

Research articleurn:lsid:zoobank.org:pub:339EA3FD-EAE0-4BFE-9C6B-8E305C6FDD26**The snakes of Chad: results of a field survey and annotated country-wide checklist****Jean-François Trape^{1,*}, Israël Demba Kodindo², Ali Sougoudi Djiddi³, Joseph Mad-Toingué⁴ & Clément Hinzoumbé Kerah⁵**¹*Institut de Recherche pour le Développement (IRD), Laboratoire de Paludologie et de Zoologie Médicale, UMR MIVEGEC, B.P. 1386, Dakar, Sénégal*²*Programme National de Lutte contre le Paludisme (PNLP), Ministère de la Santé Publique, de l'Action Sociale et de la Solidarité Nationale, N'Djaména, Chad*³*Programme National de Lutte contre le Paludisme (PNLP), Ministère de la Santé Publique, de l'Action Sociale et de la Solidarité Nationale, N'Djaména, Chad*⁴*Hôpital Général de Référence Nationale, B.P. 130, N'Djaména, Chad*⁵*Programme National de Lutte contre le Paludisme (PNLP), Ministère de la Santé Publique, de l'Action Sociale et de la Solidarité Nationale, N'Djaména, Chad**Corresponding author: Email: jean-francois.trape@ird.fr¹urn:lsid:zoobank.org:author:F8BE8015-09CF-420B-98D3-D255D142AA2D²urn:lsid:zoobank.org:author:CC89C696-9A2A-49C7-82EE-C75858F756F0³urn:lsid:zoobank.org:author:B175CEB7-969A-47E1-8B38-1E10BF7ECD25⁴urn:lsid:zoobank.org:author:352EF698-1235-4167-992C-1BE3D53E1FDD⁵urn:lsid:zoobank.org:author:2E7B97F6-E450-4C32-A8AE-E347D0DC5A61

Abstract. From 2015 to 2017 we sampled snakes in most regions of the Republic of Chad, Central Africa. A total of 1,512 snakes belonging to 66 species were collected. Based on a full account of this collection, supplemented with additional museum specimens and reliable literature reports, we present an annotated checklist of the 80 snake species currently known from Chad, including 28 species that we added to the snake fauna of this country: *Letheobia weidholzi*, *Myriopholis occipitalis*, *Tricheilostoma sundewalli*, *Crotaphopeltis hippocrepis*, *Dasypeltis sahelensis*, *Natriciteres olivacea*, *Platyceps florulentus*, *Spalerosophis diadema cliffordi*, *Telescopus tripolitanus*, *Atractaspis dahomeyensis*, *Atractaspis micropholis*, *Aparallactus lunulatus nigrocollaris*, *Boaedon longilineatus*, *Boaedon parolineatus*, *Boaedon perisilvestris*, *Boaedon subflavus*, *Lycophidion* aff. *capense*, *Malpolon moilensis*, *Micrelaps vaillanti*, *Prosymna ambigua*, *Prosymna greigerti*, *Psammophis afroccidentalis*, *Psammophis elegans*, *Psammophis mossambicus*, *Psammophis sudanensis*, *Rhamphiophis rostratus*, *Naja savannula* and *Echis romani*. Collecting localities for all specimens are provided and some taxonomical and biogeographical issues are discussed.

Key words. Squamata, Ophidia, biogeography, country checklist, venomous snakes, Central Africa.

INTRODUCTION

The Republic of Chad is the fifth largest country in Africa with an area of 1,284,000 km² between latitudes 7°N–23°N and longitudes 13°E–23°E. The northern part of the country is Saharan (Fig. 1), the central part is Sahelian (Fig. 2), or Sudano-Sahelian (Fig. 3), and the southern part is Sudanese (Fig. 4) or Sudano-Congolese (Fig. 5). South of 14°N elevation ranges from 280 m to 500 m a.s.l. in most parts of the country where the only significant reliefs are those of the Guera in central Chad (1,613 m a.s.l.) and the Monts de Lam in the southwest (1,163 m a.s.l.). North of 14°N, the Ouaddai plateau ranges from 500 m to 1,300 m a.s.l., the Ennedi plateau culminates at 1,450 m a.s.l., and the Tibesti mountains (Fig. 6)

at 3,414 m a.s.l. (Brami 2012). In northern Chad, the Bodélé depression is the lowest area of the country with 165 m a.s.l. and was occupied by Lake MegaChad at the Holocene before drying up (Leblanc et al. 2006). Average annual rainfall reaches a maximum of 1,200 mm south of 8°N and decrease progressively along a South-North gradient with 500 mm at 12°N and less than 5 mm north of 18°N, except in the Tibesti mountains where locally it may exceed 50 mm (Dubief 1963, Mahé et al. 2012). The southern and central parts of the country have a rich hydrological system, including Lake Chad, the Chari, Ouham and Logone rivers, and numerous seasonal tributaries. Each year during the rainy season (June–October) large parts of the country south of 13°N are flooded.

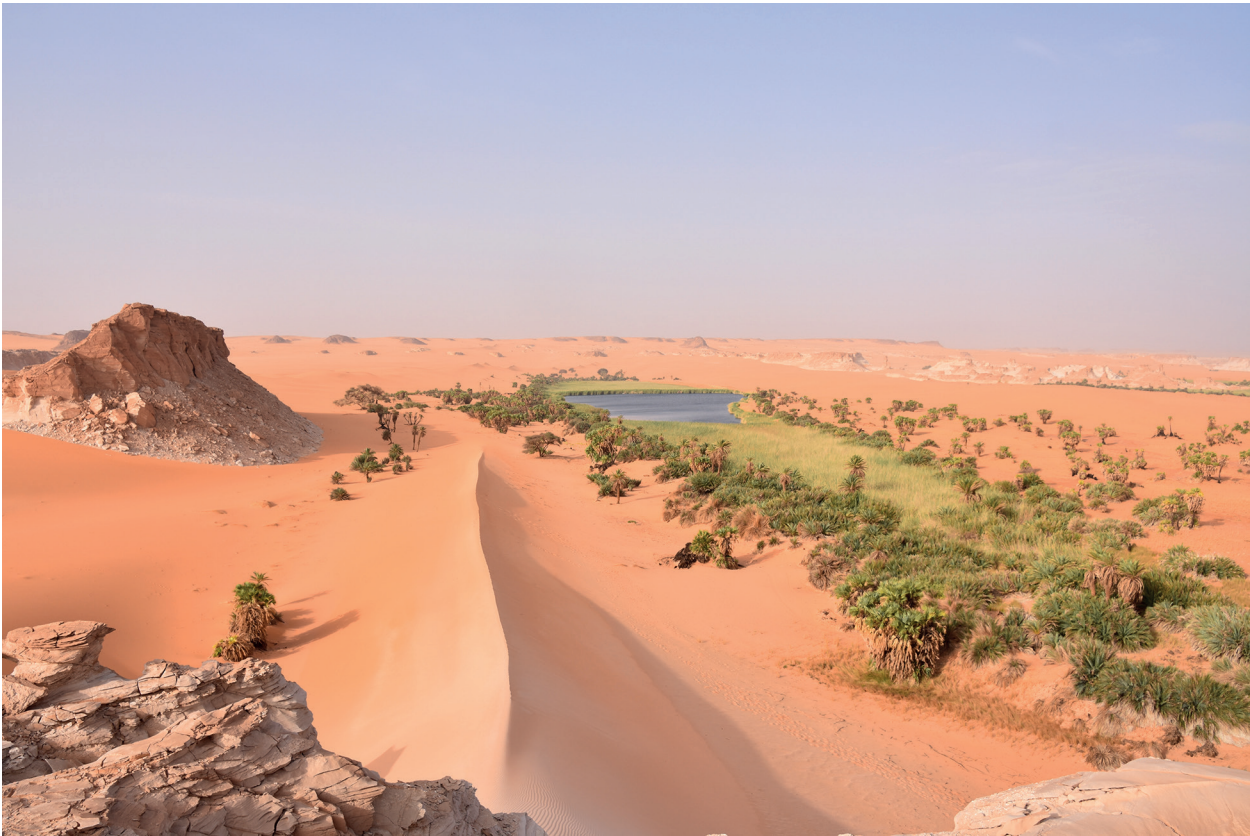


Fig. 1. The Sahara desert at Ounianga Serir in northern Chad ($18^{\circ}55'N$, $20^{\circ}54'E$) where *Cerastes cerastes* was collected.

Little data is available on the snakes of Chad. Rousset & Villiers (1965) reported a list of two hundred snakes belonging to 30 species from Gounou-Gaya ($09^{\circ}37'N$ / $15^{\circ}30'E$) and Bongor ($10^{\circ}16'N$ / $15^{\circ}22'E$). Graber (1966) reported a collection of 460 specimens from Fort-Lamy, now N'Djamena ($12^{\circ}06'N$ / $15^{\circ}02'E$), and other localities in central and northern Chad. Trape (2015) reviewed the reptile fauna of northern Chad. Museum specimens from Chad were included in works on certain genera or species, in particular by Roux-Estève (1969, 1974), Broadley (1971), Guibé & Roux-Estève (1972), Hughes (1976, 1977, 1983, 1985), Broadley (1984), Schätti (1985), Trape & Roux-Estève (1990), Broadley & Hughes (1993, 2000), Jakobsen (1997), Rasmussen (1997a, 1997b, 2005a, 2005b), Hahn & Wallach (1998), Wüster & Broadley (2003), Schätti & McCarthy (2004), Trape & Mané (2006a), Trape et al. (2006, 2012, 2019), Crochet et al. (2008), Chirio et al. (2011), Broadley et al. (2014, 2018), Trape & Mediannikov (2016), and Wüster et al. (2018). Sindaco et al. (2013) provided square-degree distribution maps of Palearctic species distributed in northern Chad. Some unpublished working documents for national parks management include lists of snake species, but they are based on presumed

distribution maps (e.g., those of Chippaux 1999), not on specimens really collected or observed in national parks.

MATERIALS AND METHODS

In May 2015, the first author contacted the last author for a field survey of the snakes of Chad. The Chad Ministry of Health was interested by this initiative and decided to provide logistic support and funds for a full research programme on snakebites and the distribution of snake species in all administrative regions of the country. The Baïbokoum area was selected by the Ministry of Health for the first survey since it was known as the place with the highest incidence and mortality from snakebite in Chad. From September 2015 to December 2017 additional surveys were conducted in most regions of the country. Local people at villages were asked to collaborate with the study and a total of 40 study areas were involved in the collection of snakes (Table 1), some of them represented by a single village or study site, and some others by several neighbouring villages (up to 18 villages for Baïbokoum area). Four of these study areas were located between $07^{\circ}00'N$ and $09^{\circ}00'N$, nine between $09^{\circ}00'N$ and $11^{\circ}00'N$, 12 between $11^{\circ}00'N$ and $13^{\circ}00'N$, eight



Fig. 2. The Sahel near Lake Chad at the end of the rainy season (13°48'N, 15°46'E). *Psammophis sudanensis* was the most abundant species at this latitude as in most other Sahelian and Sudano-Sahelian areas of Chad. The other common species between 13°N and 14°N were *Psammophis rukwae*, *Eryx colubrinus*, *Atractaspis watsoni*, *Boaedon subflavus*, *Naja haje* and *Echis leucogaster*.

between 13°00'N and 15°00'N, and seven north of 15°00'N (Fig. 7), where average annual rainfall ranges approximately from 1,300–1,100 mm, 1,100–800 mm, 800–400 mm, 400–200 mm, and 200–<5 mm, respectively (Mahé et al. 2012).

Most specimens were deposited at the Programme National de Lutte contre le Paludisme (PNLP) office in N'Djaména. Selected specimens were deposited at the Institut de Recherche pour le Développement (Dakar, Senegal; acronym: IRD) or donated to the Museum national d'Histoire naturelle (Paris, France; acronym: MNHN). Specimens were identified to species according to regional keys (Trape & Mané 2006a, Chirio & LeBreton 2007) and further taxonomic analysis. For recent changes in snake generic names, we usually followed those adopted in the reptile database by Uetz et al. (2020).

The first author also examined specimens from Chad of the MNHN collection, most of them collected either by Decorse along the Chari River in 1903–1904 (Chabanaud 1917), or by Roussel and Stauch in the 1960s. Most Roussel's specimens were collected at Gounou-Gaya, some others at Bongor (75 km north of Gounou-Gaya), but all were published then preserved in part in the

MNHN collection with Mayo-Kebbi as collecting locality, i.e., the name of the province where the two localities are located (Roussel & Villiers 1965). However, these authors also provided for each species the vernacular names of snakes, which differ between Gounou Gaya and Bongor, thus allowing in most cases to establish which species were collected in each locality.

RESULTS

We collected a total of 1,512 specimens belonging to 66 species. Fourteen other species occur in Chad, including nine species from previous collections preserved at MNHN in Paris and five species reported in the literature. Altogether, the total number of snake species currently known from Chad is 80. Coordinates of our collecting localities are listed in Table 1, and those from MNHN and literature are listed in Table 2.

