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The Congo clawless otter (*Aonyx congicus*) (Mustelidae: Lutrinae): a review of its systematics, distribution and conservation status

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Among the four African otter species, the Congo clawless otter (*Aonyx congicus*) is the least known due to the remoteness of its Central African equatorial rainforest range. The taxonomic status and the criteria to differentiate *A. congicus* from the quite similar Cape clawless otter (*Aonyx capensis*) are reviewed. The current distribution and status of *A. congicus* (Gabon, Congo, Democratic Republic of Congo, southern Cameroon and Central African Republic, northern Angola, and probably western Uganda, Rwanda and Burundi) is updated using an information network, surveys in Gabon, Cameroon and the Democratic Republic of Congo, and localities of museum specimens. The species is mainly threatened by deforestation, hunting for bush meat and use for witchcraft materials.

Key words: Africa, otter, *Aonyx congicus,* conservation, distribution.

INTRODUCTION

According to Coetzee (1971), Haltenorth & Diller (1977), Honacki *et al.* (1982), Nowak (1991), Wozencraft (1993) and Kingdon (1997), four species of otters are known to occur in Africa. The distribution range of the Eurasian otter (*Lutra lutra*) is restricted to Morocco, Algeria and Tunisia (Aulagnier *et al.* 2008). The spotted-necked otter (*Hydrictis maculicollis*) occurs in the wetlands of subsaharan areas along with the Cape clawless otter (*Aonyx capensis*), except in the Congo River basin where the latter is replaced by the Congo clawless otter or swamp otter (*Aonyx congicus*) (Larivière 2001).

The name *Aonyx congica* is very often found in the literature but *A. congicus* is the correct spelling as *Aonyx,* from the Greek *onux,* is masculine (Van Bree *et al.* 1999). Owing to the remoteness and inaccessibility of the equatorial rainforest of Central Africa, the distribution, status and biology of this species are very poorly known. Moreover, the Congo clawless otter is very similar to the Cape clawless otter and these two species are sometimes considered conspecific (Davis 1978; Wozencraft 2005; Larivière & Jennings 2009). Lönnberg (1910) described a specimen of the Congo clawless otter, *Aonyx capensis congica,* from the lower Congo river, as a subspecies of the Cape clawless otter, from which it mainly differed by smaller molars. Pohle (1920) proposed a new species, *Aonyx microdon,* based on seven specimens of Congo clawless otters from Cameroon. Hinton (1921) collected two additional specimens in Uganda and proposed a new genus, *Paraonyx,* for the Congo clawless otter. These names have been later considered as synonyms of *A. congicus* (Larivière 2001). For Allen (1924) and Davis (1978), *A. capensis* and *A. congicus* are conspecific, arguing that they represent clinal variations of the same species. However, mainly on tooth size and skin differences, Rosevear (1974), Van Zyll de Jong (1987), Wozencraft (1993), and Larivière (2001) considered *A. capensis* and *A. congicus* as separate species, but this remains debated, and Wozencraft (2005) did not retain *A. congicus* as a valid species, contrary to the opinion of the IUCN Otter Specialist Group (http://www.otterspecialistgroup.org).

This paper provides criteria to identify *A. capensis* and *A. congicus,* and reviews the status, distribution, biology and threats to the Congo clawless otter. Conservation actions are therefore proposed.

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METHODS

Morphological studies

A total of 72 skins and 29 skulls of *A. capensis,* and 73 skins and 63 skulls of *A. congicus* was examined and measured in the Royal Museum for Central Africa (Tervuren, Belgium), Natural History Museum (London, U.K.), Muséum National d'Histoire Naturelle (Paris, France) and American Museum of Natural History (New York, U.S.A.).

Colour patterns of the skins were recorded, and 23 measurements were taken on skulls and some teeth with a digital calliper: condylobasal length (CBL), zygomatic breadth (ZB), interorbital breadth (IO), post-orbital breadth (Porb), mastoid breadth (Msb), braincase breadth (Brb), mandibular length (Md), right P^4 length (P4sRl), right P^4 width P4sRw), left P^4 length (P4sLl), left P^4 width (P4sLw), right M^1 length (M1sRl), right M^1 width (M1sRw), left M^1 length (M1sLl), left M^1 width (M1sLw), right M_1 length (M1iRl), right M_1 width (M1iRw), left M_1 length (M1iLl), left M_1 width (M1iLw), right M_2 length (M2iRl), right M_2 width (M2iRw), left M_2 length (M2iLl), left M_2 width (M2iLw).

Statistical analyses performed on these data included a principal component analysis (45 specimens of both species × 19 variables due to missing data on broken skulls and/or lack of M_2, and 29 additional specimens where missing data were replaced by the mean of the 45 specimens used for the analysis), Student's *t*-tests for species comparisons per variable (all variables were normally distributed), and discriminant analyses using the leave-one-out procedure as cross-validation (using the software Minitab 12.2).

Molecular analysis

Hairs were collected from a specimen of Congo clawless otter, a young individual trapped near Franceville (Gabon) by the local people. DNA was extracted and a portion of the mtDNA Cytochrome *b* gene was sequenced following protocols and primers described by Veron & Heard (2000). The sequence was compared to sequences from Genbank using the BLAST software, in order to check the validity of the resulting sequence. Cytochrome *b* sequences from Koepfli & Wayne (1998) were used to quantify the genetic distance between the clawless otters by calculating the amount of nucleotide differences.

