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Rhinolophus capensis (Chiroptera: Rhinolophidae)

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Abstract: *Rhinolophus capensis* Lichtenstein, 1823 is a medium-sized rhinolophid commonly called the Cape horseshoe bat. It has a characteristic horseshoe-shaped nose leaf that surrounds its nostrils but does not cover the entire muzzle. This species is endemic to South Africa and is typically found in caves along the coastal parts of Northern, Western, and Eastern Cape provinces. It is a gregarious species that is often found roosting with *R. clivosus* and *Miniopterus schreibersii natalensis*. From a conservation standpoint, *R. capensis* has been listed as vulnerable until recently, when its listing was changed to near threatened. DOI: 10.1644/810.1.

Key words: bat, Cape horseshoe bat, nose leaf, rhinolophid, South Africa

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Rhinolophus capensis Lichtenstein, 1823
Cape Horseshoe Bat

Rhinolophus capensis Lichtenstein, 1823:4. Type locality "Cape of Good Hope."
Rhinolophus auritus Sundevall, 1860:13. Type locality "Belvedere, near Knysna, Cape of Good Hope."

CONTEXT AND CONTENT. Order Chiroptera, family Rhinolophidae, genus *Rhinolophus*. *R. capensis* is monotypic (Simmons 2005). With *R. denti, R. simulator,* and *R. swinnyi*, *R. capensis* makes up the *capensis* species-group (Csorba et al. 2003).

DIAGNOSIS

Rhinolophus capensis may be confused with sympatric *R. clivosus augur*. Although *R. capensis* is slightly smaller, the length of its forearm (47–52 mm) overlaps with that of *R. clivosus* (56–57 mm). Thus, these species are more accurately distinguished by the position of the anterior upper premolar. In *R. capensis* the anterior upper premolar (P1) is within the toothrow separating the canine and posterior premolar (C1 and P2). In *R. clivosus* the anterior upper premolar (P1) is outside the toothrow such that the canine (C1) and posterior premolar (P2) are in contact (Csorba et al. 2003; Taylor 2000). *R. capensis* also has broader ears than *R. clivosus* (Skinner and Smithers 1990).

GENERAL CHARACTERS

Rhinolophus capensis (Fig. 1) is a medium sized rhinolophid, with a forearm length of 47.0–51.9 mm and a range

Fig. 1.—An adult *Rhinolophus capensis* captured at De Hoop Nature Reserve in South Africa. Photograph was used with permission of the photographer, D. S. Jacobs.

Fig. 2.—Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Rhinolophus capensis* from De Hoop Nature Reserve, Western Cape Province, South Africa (Transvaal Museum, TM 40570, male). Greatest length of skull is 21.4 mm. Photograph by S. Stoffberg.

in body mass of 9.5–16.0 g (n = 59—Stoffberg 2007). Dorsal pelage is dark or pale brown in color. Cream-colored bases of individual hairs are often visible, giving the dorsum an uneven color. The venter is paler and fawn-gray in color. Ears are of medium size (21.0–25.0 mm in length) and can move independently. A horseshoe-shaped nose leaf surrounds the nostrils but does not cover the entire muzzle. A rudimentary secondary nose leaf may be present. The sella, arising from mid nose leaf, has parallel sides. It connects to a spear-shaped lancet behind the horseshoe and above the eyes

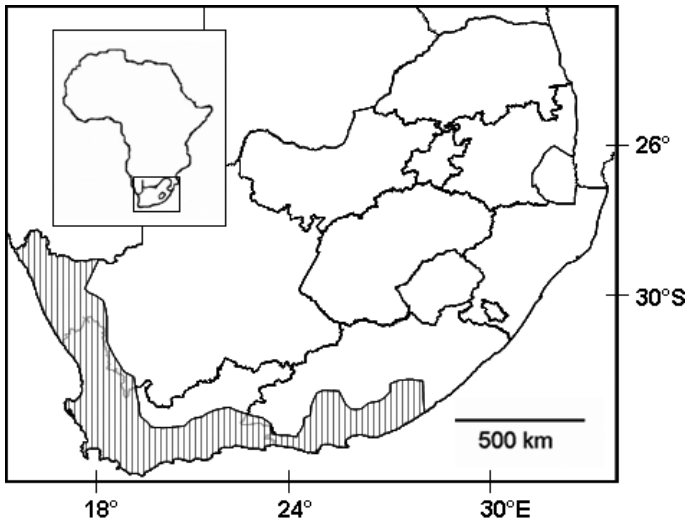

Fig. 3.—Geographic distribution of *Rhinolophus capensis*. Modified from Taylor (2000).

via a connecting process that is high, rounded (or blunt), and sparsely covered with long hairs (Csorba et al. 2003).

Cranial measurements (Fig. 2; ranges in mm; sex not distinguished) for *R. capensis* include: total length of skull (n = 20), 20.0–21.1; width of zygomatic (n = 19), 10.0–10.6; length of upper toothrow (n = 21), 7.2–7.8; length of lower toothrow (n = 21), 7.8–8.3; width of mastoid (n = 18), 9.6–10.0; length of mandible (n = 19), 13.1–14.1 (Csorba et al. 2003). External morphological measurements (ranges, in mm) for 9 male *R. capensis* from Cape Province, South Africa, are: total body length, 84–90; length of tail, 24–32; length of head and body, 58–62; length of hind foot from heel to end of longest claw, 9–12 (Skinner and Smithers 1990).

DISTRIBUTION

Rhinolophus capensis is endemic to South Africa and occurs in habitats associated with caves along coastal parts of Northern, Western, and Eastern Cape provinces (Fig. 3).

FOSSIL RECORD

Fossils of *Rhinolophus* cf. *capensis* dated to the late Pliocene were described from Makapansgat, in northeastern South Africa (Butler 1978; De Graaf 1960).