Table 1. Collecting localities of snakes in Chad (our study).

| N | Locality | Latitude | Longitude | Altitude | Ecoregion | N° of specimens | N° of species |
|--------------|------------------------|----------|-----------|----------|------------------|-----------------|---------------|
| 1 | Arningmalik | 14°02'N | 21°07'E | 716 m | Sahel | 10 | 4 |
| 2 | Bahar | 12°03'N | 21°19'E | 511 m | Sahelo-Sudanese | 61 | 15 |
| 3 | Baïbokoum | 07°44'N | 15°41'E | 515 m | Sudano-Congolese | 505 | 40 |
| 4 | Balani | 09°42'N | 15°00'E | 351 m | Sudanese | 8 | 5 |
| 5 | Bereguit (7 km N) | 11°39'N | 19°08'E | 502 m | Sahelo-Sudanese | 1 | 1 |
| 6 | Birim | 13°26'N | 14°44'E | 287 m | Sahel | 13 | 5 |
| 7 | Bitanda | 08°34'N | 15°59'E | 417 m | Sudanese | 42 | 15 |
| 8 | Bitea | 13°30'N | 20°54'E | 537 m | Sahel | 78 | 13 |
| 9 | Bon Amdaoud | 10°41'N | 19°28'E | 478 m | Sudanese | 114 | 20 |
| 10 | Djarat Abouimir | 11°01'N | 20°00'E | 423 m | Sudanese | 188 | 11 |
| 11 | Dourenge | 13°54'N | 21°00'E | 615 m | Sahel | 10 | 6 |
| 12 | Ennedi NW | 17°32'N | 21°29'E | 822 m | Sahara | 1 | 1 |
| 13 | Fada | 17°11'N | 21°35'E | 565 m | Sahelian | 2 | 1 |
| 14 | Faya Largeau | 17°55'N | 19°06'E | 242 m | Sahara | 1 | 1 |
| 15 | Fiengbac | 09°51'N | 15°04'E | 325 m | Sudanese | 10 | 7 |
| 16 | Goulmounbass | 10°19'N | 15°19'E | 324 m | Sudanese | 75 | 12 |
| 17 | Gouroungali | 13°13'N | 21°03'E | 564 m | Sahel | 3 | 3 |
| 18 | Guirli | 12°40'N | 21°20'E | 568 m | Sahel | 9 | 6 |
| 19 | Hileborno | 11°55'N | 21°28'E | 505 m | Sahelo-Sudanese | 11 | 7 |
| 20 | Kadam Digas | 11°53'N | 18°52'E | 541 m | Sahelo-Sudanese | 62 | 10 |
| 21 | Kiéké | 10°33'N | 19°49'E | 413 m | Sudanese | 25 | 9 |
| 22 | Laobida | 09°13'N | 15°07'E | 425 m | Sudanese | 49 | 13 |
| 23 | Léré | 09°39'N | 14°13'E | 235 m | Sudanese | 2 | 1 |
| 24 | Mahargal | 12°07'N | 21°22'E | 527 m | Sahelo-Sudanese | 50 | 9 |
| 25 | Mao | 14°08'N | 15°18'E | 305 m | Sahel | 6 | 3 |
| 26 | Masarma | 12°33'N | 16°35'E | 292 m | Sahel | 31 | 7 |
| 27 | Matafo 2 | 13°31'N | 14°40'E | 291 m | Sahel | 8 | 3 |
| 28 | Mataya | 11°59'N | 18°02'E | 406 m | Sahelo-Sudanese | 3 | 2 |
| 29 | Moïssala | 08°20'N | 17°45'E | 385 m | Sudano-Congolese | 55 | 18 |
| 30 | Mongo (13 km S) | 12°04'N | 18°45'E | 460 m | Sahel | 1 | 1 |
| 31 | Moundou | 08°33'N | 16°04'E | 404 m | Sudanese | 12 | 9 |
| 32 | N'Djaména (Farcha) | 12°06'N | 14°58'E | 295 m | Sahel | 4 | 1 |
| 33 | N'Djaména (Gassi) | 12°03'N | 15°08'E | 298 m | Sahel | 9 | 4 |
| 34 | Ouadi Haouach | 16°08'N | 21°07'E | 502 m | Sahel | 1 | 1 |
| 35 | Ouadi Sofoya / Torboul | 15°55'N | 20°58'E | 479 m | Sahel | 2 | 1 |
| 36 | Oum Chalouba | 15°48'N | 20°46'E | 452 m | Sahel | 2 | 2 |
| 37 | Ounianga Serir | 18°55'N | 20°54'E | 360 m | Sahara | 1 | 1 |
| 38 | Tarhacha | 13°38'N | 20°50'E | 526 m | Sahel | 2 | 1 |
| 39 | Tikem | 09°49'N | 15°03'E | 335 m | Sudanese | 5 | 5 |
| 40 | Zamagouin | 09°32'N | 14°57'E | 380 m | Sudanese | 37 | 15 |
| Total | | | | | | 1,512 | 66 |

Family Typhlopidae, Gray 1845*Afrotyphlops lineolatus* (Jan, 1864)

Material: no specimen collected.

Other specimens (coll. MNHN): Fort-Lamy (= N'Djaména) (2), Chari (2).

Literature records: Fort-Lamy, Chari (Roux-Estève 1974).

Afrotyphlops punctatus (Leach, 1819)

Material: 15 specimens.

Localities: Baïbokoum (9), Bitanda (1), Bon Amdaoud (3), Moundou (1), Zamagouin (1).



Fig. 3. The Sahelo-Sudanese savanna in eastern Chad (11°45'N / 21°10'E) near Bahar, Hileborno and Mahargal study villages. The most common species collected in this area were *Psammophis rukwae*, *Psammophis sudanensis*, *Crotaphopeltis hotamboeia*, *Echis leucogaster* and *Atractaspis watsoni*.

Other specimens (coll. MNHN): Fort-Lamy (4), Mayo-Kebbi (1).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Fort-Lamy, Bisneye (Graber 1966), Fort Lamy, Mayo-Kebbi (Roux-Estève 1974).

Letheobia weidholzi Wallach & Gemel, 2018

Material: 1 specimen.

Locality: Baïbokoum (1).

Remarks: The Baïbokoum specimen is the holotype of *Letheobia logonensis* Trape, 2019, which we now consider as a junior synonym of *L. weidholzi* which was published independently a few months earlier, based on a single old museum specimen from Garoua (Cameroon). Our specimen was collected in a field near the Logone River. A third known specimen of this species was collected at Yola, Adamawa, Nigeria. It was erroneously attributed to *Letheobia praeocularis* (Stejneger, 1894) by Rasmussen (1997a) and Wallach & Gemel (2018). Both specimens are new country records and extend the range of *Letheobia weidholzi* to Nigeria and Chad.

Family Leptotyphlopidae Stejneger, 1892

Myriopholis adleri (Hahn & Wallach, 1998)

Material: no specimen collected.

Other specimens (coll. MNHN): Bongor (3).

Literature records: Bongor (Hahn & Wallach 1998, Trape 2002).

Remark: Bongor is the type locality and easternmost record of this species distributed from Senegal to Chad (Trape 2002, Trape & Mané 2006a). It was reported in error from Birao in Central African Republic by Chirio & Ineich (2006) (Trape unpublished).

Myriopholis boueti (Chabanaud, 1917)

Material: 12 specimens collected.

Localities: Bahar (3), near Béréguet (1), Bitea (1), Bon Amdaoud (2), Guirli (1), Kiéké (1).

Other specimens (coll. MNHN): Maillao (1), N'Djaména (2).

Literature records: Maillao, N'Djaména (Hahn & Wallach 1998, as *Leptotyphlops narirostris boueti*).

Table 2. Coordinates of snake records from Chad (literature data). The asterisks indicate approximate entries.

| Locality | Longitude | Latitude | Altitude | Ecoregion |
|---------------------------|-----------|----------|-----------|------------------|
| Abéché | 13°50'N | 20°49'E | 540 m | Sahel |
| Archei | 16°54'N | 21°46'E | 580 m | Sahel |
| Ati | 13°13'N | 18°20'E | 335 m | Sahel |
| Ati (35 km SW) | 13°00'N | 18°06'E | 334 m | Sahel |
| Aozou | 21°48'N | 17°25'E | 920 m | Sahara |
| Bachikélé | 16°32'N | 22°20'E | 720 m | Sahel |
| Baguirmi (region) | 11°N* | 16°E* | 330 m* | Sahel/Sudanese |
| Bahr-el-Ghazal | 14°30'N* | 17°00'E* | 285 m | Sahel |
| Bardaï | 21°20'N | 17°01'E | 1020 m | Sahara |
| Batha | 13°30'N* | 18°30'E* | 340 m | Sahel |
| Bisneye | 12°40'N | 16°10'E | 290 m | Sahel |
| Bol | 13°28'N | 14°44'E | 285 m | Sahel |
| Bokoro | 12°22'N | 17°03'E | 300 m | Sahel |
| Bongor | 10°16'N | 15°22'E | 335 m | Sudanese |
| Chari (River) | 09/11°N* | 15/18°E* | 290/370 m | Sahel/Sudanese |
| Dejemine Batha | 13°30'N* | 18°30'E* | 340 m | Sahel |
| Djintilo | 12°49'N | 14°33'E | 290 m | Sahel |
| Fada | 17°11'N | 21°35'N | 565 m | Sahel |
| Faya Largeau | 17°55'N | 19°06'E | 242 m | Sahara |
| Fitri (Lake) | 12°50'N | 17°30'E | 285 m | Sahel |
| Fort-Archambault (= Sarh) | 09°08'N | 18°22'E | 370 m | Sudanese |
| Fort-Lamy (=N'Djaména) | 12°06'N | 15°01'E | 298 m | Sahel |
| Goré | 07°55'N | 16°38'E | 430 m | Sudano-Congolese |
| Gounou-Gaya | 09°37'N | 15°30'E | 345 m | Sudanese |
| Iro (Lake) | 10°06'N | 19°26'E | 390 m | Sudanese |
| Koalem | 09°49'N | 17°42'E | 355 m | Sudanese |
| Koboué | 17°25'N | 22°03'E | 790 m | Sahara |
| Koskobo | 09°29'N | 19°15'E | 382 m | Sudanese |
| Koudoubol | 13°24'N | 14°43'E | 285 m | Sahel |
| Kumao | 07°36'N | 15°36'E | 575 m | Sudano-Congolese |
| Maillao | 11°35'N | 15°16'E | 300 m | Sahelo-Sudanese |
| Mao | 14°08'N | 15°18'E | 305 m | Sahel |
| Mayo-Kebbi (region) | 09/10°N | 14/15°E | 350 m* | Sudanese |
| Mboura | 07°35'N | 15°35'E | 530 m | Sudano-Congolese |
| Melfi | 11°03'N | 17°55'E | 405 m | Sudanese |
| N'Djaména | 12°06'N | 15°01'E | 298 m | Sahel |
| Ngodem | 11°25'N | 15°04'E | 305 m | Sudanese |
| Niellim | 09°42'N | 17°48'E | 365 m | Sudanese |
| Ouadi Fama | 15°22'N* | 20°34'E* | 435 m | Sahel |
| Ouadi Rimé | 14°00'N | 18°00'E | 309 m | Sahel |
| Oued Basso | 17°30'N* | 22°22'E* | 845 m | Sahara |
| Oum Chalouba | 15°48'N | 20°46'E | 452 m | Sahel |
| Oum El Adam | 17°12'N | 21°12'E | 490 m | Sahara |
| Sarh | 09°08'N | 18°22'E | 370 m | Sudanese |
| Tirreno (well) | 21°34'N | 17°19'E | 1650 m | Sahara |
| Torboul (vicinity of) | 15°57'N | 21°59'E | 626 m | Sahel |
| Yambatchingsou | 09°11'N | 15°10'E | 402 m | Sudanese |
| Yebbi-Bou | 20°55'N | 18°05'E | 1385 m | Sahara |
| Zakouma | 10°53'N | 19°49'E | 420 m | Sudanese |



Fig. 4. The Sudan Savanna and Salamat River at Zakouma National Park during the dry season (10°50'N, 19°47'E). Three study villages (Djarat Abounimir, Bon Amdaoud and Kiéké) were located at the eastern, western and southern limits of the park, respectively, where 25 snake species were collected.

Myriopholis lanzai Broadley, Wade & Wallach, 2014

Material: no specimen collected.

Other specimens (coll. MNHN): Faya (1).

Literature records: Faya Largeau (Le Berre 1989, as *Leptotyphlops macrorhynchus*); Chad (Hahn & Wallach 1998, as *Leptotyphlops cairi*), Faya Largeau (Broadley et al. 2014, Trape 2015).

Myriopholis occipitalis (Trape & Chirio, 2019)

Material: 1 specimen collected.

Locality: Moïssala (1).

Literature record: Moïssala (Trape & Chirio 2018).

Remarks: The type locality of this recently described species is located in Central African Republic (Kouki, 07°09'N / 17°18'E), 150 km south of Moïssala (Trape & Chirio 2019).

Tricheilostoma sundewalli (Jan, 1861)

Material: 1 specimen collected.

Locality: Baïbokoum (1).

Other specimen (coll. MNHN): Gounou-Gaya (1)

Literature record: Gounou-Gaya (Roussel & Villiers 1965, as *Leptotyphlops bicolor*).

Remarks: First record for Chad. *T. bicolor*, erroneously reported from Chad by Roussel & Villiers (1965), seems restricted to West Africa with Nigeria as easternmost limit.

Family Boidae Gray, 1825

Eryx colubrinus (Linnaeus, 1758)

Material: 15 specimens collected.

Localities: Birim (2), Bitea (2), Doureng (3), Gouroungali (1), Guirli (4), Matafo 2 (1), Tarhacha (2).

Other specimen (coll. MNHN): Bol (1).

Literature records: Abéché, Bahr-el-Ghazal, Bisneye, Mao (Graber 1966), Bachikélé, Ouadi Rimé (Trape 2015).

Eryx muelleri (Boulenger, 1892)

Material: 9 specimens collected.

Localities: Masarma (9).

Other specimens: Mayo Kebbi (1, coll. MNHN), Ouadi Rimé (1, coll. IRD).



Fig. 5. The Sudano-Congolese savanna in southern Chad near Moïssala is strongly impacted by agricultural activities (08°05'N, 17°40'E). The most common snake species were *Psammophis mossambicus*, *Psammophis sudanensis*, *Naja nigricollis* and *Lycophidion semicinctum*.

Literature records: Gounou-Gaya, Bongor (Roussel & Villiers 1965), Fort-Lamy, Bahr-el-Ghazal (Graber 1966).

Remark: On 23 January 2003, the first author observed several dozens of dessicated *Eryx* specimens around a dried pool of the Ouadi Rimé (14°00'54"N, 18°00'12"E). Several specimens were attributed to *E. colubrinus* in the field and a voucher specimen is attributable to *E. mueleri*.

Family Pythonidae Fitzinger, 1826

Python regius (Shaw, 1802)

Material: 6 specimens collected.

Localities: Baïbokoum (5), Laobida (1).

Literature records: Gounou-Gaya, Bongor (Roussel & Villiers 1965).

Python sebae (Gmelin, 1788)

Material: 7 specimens collected.

Localities: Bitea (2), Hileborno (1), Kadam Digas (2), Mataya (1), Zamagouin (1).

Other specimen (coll. MNHN): south of Abéché (1).

Literature records: Gounou-Gaya, Bongor (Roussel & Villiers 1965), Batha, Bokoro, Bol, Fort-Lamy, Nokou, Ouaddaï (Graber 1966), Lac Fitri (ORSTOM, unpublished), Lac Iro (Pairault 1994), Zakouma (Dejace 2002).

Family Colubridae Oppel, 1811

Crotaphopeltis degeni (Boulenger, 1906)

Material: 23 specimens collected.

Localities: Djarat Abounimir (7), Fiengbac (1), Goulmounbass (11), Kiéké (2), N'Djaména (1), Tikem (1).

Other specimen (coll. MNHN): Ngodem (3).

Literature record: Ngodem (Rasmussen 1997b).

Crotaphopeltis hippocrepis (Reinhardt, 1843)

Material: 14 specimens collected.

Localities: Baïbokoum (2), Bitanda (1), Djarat Abounimir (11).

Remark: First record for Chad (but appeared in error on maps of Chippaux [1999] and Chippaux & Jackson [2019]).

Crotaphopeltis hotamboeia (Laurenti, 1768)



Fig. 6. The Tibesti mountains near the Pic Toussidé (3315 m) in the background and the caldera of the Trou du natron in the foreground (20°57'N, 16°33'E). Snake species currently known from the Tibesti include *Echis leucogaster*, *Cerastes cerastes*, *Cerastes vipera*, *Psammodphis aegyptius* and *Platycephalus saharicus*.

Material: 122 specimens collected.

Localities: Bahar (18), Baïbokoum (18), Bitanda (3), Bon Amdaoud (10), Djarat Abounimir (48), Goulmounbass (1), Hileborno (1), Kadam Digas (7), Kiéké (6), Laobida (2), Mahargal (3), Moïssala (2), Moundou (1), Zamagouin (1).