Field records

Four field trips were conducted by H.J.: two in Gabon (with F.A.) (July 2001: St Anne, Gamba Protected Area Complex; January 2002: Lope Reserve, Langoue bai), one in Congo (with F.A.) (June–July 2002: Mbeli bai and Bomassa in Nouabale Ndoki National Park) and one in Cameroon (with J.M. Weber) (February–March 2006: Dja National Park, Bertoua, Abong Mang, Sanaga river, Campo-Ma'an National Park, Doula Edea Reserve). According to published distribution maps, *A. congicus* was the only otter species in the surveyed area and therefore no confusion was possible with *A. capensis* (Alary *et al.* 2002; Jacques *et al.* 2002, unpubl. data).

Semi-structured interviews (White & Edwards 2000) were carried out with local fishermen, forest users, and game wardens to obtain general information about the presence of otters and human impacts on their populations. Ten open questions were asked, some of them used to estimate the level of confidence that we can expect from the interviewers. We also recorded both direct observations of otters and signs (tracks and spraints). Because of their similar shape of hands and feet (around 11 cm long and 8 cm wide without claw or web; see Stuart & Stuart 1998), prints of *A. congicus* were expected to be similar as those of *A. capensis.* Spraints were collected.

RESULTS & DISCUSSION

Species identification and morphometric analyses

The identification criteria are listed in Table 1. Compared to *A. capensis,* the fur of *A. congicus* is characterized by silvery tips of the hairs on head and shoulders which imparts a frosted appearance. This colour pattern is easy to check on museum specimens but is much more difficult to see in the field due to distance of observation and to wet fur. So, the main external identification criterion to differentiate *A. congicus* from *A. capensis* is the quadrangular brown patch between the eye and the nose which is circled by whitish fur in *A. congicus,* but not in *A. capensis* (Fig. 1). Nevertheless, some skins from Central African Republic or Democratic Republic of Congo (formerly Zaïre) did not tightly fit this pattern. These *A. congicus* skins exhibited less conspicuous characteristic features than *A. congicus* from the rest of the range. The existence of these morphologically intermediate forms requires more investigation. This was also raised by De Barros (1967) for northern Angola's Congo clawless otters.

The first axis of the principal component analysis

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Table 1. External criteria for identifying the two African *Aonyx* species (Hinton 1921; Rosevear 1974; Kingdon 1977; N. Duplaix, pers. comm., unpubl. data).

Criteria of identification	*Aonyx capensis*	*Aonyx congicus*
Appearance	Large and bulky	
Weight	15–25 kg	
Length (head and body + tail)	75–90 cm + 40–60 cm	
Fur	Upperparts from dark brown to pale tan; Underparts lighter, cheeks, chin, throat and upper chest white	
Digit on fore foot	Quite naked, no claws, no webbing	
Digit on hind foot	Webbed to the base of the second phalange, rudiments of claws on digits 2, 3 and 4 only	
Head and shoulders	Lightly frosted	Conspicuously frosted
Margins of ears	Lightly white or brown	Conspicuously white
Underfur on cheeks	Beige	White
Top border of rhinarium	Rounded or lightly V-shaped	Straight
Dark patch between nostrils and eyes	Not surrounded by whitish fur; not clearly separated	Surrounded by whitish fur; clearly separated and conspicuous

(63.7% of variance, mainly linked to dental measurements), clearly separated the two species (Fig. 2). The second axis (23.5% of variance, mainly linked to skull measurements) did not provide any further discrimination. No sexual dimorphism was perceptible; this result was confirmed by *t*-tests.

Whereas no skull measurements were significantly different between *A. congicus* and *A. capensis,* all the dental lengths and widths (P^4, M^1, M_1, M_2) were significantly different (Table 2). For example M^1 was 30–50% smaller in *A. congicus* than in *A. capensis.* Classically, cheek teeth size was considered as a good criterion to identify *A. congicus* (cheek teeth slender, linked to a diet including small mammals, amphibians, eggs and worms, Rahm 1966) from *A. capensis* (cheek teeth larger, linked to a diet including crabs, Rowe-Rowe 1977). Discriminant analyses showed that the length and width of any P^4, M^1or M_1 can be used to ascertain further identification of *A. congicus* as several cross-validations provide 100% of correct classification (Table 3).

