensis*, has a unique tricuspid beak and a poorly developed hinge. *Kinixys natalensis* avoids thickly forested areas and inhabits mountainous landscapes with rocky grasslands and savannah. Only slightly larger than *K. natalensis*, *K. lobatsiana* also likes rocky terrain and is the species most adapted to arid regions. *Kinixys zombensis*

has two subspecies, *K. z. zombensis*, found over much of East Africa, and *K. z. domerguei*, restricted to a tiny area of a peninsula in northwestern Madagascar and to the island of Nosy Faly off the coast of that peninsula.

David's had an interest in *Kinixys* since he was a kid and acquired one as a pet. At a Turtle Survival Alliance conference a few years ago he asked who was working with the little known and probably threatened *Kinixys* genus. He was roped into the task and after doing thorough literature and museum searches and traveling to Africa and Mozambique, he and Megan M. Stapleton compiled the *Kinixys* Conservation Bulletin (KCB) in 2014. In 2013 all species were designated as Vulnerable, Endangered, or Critically Endangered with forest species identified as those in greatest need.

The threats are what we've seen for nearly every endangered animal: habitat fragmentation and loss, climate change, and captures for the pet trade and for bush meat. Captures for alternative medicine and native religious rites add to the threats. The recommendations are familiar too. That doesn't point out any



Fetish markets add to the many threats that *Kinixys nogueyi* faces. Photograph by David Mifsud.



A group of *Kinixys homeana* suffers deplorable conditions in captivity while awaiting export. Photograph by David Mifsud.

lack in the recommendations, but simply emphasizes how much more research is needed in field biology if we are going to continue to occupy our planet with a diverse biosphere. In situ and ex situ assurance colonies have been established for some of the species. David manages the largest ex situ assurance colony but has worked hard and quickly to start colonies with institutions, zoos and other conservationists. The KCB plan asks for more study of natural histories, behaviors, and husbandry needs. Trade monitoring of the tortoises needs to be increased and enforcement of restrictions already in place needs to be stepped up. David mentioned that quotas of wild caught or “ranchered” animals need to be carefully considered because limiting supply can often drive up prices and encourage greater poaching. Protection and restoration of habitat, particularly in zones of sympatry, is important.

David then addressed some of the husbandry requirements for *Kinixys*. He likes to compare them to the needs of box turtles. Based on the turtles’ habitats, he equates *K. erosa* and *K. homeana* with *Terrapene carolina major*, *K. belliana* and *K. nogueyi* to *T. c. carolina*, *K. spekii* and *K. zombensis* to *T. c. triunguis*, *K. lobatsiana* with *T. ornata luteola*, and *K. natalensis* to *T. o. ornata*. He stresses the proper care of recent arrivals, which includes extensive soaking to rehydrate the stressed animals and maximum feeding. He provides a diet of mixed greens and vegetables, supplemented with protein from mice, worms, or other invertebrates, along with Mazuri tortoise chow and FIBReVive. He chops a bunch of these ingredients and forms them into “brownies” that he freezes, making it simple to thaw and feed. He avoids any fruit or sugars. David also mentioned that these tortoises love mushrooms.

He houses the adults either outside in large enclosures or inside in horse troughs. Inside set-ups include 10–12” of mixed hardwood chips and coconut fiber as substrate, a chicken feeder for water, hide shelters, plastic or silk plants, and appropriate lighting. Outdoor housing includes large containers for water,



An adult *Kinixys spekii* in one of David’s indoor set-ups. Photograph by David Mifsud.

loose substrate, multiple hides and visual breaks, and predator controls such as electric fences or total enclosures. Males are extremely combative, so he usually pairs one male with two or three females inside but may keep larger groups outside. Juvenile care is much like adults, but he adds protein and live food, cuttlebones, and UV-B lights with a basking area.

One of David’s first hatchlings had no eyes due to maladjusted temperatures in the incubator, but Iris started eating immediately, makes her way around her cage well, and is now paired with One-eyed Willie. David expects she’ll produce eggs when she grows. He spoke with obvious affection for all of his charges.

As usual, I’m leaving out vast amounts of David’s presentation. David is a busy person. His research on the *Kinixys* is extensive and the KCB is complete and detailed. I highly recommend following his Facebook page on *Kinixys* conservation, and if you would like to explore this interesting genus further, look up his *Kinixys* Conservation Bulletin. It has a lot of information, including extensive husbandry instructions. And you might want to pursue his name with an internet search. It can take you to interesting places. We appreciate his taking the time to talk with us.

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Minutes of the CHS Board Meeting, November 17, 2017

Rich Crowley called the meeting to order at 7:35 P.M. Board members Dan Bavirsha, Kim Klisiak and Jessica Wadleigh were absent. Minutes of the October 13 board meeting were read and accepted.

Officers' Reports

Treasurer: Andy Malawy went over the October financial reports. The point was raised that Dick Buchholz will need to transfer the show expense fund to the new co-chairs.

Membership secretary: Mike Dloogatch read the list of expiring memberships—again more renewing than expiring this month.