Other specimens (coll. MNHN): Baguirmi (1), Maillao (4).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Ati, Bisneye, Fort-Lamy (Graber 1966).

Dasypeltis confusa Trape & Mané, 2006

Material: 2 specimens collected.

Locality: Baïbokoum (2).

Other specimen (coll. MNHN): Mayo Kebbi (1).

Literature records: Gounou-Gaya (Roussel & Villiers 1965, as *Dasypeltis scabra scabra*), Mayo Kebbi (Bates 2013).

Dasypeltis gansi Trape & Mané, 2006

Material: 14 specimens collected.

Localities: Baïbokoum (8), Laobida (2), Moïssala (2), Zamagouin (2).

Other specimen (coll. MNHN): Koudoubol (1).

Literature record: Bol, Koudoubol (Bates & Ineich, 2012).

Dasypeltis sahelensis Trape & Mané, 2006

Material: 7 specimens collected.

Localities: Bon Amdaoud (1), Goulmounbass (1), Guirli (1), Kadam Digas (2), Mahargal (1), N'Djaména (1).

Other specimens (coll. MNHN): N'Djaména (2).

Literature record: Fort-Lamy (Graber 1966, as *Dasypeltis scabra*).

Remarks: First record for Chad. All previous records of this species were either from West Africa or Morocco (Trape & Mané 2006b, Trape et al. 2012). We also attribute to *D. sahelensis* the El Geneina specimen (Darfur, Sudan) attributed to *D. scabra* by Colley (1946).

Dispholidus aff. *typus* (Smith, 1829)

Material: 6 specimens collected.

Localities: Baïbokoum (5), Moïssala (1).

Literature record: Gounou-Gaya (Roussel & Villiers 1965).

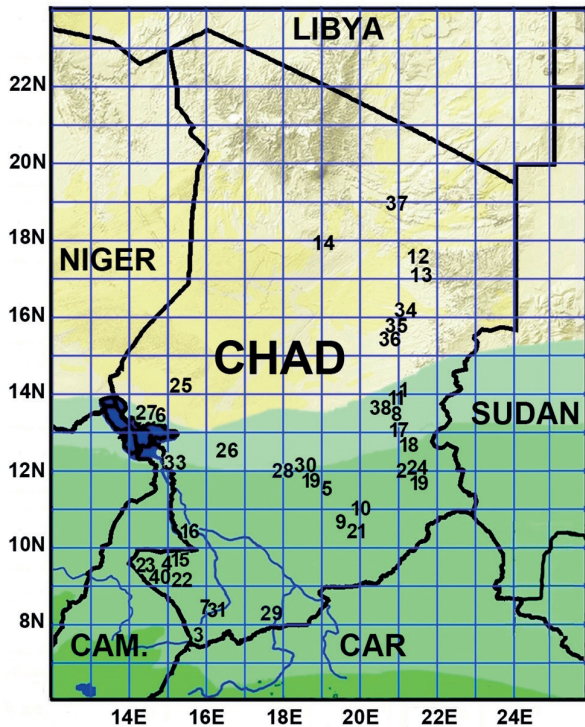


Fig. 7. Map of Chad with location of study areas. See Table 1 for locality numbers. Tikem and Balani, two close villages, and Farcha and Gassi, two suburbs of N'Djaména, are represented by a single number (4 and 33 respectively). Colours for vegetation areas: Congolese: dark green; Sudanese: green; Sahelian: light green; Saharan: yellow for sandy areas, white for stony areas, grey for rocky and mountainous areas.

Remarks: Molecular studies have shown that the Boomslang is a complex of several species, with *D. typus* restricted to southern South Africa (Eimermacher 2012). Perret (1961) highlighted some pattern and colour differences between the material he collected in Cameroon and the various subspecies described from D.R. Congo and Southern Africa. He proposed the name *occidentalis* ssp n. for his material. Our specimens from Chad match the description of *occidentalis*.

Grayia smithii (Leach, 1818)

Material: no specimen collected.

Other specimens (coll. MNHN): Gounou-Gaya (1), Chari H656 (1).

Literature record: Gounou-Gaya (Roussel & Villiers 1965, as *Grayia tholloni*).

Remarks: The Gounou-Gaya specimen (MNHN 1965.397), previously attributed to *G. tholloni* by Roussel & Villiers (1965), is a male with only 15 rows of dorsal scales, 8(4) and 7(4) supralabials, 158 ventrals and 89 subcaudals. Despite its low number of dorsals, it clearly belongs to *G. smithii*. The Chari specimen (MNHN 1978.1832) has 7(4) supralabials on each side of the

head, 155 ventrals and a mutilated tail. It also presents a low number of dorsals, only 16 rows at midbody.

Meizodon coronatus (Schlegel, 1837)

Material: 4 specimens collected.

Localities: Baïbokoum (3), Laobida (1).

Literature record: Mayo-Kebbi (Roussel & Villiers 1965, Roux-Estève 1969).

Meizodon regularis Fisher, 1856

Material: no specimen collected.

Literature record: Koskobo (Schätti 1985).

Meizodon semiornatus tchadensis (Chabanaud, 1917)

Material: 1 specimen collected.

Localities: Bahar (1),

Other specimen (coll. MNHN): Koalem (1).

Literature records: Koalem (Chabanaud 1917, holotype of *Zamenis tchadensis*), Abéché, Fort-Lamy (Graber 1966, as *Meizodon coronatus*), Fort-Lamy (Roux-Estève 1969, Schätti 1985).

Natriciteres olivacea (Peters, 1854)

Material: 1 specimen collected.

Locality: Birim (1).

Other specimens (coll. MNHN): Maillao (2).

Remarks: First records for Chad and Lake Chad area.

Philothamnus bequaerti (Schmidt, 1923)

Material: 2 specimens collected.

Localities: Baïbokoum (1), Moïssala (1).

Literature record: Sarh (Hughes 1985).

Philothamnus hughesi Trape & Roux-Estève, 1990

Material: no specimens collected.

Other specimen (coll. MNHN): Chari (1).

Literature record: Chad (Trape & Roux-Estève 1990).

Remark: This specimen (MNHN 1904.0186) was collected by J. Decorse during the 1902–1904 Chari – Lake Chad expedition. There is no precise location but the most likely origin of this specimen is between 8°N and 9°N on the banks of the upper Chari River which is issued from the junction of Bamingui and Gribingui rivers. Additional specimens of *P. hughesi* were collected at the same latitude in Central African Republic (Chirio & Ineich 2006).

Philothamnus irregularis (Leach, 1819)

Material: 22 specimens collected.

Localities: Baïbokoum (18), Zamagouin (4).

Other specimen (coll. MNHN): Maillao (1).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Fort-Lamy (Graber 1966).

Philothamnus aff. *semivariiegatus* (Smith, 1840)

Material: 3 specimens collected.



Fig. 8. View of Baïbokoum area where 40 species of snakes were collected within only ten days. The Logone occidentale River is in the background, the rocky hill that dominates Baïbokoum is in the foreground (07°44'N, 15°40'E).

Localities: Baïbokoum (1), Moïssala (1), Moundou (1).
Other specimen (coll. MNHN): Maillao (1).

Remarks: *Philothamnus semivariiegatus* is now restricted to southern Africa (Engelbrecht 2019) and further molecular studies are needed to establish the status of Central African populations. This species complex is represented by *Philothamnus smithi* Bocage, 1882, in West Africa (Trape & Baldé 2014) and possibly also in Chad and the whole savannas areas north of the Congolese forest block.

Platyceps florulentus (Geoffroy, 1827)

Material: 6 specimens collected.

Localities: Arningmalik (1), Bitea (3), Doureng (2).

Remarks: First record for Chad. Our six specimens, all from Ouaddaï plateau, show 21 rows of dorsal scales, compared to 25 rows for the subspecies *P. f. perreti* (Schätti, 1988) from northern Cameroon and north-eastern Nigeria reliefs.

Platyceps saharicus Schätti & McCarthy, 2004

Material: No specimen collected.

Literature records: Aozou (Beck & Huard 1969, as *Zamenis rhodorachis*), Yebbi-Bou (Le Berre 1989, as *Coluber*

rhodorachis), Yebbi-Bou (Schätti & McCarthy 2004), Gouffre de Koboué (Geniez & Gauthier 2008), Aozou, Yebbi-Bou, Koboué (Trape 2015, as *Platyceps tessellata*).

Scaphiophis albopunctatus Peters, 1870

Material: 11 specimens collected.

Localities: Baïbokoum (6), Bon Amdaoud (2), Laobida (3).

Other specimens (coll. MNHN): Mayo-Kebbi (1), Maillao (1).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Fort-Lamy (Graber 1966), Maillao, Mayo-Kebbi (Broadley 1994).

Spalerosophis diadema cliffordi (Schlegel, 1837)

Material: no specimen collected.

Other specimen (coll. MNHN): Ouadi Fama (1).

Remark: First record for Chad.

Telescopus obtusus (Reuss, 1834)

Material: No specimen collected.

Literature record: Oum El Adam (Wake & Kluge 1961, as *Tarbophis obtusus*), Oum El Adam (Crochet et al. 2008, Trape 2015, as *Telescopus dhara obtusus*).

Telescopus tripolitanus (Werner, 1909)

Material: 12 specimens collected.

Localities: Bahar (1), Bitea (2), Bon Amdaoud (9).

Remark: First record for Chad.

Telescopus variegatus (Reinhardt, 1843)

Material: 14 specimens collected.

Localities: Baïbokoum (3), Laobida (9), Moïssala (1), Zamagouin (1).

Other specimen (coll. MNHN): Mayo-Kebbi (1).

Literature record: Gounou-Gaya (Roussel & Villiers 1965).

Family Lamprophiidae Ritzinger, 1843*Amblyodipsas unicolor* (Reinhardt, 1843)

Material: 4 specimens collected.

Localities: Baïbokoum (2), Moïssala (1), Tikem (1).

Other specimen (coll. MNHN): Mayo-Kebbi (1).

Literature record: Gounou-Gaya (Roussel & Villiers 1965).

Aparallactus lunulatus nigrocollaris Chabanaud, 1916

Material: 4 specimens collected.

Locality: Baïbokoum (4).

Remark: First record for Chad.

Atractaspis aterrima Günther, 1863

Material: no specimen collected.

Other specimen (coll. MNHN): Fort-Archambaut (1).

Literature record: Chari (Rasmussen 2005a).

Atractaspis dahomeyensis Barboza du Bocage, 1887

Material: 4 specimens collected.

Locality: Baïbokoum (4).

Remarks: First record for Chad. This West African species seems to be very rare east of Nigeria where the only other records are those from Sternfeld (1908) in south-western Cameroon (Chirio & LeBreton 2007). *Atractaspis dahomeyensis* was erroneously reported from Central African Republic by Chippaux (1999) (plots on the distribution map are those of *A. watsoni*). Two of our Baïbokoum specimens were sequenced and proved similar to West African specimens (Portillo et al. 2019).

Atractaspis micropholis Günther, 1872

Material: 2 specimens collected.

Localities: Arningmalik (1), Gouroungali (1).

Remarks: First record for Chad. The occurrence of this species in Ouaddaï extends 900 km eastward the known distribution of this species previously reported from Senegal to Nigeria (Trape et al. 2006, Trape & Mané 2006).

Atractaspis watsoni Boulenger, 1908

Material: 56 specimens collected.

Localities: Bahar (3), Balani (2), Bitea (11), Bon Amdaoud (3), Djarat Abounimir (9), Goulmounbass (1), Guirli (1), Hileborno (3), Kadam Digas (14), Kiéké (1), Mahargal (2), Masarma (1), Zamagouin (5).

Other specimens (coll. MNHN): Mayo Kebbi (1), N'Djaména (2).

Literature records: Gounou-Gaya (Roussel & Villiers 1965, as *Atractaspis microlepidota*), Fort-Lamy (Graber 1966), Maillao, Mayo-Kebbi, N'Djaména (Trape et al. 2006).

Boaedon longilineatus Trape, 2016

Material: 18 specimens collected.

Localities: Bahar (1), Bon Amdaoud (2), Djarat Abounimir (6), Fiengbac (2), Goulmounbass (2), Hileborno (1), Masarma (3), Zamagouin (1).

Other specimens (coll. MNHN): Chari (2), Mayo-Kebbi (1).

Literature records: Gounou-Gaya (Roussel & Villiers 1965, as *B. fuliginosum* forme *lineatum*), Fort-Lamy (Graber 1966, as *B. fuliginosum* forme *lineatum*), Fiengbac, Goulmounbass, Zamagouin (Trape & Mediannikov 2016).

Remarks: This species recently described is currently known from Cameroon and Chad (Trape & Mediannikov 2016). We also attribute to *B. longilineatus* part of the specimens from El Geneina (Darfur, Sudan) attributed to *B. lineatus* by Colley (1946).

Boaedon parolineatus Trape & Mediannikov, 2016

Material: 34 specimens collected.

Localities: Baïbokoum (31), Bitanda (3).

Literature record: Baïbokoum (Trape & Mediannikov 2016).

Remark: This species recently described is currently known from Cameroon, Chad and Central African Republic (Trape & Mediannikov 2016, Trape unpublished).

Boaedon perisilvestris Trape & Mediannikov, 2016

Material: 2 specimens collected.

Locality: Baïbokoum (2).

Literature record: Baïbokoum (Trape & Mediannikov 2016).

Remark: This species recently described is currently known from Chad, Cameroon, SE Nigeria, Gabon, Congo-Brazzaville, D. R. Congo, Central African Republic and South Sudan (Trape & Mediannikov 2016, Nneji et al. 2019, Trape unpublished).

Boaedon subflavus Trape, 2016

Material: 125 specimens collected.

Localities: Bahar (8), Baïbokoum (60), Balani (2), Bitanda (5), Bitea (10), Bon Amdaoud (15), Doureng (1), Goulmounbass (1), Kadam Digas (9), Laobida (4), Mahargal (4), Moundou (3), Tikem (1), Zamagouin (2).

Literature record: Gounou-Gaya (Roussel & Villiers 1965, as *B. fuliginosum* “forme typique”), Fort-Lamy (Graber 1966, as *B. fuliginosum* “forme *fuliginosum*”), Baïbokoum, Balani, Goulmounbass, Kumao, Malgandi, Moundou, Tikem, Yambatchingsou, Zamagouin (Trape & Mediannikov 2016).

Remark: This species recently described is currently known from Cameroon, Central African Republic and Chad (Trape & Mediannikov 2016).

Gonionotophis grantii (Günther, 1863)

Material: 1 specimen collected.

Locality: Baïbokoum (1).

Literature record: a specimen of unknown origin is mapped near Bongor in Chippaux (2006) and Chippaux & Jackson (2019).

Hemirhagerhis nototaenia (Günther, 1864)

Material: 2 specimens collected.

Localities: Baïbokoum (1), Kiéké (1).

Other specimens (coll. MNHN): N’Djaména (1), Niellim (1).

Literature record: N’Djaména (Broadley & Hughes 2000).

Limaformosa crossi (Boulenger, 1895)

Material: 12 specimens collected.