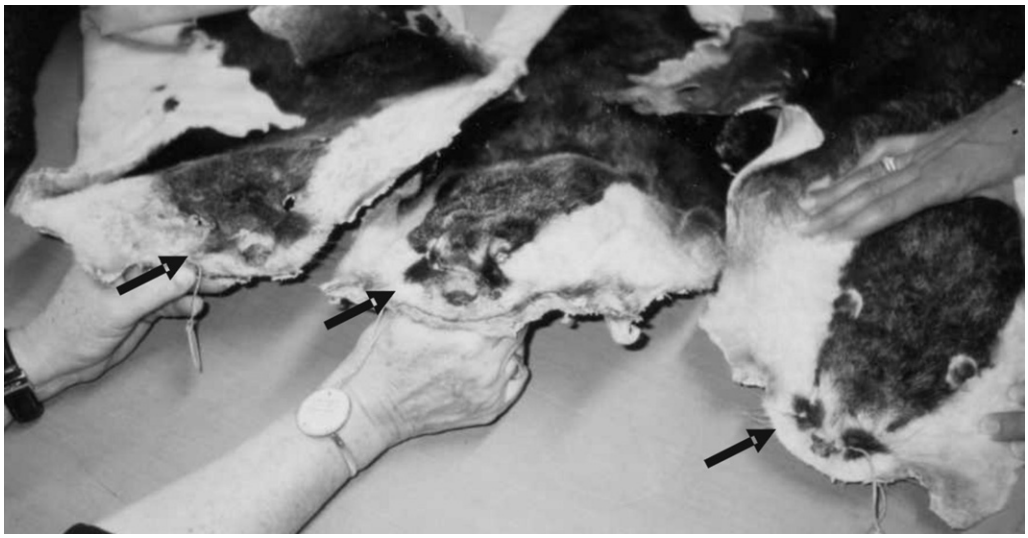

Fig. 1. Head pattern of the two African *Aonyx* species showing the difference in the quadrangular nose patch (arrows). From left to right: *A. capensis* (from Democratic Republic of Congo), *A. congicus* showing intermediate pattern (from Central African Republic), *A. congicus* (from Democratic Republic of Congo).

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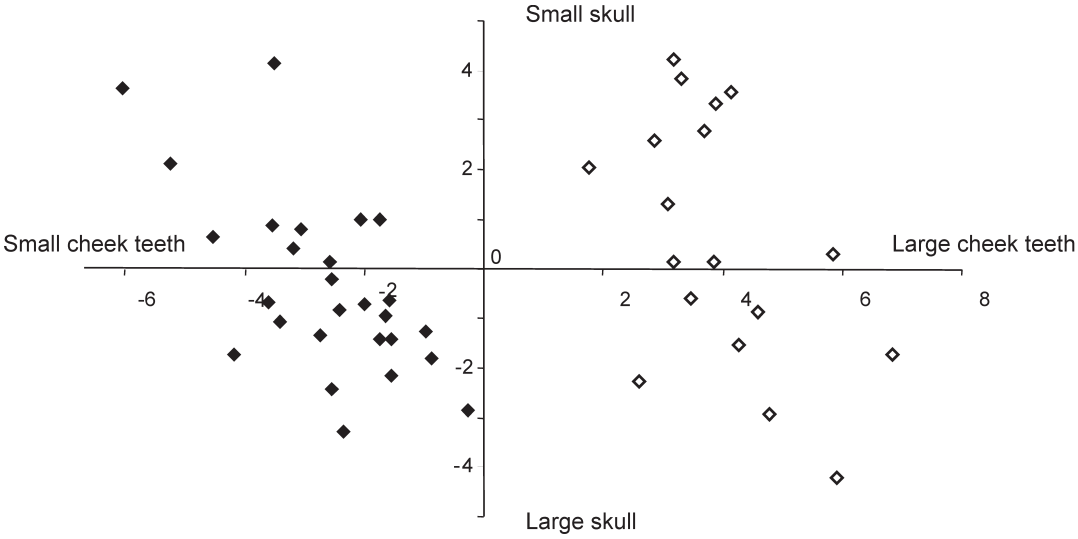

Fig. 2. Two first principal components from a principal component analysis performed on 19 skull and tooth measurements of 45 specimens of *Aonyx congicus* (black diamonds) and *A. capensis* (white diamonds), and projection of 29 additional specimens where missing data (often M_2 length and width) were replaced by the mean of the 45 specimens used in the analysis.

Genetics

Due to the bad preservation of the hair sample, only a very small amount of fragmented DNA was obtained, and only a very short fragment of Cytochrome *b* was sequenced (194 bp). In Genbank, using the BLAST software, the closest sequence was, as expected, a Cytochrome *b* sequence of *A. capensis* (accession number AF057118, Koepfli & Wayne 1998). The two sequences differed only by three nucleotides, and this gave a divergence between the two sequences of 1.55%. Obviously, this cannot provide an estimation of the genetic divergence between the species, due to the short length of the sequence, and as only one sequence of *A. capensis* was available in Genbank. But, as a comparison, on the same fragment, *Aonyx cinereus* and *A. capensis* differed by 27 nucleotides (13.92%), *A. cinereus* and *A. congicus* by 25 nucleotides (12.89%), *L. lutra* and *L. maculicollis* by 29 nucleotides (14.95%), and *Lontra felina* and *Lontra longicaudis* by 10 nucleotides (5.15%) (Genbank sequences AF057119, AF057124, AF057125, AF057122, AF057123, respectively; Koepfli & Wayne 1998). Further molecular work should be done to investigate the genetic divergence between *A. capensis* and *A. congicus.*

Distribution and habitat

Aonyx congicus occurs in the rainforests of the Congo basin (see Table 4 and Fig. 3), including mainly Equatorial Guinea, Gabon, Democratic Republic of Congo, Congo, southern Cameroon, southern Central African Republic, Angola north of the 10° parallel (De Barros Machado 1967) and extending eastward to the forests and the wetlands of Rwanda, Burundi and Uganda (Rowe-Rowe 1995; Larivière 2001) although no recent record was collected in this area (see Table 4). The exact limits of the species range remains unclear, particularly due to possible confusion with *A. capensis.* Rowe-Rowe (1995) claimed that *A. congicus* was present in Nigeria, but Happold (1987) and Van Rompaey & Powell (1999) did not report it. Moreover, the older recorded localities of *A. congicus* from Nigeria are now located in Cameroon due to international boundary changes in 1963.