Media secretary: Newly appointed Kim Klisiak is checking into updating the website. John Palis has finished scanning six years of Bulletins (1990–1995). The first four years can now be downloaded from the CHS website.

Sergeant-at-arms: Attendance at the October 25 meeting was 36.

Committee Reports

Shows: The new co-chairs have started a list of people who are

interested in participating at shows.

ReptileFest: 'Fest will take place April 14–15, 2018, at NEIU. A new logo has been designed by James Krause. Hand-out cards will be sent to the printer shortly (photos are of CHS members' kids). Frank Sladek is working on a contact list of all people involved in 'Fest, and has met with several people to enlist sponsors. We need a "day of" leader to coordinate all the helpers.

Junior Herpers: Rich Lamszus reported 40 people at the last meeting. George Ramirez was the speaker. Nathan Kutok will speak at the December meeting on his experiences field herping last summer. Next year's hand-out cards should be ready soon.

New Business

We will need a new venue for board meetings in 2018.

The meeting adjourned at 9:47 P.M.

Respectfully submitted by recording secretary Gail Oomens

Advertisements

For sale: **highest quality frozen rodents.** I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , \$25 /100; Large pink mice (4 to 5 days old—2 to 3 gm) , \$27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , \$30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm) , \$35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale or trade: Probable pair of albino Harquahala rosy boas. They were born in my home in late 2016 and are feeding on f/t peach fuzz mice. Pure locality animals exhibiting a recessive gene. Viewing is possible, parents on site. I can drive to meet a reasonable distance, or ship if you are not local. Discount if you pick them up from my home. Cash, credit card or PayPal. Call or text 510-318-1715, or email elenabmoss@gmail.com.

Herp tours: **Costa Rica herping adventures.** Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site <http://hiss-n-things.com> and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

NEW CHS MEMBERS THIS MONTH

Freddie Lambright, III
George Klut
Jenny Hanson
David Mifsud

Arianne Messerman
Justin Perrault
David Tattoni
Mary Green

Luke Pearson
Amanda Cicchino
Zachary Lange

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UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, December 27, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **This meeting will be a holiday party.** The CHS will provide soft drinks and snacks. If you would like to bring something edible to share with the group, you are invited to do so. If you would like to bring an animal to show off to the group, you are encouraged to do that as well. This will be a chance to socialize all evening and get to know your fellow members a little better.

Ray Pawley will speak at the January 31 meeting. Ray is a retired curator of reptiles at Brookfield Zoo, who now makes his home near Hondo, New Mexico. He is also a many-times past president of the CHS and a frequent contributor to the *Bulletin*. Ray's talk will deal with what he has learned over the years about hibernation in rattlesnakes.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to take place on January 19, 2019. The venue is as yet uncertain, so if you wish to attend please email mdloogatch@chicagoherp.org.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

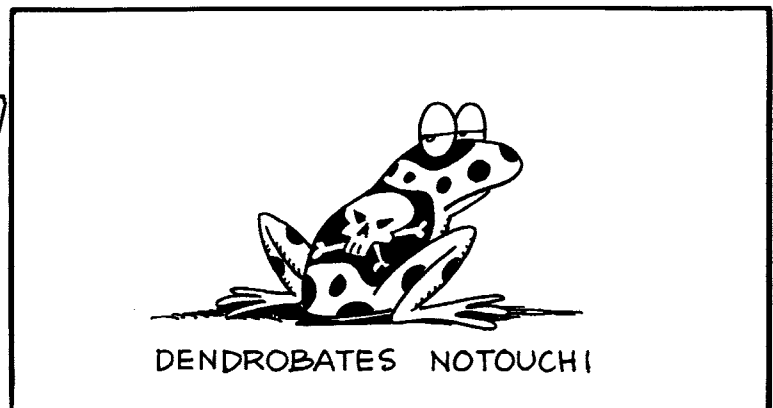
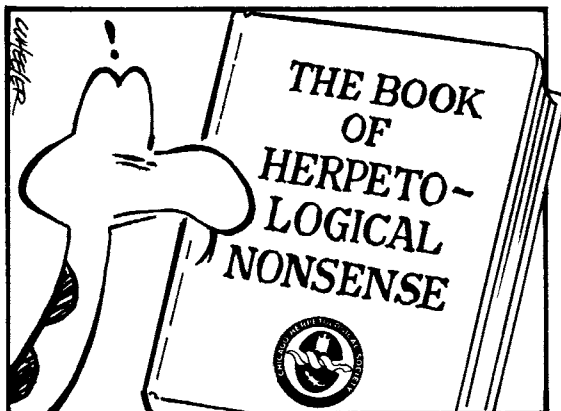
ELECTION RESULTS

As a result of the elections held November 29, 2017, the following officers and members-at-large will serve on the CHS Board of Directors for the year 2018.

President: Rich Crowley
Vice-president: Jessica Wadleigh
Treasurer: John Archer
Recording Secretary: Gail Oomens
Media Secretary: Kim Klisiak

Membership Secretary: Mike Dloogatch
Sergeant-at-arms: Mike Scott
Members-at-large: Dan Bavirsha
Lawrence Huddleston
Tom Mikosz
Zac Oomens

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