Localities: Baïbokoum (10), Bitanda (1), Zamagouin (1). Other specimen (coll. MNHN): Mayo-Kebbi (1).

Literature record: Gounou-Gaya (Roussel & Villiers 1965).

Remark: One specimen from Baïbokoum was included in the phylogeny and genus-level revision of the African file snakes *Gonionotophis* and *Mehelya* (Broadley et al. 2018).

Lycophidion aff. *capense* (Smith, 1831)

Material: 3 specimens collected.

Localities: Bon Amdaoud (2), Kiéké (1).

Remark: First record for Chad. Our specimens are three males with a single apical pit, a postnasal in contact with the first supralabial, 17-17-15 dorsals, 180-187 ventrals and 32-37 subcaudals. The top of the head and the snout are uniformly blackish, but there are limited white vermiculations on the side of the head. The dorsal scales have a light apical spot increasing in size on the lower lateral rows where they form a light border. The ventrum is uniformly dark except a light border on the more lateral part of the ventrals and white vermiculations on the throat. These specimens probably belong to an undescribed species since they differ from the nearest East-African representative of the *L. capense* complex (*L. capense jacksoni*) by a lower number of subcaudals and a different colour pattern (Broadley & Hughes 1993, Broadley 1996).

Lycophidion semicinctum (Duméril, Bibron & Duméril, 1854)

Material: 20 specimens collected.

Localities: Baïbokoum (8), Bitanda (3), Laobida (1), Moïssala (8).

Other specimens (coll. MNHN): Fort-Archambault (1), Mayo-Kebbi (1).

Literature records: Fort-Archambault, Mayo-Kebbi (Guibé & Roux-Estève 1972), Mayo-Kebbi (Roussel & Villiers 1965, as *Lycophidion irroratum*).

Lycophidion taylori Broadley & Hughes, 1993

Material: 2 specimens collected.

Localities: Bahar (1), Hileborno (1)

Other specimen (coll. MNHN): 20 km E of Abéché (1).

Literature record: Abéché (Broadley & Hughes 1993).

Malpolon moilensis (Reuss, 1834)

Material: 2 specimens collected.

Localities: Ennedi 17°32’N / 21°29’E (1), Ouadi Haouach (1).

Literature record: Ennedi 17°32’N / 21°29’E (Trape 2015, as *Rhagerhis moilensis*).

Remarks: The Ennedi specimen was the first record for Chad. We follow Figueroa et al. (2016) in reattributing this species to the genus *Malpolon*.

Micrelaps vaillanti (Mocquard, 1888)

Material: 7 specimens collected.

Localities: Bon Amdaoud (4), Kiéké (1), Mahargal (2).

Remarks: First record for Chad. The occurrence of this species in Sila and Salamat provinces, including the Zakouma National Park, extends 1,200 km westward the distribution of this species known from East Africa and Kurdufan in Sudan (Rasmussen 2002).

Prosymna ambigua Bocage, 1876

Material: 1 specimen collected.

Locality: Moïssala (1).

Remark: First record for Chad and northernmost record of these wet Congolese savanna species.

Prosymna collaris (Sternfeld, 1908)

Material: 10 specimens collected.

Localities: Bahar (4), Balani (2), Djarat Abounimir (1), Fiengbac (2), Moundou (1).

Other specimens (coll. MNHN): Mayo-Kebbi (3).

Literature records: Gounou-Gaya (Roussel & Villiers 1965, as *Prosymna meleagris*), Abéché, Fort-Lamy (Graber 1966, as *Prosymna meleagris*), Maillao, Mayo-Kebbi (Chirio et al. 2011, as *Prosymna greigerti collaris*).

Remarks: The occurrence of both *collaris* and *greigerti* patterns at Bahar (Sila province), Djarat Abounimir (Salamat province) and Moundou/Bitanda (Logone oriental province) support the view that these two taxa are best treated as separate species. As well documented in

other parts of West and Central Africa (Chirio et al. 2011) and confirmed in Chad, most of their respective ranges are distinct (mainly sahelian for *collaris* and sudanese for *greigerti*).

Prosymna greigerti Mocquard, 1906

Material: 17 specimens collected.

Localities: Bahar (4), Baïbokoum (4), Bitanda (1), Bon Amdaoud (1), Djarat Abounimir (15), Kadam Digas (3), Moïssala (1).

Remark: First record for Chad, all previous literature reports correspond to *P. collaris*.

Psammophis aegyptius Marx, 1958

Material: No specimen collected.

Other specimen (coll. MNHN): Dejemine Batha (1).

Literature records: Abéché, Bahr el Ghazal, Fort-Lamy (Graber 1966, as *Psammophis schokari*), puits de Tirenno (Beck & Huard 1969, as *Psammophis schokari*).

Psammophis afroccidentalis Trape, Böhme & Medianikov, 2019

Material: 1 specimen collected.

Locality: Mao (1).

Literature record: Mao (Trape et al. 2019).

Remarks: This specimen was included in the recent review and molecular study of the *Psammophis sibilans* group in Africa north of 12°S (Trape et al. 2019). It was the only specimen from Chad belonging to *Psammophis afroccidentalis*, a species new for Chad widely distributed in West Africa and previously confounded with *P. sibilans*. The specimens from other areas of Chad classically assigned to *P. sibilans* belong to *P. rukwae* or *P. sudanensis*.

Psammophis elegans elegans (Shaw, 1802)

Psammophis elegans univittatus Perret, 1961

Material: 16 specimens collected, including 14 *univittatus*.

Localities: Mao (2 *elegans*), Baïbokoum (6 *univittatus*), Bon Amdaoud (7 *univittatus*), Djarat Abounimir (1 *univittatus*).

Remarks: First record for Chad. Reported in error on maps of Chippaux (2006) and Chippaux & Jackson (2019). Interestingly Mao, north of Lake Chad, is the only known locality in Chad and the easternmost record for both *P. afroccidentalis* and the nominative subspecies of *P. elegans*.

Psammophis lineatus (Duméril, Bibron & Duméril, 1854)

Material: 64 specimens collected.

Localities: Baïbokoum (15), Bitanda (2), Goulmounbass (42), Léré (2), Zamagouin (3).

Other specimen (coll. MNHN): Mayo-Kebbi (1).

Literature record: Gounou-Gaya (Roussel & Villiers 1965, as *Dromophis lineatus*), Fort-Lamy (Graber 1966, as *Dromophis lineatus*).

Psammophis mossambicus (Peters, 1882)

Material: 61 specimens collected.

Localities: Baïbokoum (41), Bitanda (1), Laobida (6), Moïssala (12), Moundou (1).

Literature record: Fort-Archambault (Loveridge 1940, as *Psammophis sibilans phillipsii*).

Remarks: Several specimens were included in the recent review and molecular study of the *Psammophis sibilans* group in Africa north of 12°S (Trape et al. 2019). This study has shown that *P. phillipsii* is restricted to West Africa and that *P. mossambicus* is distributed both in southern Africa and north, east and south of the Congolese forest block.

Psammophis praeornatus gribinguiensis (Angel, 1921)

Material: No specimen collected.

Literature records: Logone region (Loveridge 1940, as *Dromophis praeornatus gribinguiensis*), Mayo-Kebbi (Roussel & Villiers 1965, as *Dromophis praeornatus*), Zakouma (Dejace 2002).

Psammophis rukwae Broadley, 1966

Material: 160 specimens.

Localities: Bahar (11), Baïbokoum (30), Birim (7), Bitea (7), Bon Amdaoud (3), Djarat Abounimir (37), Fiengbac (2), Goulmounbass (8), Gouroungali (1), Hileborno (2), Kadam Digas (5), Kiéké (10), Mahargal (11), Masarma (8), Matafo 2 (2), Mataya (2), N'Djaména Farcha (4), N'Djaména Gassi (5), Tikem (1), Zamagouin (4).

Literature records: Fort-Archambault (Loveridge 1940, as *Psammophis sibilans*), Gounou-Gaya (Roussel & Villiers 1965, as *Psammophis sibilans sibilans* forme typique), Fort-Lamy, Bokoro, Oum Chalouba (Graber 1966, as *Psammophis sibilans*, pro parte).

Remarks: Several specimens were included in the recent review and molecular study of the *Psammophis sibilans* group in Africa north of 12°S (Trape et al. 2019). *P. rukwae* ranges from East Africa to Chad and Cameroon and is replaced by *P. afroccidentalis* in West Africa, with *P. sibilans* restricted to Egypt, Sudan and Ethiopia.

Psammophis sudanensis Werner, 1919

Material: 174 specimens collected.

Localities: Arningmalick (4), Bahar (2), Baïbokoum (16), Balani (1), Bitea (30), Bon Amdaoud (25), Djarat Abounimir (45), Doureng (1), Goulmounbass (3), Guirli (1), Hileborno (2), Kadam Digas (13), Kiéké (2), Mahargal (15), Masarma (3), Moïssala (8), Moundou (1), Zamagouin (3).

Other specimens (coll. MNHN): Bol (1), N'Djaména (6).

Literature records: Gounou-Gaya (Roussel & Villiers 1965, as *Psammophis sibilans sibilans* pro parte), Fort-Lamy (Graber 1966, as *Psammophis sibilans* pro parte). Remarks: First record for Chad. Paradoxically, *P. sudanensis* is the most common snake in the Sahel and Sudan savannas of Chad. Almost all specimens have the lineated head and dorsal pattern typical of this species but some rare specimens are plain (e.g., IRD 2871.N from Arningmalick and IRD 2884.N from Bitea). Several specimens were included in the recent review and molecular study of the *Psammophis sibilans* group in Africa north of 12°S (Trape et al. 2019).

Rhamphiophis oxyrhynchus (Reinhardt, 1843)

Material: 55 specimens collected.

Localities: Bahar (1), Baïbokoum (21), Bitanda (11), Bon Amdaoud (8), Fiengbac (1), Goulmounbass (3), Kadam Digas (3), Laobida (3), Moïssala (2), Moundou (2).

Other specimens (coll. MNHN): Fort-Archambault (1), Maillao (1), Mayo-Kebbi (4).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Fort-Lamy (Graber 1966), Sarh (Chirio & Ineich 1991).

Rhamphiophis rostratus Peters, 1854

Material: 1 specimen collected.

Locality: Bitea (1).

Remarks: First record for Chad, extending 950 km westward the distribution of this species known from Kurdufan in Sudan, and also distributed in eastern and southern Africa.

Family Elapidae Boie, 1827

Elapsoidea laticincta (Werner, 1919)

Material: 2 specimens collected.

Locality: Baïbokoum (2).

Literature record: Goré (Jakobsen 1997).

Remarks: The holotype designated by Werner is a female from Kadugli (Sudan) with 150 ventrals, 13 subcaudals, 13 pale bands on the dorsum of body and tail. The head is pale with forward prolongation of first dark nuchal band onto frontal where it is forked (see picture of the holotype in Jakobsen [1997]). This species has been reported from Sudan, South Sudan, D.R. Congo, Central African Republic, Cameroon and Chad (Jakobsen 1997, Chirio & LeBreton 2007). According to Broadley (1971, 1998) and Jakobsen (1997) this species is possibly conspecific with *E. semiannulata moebiusi*. However, according to Jakobsen (1997) the two taxa can be distinguished on the basis of the number of ventral scales (*laticincta* 139–151 in males and 140–150 in females, *moebiusi* 151–167 in males and 148–161 in females) and the dorsal pattern (*laticincta* 8–17 pale bands, usually with white reticulate pattern, *moebiusi* 10–21 bands without reticulate pattern). Two specimens from Baïbokoum (one male and

one female with 150 ventrals) fall in the range of variation of *E. laticincta* and present head and dorsal patterns similar to those of the holotype of *E. laticincta*.

Elapsoidea semiannulata moebiusi (Werner, 1897)

Material: 16 specimens collected.

Localities: Baïbokoum (14), Moïssala (2).

Other specimens (MNHN): Fort Archambault (1), Mayo-Kebbi (2).

Literature records: Gounou-Gaya (Roussel & Villiers 1965, as *Elapsoidea decosteri moebiusi*), Fort-Archambault, Mayo-Kebbi (Broadley 1971, 1998).

Remarks: Males (n = 10) have 152–157 ventrals and the only female 153. The number of pale bands range from 10 to 14 (body only), and from 11 to 17 when tail is included. The head pattern of the youngest specimens is not different of those of the two specimens we attributed to *E. laticincta* and the holotype from Kadugli. Further studies are needed to clarify the status of populations attributed to these two taxa in Chad and neighbouring countries of Central Africa.

Naja haje (Linnaeus, 1758)

Material: 22 specimens collected.

Localities: Baïbokoum (3), Birim (2), Bitanda (2), Bitea (1), Bon Amdaoud (3), Doureng (1), Mao (3), Masarma (1), Matafo 2 (4), Moïssala (1), Moundou (1).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Abéché, Fort-Lamy (Graber 1966).

Naja nigricollis Reinhardt, 1843

Material: 27 specimens collected.

Localities: Baïbokoum (8), Bon Amdaoud (4), Fiengbac (1), Goulmounbass (1), Laobida (2), Moïssala (9), Zama-gouin (2).

Other specimens (MNHN): Fort-Lamy (1), Mayo-Kebbi (1).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Abéché, Fort-Lamy (Graber 1966).

Naja nubiae Wüster & Broadley, 2003

Material: no specimen collected.

Other specimens (MNHN): Nord du Mont Ennedi (1), Ouadi Basso (1).

Literature records: Archei, Ennedi, Oued Basso (Wüster & Broadley 2003, Trape 2015).

Naja savannula Broadley, Trape, Chirio & Wüster, 2018

Material: 1 specimen collected.

Locality: Mbouira near Baïbokoum (1).

Literature record: Mbouira (Wüster et al. 2018).

Remarks: First record for Chad and easternmost record for this West African savanna species (Wüster et al. 2018). A 218 cm long specimen collected on the roof of a hut located on the banks of the Mbéré River which separates Chad from Cameroon.

Naja subfulva Laurent, 1955

Material: 2 specimens collected.

Localities: Birim (1), Bitanda (1).

Other specimen (coll. MNHN): Djintilo (1).

Literature records: Fort-Archambault (Graber 1966, as *Naja melanoleuca*), Lac Tchad (Buffrénil 1992, as *Naja melanoleuca*).

Remarks: The Birim specimen, on the northern edge of Lake Chad near Bor, is the northernmost record for this species (see Wüster et al. 2018).

Family Viperidae Opperl, 1811

Bitis arietans (Merrem, 1820)

Material: 8 specimens collected and 2 specimens observed but non preserved.

Localities: Baïbokoum (3), Bitea (1), Bon Amdaoud (1), Matafo 2 (1), Moïssala (2).

Sight record: Ouadi Sofoya (A. S. Djiddi, unpublished).

Photographic record: near Torboul (A. S. Djiddi, unpublished).

Other specimens (coll. MNHN): Bol (1), Maillao (2), N'Djaména (1).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Abéché, Ati, Fort-Lamy (Graber 1966), Zakouma (Dejace 2002).

Causus maculatus (Hallowell, 1842)

Material: 18 specimens collected.