The rainforest and lowland swamp forest were the favoured habitats of *A. congicus,* which can be readily observed in large and small rivers and streams (Larivière 2001), and not only in swamps as one of its common names suggests (swamp otter). No data currently exist to indicate that *A. congicus* used shoreline habitats (while *A. capensis* did; Rowe-Rowe 1977; Nel & Somers 2007) though its presence further inland in coastal freshwater lagoons and mangrove swamps was reported in Congo (M. Vacher, pers. comm.).

Biology

Aonyx otters are adapted to forage with their digits. The lack of web between the digits of their forepaws is associated with considerable dexterity

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Table 2. Skulls and cheek teeth measurements of *Aonyx congicus* and *A. capensis* (variables listed in the text, *n* = number of specimens, S.D. = standard-deviation, Min: minimum, Max: maximum, *t* = Student's test value, *P* = *P*-value).

	A. congicus					*A. capensis*						
Variable	*n*	Mean	S.D.	Min	Max	*n*	Mean	S.D.	Min	Max	*t*	*P*
CBL	44	129.91	7.96	108.4	145.0	24	132.13	5.78	119.6	142.7	–1.20	0.234
ZB	39	89.73	7.85	70.8	109.0	22	90.89	6.44	72.0	99.1	–0.59	0.557
IO	41	28.87	2.79	23.5	34.0	25	30.21	2.91	23.9	35.8	–1.87	0.066
Porb	43	31.21	3.33	25.1	38.9	26	31.98	4.50	25.6	40.0	–0.82	0.415
Msb	42	87.52	6.08	74.8	102.0	23	88.36	6.28	74.0	96.8	–0.53	0.598
Brb	40	72.87	4.10	65.0	80.0	23	73.23	4.18	63.6	79.3	–0.33	0.743
Md	41	82.09	6.34	69.8	95.0	24	82.42	4.29	76.0	92.5	–0.23	0.819
P4sRl	43	10.04	0.69	8.6	11.5	26	12.90	0.76	11.5	14.3	–15.95	<0.001
P4sRw	43	10.73	0.94	8.2	12.6	26	14.29	0.91	12.2	16.4	–15.42	<0.001
P4sLl	44	9.96	0.94	7.1	11.9	28	12.85	0.90	11.2	14.7	–12.96	<0.001
P4sLw	44	10.66	1.21	8.3	13.0	28	13.89	0.95	11.9	16.5	–11.95	<0.001
M1sRl	44	12.98	1.33	9.1	14.8	28	17.77	0.79	16.1	19.5	–17.17	<0.001
M1sRw	44	10.03	1.02	8.2	11.9	28	14.22	0.97	12.6	16.1	–17.32	<0.001
M1sLl	44	12.92	1.12	9.6	15.1	28	17.74	0.85	15.6	19.5	–19.42	<0.001
M1sLw	44	10.02	0.94	7.8	12.0	28	14.27	0.80	12.5	15.5	–19.78	<0.001
M1iRl	40	13.48	1.10	10.3	16.6	23	17.70	1.11	16.0	19.8	–14.62	<0.001
M1iRw	40	7.65	0.73	5.9	8.9	23	10.70	0.67	9.2	11.8	–16.52	<0.001
M1iLl	41	13.33	1.06	10.5	16.3	23	17.51	1.24	15.3	20.1	–14.26	<0.001
M1iLw	41	7.61	0.64	6.0	8.7	23	10.68	0.69	8.9	11.6	–17.95	<0.001
M2iRl	29	4.21	0.46	3.3	5.1	17	6.24	0.49	5.1	7.2	–14.11	<0.001
M2iRw	29	5.58	0.84	3.8	6.9	17	8.28	0.71	7.3	9.4	–11.13	<0.001
M2iLl	29	4.21	0.44	3.3	5.2	19	6.42	0.73	5.1	7.5	–13.03	<0.001
M2iLw	29	5.79	0.77	3.9	6.9	19	8.31	0.67	7.2	9.5	–11.62	<0.001

when searching for prey in mud and murky water (Duplaix 1981; Nel & Somers 2007). The Asian small-clawed otter (*A. cinereus*) was shown to find and catch crabs and other small prey in mud and murky water with its forepaws (Duplaix 1981), and they have a large somatic sensorial areas in their brain corresponding with increased forepaw use (Radinsky 1968).

The diet of *A. congicus* includes earthworms, molluscs, fishes, frogs, crabs and other small vertebrates and invertebrates (Rahm 1966; Carpaneto & Germi 1989; Baranga 1995). At Mbeli Bai in Congo where this species was regularly observed from 1998 to 2001 (R. Parnell & E. Stokes, unpubl. data), it was seen digging for worms in the mud most of the time, though fish were sometimes caught. Worms were located by pushing the forepaws deep into soft mud banks, and feeling through the mud with the fingers, gaze averted. After several seconds the forepaws were withdrawn and the worm transferred from the digits to the mouth. An average of three worms per minute was obtained in this manner. Parent otters were observed feeding young passing worms from mouth to mouth (R. Parnell, pers. comm.). After feeding, otters at Mbeli were observed rolling in grass, self-grooming, and further drying their fur by resting in the sun; defecation at rolling sites was common (R. Parnell, pers. comm.).

At Mbeli Bai, up to four individuals of *A. congicus*

Table 3. Performance of discriminant analyses (learning and cross-validation) for identifying *Aonyx congicus* from *A. capensis* for some combinations of variables (listed in the text).