FORM AND FUNCTION

The dental formula is i 1/2, c 1/1, p 2/3, m 3/3, total 32. Wing parameters (range) for 59 *R. capensis* include: wingspan, 27.6–34.1 cm; wing area, 131.8–177.8 cm^2; wing loading, 6.13–10.2; aspect ratio, 5.08–6.87; tip shape index, 1.1–4.4 (Stoffberg 2007). The Cape horseshoe bat has a short-

tipped wing, low wing loading, and a below-average aspect ratio that are indicative of a bat that is very maneuverable and capable of slow-speed foraging in and around vegetation (McDonald et al. 1990; Norberg and Rayner 1987).

ONTOGENY AND REPRODUCTION

Male *R. capensis* mate for the 1st time in their 2nd year even though their testes are active at an age of 11–12 months (Bernard 1985). Similarly, females do not become reproductively mature in their 1st year. After a 4-month period of inactivity (June–September), reactivation of seminiferous tubules occurs in early summer (October). The development of sperm is closely associated with changes in Leydig cell activity and with increased plasma testosterone concentrations (Bernard 1986). Sperm storage occurs in males of *R. capensis*, and spermatogenesis occurs between October and May. Before winter (April–May), spermatozoa are released into the cauda epididymis where sperm are stored until copulation occurs at the end of winter. Although females are in estrus during April and May, ovulation, copulation, and fertilization are delayed until August–September, after winter hibernation. Females tend to give birth to a single young in November–December, after a 3- to 4-month gestation. Lactation occurs in December–January (Bernard 1985). Young cling to their mothers during the day, but remain in the roost when mothers leave to forage (J. C. Herselman, in litt.).

Results of a study of African bats (which included *R. capensis*) indicated that parturition commonly occurs 1 month before peak rainfall. This peak in rainfall is followed by an increase in insect abundance (Cumming and Bernard 1997), which coincides with the postweaning phase of the young bats. It has been suggested that the synchronicity between the postweaning phase and the increased insect abundance may be driving the timing of the reproductive cycle in certain African microchiroptera (Cumming and Bernard 1997).

ECOLOGY

Rhinolophus capensis is typically a cave-dwelling, gregarious species. Diurnal roosts consist of caves and mine adits where Cape horseshoe bats are often found roosting in separate clusters with Geoffroy's horseshoe bat (*R. clivosus*) and Schreiber's long-fingered bat (*Miniopterus schreibersii natalensis*—McDonald et al. 1990; Skinner and Smithers 1990). *R. capensis* shows no evidence of seasonal changes in preference for thermal characteristics of roosts, and thermal preference does not appear to be a factor limiting its distribution (Brown and Bernard 1994).

Rhinolophus capensis is insectivorous and feeds predominantly on lepidopterans and coleopterans (Schoeman 2006). It is described as a slow aerial clutter-forager (Taylor 2000). The Cape horseshoe bat may also feed by perch-hunting, which involves perching in vegetation and waiting to ambush passing insect prey (Schnitzler et al. 1985; Taylor 2000).

Rhinolophus capensis is a high–duty-cycle echolocator; the duration of a pulse is long relative to the time between consecutive pulses. Echolocation signals are dominated by a constant-frequency component, and end with a short frequency-modulated component. Peak frequency, at which bats place the most energy in each pulse, varies among *R. capensis* from 81.9 to 85.5 kHz ($n = 40$). Within individuals, the range of variability in peak frequency is relatively small. Pulse duration ranges from 28.1 to 52.7 ms ($n = 40$—Stoffberg 2007).

The high–duty-cycle calls are used by rhinolophids to detect and classify prey in cluttered habitats. They evaluate Doppler shifts that encode information about relative movement (Schnitzler and Kalko 1998). This makes *R. capensis* very efficient at capturing moving insects in cluttered habitats.

GENETICS

In the karyotype of *R. capensis*, 2n = 58 and FN = 60 (Erasmus and Rautenbach 1984). Both male and female sex chromosomes are submetacentric (no description of autosomes provided—Rautenbach 1986). Analyses based on 34 allozyme encoding loci, grouped *R. capensis* with *R. denti*, *R. simulator,* and *R. swinnyi* (Maree and Grant 1997). Mitochondrial cytochrome-*b* gene sequences and nuclear introns (thyroglobulin and thyrotropin—Matthee et al. 2001) suggest that *R. capensis* is a sister species to *R. swinnyi* (Stoffberg 2007).

CONSERVATION

Rhinolophus capensis is listed as "near threatened" in the *Red Data Book of the Mammals of South Africa* (Friedmann and Daly 2004) and in the *African Chiroptera Report* (African Chiroptera Project 2006). It was listed as "vulnerable" by the International Union for the Conservation of Nature and Natural Resources (Hutson et al. 2001), but its status more recently has been changed to "near threatened" (Jacobs et al. 2004).

REMARKS

Previously, higher-order classification based on morphological characteristics placed the Rhinolophidae in the suborder Microchiroptera. More recent molecular evidence has prompted assignment to the suborder Yinpterochiroptera (Springer et al. 2001) and superfamily Rhinolophoidea (Teeling et al. 2005). However, because classifications of bat

families that are based on morphological data and those that are based on molecular data are often incongruent, higher-level classifications are not recognized by Simmons (2005). The generic name *Rhinolophus* means nose-crest, referring to the characteristic nose leaf. The specific name *capensis* refers to the Cape of Good Hope, which is the type locality for this species. *R. capensis* and sympatric *R. clivosus*, distinguishable by the dental characters mentioned earlier, also can be distinguished by the frequency of their echolocation calls (Jacobs et al. 2007).

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