Localities: Baïbokoum (8), Bitanda (1), Bon Amdaoud (8), Laobida (1).

Other specimens (coll. MNHN): Fort-Archambault (1), Mayo-Kebbi (1), Niellim (4).

Literature records: Gounou-Gaya (Roussel & Villiers 1965), Chari, Mayo-Kebbi, Melfi, N'Djaména, Sarh (Hughes 1977), see also square degree map of Rasmussen (2005b).

Causus resimus (Peters, 1862)

Material: 28 specimens collected.

Localities: Bahar (2), Bon Amdaoud (1), Djarat Abounimir (20), Mahargal (2), N'Djaména Gassi (2), Tikem (1). Other specimens (coll. MNHN): Bol (2), Chari (1), Mayo-Kebbi (3), Maillao (10), N'Djaména (13), Niellim (4).

Literature records: Mayo Kebbi (Roussel & Villiers 1965), Abéché, Ati, Fort-Foureau, Fort-Lamy (Graber 1966, as *Causus rhombeatus*), Chari, Mayo-Kebbi, N'Djaména (Hughes 1977), see also square degree map of Rasmussen (2005b).

Cerastes cerastes (Linnaeus, 1758)

Material: 3 specimens collected.

Localities: Faya Largeau (1), Ounianga Serir (1), Oum Chalouba (1).

Literature records: Aozou, Yebbi-Bou (Pellegrin 1935), Ennedi, Bahr-el-Ghazal (Graber 1966), Aozou, Yebbi-Bou, Fada (Trape 2015).

Cerastes vipera (Linnaeus, 1758)

Material: no specimen collected.

Literature records: Tibesti (Graber 1966), Fada (Trape 2015).

Echis leucogaster Roman, 1972

Material: 40 specimens collected.

Localities: Arningmalik (4), Bahar (2), Bitea (7), Doureng (2), Fada (2), Guirli (1), Kadam Digas (4), Mahargal (10), Masarma (6), Mongo (1), Oum Chalouba (1).

Other specimens: Fada (1, coll. MNHN), 35 km SW of Ati (1, coll. IRD).

Literature records: Abéché, Ouaddai, Bahr-el-Ghazal, Bisneye, Zaghaoa (Graber 1966, as *Echis carinatus*), between Bardaï and Aozou (Beck & Huard 1969, as *Echis carinata*), between Bardaï and Aozou, Fada (Trape 2015).

Remarks: Most specimens have a clear uniform venter, but some specimens with a spotted venter, at least on each side of the ventrals, were collected in southeastern Chad (6 of 13 specimens from Bahar, Guirli and Mahargal). Meristic data were similar to those of unspotted specimens. In West Africa, specimens of *E. leucogaster* with a spotted venter are not rare in western Mali and central Senegal (Trape & Mané 2017). Pending for comprehensive molecular studies including all the various taxa and populations of the *Echis pyramidum* complex in Africa we prefer to keep binomials for *E. leucogaster*.

Echis romani Trape 2018

Material: 155 specimens collected.

Localities: Baïbokoum (127), Bitanda (6), Fiengbac (1), Goulmounbass (1), Laobida (14), Zamagouin (6).

Other specimens (coll. MNHN): Maillao (1), Mayo-Kebbi (1).

Literature records: Gounou-Gaya, Bongor (Roussel & Villiers 1965, as *Echis carinatus*), Maillao, Mayo-Kebbi (Hughes 1976, as *Echis ocellatus*), Baïbokoum, Bitanda, Fiengbac, Goulmounbass, Laobida, Yambatchingsou, Zamagouin (Trape 2018).

Remark: This recently described species of the *Echis ocellatus* complex is currently known from Nigeria, Cameroon, Chad, Central African Republic and Sudan (Trape 2018, Trape unpublished).

DISCUSSION

The two most important previous collections of snakes from Chad covered both Sudanese (Roussel & Villiers 1965) and Sahelian (Graber 1966) areas of the country. When adding museum specimens mentioned in works

on certain genera or species, or on the snake fauna of the Saharan part of the country, the number of snakes from Chad mentioned in the literature totalized about 700 specimens belonging to 56 species. We deleted ten of these species (*Tricheilostoma bicolor*, *Boaedon lineatus*, *Boaedon fuliginosus*, *Grayia tholloni*, *Lycophidion irroratum*, *Psammophis schokari*, *Psammophis sibilans*, *Psammophis phillipsi*, *Naja melanoleuca* and *Echis ocellatus*) and reattributed the corresponding specimens to the following species: *Tricheilostoma sundewalli*, *Boaedon longilineatus*, *Boaedon subflavus*, *Grayia smithii*, *Lycophidion semicinctum*, *Psammophis aegyptius*, *Psammophis rukwae*, *Naja subfulva* and *Echis romani*. Among the 1,512 specimens we collected, 66 species were represented, including 27 species that have not been reported before from Chad: *Letheobia weildholzi*, *Myriopholis occipitalis*, *Tricheilostoma sundewalli*, *Crotaphopeltis hippocrepis*, *Dasypeltis sahelensis*, *Natriciteres olivacea*, *Platyceps florulentus*, *Telescopus tripolitanus*, *Aparallactus lunulatus nigrocollaris*, *Atractaspis dahomeyensis*, *Atractaspis micropholis*, *Boaedon longilineatus*, *Boaedon parolineatus*, *Boaedon perisilvestris*, *Boaedon subflavus*, *Lycophidion aff. capense*, *Malpolon moilensis*, *Micrelaps vaillanti*, *Prosymna ambigua*, *Prosymna greigerti*, *Psammophis afroccidentalis*, *Psammophis elegans*, *Psammophis mossambicus*, *Psammophis sudanensis*, *Rhamphiophis rostratus*, *Echis romani*, and *Naja savannula*. In addition, we found in the MNHN collection one specimen of *Spalerosophis diadema cliffordi*, another species not reported before from Chad. Currently, 80 snake species are known from Chad.

As expected, the richest snake fauna was observed in the southern part of the country (07°30'N / 09°00'N) where vegetation is Sudano-Congolese with annual rainfall reaching 1,100–1,300 mm and where 44 species were collected and one additional species is known (Table 3). In a radius of approximately 20 km around Baïbokoum (average rains 1,200 mm according to Mahé et al. [2012]), villagers collected within ten days a total of 505 specimens belonging to 40 species, one of the richest snake fauna for an African savanna area (Fig 8). At Bandafassi in southeastern Senegal (average rains: 1,100 mm) and Mamoroubougou in southern Mali (average rains: 1,000 mm), two Sudan savanna area where 1,282 and 1,064 snakes were collected, 35 and 36 species were represented, respectively (Trape & Mané 2004, 2017).

The most abundant species south of 09°00'N, each one representing at least 5% of the snakes collected, were *Echis romani*, *Boaedon subflavus*, *Psammophis mossambicus*, *Rhamphiophis oxyrhynchus*, *Boaedon parolineatus* and *Psammophis rukwae*. The most remarkable species were *Prosymna ambigua* and *Boaedon perisilvestris* (northernmost limit of these wet Congolese savanna species), *Atractaspis dahomeyensis* and *Naja savannula* (easternmost limit of these West African sa-

vanna species), and *Letheobia weildholzi* and *Myriopholis occipitalis* (rare new species). At Baïbokoum the most abundant species was the deadly viper *Echis romani* which represented 31% of the snakes collected. The number and proportion of specimens of *E. romani* could have been even higher since after a few days we asked the villagers to stop collecting this species. Interestingly, *E. romani* was found only in southwestern Chad and its eastern limit in Chad and Central African Republic is approximately 17°E (Chirio & Ineich 2006, Trape 2018). In Chad this limit corresponds to the seasonally flooded plains of the Logone and Chari rivers system. However, eastward *E. romani* is also widely distributed in the Kordofan province of Sudan (T. Mazuch, personal communication, 2019).

Between 09°00'N and 11°00'N, an area of Sudan savanna, a total of 36 species were collected and eleven additional species are known (Table 3). The most abundant species were *Psammophis lineatus*, *Psammophis sudanensis*, *Psammophis rukwae*, *Boaedon subflavus*, *Echis romani* and *Crotaphopeltis hotamboeia*. The most remarkable species was *Micrelaps vaillanti*, a species previously known only from East Africa and Sudan.

Between 11°00'N and 15°00'N the climate and vegetation are typically Sahelian. A total of 31 species were collected and ten additional species are known (Table 3). The most abundant species were *Psammophis sudanensis*, *Psammophis rukwae*, *Crotaphopeltis hotamboeia*, *Atractaspis watsoni*, *Boaedon subflavus* and *Echis leucogaster*. The abundance of *Crotaphopeltis hotamboeia* was associated to the seasonally flooded areas of the Salamat province where *Crotaphopeltis hippocrepis*, *Crotaphopeltis degeni* and *Causus resimus* – three other amphibian eaters – were also common. Interesting species were *Rhamphiophis rostratus*, *Platyceps florulentus*, *Psammophis elegans univittatus*, *Atractaspis micropholis* and *Natriciteres olivacea*, which all present important range extensions.

North of 15°00'N the climate and vegetation are Sahe-lo-Saharan or Saharan. Our investigations were limited and we collected or observed only four of the 13 species that are known in this area where little data is available (Trape 2015). The most common species is *Echis leucogaster* which occurs both in Ouaddai, Ennedi and Tibesti. *Cerastes cerastes* is also a common species. Probably additional species, both Sahelian and Saharan, occur in northern Ouaddai which has never been investigated.

Bauer et al. (2017) recently reviewed the reptile fauna of Libya. In the two Saharan provinces of Libya closest from Chad (Murzuq and Kufrah), nine species of snakes have been reported, including six species also known from northern Chad (*Platyceps saharicus*, *Spalerosophis diadema cliffordi*, *Malpolon moilensis*, *Psammophis aegyptius*, *Cerastes cerastes* and *Cerastes vipera*), one palearctic species absent from Chad (*Malpolon insignitus*), one species probably present in Chad but not col-

Table 3. Latitudinal distribution of snakes in Chad (our study, 1,512 specimens collected). The 14 species not collected during our study are indicated by a black square (■) with the number of MNHN or literature specimens in brackets. Black triangle (▲) indicates latitudinal occurrence of literature or MNHN specimens when not present at the same latitude in our collection. Latitudes of northernmost records are based on whole data.

* Additional number of species when including literature data and MNHN collection are mentioned in parentheses.

| Species | 7°N | 8°N | 9°N | 10°N | 11°N | 12°N | 13°N | 14°N | ≥15°N | Total | Northernmost record in Chad |
|-----------------------------------|-----|-----|-----|------|------|------|------|------|-------|-------|-----------------------------|
| <i>Platyceps saharicus</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ■(3) | ■(3) | 21°48'N |
| <i>Cerastes cerastes</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ▲ | 3 | 3 | 21°48'N |
| <i>Psammophis aegyptius</i> | 0 | 0 | 0 | 0 | 0 | ■(1) | ■(2) | ■(1) | ■(1) | ■(5) | 21°34'N |
| <i>Echis leucogaster</i> | 0 | 0 | 0 | 0 | 4 | 20 | 9 | 4 | 3 | 40 | 21°30'N |
| <i>Cerastes vipera</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ■(2) | ■(2) | 21°20'N |
| <i>Myriopholis lanzai</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ■(1) | ■(1) | 17°55'N |
| <i>Malpolon moilensis</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 17°32'N |
| <i>Naja nubiae</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ■(3) | ■(3) | 17°30'N |
| <i>Telescopus obtusus</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ■(1) | ■(1) | 17°12'N |
| <i>Eryx colubrinus</i> | 0 | 0 | 0 | 0 | 0 | 4 | 11 | ▲ | ▲ | 15 | 16°32'N |
| <i>Bitis arietans</i> | 3 | 2 | ▲ | 1 | ▲ | ▲ | 2 | 0 | 2 | 10 | 15°57'N |
| <i>Psammophis rukwae</i> | 30 | 0 | 7 | 21 | 46 | 39 | 17 | 0 | ▲ | 160 | 15°48'N |
| <i>Spalerosophis diadema</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ■(1) | ■(1) | 15°22'N |
| <i>Eryx muelleri</i> | 0 | 0 | ▲ | ▲ | 0 | 9 | ▲ | ▲ | 0 | 9 | 14°30'N |
| <i>Psammophis afroccidentalis</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 14°08'N |
| <i>Psammophis elegans</i> | 6 | 0 | 0 | 7 | 1 | 0 | 0 | 2 | 0 | 16 | 14°08'N |
| <i>Naja haje</i> | 3 | 4 | ▲ | 3 | 0 | 1 | 8 | 3 | 0 | 22 | 14°08'N |
| <i>Platyceps florulentus</i> | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 6 | 14°02'N |
| <i>Atractaspis micropholis</i> | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 14°02'N |
| <i>Psammophis sudanensis</i> | 16 | 10 | 4 | 30 | 60 | 21 | 31 | 4 | 0 | 176 | 14°02'N |
| <i>Boaedon subflavus</i> | 60 | 8 | 9 | 16 | 9 | 12 | 11 | 0 | 0 | 125 | 13°54'N |
| <i>Naja nigricollis</i> | 8 | 9 | 5 | 5 | 0 | ▲ | ▲ | 0 | 0 | 27 | 13°50'N |
| <i>Meizodon semiornatus</i> | 0 | 0 | 0 | 0 | 0 | 1 | ▲ | 0 | 0 | 1 | 13°50'N |
| <i>Lycophidion taylori</i> | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 13°50'N |
| <i>Prosymna collaris</i> | 0 | 1 | 4 | 0 | 1 | 4 | ▲ | 0 | 0 | 10 | 13°50'N |
| <i>Atractaspis watsoni</i> | 0 | 0 | 7 | 5 | 26 | 7 | 11 | 0 | 0 | 56 | 13°30'N |
| <i>Rhamphiophis rostratus</i> | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 13°30'N |
| <i>Myriopholis boueti</i> | 0 | 0 | 0 | 3 | 1 | 4 | 1 | 0 | 0 | 9 | 13°30'N |
| <i>Python sebae</i> | 0 | 0 | 1 | 0 | 4 | 0 | 2 | 0 | 0 | 7 | 13°30'N |
| <i>Telescopus tripolitanus</i> | 0 | 0 | 0 | 9 | 0 | 1 | 2 | 0 | 0 | 12 | 13°30'N |
| <i>Dasypeltis gansi</i> | 8 | 2 | 4 | 0 | 0 | 0 | ▲ | 0 | 0 | 14 | 13°28'N |
| <i>Causus resimus</i> | 0 | 0 | 2 | 1 | 20 | 5 | ▲ | 0 | 0 | 28 | 13°28'N |
| <i>Natriciteres olivacea</i> | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 13°26'N |
| <i>Naja subfulva</i> | 0 | 1 | ▲ | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 13°26'N |
| <i>Crotaphopeltis hotamboeia</i> | 18 | 7 | 3 | 17 | 56 | 21 | ▲ | 0 | 0 | 122 | 13°13'N |
| <i>Dasypeltis sahelensis</i> | 0 | 0 | 0 | 2 | 2 | 3 | 0 | 0 | 0 | 7 | 12°40'N |
| <i>Afrotrophlops punctatus</i> | 9 | 2 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 15 | 12°40'N |
| <i>Boaedon longilineatus</i> | 0 | 0 | 3 | 4 | 7 | 4 | 0 | 0 | 0 | 18 | 12°33'N |
| <i>Micrelaps vaillanti</i> | 0 | 0 | 0 | 5 | 0 | 2 | 0 | 0 | 0 | 7 | 12°07'N |
| <i>Afrotrophlops lineolatus</i> | 0 | 0 | 0 | 0 | ■(2) | ■(2) | 0 | 0 | 0 | ■(4) | 12°06'N |
| <i>Crotaphopeltis degeni</i> | 0 | 0 | 2 | 13 | 7 | 1 | 0 | 0 | 0 | 23 | 12°06'N |
| <i>Scaphiophis albopunctatus</i> | 6 | 0 | 3 | 2 | 0 | ▲ | 0 | 0 | 0 | 11 | 12°06'N |
| <i>Hemirhagerrhis nototaenia</i> | 1 | 0 | ▲ | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 12°06'N |
| <i>Psammophis lineatus</i> | 15 | 2 | 5 | 42 | 0 | ▲ | 0 | 0 | 0 | 64 | 12°06'N |
| <i>Causus maculatus</i> | 8 | 1 | 1 | 8 | ▲ | ▲ | 0 | 0 | 0 | 18 | 12°06'N |
| <i>Philothamnus irregularis</i> | 18 | 0 | 4 | 0 | 0 | ▲ | 0 | 0 | 0 | 22 | 12°06'N |