Variables	Number of specimens	Correct classification of learning (%)	Correct classification of cross-validation (%)
P4sRl × P4sRw	69	100	100
P4sLl × P4sLw	72	97.2	95.3
M1sRl × M1sRw	72	100	100
M1sLl × M1sLw	64	100	100
M1iRl × M1iRw	63	100	100
M1iLl × M1iLw	64	100	98.4
Skull measurements	56	67.9	55.4

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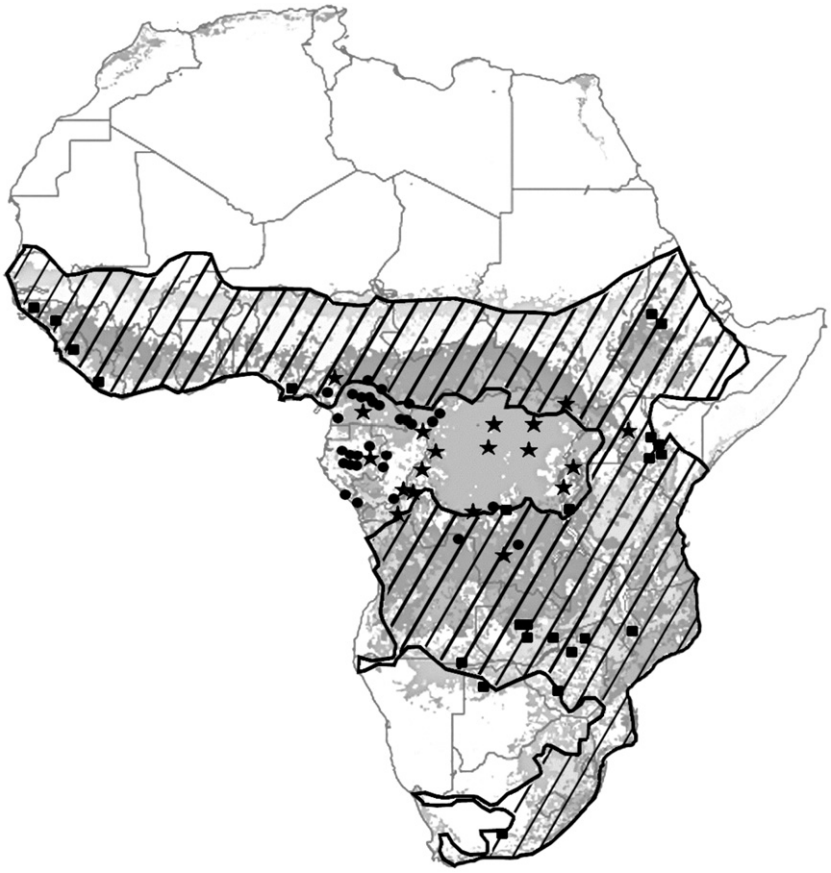

Fig. 3. Distribution of the two African *Aonyx* species over a map of vegetation classes (University of Maryland, Department of Geography / NASA GSFC Central Africa Project Biodiversity Support Program / AID), hatched area, distribution of *A. capensis* after Ray *et al.* 2005; squares, Museum specimens of *A. capensis;* stars, Museum specimens of *A. congicus*; circles, field records of *A. congicus.*

were seen together although most were alone or in pairs (frequently mother/offspring; (R. Parnell. & E. Stokes, pers. comm.). Spotted-necked otters (*Hydrictis maculicollis*) were sympatric with *A. congicus* at Mbeli and both species were observed feeding in close proximity without conflict, *H. maculicollis* favouring more open water than *A. congicus* (R. Parnell. & E. Stokes, pers. comm.).

Vocalisations of the Congo clawless otter, which are frequent when individuals meet, include barks, growls, snorts, hah!, coos, hums and whistles (Duplaix 1982). Serious fights are rare but squabbles and play fighting are frequently observed (R. Parnell, pers. comm.).

Newborn cubs of *A. congicus* are pure white (J. Thompson & P. Charles-Dominique, pers. comm.; and museum specimens, pers. obs.); two-month-old cubs have the same colouration as adults. Owing to the warm climate, reproduction may occur throughout the year. A cub was born in August in Congo (J. Thompson, pers. comm.) and three cubs were born in the beginning of January in southeast Gabon (O. Bourry, pers. comm.).

Threats

Habitat decline

Aonyx congicus may not be endangered in the centre of its range as the forest is still well preserved in Gabon (World Resources Institute 2000) and in Congo (B. Curran, pers. comm.). Nevertheless, road opening for wood exploitation could adversely affect the sustainable use of the forest with hunters using these roads for their illegal activities. Deforestation has dramatically increased in Cameroon (200 000 hectares of forest are lost annually, Besong & Ngwasiri 1995) and will probably be an even bigger problem in future.

Table 4. List of localities of the museum specimens and of the field observations (tracks, spraints and sightings).

