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THE HERPETOFAUNA OF THE PHNOM AURAL WILDLIFE SANCTUARY AND CHECKLIST OF THE HERPETOFAUNA OF THE CARDAMOM MOUNTAINS, CAMBODIA

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(with 38 text-figures)

ABSTRACT.– **A survey of the Phnom Aural Wildlife Sanctuary in the eastern Cardamom Mountains augments and complements previous herpetological surveys of this mountain range, adding one new species record for frogs, five new species records for lizards and seven new records of snakes, one of which (*Dendrelaphis subocularis*) is a new record for the Cardamom Mountains. A checklist of the herpetofauna of the Cardamom Mountains is provided.**

KEY WORDS.– **Cambodia, Cardamom Mountains, Phnom Aural, herpetofauna.**

INTRODUCTION

Cambodia is centrally located in the southern portion of the Indochinese Peninsula and owing to its position at the northern end of the Indo-Malayan Forest (Webb, 2005), it serves as an important biogeographical link between south-east and east Asian herpetofaunas. Several recent studies have demonstrated that many wide-ranging lineages previously considered to be single species, are actually composed of multiple species and the species boundaries within many of these complexes occur within this general region of Indochina (e.g., Bain et al., 2003; Matsui, et al., 1996, 2001, 2005a,b; Ota et al., 2001; Wüster et al., 1995). Therefore, in order to understand the historical biogeography of the Indochinese herpetofauna and to implement effective measures of conservation, groundwork from baseline field surveys and alpha-taxonomic investigations must first be laid. However, years of political turmoil and genocide have all but halted any field-based studies in Cambodia, and as such, it lags behind neighbouring countries of Indochina, namely Vietnam, Laos, and Thailand (see Campden-Main, 1970; Cox, 1991; Deuve, 1970; Inger et al., 1999; Manthey and Grossmann, 1997; Stuart, 2005; Teynie et al., 2004; Ziegler, 2002 and references therein). Only within the last few years has the political situation in Cambodia stabilized enough to enable reasonably safe field work in some areas.

Cambodia for the most part, is a large floodplain whose central basin receives drainage from the Khorat Plateau of north-eastern Thailand in the north and the Langbian and Kontum Plateaus from the east. The southern portion of Cambodia, along the northern edge of the Gulf of Thailand, is physiographically unique, being dominated by the isolated Cardamoms (*sensu* Stuart and Emmett, 2006, which

also include the Elephant Mountains of the extreme south-east). Cardamom Mountains generally run from the Thai/Cambodia border in the west in the Palin Province, south-eastwards for approximately 311 km to the Kampong Bay in the Kampot Province and span more than 10,000 km^2 (Fig. 1). They comprise four, distinct massifs; the Phnom Samkos massif in the north-west (north-western Cardamoms), the central Cardamom Mountains (central Cardamoms), the relatively isolated Elephant and Bokor Mountains in the south-east (south-eastern Cardamoms), and the relatively isolated Phnom Aural Massif in the north-east (north-eastern Cardamoms). The Cardamom Mountains range in height from approximately 69 m above sea level to 1,831 m at the summit of Phnom Aural, Cambodia's highest peak (Peakbagger.com http://peakbagger.com, 2006). They receive the highest amount of annual rainfall (3,000–5,000 mm; Weiler, 1998) than anywhere in Cambodia, which comes mainly from the south-westerly monsoon moving onshore out of the Gulf of Thailand from May through October (Maxwell, 2001).

Herpetofaunal reports from the Cardamom Mountains appear in early, scattered publications and the regional works of Bourret (1934, 1941, 1942), Smith (1935, 1943), and Saint Girons (1972). Additionally, Taylor's (1962b, 1963, 1965) monographic series included species from the Thai portion of the Cardamom Mountains. Only recently have the results from field surveys specifically focused in the mountainous south-western portion of Cambodia and surrounding regions been published (e.g., Daltry and Chheang, 2000; Long et al., 2001; Ohler et al., 2002; Swan and Daltry, 2002; Daltry and Traeholt, 2003; Chuaynken et al., 2004; Stuart and Platt, 2004; Stuart and Emmett, 2006). Stuart and Emmett's (2006) report was unique in that, for the first time, it provided diagnostic characteristics of every species collected and thus, laid a foundation of morphological profiles for this herpetofauna. Additionally and of extreme importance, is the fact that the species accounts of the aforementioned surveys were based on vouchered material and those of Stuart and Emmett (2006) were also accompanied by diagnoses open to scrutiny.