Table 3. continued.

| | | | | | | | | | | | |
|--|------------|-------------|------------|--------------|------------|------------|------------|--------------|-------------|--------------|-------------|
| <i>Rhamphiophis oxyrhynchus</i> | 21 | 15 | 4 | 11 | 3 | 1 | 0 | 0 | 0 | 55 | 12°06'N |
| <i>Prosymna greigerti</i> | 4 | 2 | 0 | 1 | 6 | 4 | 0 | 0 | 0 | 17 | 12°03'N |
| <i>Philothamnus</i> aff. <i>semivariiegatus</i> | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 11°35'N |
| <i>Echis romani</i> | 127 | 6 | 21 | 1 | ▲ | 0 | 0 | 0 | 0 | 155 | 11°35'N |
| <i>Crotaphopeltis hippocrepis</i> | 2 | 1 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 14 | 11°01'N |
| <i>Psammophis praeornatus</i> | 0 | 0 | ■(1) | ■(1) | 0 | 0 | 0 | 0 | 0 | ■(2) | 10°53'N |
| <i>Lycophidion</i> aff. <i>capense</i> | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 10°41'N |
| <i>Myriopholis adleri</i> | 0 | 0 | 0 | ■(3) | 0 | 0 | 0 | 0 | 0 | ■(3) | 10°16'N |
| <i>Python regius</i> | 5 | 0 | 1 | ▲ | 0 | 0 | 0 | 0 | 0 | 6 | 10°16'N |
| <i>Amblyodipsas unicolor</i> | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 09°47'N |
| <i>Meizodon coronatus</i> | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 09°37'N |
| <i>Tricheilostoma sundewalli</i> | 1 | 0 | ▲ | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 09°37'N |
| <i>Dasyplectis confusa</i> | 2 | 0 | ▲ | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 09°37'N |
| <i>Dispholidus typus</i> | 5 | 1 | ▲ | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 09°37'N |
| <i>Grayia smithii</i> | 0 | 0 | ■(2) | 0 | 0 | 0 | 0 | 0 | 0 | ■(2) | 09°37'N |
| <i>Telescopus variegatus</i> | 3 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 09°37'N |
| <i>Limaformosa crossi</i> | 10 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 09°37'N |
| <i>Lycophidion semicinctum</i> | 8 | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 09°37'N |
| <i>Elapsoidea semiannulata</i> | 14 | 2 | ▲ | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 09°37'N |
| <i>Meizodon regularis</i> | 0 | 0 | ■(1) | 0 | 0 | 0 | 0 | 0 | 0 | ■(1) | 09°29'N |
| <i>Psammophis mossambicus</i> | 41 | 14 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 09°13'N |
| <i>Boaedon parolineatus</i> | 31 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 09°12'N |
| <i>Atractaspis aterrima</i> | 0 | 0 | ■(1) | 0 | 0 | 0 | 0 | 0 | 0 | ■(1) | 09°08'N |
| <i>Philothamnus bequaerti</i> | 1 | 1 | ▲ | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 09°08'N |
| <i>Philothamnus hughesi</i> | 0 | ■(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ■(1) | 08°30'N (?) |
| <i>Myriopholis occipitalis</i> | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 08°20'N |
| <i>Prosymna ambigua</i> | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 08°20'N |
| <i>Elapsoidea laticincta</i> | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 07°55'N |
| <i>Letheobia weildholzi</i> | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 07°44'N |
| <i>Aparallactus lunulatus</i> | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 07°44'N |
| <i>Atractaspis dahomeyensis</i> | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 07°44'N |
| <i>Boaedon perisilvestris</i> | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 07°44'N |
| <i>Gonionotophis granti</i> | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 07°44'N |
| <i>Naja savannula</i> | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 07°35'N |
| Number of specimens | 505 | 112 | 111 | 214 | 265 | 165 | 114 | 16 | 10 | 1512 | |
| Number of species | 40 | 28 | 26 | 25 | 18 | 21 | 16 | 7 | 3 | 66 | |
| Cumulated number of species by ecoregion* | | 44 | | 36 | | | | 31 | 4 | 66 | |
| | | (+1) | | (+12) | | | | (+10) | (+9) | (+14) | |

lected until now (*Litorhynchus diadema*) and one species with doubtful mentions from Chad and southeastern Libya (*Psammophis schokari*). Interestingly, no *Echis* species has been reported from Murzuk and Kufrah districts (Bauer et al. 2017).

Compared to Niger (51 species) and Mali (65 species) (Trape & Mané 2015, 2017), two other large African countries extending both in the Sahara, Sahel and Sudan savanna, the snake fauna of Chad appears more diversified. Of 103 taxa (101 species and two additional subspecies) known in at least one of these three countries,

only 45 (43.7 %) were reported both from Mali and Chad (Table 4). Among the other taxa, 28 taxa known in Chad but not in Mali are typical Central African species or East African “invaders” (Hughes 1985), 16 taxa known in Mali but not in Chad are typical West African species, and 15 taxa, including two taxa reported only from Niger (*Myriopholis cairi* and *Litorhynchus diadema*), were not collected in Chad (three taxa) or in Mali (14 taxa) probably or possibly due to insufficient sampling.

Compared to Cameroon (Chirio & Lebreton 2007), all species known from this country north of 08°N were also

Table 4. Comparison of the snake fauna of Chad, Niger and Mali. Data for Niger and Mali are from Trape & Mané (2015, 2017).

| Species | Chad | Niger | Mali | Species | Chad | Niger | Mali |
|--|------|-------|------|--|------|-------|------|
| <i>Afrotyphlops lineolatus</i> | X | X | X | <i>Telescopus obtusus</i> | X | | |
| <i>Afrotyphlops punctatus</i> | X | X | X | <i>Telescopus tripolitanus</i> | X | X | X |
| <i>Letheobia weildholzi</i> | X | | | <i>Telescopus variegatus</i> | X | | X |
| <i>Myriopholis adleri</i> | X | X | X | <i>Amblyodipsas unicolor</i> | X | | X |
| <i>Myriopholis algeriensis</i> | | X | X | <i>Aparallactus lunulatus nigrocollaris</i> | X | | |
| <i>Myriopholis boueti</i> | X | X | X | <i>Atractaspis aterrima</i> | X | | X |
| <i>Myriopholis cairi</i> | | X | | <i>Atractaspis dahomeyensis</i> | X | | X |
| <i>Myriopholis lanzai</i> | X | | | <i>Atractaspis micropholis</i> | X | X | X |
| <i>Myriopholis occipitalis</i> | X | | | <i>Atractaspis watsoni</i> | X | X | X |
| <i>Rhinoguinia magna</i> | | | X | <i>Boaedon fuliginosus</i> | | X | X |
| <i>Rhinoleptus koniagui</i> | | | X | <i>Boaedon lineatus</i> | | X | X |
| <i>Tricheilostoma bicolor</i> | | X | X | <i>Boaedon longilineatus</i> | X | | |
| <i>Tricheilostoma sundewalli</i> | X | | | <i>Boaedon paralineatus</i> | X | | |
| <i>Eryx colubrinus</i> | X | X | | <i>Boaedon perisilvestris</i> | X | | |
| <i>Eryx muelleri</i> | X | X | X | <i>Boaedon subflavus</i> | X | | |
| <i>Python regius</i> | X | X | X | <i>Gonionotophis granti</i> | X | X | X |
| <i>Python sebae</i> | X | X | X | <i>Hemirhagerrhis nototaenia</i> | X | X | |
| <i>Afronatrix anoscopus</i> | | | X | <i>Limaformosa crossi</i> | X | X | X |
| <i>Bamanophis dorri</i> | | | X | <i>Lycophidion aff. capense</i> | X | | |
| <i>Crotaphopeltis degeni</i> | X | | | <i>Lycophidion albomaculatum</i> | | | X |
| <i>Crotaphopeltis hippocrepis</i> | X | | X | <i>Lycophidion irroratum</i> | | | X |
| <i>Crotaphopeltis hotamboeia</i> | X | X | X | <i>Lycophidion semicinctum</i> | X | X | X |
| <i>Dasypeltis confusa</i> | X | | X | <i>Lycophidion taylori</i> | X | | |
| <i>Dasypeltis gansi</i> | X | X | X | <i>Malpolon moilensis</i> | X | X | X |
| <i>Dasypeltis latericia</i> | | | X | <i>Micrelaps vaillanti</i> | X | | |
| <i>Dasypeltis sahelensis</i> | X | X | X | <i>Polemon neuwiedi</i> | | | X |
| <i>Dispholidus aff. typus</i> | X | | X | <i>Prosymna ambigua</i> | X | | |
| <i>Grayia smithii</i> | X | X | X | <i>Prosymna collaris</i> | X | X | X |
| <i>Litorhynchus diadema</i> | | X | | <i>Prosymna greigerti</i> | X | | X |
| <i>Meizodon coronatus</i> | X | X | X | <i>Psammophis aegyptius</i> | X | X | |
| <i>Meizodon regularis</i> | X | | | <i>Psammophis afroccidentalis</i> | X | X | X |
| <i>Meizodon semiornatus tchadensis</i> | X | | | <i>Psammophis elegans elegans</i> | X | X | X |
| <i>Natriciteres olivacea</i> | X | X | X | <i>Psammophis elegans univittatus</i> | X | X | |
| <i>Philothamnus bequaerti</i> | X | | | <i>Psammophis lineatus</i> | X | X | X |
| <i>Philothamnus hughesi</i> | X | | | <i>Psammophis mossambicus</i> | X | | |
| <i>Philothamnus irregularis</i> | X | X | X | <i>Psammophis phillipsi</i> | | | X |
| <i>Philothamnus aff. semivariiegatus</i> | X | X | X | <i>Psammophis praeornatus gribingu- iensis</i> | X | | |
| <i>Platyceps florulentus</i> | X | | | <i>Psammophis praeornatus praeor- natus</i> | | X | X |
| <i>Platyceps saharicus</i> | X | | | <i>Psammophis rukwae</i> | X | | |
| <i>Scaphiophis albopunctatus</i> | X | | | <i>Psammophis schokari</i> | | | X |
| <i>Spalerosophis diadema cliffordi</i> | X | X | X | | | | |

Table 4. Continued.

| Species | Chad | Niger | Mali |
|---|------|-------|------|
| <i>Psammophis sudanensis</i> | X | X | |
| <i>Rhamphiophis oxyrhynchus</i> | X | X | X |
| <i>Rhamphiophis rostratus</i> | X | | |
| <i>Elapsoidea laticincta</i> | X | | |
| <i>Elapsoidea semiannulata moebiusi</i> | X | X | X |
| <i>Naja haje</i> | X | X | X |
| <i>Naja katiensis</i> | | | X |
| <i>Naja nigricollis</i> | X | X | X |
| <i>Naja nubiae</i> | X | X | |
| <i>Naja savannula</i> | X | X | X |
| <i>Naja senegalensis</i> | | X | X |
| <i>Naja subfulva</i> | X | | |
| <i>Bitis arietans</i> | X | X | X |
| <i>Causus maculatus</i> | X | X | X |
| <i>Causus resimus</i> | X | | |
| <i>Cerastes cerastes</i> | X | X | X |
| <i>Cerastes vipera</i> | X | X | X |
| <i>Echis jogeri</i> | | | X |
| <i>Echis leucogaster</i> | X | X | X |
| <i>Echis ocellatus</i> | | X | X |
| <i>Echis romani</i> | X | | |

collected in Chad, with the exception of only three species: *Psammophylax togoensis*, which is rare in West and Central Africa, *Naja katiensis*, a species common in the West African Sudan savanna but reaching its eastern limit in Cameroon near the Nigerian border, and *Philothamnus heterodermus*, a forest species with a single record in Cameroon north of 08°N (Chirio & LeBreton 2007). A fourth species not found in Chad, *Afronatrix anoscopus*, was mapped in error from northern Cameroon by these authors (M. LeBreton, pers. comm.), then by Chipaux & Jackson (2019). Likewise, when excluding Sahelo-Saharan species, most species distributed in Chad are also known from Cameroon, with only four species likely to reach their westernmost limit in central Chad: *Myriopholis occipitalis*, *Micrelaps vaillanti*, *Rhamphiophis rostratus* and *Lycophidion taylori*.

Snakes presenting a high risk of death for humans in case of bite were distributed in all regions of the country and represented 17.7 % of the total number of snakes collected. They belonged to (a) four viperid species: *Echis romani* (10.3 %), *Echis leucogaster* (2.6 %), *Bitis arietans* (0.6 %), and *Cerastes cerastes* (0.2 %), (b) four elapid species: *Naja nigricollis* (1.8 %), *Naja haje* (1.5

%), *Naja subfulva* (0.1 %) and *Naja savannula* (0.1 %), and (c) one colubrid species: *Dispholidus aff. typus* (0.4 %). Atractaspids (4.1 %), in particular *Atractaspis watsoni*, were also common and they are known to be occasionally responsible for fatal envenomations (Spawls & Branch 2020). The distribution of *Echis romani* appears limited to the southwest of the country where it is clearly a major medical problem. Several dozens of cases of *Echis romani* bites are hospitalized each year at Baïbokoum. Although antivenoms were provided to district hospitals by the Ministry of Health, until recently they were not adapted to the species of snakes encountered in Chad (they were manufactured in India where non-african snakes were used in their production) and modalities of administration were often unsatisfactory, with insufficient dosage in case of severe envenomation. In Chad as in other countries of tropical Africa there is an urgent need to improve access to effective antivenoms and to train health workers for adequate management of snakebite.