Locality	Museum no./ Nature	Date	Sex	Observer/s	Latitude	Longitude
***A. congicus* – Museum specimens**						
Faradje (D.R. Congo)	AMNH 51831	7.03.1911		Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51834	25.02.1911	Female	Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51834	5.03.1911	Female	Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51835	5.03.1911	Male	Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51837	6.03.1911	Female	Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51838	9.03.1911	Female	Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51841	x.03.1911	Female	Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51845	13.08.1911		Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51847	22.01.1910	Male	Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 51850	7.02.1913	Female	Lang & Chaplin	N 03°45′	E 29°40′
Niapu (D.R. Congo)	AMNH 51853	15.01.1914	Female	Lang & Chaplin	N 02°25′	E 26°30′
Faradje (D.R. Congo)	AMNH 52104	28.04.1912	Male	Lang & Chaplin	N 03°45′	E 29°40′
Faradje (D.R. Congo)	AMNH 52105	28.04.1912	Male	Lang & Chaplin	N 03°45′	E 29°40′
Karamojo Moru (Uganda)	AMNH 118895	x.07.1940	Female	G.H.E. Hopkins	N 02°32′	E 34°41′
Female Kabale Kigeni Uganda	BMNH 31.12.9.1		Female	Capt J.E.Phillips, F.H. Rovers	S 01°15′	E 29°58′
SW Lake Bunyonyi Kigesi (Rwanda)	BMNH 21.1.22.2		Female	Capt J.E.Phillips	S 01°17′	E 29°55′
Bitye (Cameroon)	BMNH 23.1.22.43	x.04.1921		G.L. Balé	N 03°00′	E 12°21′
Nun marshes Bamenda Division (Cameroon)	BMNH 38.9.29.2–8			M.D.W. Jeffreys	N 05°57′	E 10°09′
Ndop plains Bamenda (Cameroon)	BMNH 50.313–4			D.R. Rosevear	N 05°57′	E 10°09′
Faradje (D.R. Congo)	RMCA 12322			Lang	N 03°45′	E 29°40′
Kunungu (D.R. Congo)	RMCA 14176		Female	Dr Shouteden	S 02°06′	E 16°26′
Kinda (D.R. Congo)	RMCA 3978			M. de Baillet	S 04°47′	E 21°48′
Ruzine (Burundi)	RMCA 7826M60–1			Vandromme	S 03°00′	E 29°06′
Ituri (D.R. Congo)	RMCA 860337M4	1984		M. Colyn	N 00°30′	E 25°45′
Stanley beach, Sud du Boloba (D.R. Congo)	RMCA RG 12761				S 02°10′	E 16°14′
Luisa Kasao (D.R. Congo)	RMCA RG 20203			Jobart	S 08°36′	E 24°50′
Bokuma (D.R. Congo)	RMCA RG 230				S 00°06′	E 18°41′
Kisantu (D.R. Congo)	RMCA RG 734				S 05°08′	E 15°19′
Lukolela (D.R. Congo)	RMCA RG 7032		Male		S 01°10′	E 17°11′
Loleka (D.R. Congo)	RMCA RG 8235				N 00°50′	E 23°31′
Kunungu (D.R. Congo)	RMCA RG 9678		Male	Dr Shouteden	S 02°06′	E 16°26′
N′dwa Batenda Mushie (D.R. Congo)	RMCA RG 20239				S 02°09′	E 16°25′
Ibembo (D.R. Congo)	RMCA RG 20636				N 02°36′	E 23°40′

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Table 4 (*continued*)

Locality	Museum no./ Nature	Date	Sex	Observer	Latitude	Longitude
Ibembo (D.R. Congo)	RMCA RG 20742				N 02°36′	E 23°40′
N'dwa (D.R. Congo)	RMCA RG 21348		Male		S 02°09′	E 16°25′
Entre Latoursville et Boué sur l'Ogoué (Gabon)	MNHN 1947 31			Maclatchy	S 00°49′	E 12°42′
Lac Toumba (D.R. Congo)	MNHN 1973 65			H. Pagezy Tondo	S 00°54′	E 18°07′
***A. congicus* – Field data**						
Inondated forest Ogooué (Gabon)	Alive	1994		P. Christy	N 00°13′	E 12°09′
Jonction Lopé/Ogooué (Gabon)	Alive	2000		J. de Dieu Makinda	S 00°05′	E 11°45′
In front of the hotel la Lopé (Gabon)	Alive	x.10.2001		J. de Dieu Makinda	S 00°05′	E 11°50′
Makokou (Gabon)	Alive			P. de Watcher	N 00°34′	E 12°52′
River of the Langoué baï (Gabon)	Alive	22–24.01.2002		H. Jacques, F. Alary	S 00°11′	E 12°34′
Conkouati reserve list (Congo)	Alive	16.11.2001		M. Vacher	S 04°00′	E 11°16′
Kouilou Basin (Congo)	Alive			B. Guillon	S 04°23′	S 11°56′
Likouala aux herbes (Congo)	Alive	1989		M. Agnagna	N 01°28′	E 17°42′
Sanctuary of Lesio-Louna (Congo)	Alive			D. Chronopoulos	S 03°00′	E 16°00′
Télé Lake (Congo)	Alive (photograph)	07.2001, 04.2002		C. Clark	N 01°23′	E 17°27′
Maya bai Odzala NP (Congo)	Alive	2002		J.M. Froment	S 00°05′	E 14°33′
Lokoué et Maya Nord (Congo)	Alive (video)	2002		S. Gatti	N 03°32′	E 26°23′
500m far from Kabo village (D.R. Congo)	Alive	15.7.2002		P. Ibata	S 07°15′	E 25°39′
Mbeli bai (Congo)	Alive	11, 27.06.2002		R. Parnell, Angela Nowell	N 02°16′	E 16°30′
Mbeli bai (Congo)	Alive	01.07.2002		H. Jacques, F. Alary	N 02°16′	E 16°30′
Kivu Province (D.R. Congo)	Alive	1968		C.R. Schmidt	S 01°00′	E 29°30′
Sankuru river (D.R. Congo)	Alive	2002		J. Thompson	S 04°30′	E 23°00′
Mbam and Djerem National Park (Cameroon)	Alive	2006		R.C. Fotso	N 05°52′	E 12°46′
Liboumba, Louayé, Lodie river (Gabon)	Alive and tracks			S. Lahm	N 00°34′	E 12°53′
Marché Mohaba Mozeye (Gabon)	Bush meat	x.04.2001		F. Alary	S 00°03′	E 13°30′
Banyang Mbo (50 km est Korup) (Cameroon)	Bush meat	2002		A. Willox	N 05°25′	E 09°35′
Kouilou Basin (Congo)	Bush meat (3 fresh, 1 smoked)	1996		M. Malonga	S 04°23′	S 11°56′
South of Abong-Mbang (Cameroon)	Bush meat (photograph)	20.01.1994		H. Planton	N 03°58′	E 13°10′
Doume river (Cameroon)	Bush meat (photograph)	1994		J.-F. Noblet	N 04°15′	E 14°20′
Dja National Park (Cameroon)	Skin and bush meat (photograph)	x.01.1992		H. Planton	N 03°20′	E 13°00′
Ndop plains, E of Bamenda (Cameroon)	Skulls	1974		D.R. Rosevear	N 05°58′	E 10°10′
N of Luanga district (Angola)	Skulls and skins			De Barros Machado	S 08°00′	E 21°00′