The results of this survey come from the Phnom Aural Wildlife Sanctuary in the north-eastern Cardamoms and build primarily upon the previous contributions of Ohler et al. (2002) and Daltry and Traeholt (2003). This study was a continuation of the Cambodian Government's request for biodiversity surveys for purposes of conservation management (Daltry and Momberg, 2000).

SURVEY SITES

Our survey from 4–10 August 2005, focused on the eastern flank of Phnom Aural within the Phnom Aural Wildlife Sanctuary in the eastern Cardamoms during the peak of the rainy season. Phnom Aural reaches 1,831 m in elevation and supports three distinct vegetation types that align themselves along an altitudinal gradient: dry dipterocarp forest occupies the lowland basins surrounding the base of Phnom Aural; hill evergreen forest covers the mountain's slopes up to 1,200 m; and montane evergreen forest ranges from 1,200 m to the summit. The latter two regions have been placed in a distinct bioclimatic region referred to as the Cardamom Evergreen Forest Ecoregion (Fontanel, 1972). Phnom Aural and its surrounding lowlands have been placed in the Phnom Aural Wildlife Sanctuary (12°00'N, 104°10'E), a nominally protected area that still suffers from considerable illegal logging. The primary localities of our survey within this sanctuary were Aural Village, two camps at different elevations on the south-east-facing flank of Phnom Aural, and the summit of Phnom Aural. Specimens were also collected in transit from one study site to the next.

Aural Village (11°57'N, 104°65'E; 175 m asl; Fig. 2).– Aural Village lies in a flat, wide valley crisscrossed by small streams. The vegetation has been characterized as dry dipterocarp forest (Boyce et al., 2002) and is highly degraded from illegal logging. Daytime temperatures exceed 35°C with nighttime lows near 28°C. Temporary puddles within, and alongside a road running through the village and leading to the base of Phnom Aural, provided ample habitat for many species of frogs common in anthropogenically-modified environments.

Camp I (12°01'N, 104°08'E; 549 m asl; Fig. 3).– Camp I was near a small, rocky, ephemeral

stream situated on a hillside in hill evergreen forest. Daytime temperatures reached 26°C with nighttime lows of 21°C. Recent logging activity near this camp provided access into the forest as well as forest-edge habitats where much collecting was done. Decaying logs and debris left over from felled trees provided ample surface litter under which a number of species were collected.

Camp II (12°01'N, 104°09'E; 1,121 m asl; Fig. 4).– Camp II lies at the lower edge of the montane evergreen forest near a small, shallow, sandy stream. At this elevation no evidence of logging was present and many of the dipterocarp trees had trunk diameters exceeding 1 m with buttressed roots that provided microhabitats for some species. Daytime temperatures reached 24°C with nighttime lows of 18°C. The understory was relatively open but the streamside vegetation was thick and bushy.

Summit of Phnom Aural (12°03'N, 104°10'E; 1,831 m asl; Fig. 5).– The summit of Phnom Aural is characterized by stunted, lichen and moss-covered trees supported by fog-induced humidity. During our brief visit, the daytime temperatures did not exceed 14°C and there was heavy fog and light rain.

MATERIALS AND METHODS

Surveys were done throughout all hours of the day and night and collections were made by hand or with the aid of blowpipes. Local dogs were used in some cases, to search for turtles and snakes. Specimens were photographed prior to euthanasia, after which they had liver tissue removed, preserved and fixed with 10% formalin, and transferred into 70% ethanol for storage. All specimens were identified and compared to descriptions in the literature and, in some cases, to material on hand from the Field Museum of Natural History, Chicago, Illinois, U.S.A. (FMNH), The Natural History Museum, London, United Kingdom (BMNH), and the La Sierra University Herpetological Collection, Riverside, California, U.S.A. (LSUHC). Voucher photographs are deposited in the La Sierra University Digital Photograph Collection (LSUDPC). Measurements were taken with dial calipers to the nearest 0.1 mm under a binocular, dissecting microscope. We follow the scholarly example of Stuart and Emmett (2006) in that all species reported are accompanied by previously published morphological diagnoses and/or descriptions of that species, thus rendering our identifications open to scrutiny. Additionally, this practice begins the important process of building morphological profiles of these populations. All material is temporarily deposited in the LSUHC.