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APPENDIX I

List of collected specimens, locality, and collection number (IRD Dakar and PNL N'Djaména)

Afrotyphlops punctatus. Baïbokoum: 2051.N, 2151.N, 2258.N, 2259.N, 2261.N, 2296.N, 2303.N, 2304.N, 2305.N; Bitanda: 2605.N; Bon Amdaoud: 1967.N, 3041.N, 3066.N; Moundou (Belaba): 2622.N; Zamagouin: 2561.N.

Amblyodipsas unicolor. Baïbokoum: 2209.N, 2286.N; Moïssala: 2710.N; Tikem (Goundwaye): 2555.N.

Aparallactus lunulatus nigrocollaris. Baïbokoum: 2158.N, 2178.N, 2366.N, 2403.N.

Atractaspis dahomeyensis. Baïbokoum: 2197.N, 2278.N, 2293.N, 2307.N.

Atractaspis micropholis. Arningmalik: 1833.N; Gouroungali: 1873.N.

Atractaspis watsoni. Bahar: 2987.N, 2988.N, 3003.N; Balani: 2523.N, 2565.N; Bitea: 1843.N, 1854.N, 1863.N, 1866.N, 2877.N, 2878.N, 2896.N, 2897.N, 2928.N, 2929.N, 2930.N; Bon Amdaoud: 3056.N, 3061.N, 3113.N; Djarat Abounimir: 1938.N, 3138.N, 3139.N, 3140.N, 3157.N, 3158.N, 3159.N, 3165.N, 3166.N; Goulmounbass: 2649.N; Guirli: 2921.N; Hileborno: 3274.N, 3275.N, 3276.N; Kadam Digas: 1822.N, 1823.N, 2826.N, 2827.N, 2830.N, 2836.N, 2837.N, 2841.N, 2845.N, 2854.N, 2856.N, 2858.N, 2859.N, 2863.N; Kiéké: 3033.N; Mahargal: 2939.N, 2940.N; Masarma: 2821.N; Zamagouin: 2517.N, 2526.N, 2539.N, 2743.N, 2748.N.

Bitis arietans. Baïbokoum: 2052.N, 2372.N, 2422.N; Bitea: 2911.N; Bon Amdaoud: 3047.N; Matafo 2: 2788.N; Moïssala: 3277.N, 3278.N.

Boaedon longilineatus. Bahar: 2977.N; Bon Amdaoud: 3068.N, 3085.N; Djarat Abounimir: 1939.N, 3155.N, 3156.N, 3160.N, 3161.N, 3162.N; Fiengbac: 2521.N, 2553.N; Goulmounbass: 2626.N, 2627.N; Hileborno: 2923.N; Masarma: 2809.N, 2818.N, 2823.N; Zamagouin: 2558.N.

Boaedon parolineatus. Baïbokoum: 2012.N, 2015.N, 2016.N, 2018.N, 2028.N, 2029.N, 2069.N, 2074.N, 2081.N, 2089.N, 2094.N, 2111.N, 2113.N, 2117.N, 2138.N, 2153.N, 2155.N, 2159.N, 2160.N, 2162.N, 2164.N, 2184.N, 2194.N, 2206.N, 2208.N, 2217.N, 2243.N, 2311.N, 2315.N, 2338.N, 2505.N; Bitanda: 2575.N, 2576.N, 2606.N.

Boaedon perisilvestris. Baïbokoum: 2143.N, 2191.N.

Boaedon subflavus. Bahar: 1892.N, 2984.N, 2986.N, 3007.N, 3008.N, 3009.N, 3010.N, 3015.N; Baïbokoum: 2004.N, 2009.N, 2017.N, 2027.N, 2030.N, 2044.N, 2045.N, 2046.N, 2047.N, 2049.N, 2050.N, 2055.N, 2082.N, 2086.N, 2090.N, 2102.N, 2105.N, 2108.N, 2109.N, 2110.N, 2116.N, 2144.N, 2154.N, 2161.N, 2163.N, 2165.N, 2166.N, 2181.N, 2182.N, 2187.N, 2188.N, 2189.N, 2196.N, 2198.N, 2199.N, 2200.N, 2207.N, 2212.N, 2214.N, 2247.N, 2248.N, 2275.N, 2284.N, 2287.N, 2317.N, 2323.N, 2324.N, 2325.N, 2333.N, 2339.N, 2360.N, 2362.N, 2367.N, 2370.N, 2387.N, 2388.N, 2391.N, 2399.N, 2400.N, 2401.N; Balani: 2566.N, 2567.N; Bitanda:

2578.N, 2587.N, 2601.N, 2603.N, 2614.N; Bitea: 1835.N, 1837.N, 1844.N, 1846.N, 1857.N, 1871.N, 2875.N, 2879.N, 2898.N, 2906.N; Bon Amdaoud: 1946.N, 1951.N, 1956.N, 1959.N, 1960.N, 1964.N, 3048.N, 3057.N, 3058.N, 3070.N, 3094.N, 3106.N, 3116.N, 3121.N, 3123.N; Doureng: 2865.N; Goulmounbass: 2629.N; Kadam Digas: 2773.N, 2829.N, 2833.N, 2839.N, 2848.N, 2849.N, 2850.N, 2857.N, 2864.N; Laobida: 2729.N, 2731.N; Laobida (Malgandi): 2571.N; Laobida (Yamba-Tchangsou): 2518.N; Mahargal: 2935.N, 2965.N, 2966.N, 2967.N; Moundou: 2618.N, 2623.N; Moundou (Belaba): 2624.N; Tikem: 2520.N; Zamagouin: 2741.N, 2751.N.

Causus maculatus. Baïbokoum: 2021.N, 2048.N, 2070.N, 2099.N, 2213.N, 2239.N, 2255.N, 2310.N; Bitanda: 2579.N; Bon Amdaoud: 3049.N, 3050.N, 3077.N, 3081.N, 3089.N, 3096.N, 3104.N, 3111.N; Laobida (Malgandi): 2515.N.

Causus resimus. Bahar: 2989.N; Balani: 2536.N; Bon Amdaoud: 3069.N; Djarat Abounimir: 1903.N, 1908.N, 1910.N, 1923.N, 1924.N, 1930.N, 1941.N, 3126.N, 3127.N, 3128.N, 3129.N, 3130.N, 3131.N, 3132.N, 3133.N, 3141.N, 3167.N, 3168.N, 3169.N, 3170.N; Mahargal: 1874.N, 1886.N; N'Djaména Gassi: 1993.N, 2789.N; Tikem (Goundwaye): 2537.N.

Cerastes cerastes. Faya Largeau: 2779.N; Oum Chalouba (Houk): 3280.N; Ounianga Sérir: 2777.N.

Crotaphopeltis degeni. Djarat Abounimir: 3142.N, 3143.N, 3144.N, 3145.N, 3146.N, 3163.N, 3164.N; Fiengbac: 2564.N; Goulmounbass: 2638.N, 2639.N, 2640.N, 2641.N, 2642.N, 2643.N, 2644.N, 2645.N, 2646.N, 2647.N, 2648.N; Kiéké: 3032.N, 3039.N; N'Djaména: 3281.N; Tikem: 2510.N.

Crotaphopeltis hippocrepis. Baïbokoum: 2041.N, 2076.N; Bitanda: 2590.N; Djarat Abounimir: 1901.N, 1905.N, 1906.N, 1907.N, 1909.N, 1917.N, 1920.N, 1925.N, 1926.N, 1931.N, 1940.N.

Crotaphopeltis hotamboeia. Bahar: 2991.N, 2992.N, 2993.N, 2994.N, 2995.N, 2996.N, 2997.N, 2998.N, 2999.N, 3000.N, 3001.N, 3002.N, 3004.N, 3005.N, 3006.N, 3011.N, 3012.N, 3013.N; Baïbokoum: 2024.N, 2125.N, 2152.N, 2201.N, 2219.N, 2257.N, 2262.N, 2328.N, 2350.N, 2358.N, 2361.N, 2364.N, 2368.N, 2389.N, 2395.N, 2397.N, 2402.N, 2420.N; Bitanda: 2592.N, 2593.N, 2615.N; Bon Amdaoud: 1953.N, 1954.N, 1961.N, 2760.N, 3055.N, 3062.N, 3073.N, 3098.N, 3114.N, 3124.N; Djarat Abounimir: 1915.N, 1935.N, 3147.N, 3148.N, 3229.N, 3230.N, 3231.N, 3232.N, 3233.N, 3234.N, 3235.N, 3236.N, 3237.N, 3238.N, 3239.N, 3240.N, 3241.N, 3242.N, 3243.N, 3244.N, 3245.N, 3246.N, 3247.N, 3248.N, 3249.N, 3250.N, 3251.N, 3252.N, 3253.N, 3254.N, 3255.N, 3256.N, 3257.N, 3258.N, 3259.N, 3260.N, 3261.N, 3262.N, 3263.N, 3264.N, 3265.N, 3266.N, 3267.N, 3268.N, 3269.N, 3270.N, 3271.N, 3272.N; Goulmounbass: 2630.N; Hileborno: 1898.N; Kadam Digas: 2765.N, 2774.N, 2828.N, 2835.N, 2844.N, 2852.N, 2860.N; Kiéké: 3023.N, 3024.N, 3026.N, 3029.N, 3031.N, 3035.N; Laobida: 2525.N, 2732.N; Mahargal: 1875.N, 2964.N, 2968.N; Moïssala: 1990.N, 3282.N, 3313.N; Moundou: 2621.N; Zamagouin: 2742.N.

Dasypeltis confusa. Baïbokoum: 2142.N, 2290.N.

Dasypeltis gansi. **Baïbokoum**: 2008.N, 2167.N, 2168.N, 2218.N, 2266.N, 2270.N, 2343.N, 2347.N; **Laobida**: 2548.N, 2549.N; **Moïssala**: 3283.N, 3284.N; **Zamagouin**: 2559.N, 2754.N.

Dasypeltis sahelensis. **Bon Amdaoud**: 3074.N; **Goulmounbass**: 2650.N; **Guirli**: 2918.N; **Kadam Digas**: 1824.N, 1826.N; **Mahargal**: 2936.N; **N°Djaména**: 3285.N.

Dispholidus aff. typus. **Baïbokoum**: 2061.N, 2106.N, 2185.N, 2297.N, 2376.N; **Moïssala**: 1988.N.

Echis leucogaster. **Arningmalik**: 1830.N, 1834.N, 2873.N, 2874.N; **Bahar**: 1896.N, 2990.N; **Bitea**: 1848.N, 1856.N, 1868.N, 1870.N, 2900.N, 2901.N, 2910.N; **Dourenge**: 1829.N, 2867.N; **Fada**: 3287.N, 3288.N; **Guirli**: 2920.N; **Kadam Digas**: 2766.N, 2776.N, 2846.N, 2853.N; **Mahargal**: 1877.N, 1883.N, 1885.N, 1887.N, 2958.N, 2959.N, 2960.N, 2961.N, 2962.N, 2963.N; **Masarma**: 1808.N, 2812.N, 2817.N, 2822.N, 2824.N, 2825.N; **Mongo** (vicinity): 2508.N; **Oum Chalouba**: 3286.N.

Echis romani. **Baïbokoum**: 2011.N, 2013.N, 2014.N, 2026.N, 2034.N, 2035.N, 2038.N, 2039.N, 2042.N, 2043.N, 2057.N, 2078.N, 2079.N, 2080.N, 2085.N, 2096.N, 2100.N, 2101.N, 2115.N, 2124.N, 2126.N, 2127.N, 2128.N, 2133.N, 2134.N, 2135.N, 2139.N, 2140.N, 2141.N, 2157.N, 2169.N, 2176.N, 2190.N, 2230.N, 2268.N, 2272.N, 2318.N, 2322.N, 2331.N, 2332.N, 2334.N, 2335.N, 2336.N, 2337.N, 2351.N, 2354.N, 2357.N, 2373.N, 2423.N, 2424.N, 2425.N, 2426.N, 2427.N, 2428.N, 2429.N, 2430.N, 2431.N, 2432.N, 2433.N, 2434.N, 2435.N, 2436.N, 2437.N, 2438.N, 2439.N, 2440.N, 2441.N, 2442.N, 2443.N, 2444.N, 2445.N, 2446.N, 2447.N, 2448.N, 2449.N, 2450.N, 2451.N, 2452.N, 2453.N, 2454.N, 2455.N, 2456.N, 2457.N, 2458.N, 2464.N, 2465.N, 2466.N, 2467.N, 2468.N, 2469.N, 2470.N, 2471.N, 2472.N, 2473.N, 2474.N, 2475.N, 2476.N, 2477.N, 2478.N, 2479.N, 2480.N, 2481.N, 2482.N, 2483.N, 2484.N, 2485.N, 2486.N, 2487.N, 2488.N, 2489.N, 2490.N, 2491.N, 2492.N, 2493.N, 2494.N, 2495.N, 2496.N, 2497.N, 2498.N, 2499.N, 2500.N, 2501.N, 2502.N, 2503.N, 2504.N, 2506.N, 2507.N; **Bitanda**: 2573.N, 2583.N, 2586.N, 2595.N, 2609.N, 2610.N; **Fiengbac**: 2562.N; **Goulmounbass**: 2628.N; **Laobida**: 2550.N, 2713.N, 2717.N, 2720.N, 2724.N, 2725.N, 2727.N, 2728.N, 2730.N, 2733.N, 2734.N; **Laobida** (Berete): 2545.N; **Laobida** (Yamba-Maloum): 2546.N; **Laobida** (Yamba-Tchangsou): 2547.N; **Zamagouin**: 2542.N, 2543.N, 2544.N, 2560.N, 2740.N, 2746.N.

Elapsoidea laticincta. **Baïbokoum**: 2215.N, 2302.N.

Elapoisea semiannulata moebuisi. **Baïbokoum**: 2031.N, 2071.N, 2174.N, 2210.N, 2227.N, 2237.N, 2274.N, 2282.N, 2291.N, 2295.N, 2299.N, 2300.N, 2301.N, 2346.N; **Moïssala**: 1992.N, 3289.N.

Eryx colubrinus. **Birim**: 2791.N, 2792.N; **Bitea**: 1838.N, 1845.N; **Dourenge**: 2869.N, 2895.N, 3019.N; **Gouroungali**: 1872.N; **Guirli**: 2914.N, 2915.N, 2916.N, 2917.N; **Matafo 2**: 2784.N; **Tarhacha**: 2903.N, 2904.N.

Eryx muelleri. **Masarma**: 1802.N, 1803.N, 1805.N, 1810.N, 2810.N, 2811.N, 2814.N, 2815.N, 2819.

Gonionotophis granti. **Baïbokoum**: 2195.N.

Hemirhagerhis nototaenia. **Baïbokoum**: 2065.N; **Kiéké**: 3030.N.

Letheobia weildhozi. **Baïbokoum**: 2285.N.

Limaformosa crossi. **Baïbokoum**: 2007.N, 2060.N, 2084.N, 2107.N, 2249.N, 2319.N, 2352.N, 2353.N, 2359.N, 2385; **Bitanda**: 2612.N; **Zamagouin**: 2738.N.

Lycophidion aff. capense. **Bon Amdaoud**: 3045.N, 3059.N; **Kiéké**: 3037.N.