Continued on p. 167

Table 4 (*continued*)

Locality	Museum no./ Nature	Date	Sex	Observer	Latitude	Longitude
Marshes between Abong Mbang et Doume (Cameroon)	Dead (photograph)	x.10.2000		M. Van der Wal	N 04°05′	E 13°20′
Somalomo, Dja (Cameroon)	Dead (photograph)	x.02.2002		F. Alary	N 03°23′	E 12°44′
Dja river (Cameroon)	Spraints	17.02.2006		H. Jacques, J.M. Weber	N 03°24′	E 12°43′
Sanaga river, Nachtingal Falls (Cameroon)	Spraints	20.02.2006		H. Jacques, J.M. Weber	N 04°21′	E 11°38′
Campo National Park (Cameroon)	Spraints	28.02.2006		J.M. Weber	N 02°21′	E 10°15′
Banks of Ogooué river (Gabon)	Tracks			L. White	S 00°05′	E 11°00′
Lekori river (Gabon)	Tracks			O. Bourry	S 00°50′	E 14°07′
1°camp 'Limba', 5 hours from Dilo river (Gabon)	Tracks			H. Jacques, F. Alary	S 00°09′	E 12°25′
Bridge of Abeilles (Gabon)	Tracks	26.01.2002		H. Jacques, F. Alary	S 00°10′	E 12°26′
Landing stage Dilo river (Gabon)	Tracks	27.01.2002		H. Jacques, F. Alary	S 00°07′	E 12°20′
Dzanga-Sangha National Park (Central African Republic)	Tracks	2002		A.Turkalo, J. Ray	N 02°30′	E 16°00′
Near Bomassa (Congo)	Tracks and holes dug to find worms	17.07.2002		H. Jacques, F. Alary	N 02°12′	E 16°10′
Djomedjo (Cameroon)	Tracks (photograph)	23.01.1994		H. Planton	N 03°06′	E 13°36′
Bamenda et Bipindi (Cameroon)		1973		D.C.D. Happolds	N 05°57′	E 10°09′
***A. capensis* – Museum specimens**						
Abardare Range above Kajabi Station (Kenya)	AMNH 55229	15.12.1914	Male	A.J. Klein	S 00°25′	E 36°40′
Chas White (Zimbabwe)	AMNH 89849–50	1939			S 17°00′	E 30°00′
Samlin Okavango (Botswana)	AMNH 165148	23.12.1953	Female	W. Hoesch	S 19°30′	E 23°00′
Liberia	AMNH 186955	11.08.1961	Female	UK	N 06°00′	W 10°00′
Nyeri (Kenya)	BMNH 7.1.6.2		Male	S.L. Hinde	S 00°25′	E 36°57′
District N. Rhodesia (Zambia)	BMNH 33.3.11.24		Male	C.R.S. Pitman	S 16°00′	E 31°00′
West flank of Mt Kenya, 6000 ft (Kenya)	BMNH 44.58		Male	C.H. Stockley	S 00°09′	E 37°17′
Lake Naivasha (Kenya)	BMNH 04.9.29.1		Female	F. Jackson	S 00°44′	E 36°25′
Daugila, 40 miles S of Lake Tina (Ethiopia)	BMNH 37.2.24.48		Female	Major R.E. Cheesmaw	N 11°13′	E 37°51′
Bahr dar Giorgis Lake Tsana (Ethiopia)	BMNH 23.3.26.16		Female	J.P. Mitchell	N 11°42′	E 37°20′
Mamusala or Mumbwa, District N. Rhodesia (Zambia)	BMNH 32.9.1.159a			C.R.S. Pitman	S 15°00′	E 26°30′
Nr Nkala Old Mission (Zambia)	BMNH 68.1459			W.F.H. Ansell	S 15°44′	E 26°26′
Kigoma District (Tanzania)	BMNH 36.2.28.25	x.11.1933		B.W. Savory	S 04°54′	E 29°40′
Belived or in or adjacent to Kafue National Park (Zambia)	BMNH 68.603.a410			W.F.H. Ansell	S 15°47′	E 28°11′
Chilanga (Zambia)	BMNH 61.993				S 20°10′	E 28°34′