RESULTS

Bufonidae

Bufo macrotis Boulenger, 1887

LSUHC 7469–71: base of Phnom Aural approximately 15 km west of Aural Village, 11°58,N, 104°08'E, 202 m asl, dry dipterocarp forest, 10 August.

Two gravid females and one adult male with nuptial pads on digits I, II, and III agree with the expanded diagnosis of Taylor (1962b) in lacking cranial crests; having low parotoid glands slightly larger than eyelid; tympanum large, equal or slightly smaller than eye; body covered with tubercles of varying size, those on head smallest; lacking a tarsal fold but having a row of enlarged tarsal tubercles; inner metatarsal tubercle slightly smaller than outer; large, rounded palmar tubercle; first finger longer than second; and subarticular tubercles on hand bifid or trifid.

All individuals were collected during the day in moist, tall (ca. 30 cm) grass in the vicinity of fallen trees and stumps.

Megophryidae

Megophrys auralensis Ohler, Swan & Daltry, 2002

LSUHC 7385: Camp I, 4 August and LSUHC 7428: Camp II, 7 August.

The two juvenile specimens correspond to the diagnosis of Ohler et al. (2002) in having a vomerine ridge lacking vomerine teeth; broad head; well-developed tympanum; no white band on the upper lip; and a relatively long tibia.

LSUHC 7385 (SVL 21 mm) was collected during the day from leaf litter adjacent to a small stream. LSUHC 7428 (SVL 29 mm) was found

moving across the forest floor in the leaf litter during the early evening. Ohler et al. (2002) reported calling males perched on rocks in the splash zone along swiftly flowing streams. No males were heard calling during our survey.

Microhylidae

All microhylids were collected from temporary puddles in Aural Village and along the road to the base of Phnom Aural. All are common to anthropogenically modified environments.

Kaloula pulchra Gray, 1831

LSUHC 7359: Aural Village, 6 August and LSUHC 7481: base of Phnom Aural, 7 August.

Both specimens agree with Parker's (1934) expanded description and Taylor's (1962b) diagnosis in having widened, expanded, truncate toe tips; brown dorsum with wide, darkly-edged, light dorsolateral stripes; no vertebral stripe; and webbing on foot very weak.

The juvenile (LSUHC 7359, SVL 16 mm) was collected during the evening beneath a log. An adult (LSUHC 7481, SVL 67 mm) was collected during the day, while sitting in a road-side puddle.

Microhyla butleri Boulenger, 1900

LSUHC 7326: between Aural Village and base of Phnom Aural, 5 August.

The single specimen is in accord with Parker's (1934) diagnosis and a series from northern Malaysia (LSUHC 7184–89) in having a snout no longer than twice the diameter of the eye; toes at least 1/3 webbed with distinct discs possessing a medial groove; a palatine bone; two metatarsal tubercles; and a diagonal fold along the underside of the tarsus.

One adult (SVL 23 mm) was collected during the day from a roadside puddle.

Microhyla heymonsi Vogt, 1911

LSUHC 7356–57: between Aural Village and base of Phnom Aural, 4 August 2005.

Both specimens are in accord with Parker's (1934) diagnosis and specimens from northern Malaysia (LSUHC 6511–12, 6654, 6658) in having a snout no longer than twice the diameter of the eye; toes not more than 1/3 webbed with small discs with a medial groove; palatine bone absent; outer metacarpal tubercle divided; and a continuous dark band from snout to groin.

Both specimens were collected during the evening along roadside puddles. LSUHC 7357 is gravid (SVL 28 mm) and LSUHC 7356 is an adult male (SVL 21 mm). Other males were heard calling nearby.

Microhyla pulchra (Hallowell, 1861)

LSUHC 7338: between Aural Village and base of Phnom Aural; 4 August 2005.