Lycophidion semicinctum. **Baïbokoum**: 2019.N, 2216.N, 2273.N, 2276.N, 2277.N, 2288.N, 2306.N, 2419.N; **Bitanda**: 2572.N, 2574.N, 2611.N; **Laobida**: 2735.N; **Moïssala**: 1980.N, 1982.N, 2709.N, 3292.N, 3293.N, 3294.N, 3295.N, 3312.N.

Lycophidion taylori. **Bahar**: 2985.N; **Hileborno**: 2924.N.

Malpolon moilensis **Ennedi** (17°32'N / 21°29'E): 3309.N; **Ouadi Haouach**: 3296.N.

Meizodon coronatus. **Baïbokoum**: 2010.N, 2246.N, 2250.N; **Laobida**: 2535.N.

Meizodon semiornatus tchadensis. **Bahar**: 2969.N.

Micrelaps vaillanti. **Bon Amdaoud**: 3075.N, 3115.N, 3117.N, 3122; **Kiéké**: 3034.N; **Mahargal**: 2937.N, 2938.N.

Myriopholis boueti. **Bahar**: 2932.N, 2933.N, 2934; **Béréguet** (vicinity of): 2778.N; **Bitea**: 1865.N; **Bon Amdaoud**: 1944.N, 3110.N; **Guirli**: 2919.N; **Kiéké**: 3020.N.

Myriopholis occipitalis. **Moïssala**: 3273.N.

Naja haje. **Baïbokoum**: 2114.N, 2229.N, 2240.N; **Birim**: 2800.N, 2801.N; **Bitanda**: 2596.N, 2598.N; **Bitea**: 2913.N; **Bon Amdaoud**: 1965.N, 3080.N, 3090.N; **Dourenge**: 1828.N; **Mao**: 2803.N, 2804.N, 2805.N; **Masarma**: 1801.N; **Matafo 2**: 2781.N, 2782.N, 2783.N, 2785.N; **Moïssala**: 3297.N; **Moundou**: 2620.N.

Naja nigricollis. **Baïbokoum**: 2112.N, 2118.N, 2192.N, 2221.N, 2235.N, 2309.N, 2379.N, 2398.N; **Bon Amdaoud**: 1947.N, 1966.N, 3065.N, 3072.N; **Fianga** (env): 2509.N; **Goulmounbass**: 2631.N; **Laobida**: 2712.N, 2719.N; **Moïssala**: 1970.N, 1974.N, 1975.N, 1981.N, 1984.N, 1991.N, 2708.N, 3298.N, 3299.N; **Zamagouin**: 2736.N, 2739.N.

Naja savannula. **Baïbokoum** (Mboursa): 2281.N.

Naja subfulva. **Birim**: 2802.N; **Bitanda**: 2600.N.

Natriciteres olivacea. **Birim**: 2790.N.

Philothamnus bequaerti. **Baïbokoum**: 2294.N.; **Moïssala**: 1972.N.

Philothamnus irregularis. **Baïbokoum**: 2003.N, 2072.N, 2098.N, 2170.N, 2171.N, 2193.N, 2211.N, 2256.N, 2312.N, 2313.N, 2314.N, 2316.N, 2320.N, 2321.N, 2377.N, 2386.N, 2405.N, 2411.N.; **Zamagouin**: 2556.N, 2557.N, 2737.N, 2745.N.

Philothamnus semivariatus Baïbokoum: 2298.N; Moïssala: 2707.N; Moundou: 2616.N.

Platyceps florulentus. Arningmalik:1831.N; Bitea: 1864.N, 2883.N, 2905.N; Doureng: 1827.N, 2868.N.

Prosymna ambigua. Moïssala: 1973.N.

Prosymna collaris. Bahar: 1891.N, 2970.N, 2971.N, 2972.N; Balani: 2538.N, 2568.N; Djarat Abounimir: 3137.N; Fiengbac: 2551.N, 2552.N; Moundou: 2580.N.

Prosymna greigerti. Bahar: 2973.N, 2974.N, 2975.N, 2976.N; Baïbokoum: 2033.N, 2093.N, 2104.N, 2180.N; Bitanda: 2608.N; Bon Amdaoud: 3118.N; Djarat Abounimir: 3134.N, 3135.N, 3136.N; Kadam Digas: 2763.N, 2834.N, 2855.N; Moïssala: 1978.N.

Psammophis afroccidentalis. Mao: 2808.N.

Psammophis elegans elegans. Mao: 2806.N, 2807.N.

Psammophis elegans univittatus. Baïbokoum: 2005.N, 2036.N, 2097.N, 2122.N, 2183.N, 2222.N; Bon Amdaoud: 1955.N, 2761.N, 3082.N, 3083.N, 3092.N, 3100.N, 3125.N; Djarat Abounimir: 1932.N.

Psammophis lineatus. Baïbokoum: 2040.N, 2092.N, 2120.N, 2132.N, 2203.N, 2204.N, 2225.N, 2228.N, 2265.N, 2369.N, 2375.N, 2383.N, 2394.N, 2421.N, 2463.N; Bitanda: 2577.N, 2602.N; Goulmounbass: 2659.N, 2660.N, 2661.N, 2662.N, 2663.N, 2664.N, 2665.N, 2666.N, 2667.N, 2668.N, 2669.N, 2670.N, 2671.N, 2672.N, 2673.N, 2674.N, 2675.N, 2676.N, 2677.N, 2678.N, 2679.N, 2680.N, 2681.N, 2682.N, 2683.N, 2684.N, 2685.N, 2686.N, 2687.N, 2688.N, 2689.N, 2690.N, 2691.N, 2692.N, 2693.N, 2694.N, 2695.N, 2696.N, 2697.N, 2698.N, 2699.N, 2700.N; Léré: 2756.N, 2757.N; Zamagouin: 2534.N, 2747.N, 2752.N.

Psammophis mossambicus. Baïbokoum: 2006.N, 2053.N, 2054.N, 2066.N, 2067.N, 2068.N, 2083.N, 2087.N, 2088.N, 2123.N, 2129.N, 2130.N, 2136.N, 2145.N, 2146.N, 2148.N, 2172.N, 2175.N, 2177.N, 2186.N, 2202.N, 2224.N, 2226.N, 2238.N, 2244.N, 2245.N, 2252.N, 2260.N, 2264.N, 2269.N, 2341.N, 2342.N, 2408.N, 2409.N, 2410.N, 2412.N, 2418.N, 2459.N, 2460.N, 2461.N, 2462.N; Bitanda: 2581; Laobida: 2529.N, 2714.N, 2715.N, 2716.N, 2718.N, 2722.N; Moïssala: 1971.N, 1977.N, 1983.N, 1989.N, 2704.N, 2705.N, 2706.N, 3300.N, 3301.N, 3302.N, 3303.N, 3304.N; Moundou: 2619.N.

Psammophis rukwae. Bahar: 1894.N, 1895.N, 1897.N, 2978.N, 2979.N, 2980.N, 2981.N, 2982.N, 3016.N, 3017.N, 3018.N; Baïbokoum: 2020.N, 2022.N, 2023.N, 2056.N, 2059.N, 2062.N, 2064.N, 2121.N, 2131.N, 2147.N, 2150.N, 2173.N, 2179.N, 2205.N, 2223.N, 2241.N, 2242.N, 2254.N, 2267.N, 2271.N, 2329.N, 2330.N, 2340.N, 2344.N, 2345.N, 2371.N, 2378.N, 2381.N, 2416.N, 2417.N; Birim: 2793.N, 2794.N, 2795.N, 2796.N, 2797.N, 2798.N, 2799.N; Bitea: 1836.N, 1840.N, 1847.N, 1852.N, 1860.N, 2885.N, 2902.N; Bon Amdaoud: 1949.N, 2762.N, 3078.N; Djarat Abounimir: 1914.N, 1916.N, 1919.N, 1928.N, 1937.N, 3151.N, 3152.N, 3153.N, 3154.N, 3201.N, 3202.N, 3203.N, 3204.N, 3205.N, 3206.N, 3207.N, 3208.N, 3209.N, 3210.N, 3211.N, 3212.N, 3213.N, 3214.N, 3215.N, 3216.N, 3217.N, 3218.N, 3219.N,

3220.N, 3221.N, 3222.N, 3223.N, 3224.N, 3225.N, 3226.N, 3227.N, 3228.N; Fiengbac: 2531.N, 2563.N; Goulmounbass: 2651.N, 2652.N, 2653.N, 2654.N, 2655.N, 2656.N, 2657.N, 2658.N; Gouroungali: 2926.N; Hileborno: 1899.N, 1900.N; Kadam Digas: 2764.N, 2831.N, 2832.N, 2838.N, 2851.N; Kiéké: 1942.N, 1943.N, 2758.N, 2759.N, 3021.N, 3022.N, 3025.N, 3027.N, 3038.N, 3040.N; Mahargal: 1878.N, 1881.N, 1888.N, 2945.N, 2946.N, 2947.N, 2948.N, 2949.N, 2950.N, 2951.N, 2952.N; Masarma: 1806.N, 1807.N, 1809.N, 1812.N, 1813.N, 2813.N, 2816.N, 2820.N; Matafo 2: 2786.N, 2787.N; Mataya: 1815.N, 1816.N; N'Djaména (Farcha): 1997.N, 1998.N, 1999.N, 2000.N; N'Djaména (Gassi): 1994.N, 1995.N, 1996.N, 2001.N, 2002.N; Tikem (Goundwaye): 2554.N; Zamagouin: 2522.N, 2744.N, 2749.N, 2753.N.

Psammophis sudanensis. Arningmalik: 1832.N, 2870.N, 2871.N, 2872.N; Bahar: 1893.N, 3014.N; Baïbokoum: 2149.N, 2156.N, 2231.N, 2232.N, 2234.N, 2280.N, 2283.N, 2289.N, 2292.N, 2308.N, 2365.N, 2380.N, 2392.N, 2393.N, 2396.N, 2404.N; Balani: 2527.N; Bitea: 1839.N, 1841.N, 1842.N, 1849.N, 1850.N, 1851.N, 1853.N, 1855.N, 1858.N, 1859.N, 1862.N, 1869.N, 2876.N, 2880.N, 2884.N, 2886.N, 2887.N, 2888.N, 2889.N, 2890.N, 2891.N, 2892.N, 2893.N, 2894.N, 2899.N, 2907.N, 2908.N, 2909.N, 2912.N, 2931.N; Bon Amdaoud: 1945.N, 1948.N, 1950.N, 1952.N, 1957.N, 1958.N, 1962.N, 1969.N, 3044.N, 3046.N, 3053.N, 3054.N, 3060.N, 3071.N, 3076.N, 3079.N, 3087.N, 3091.N, 3093.N, 3095.N, 3105.N, 3107.N, 3108.N, 3109.N, 3112.N; Djarat Abounimir: 1902.N, 1904.N, 1911.N, 1912.N, 1913.N, 1918.N, 1921.N, 1922.N, 1927.N, 1929.N, 1933.N, 1934.N, 1936.N, 3149.N, 3150.N, 3171.N, 3172.N, 3173.N, 3174.N, 3175.N, 3176.N, 3177.N, 3178.N, 3179.N, 3180.N, 3181.N, 3182.N, 3183.N, 3184.N, 3185.N, 3186.N, 3187.N, 3188.N, 3189.N, 3190.N, 3191.N, 3192.N, 3193.N, 3194.N, 3195.N, 3196.N, 3197.N, 3198.N, 3199.N, 3200.N; Doureng: 2866.N; Goulmounbass: 2632.N, 2633.N, 2634.N; Guirli: 2922.N; Hileborno: 2925.N, 3307.N; Kadam Digas: 1818.N, 1819.N, 1820.N, 1821.N, 1825.N, 2769.N, 2770.N, 2771.N, 2772.N, 2840.N, 2842.N, 2843.N, 2862.N; Kiéké: 3028.N, 3036.N; Mahargal: 1876.N, 1879.N, 1880.N, 1882.N, 1884.N, 1889.N, 2941.N, 2942.N, 2943.N, 2944.N, 2953.N, 2954.N, 2955.N, 2956.N, 2957.N; Masarma: 1804.N, 1811.N, 1814.N; Moïssala: 1976.N, 1979.N, 1985.N, 1987.N, 2701.N, 2702.N, 3305.N, 3306.N, 3311; Moundou (Tayé): 2613.N; Zamagouin: 2528.N, 2569.N, 2750.N.

Python regius. Baïbokoum: 2119.N, 2355.N, 2356.N, 2406.N, 2407.N; Laobida (Dobarbian): 2780.N.

Python sebae. Bitea: 1867.N, 2927.N; Hileborno: 3308.N; Kadam Digas: 2775.N, 2861.N; Mataya: 1817.N; Zamagouin: 2530.N.

Rhamphiophis oxyrhynchus. Bahar: 2983.N; Baïbokoum: 2025.N, 2063.N, 2075.N, 2077.N, 2091.N, 2095.N, 2103.N, 2137.N, 2220.N, 2233.N, 2251.N, 2253.N, 2263.N, 2349.N, 2363.N, 2382.N, 2384.N, 2390.N, 2413.N, 2414.N, 2415.N; Bitanda: 2582.N, 2584.N, 2585.N, 2588.N, 2589.N, 2591.N, 2594.N, 2597.N, 2599.N, 2604.N, 2607.N; Bon Amdaoud: 1968.N, 3063.N, 3064.N, 3088.N, 3099.N, 3101.N, 3102.N, 3103.N; Fiengbac: 2511.N; Goulmounbass: 2635.N, 2636.N, 2637.N; Kadam Digas: 2767.N, 2768.N, 2847.N; Laobida: 2711.N, 2723.N; Laobida (Yamba-Tchangou): 2533.N; Moïssala: 2703.N, 3310.N; Moundou (Belaba): 2617.N, 2625.N.

Rhamphiophis rostratus. Bitea: 1861.N.

Scaphiophis albopunctatus. Baïbokoum: 2037.N, 2236.N, 2279.N, 2326.N, 2327.N, 2348.N; Bon Amdaoud: 1963.N, 3084.N; Laobida (including Malgandi and Yamba-Tchang-sou): 2721.N, 2514.N, 2519.N.

Telescopus tripolitanus. Bahar: 1890.N; Bitea: 2881.N, 2882.N; Bon Amdaoud: 3042.N, 3043.N, 3051.N, 3052.N, 3067.N, 3086.N, 3097.N, 3119.N, 3120.N.

Telescopus variegatus. Baïbokoum: 2032.N, 2058.N, 2374.N; Laobida: 2512.N, 2513.N, 2570.N, 2726.N; Laobida (Baïbag-la): 2516.N, 2524.N, 2540.N, 2541.N; Laobida (Yamba-Maloum): 2532.N; Moïssala: 1986 N; Zamagouin: 2755.N.

Tricheilostoma sundewalli. Baïbokoum: 2073.N.

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Autor(en)/Author(s): Trape Jean-Francois, Kodindo Israel Demba, Djiddi Ali Sougoudi, Mad-Toingue Joseph, Kerah Clement Hinzoumbe

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