Continued on p.168

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Table 4 (*continued*)

Locality	Museum no./ Nature	Date	Sex	Observer	Latitude	Longitude
Cape of Good Hope (South Africa)	BMNH 37.9.26.94				S 32°00′	E 24°00′
Okavango Omatako Jonction, Grootfontein (Namibia)	BMNH 35.9.1.280			G.C. Shortridge	S 18°00′	E 20°46′
Zomba Mountains (Nyassa = Malawi)	BMNH 09.11.21.1			Major Peace	S 15°22′	E 35°19′
Okolobiri Creek, 1 km W of Diebu village, Nun River (Nigeria)	BMNH 95.318			S. Adada, C.B. Powell	N 05°00′	E 06°30′
Kamabogu market, E of Diebli, Niger Delta (Nigeria)	BMNH 98.148			Ezekig et Paba, C.B.Powell	N 05°00′	E 06°30′
Kamabogu, market E of Diebli, Niger Delta (Nigeria)	BMNH 98.149			Gbeneowei, C.B. Powell	N 05°00′	E 06°30′
Portuguese Guinea (= Guinée Bissau)	BMNH 10.11.25.2			C. Burnett	N 12°00′	W 15°00′
Sierra Leone	BMNH 59.666				N 08°00′	W 12°00′
Lake Naivasha (Kenya)	BMNH 09.5.27.1			R.J. Cunningham	S 00°46′	E 36°21′
Inkongo Lusambo (D.R. Congo)	RMCA RG 12119				S 04°54′	E 23°20′
Conakry (Guinea)	MNHN 1897982			Dr Maclaud	N 11°00′	W 13°00′

As for many other forest species, habitat loss may be the major threat.

Hunting

Otters are occasionally hunted for bush meat, but have the reputation of being quite difficult to catch. They were seldom recorded in bushmeat reports (S. Lahm & A. Willox, pers. comm.; Malonga 1996; Dowsett & Dowsett 1991; H.J., pers. obs.). The price is quite similar to other bushmeat. If this meat is sought after in Congo and Cameroon, this is not the case in Gabon. Moreover, in Gabon, otters are sometimes considered as a dangerous animal giving an electrical shock when caught with a spear. In Central and West Africa, their meat has the reputation of being an aphrodisiac (as it is with many other species too). In some areas, the otter is said to possess magical powers: by wearing a piece of fur one can become invisible to an opponent, or escape an enemy as otters escape fish traps. The skin of *A. congicus* is used in Cameroon to make drums (Alary *et al.* 2002).

Human conflicts

In the Dja river area in Cameroon, there is conflict with fishermen due to the destruction of nets, stolen fish and disturbance by the otters (Alary *et al.* 2002; H.J., pers. obs.). In Gabon, the otters are persecuted and killed by fishers only in areas where it is considered a competitor (Jacques *et al.* 2002). There are also few reports of otters drowning in fish traps, but apparently less often for *A. congicus* than for *H. maculicollis* as the latter species preys more on fish (P. Christy, pers. comm).

Conservation

The main threat for the Congo clawless otter could be the ignorance of its existence by institutions in charge of wildlife conservation in most African countries. The initiative of the Wildlife Conservation Society to include otters in their document 'Setting conservation and research priorities for larger African carnivores' (Ray *et al.* 2005) could be a beginning for more consideration and studies on African otters. Otters could be used as symbols of water quality and preservation, and this may contribute in environmental education. The Congo clawless otter should be totally protected in Gabon, Congo and Cameroon until more information is collected about its status.

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CONCLUSIONS

Morphometric differences, together with diet and habitat particularities, suggest that *A. congicus* is a different taxon from *A. capensis,* and a separate conservation unit. However, more data are needed to investigate its specific status. The major threats are habitat loss, hunting for bushmeat and local medicine, and human conflicts. The impacts of interspecific conflict, disease, road kills, genetic issues and climate change are still to be evaluated (Ray *et al.* 2005).

Owing to the difficulties of doing field work in the Central African rainforests, surveys and ecological studies of this elusive species have been very limited. The distribution, biology and status of both the Congo and Cape clawless otters need to be investigated further. In fact, *A. capensis* may be much more threatened in West and Central Africa than *A. congicus. A. capensis* has probably been extirpated from northern Cameroon, Togo and is very rare in Niger or Benin (H. Planton, pers. comm.; H.J., pers. obs.). More investigations are needed to confirm the conservation status of both species. For now, *A. capensis* is listed as Least Concern (IUCN 2008) and *A. congicus* has recently been moved from Data Deficient to Least Concern (IUCN 2008).

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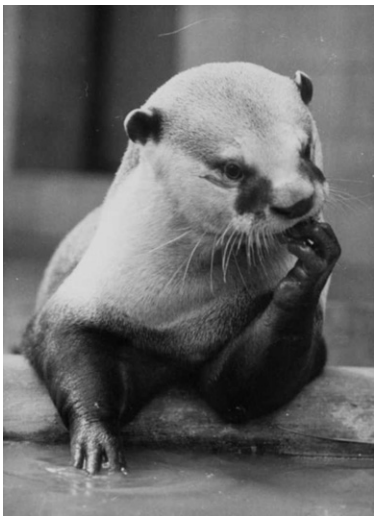

Aonyx congicus.
Photograph: Nicole Duplaix, Bale zoological gardens, 1968.