This specimen is in accord with Parker's (1934) diagnosis and specimens from Hainan Island, China (LSUHC 4118–19, 4166, 4183) in having a snout no longer than twice the diameter of the eye; toes not more than 1/3 webbed with no discs; two, non-shovel-shaped metatarsal tubercles; and no palatine bones.

An adult male (SVL 25 mm) was collected during the evening from along the edge of a roadside puddle.

Ranidae

Fejervarya cancrivora (Gravenhorst, 1829)

LSUHC 7351–53: 4 August and LSUHC 7472–76: 10 August; all between Aural Village and base of Phnom Aural.

Eight specimens match Taylor's (1962b) and Berry's (1975) diagnoses and material from northern Malaysia (LSUHC 5245–49, 5202, 5210) in lacking a dorsolateral fold; the tips of the digits being slightly swollen and lacking a fleshy lateral fringe on the inside of the first finger; having a free flap of skin along the outside edge of fifth toe; no outer metatarsal tubercle; and no vocal slits in males.

All individuals were juveniles (SVL 22–32 mm) found within or sitting along roadside puddles during the day. Although this species is common in anthropogenically altered habitats, it was not reported by Ohler et al. (2002) or Stuart and Emmett (2006).

Limnonectes kohchangae (Smith, 1922)

LSUHC 7388: Camp I, 6 August and LSUHC 7431–41, 7448–49: Camp II, 7 August 2005.

Thirteen specimens agree with Smith's (1922) and Taylor's (1962b) diagnoses of mate-

rial from the type locality of Koh Chang Island in having a pair of enlarged, fang-like odontoids at the front of the mandible in males; an obtuse canthus rostralis; distance between nostrils greater than interorbital width which is greater than width of upper eyelid; first finger as long as second; no outer metatarsal tubercle; tarsal fold present; and no flap in interorbital or occipital area. They also agree with Stuart and Emmett's (2006) expanded description of a series from the central Cardamoms and Elephant Mountains in having a light coloured interorbital bar bordered posteriorly in black; the frontal region lighter than dorsum; 23% (3 of 13) having a white vertebral line; males lacking vocal slits and males having enlarged heads and tympani the size of the eye—characteristics lacking in females.

LSUHC 7388 (female, SVL 38 mm) was collected on the forest floor during the day hundreds of meters from the nearest stream. The remaining specimens were common along and within the stream at Camp II. Males called at night and occasionally during the day.

Occidozyga lima (Gravenhorst, 1829)

LSUHC 7358: Aural Village, 4 August.

This specimen agrees with the diagnosis of Taylor (1962b) in lacking vomerine teeth; having a narrow tongue with an elongate, pointed tip; pointed fingers with the first as long as the second; two distinct metacarpal tubercles; an inner and outer metatarsal tubercle; a large tubercle at the posterior end of the tarsus; tubercular or spiny skin; linear series of small warts on the belly, flanks, and chin; continuous dark and light longitudinal stripes on posterior margins of thighs (Taylor [1962b] erroneously refers to their orientation as transverse]); fingers slightly webbed; and toes fully webbed.

LSUHC 7358 (female, SVL 27 mm) was collected at night, while sitting at the edge of a puddle along the road. This species is common to anthropogenically modified environments.

Occidozyga martensii (Peters, 1867)

LSUHC 7477–79: between Aural Village and base of Phnom Aural, 10 August.

Three specimens are in accord with the diagnosis of Taylor (1962b) and specimens from Malaysia (LSUHC 6881–84, 7197) in lacking vomerine teeth; having a rounded, posterior tongue margin; small, terminal discs on the tips of the digits; no longitudinal dorsal grooves; and relatively small size (SVL 21–29 mm in our series).

All specimens were collected during the day from puddles along the road. This species is common to anthropogenically modified environments.

Paa fasciculispina (Inger, 1970)

LSUHC 7339: Camp I, 5 August.

An immature female (SVL 50 mm) agrees with the original description of this species (Inger, 1970) from the Thai Cardamom Mountains in Chantaburi Province and Stuart and Emmett's (2006) expanded description of a male and a female from the central Cardamoms. It is similar to Stuart and Emmett's (2006) female in having single asperities on tubercles from the upper parts of the chest and throat that are not grouped into clusters. In life, the dorsum was brownish and the flanks and tibial region greenish, both of which were mottled with lightened areas. The venter was dull-white.

This specimen was found at night sitting in a shallow pool below a small waterfall.

Rhacophoridae

Chirixalus nongkhorensis (Cochran, 1927)

LSUHC 7349–50: Aural Village, 4 August.

The two specimens agree with Cochran's (1927) description of the type series from Nong Khor in south-eastern Thailand and Stuart and Emmett's (2006) description of specimens from the central Cardamoms in having the two outer fingers (digits III and IV) nearly opposable to the inner two (digits I and II); interorbital distance much greater than the width of the upper eyelid; SVL greater than 20 mm (SVL 27 and 29 mm in our sample); dorsum reddish-brown with dark, transverse blotches and barred limbs; head slightly wider than body; tibiotarsal articulation reaches eye or slightly beyond it; toes nearly completely webbed; canthus angular; tympanum distinct. Taylor (1962b) stated that the outer two fingers are 2/3 webbed but in our specimens, webbing is restricted to the base, toes 1/4–1/2 webbed at most.

Both specimens were calling while seated on the small leaves of low bushes adjacent to roadside puddles.

Philautus parvulus (Boulenger, 1893)

LSUHC 7422–27: 7 August 2005; LSUHC 7460: 8 August; all from Camp II.

Seven adult males (SVL 17–19 mm) agree with the descriptions of Taylor (1962b) of Thai specimens and largely with Stuart and Emmett's (2006) description of central Cardamom specimens in lacking vomerine teeth; having a snout shorter than the diameter of the orbit; slanted loreals; an interorbital region wider than the upper eyelids; hidden tympanum; slight finger webbing (Stuart and Emmett [2006] report no webbing and Taylor [1962b] reports webbing restricted to the base); webbing of third and fifth toe reaching the distal, subarticular tubercles; tibiotarsal articulation reaching eye; large digital discs; granular venter; large vocal sac in males.

All specimens were heard calling from bushes and small trees no more than 2 m above the ground. Most were seated on leaves. One male was observed in an inverted position on the underside of a leaf and two others were observed sidelong on small branches. During a cool, cloudy, windy day with light rain on 9 August, we heard *Philautus* calls while at the summit of Phnom Aural, at 1,813 m. The calls were coming from within tangled, moss-covered root masses at the bases of small trees. We were unable to collect any material and thus, can not equivocally state that the call was of *P. philautus* and not *P. cardamonus* which is known from 1,650 m on Phnom Samkos and 1,250 m from Phnom Tumpor in the western Cardamoms (Ohler et al., 2002).

Polypedates cf. *leucomystax* (Gravenhorst, 1829)

LSUHC 7347–48, 7354–55: Aural Village, 4 August.

Three specimens (LSUHC 7347–48, 7354) match the description of *Polypedates leucomystax leucomystax* in Taylor (1962b) in that the skin of the head is fused to the frontoparietal and nasal bones; vocal sac present in males; interorbital space wider than the upper eyelid; tympanum distinct; fingers with small (nearly absent in our sample) webbing; toes at least 2/3 webbed; digital discs smaller than tympanum; tibiotarsal articulation reaching from eye to end of snout; vomerine teeth; hourglass-shaped, dark marking on head and occiput reaching shoulders. LSUHC 7354 has all the above characteristic except in having four, dark, dorsal stripes instead of an hourglass marking, thus matching the description of *P. l. sexvirgatus* (Taylor, 1962b).

The *Polypedates leucomystax* complex is remain incompletely known, with many distinct forms from various regions masquerading under a single name (Inger et al., 1999; Inger and Tan, 1996; Matsui et al., 1986; Orlov et al., 2001; Trepanier et al., 1999; Zhao and Adler, 1993). The four individuals reported here were collected at night, while sitting on the leaves of low bushes next to roadside puddles. Many others were heard calling from nearby vegetation.

Rhacophorus bipunctatus Ahl, 1927

LSUHC 7420–21: Camp II, 7 August.

Two adult males (SVL 37 and 38 mm) agree with the description of an adult male described by Stuart and Emmett (2006) from the central Cardamoms in that the webbing on the third finger extends beyond the distal margin of the distal subarticular tubercle; the dermal projection of the tibiotarsal joint is almost non-existent as opposed to just being small; and the lack of a dark, axillary blotch as opposed to having one.

Both specimens were heard calling during the early evening and located on the branches of small trees adjacent to a stream, approximately 3–4 m above the ground.

Testudinidae

Indotestudo elongata Blyth, 1854

LSUDPC 1202–03: Camp I, 5 August.

One individual was found by our guide's dogs, as it was crawling through leaf litter and brought to camp, was photographed and released.

Agamidae

Acanthosaura crucigera Boulenger, 1885

LSUHC 7337, 7393–95, 7406: Camp I, 5 August. LSUHC 7446–47, 7451, 7457: Camp II, 8 August. LSUHC 7466: above Camp II at 1400 m, 9 August.

A series of 10 specimens agrees reasonably well with Boulenger's (1885) description of a male and female from Tavoy, Myanmar and Stuart and Emmett's (2006) description of a series of eight specimens from the central Cardamoms, except Boulenger's (1885) description mentioned *A. crucigera* as having 9 or 10 supralabial and infralabial scales. In the Cardamom series from this survey, supralabial scales range from 12–14 and infralabials from 10–13. This is in accord with nine specimens of *A. crucigera* examined from southern Thailand and northern Malaysia (FMNH 177677, 177892–98, LSUHC 6831) whose supralabials are 12 or 13 in number and infralabials range from 11–14. Additionally, our series shows remarkable colour pattern variability and some lack the diagnostic, black, diamond-shaped nuchal blotch (Taylor, 1963). LSUHC 7447 (male; SVL 155 mm; Fig. 19 upper) has a nearly uniform, blonde-coloured dorsum; uniform, light-greenish limbs; a black eye patch that does not contact the nostril and ends posteriorly dorsal to the tympanum; a beige, nearly unpigmented gular sac; and a dark vertebral blotch on the nape lacking ventrally projecting "arms" which in other populations, connect to a dark, antebrachial blotch. In contrast, LSUHC 7393 (female; SVL 118 mm; Fig. 19 middle) has the typical colour pattern of *A. crucigera* with a black eye patch extending from the nostril through the tympanum; a dark diamond-shaped nuchal blotch with ventrally projecting arms; a black gular sac; and a greenish-yellow dorsum with grey reticulations enclosing yellow spots. A juvenile female (LSUHC 7394; SVL 62 mm; Fig. 19 lower) has a colour pattern similar to that of LSUHC 7393 except for being more boldly contrasted and having a spotted as opposed to an immaculate venter. Smith (1935) noted that the gular sac attained its greatest development in populations from south-eastern Thailand and southern Indochina. The southern Thai and northern Malaysia specimens examined here are in accord with Smith's (1935) assessment of gular sac geographic variation in that they are less than one-half the size of those from the Cardamom Mountains.

All specimens from Camp I were captured at night, while sleeping on low branches and the trunks of trees. Some lizards from camp II were also collected at night but LSUHC 7451 and 7457 were found beneath logs during the day. LSUHC 7466 was collected at 1,400 m in elevation during mid-morning, while basking in a sun-spot on the side of a large tree. LSUHC 7447 (SVL 155 mm) contained 18 eggs.

Calotes versicolor (Daudin, 1802)

LSUHC 7360: Aural Village, 4 August. LSUHC 7327, 7487: between Aural Village and base of Phnom Aural, 5 August. LSUHC 7408: Camp I, 6 August and LSUHC 7483, 10 August.

Two subadults (SVL 64–75 mm) and three juveniles (SVL 26–43 mm) match Taylor's (1963) diagnosis and specimens from Malaysia (LSUHC 7230–31, 7245–47) in having posterodorsally-directed, keeled scales on the flanks; no fold anterior to the shoulders; a pair of spines above the tympanum; nuchal and dorsal crests continuous, the spines of which diminish in size posteriorly; gular region with dark, oblique lines; dark lines radiating from eye; and a faded, dark median line in pectoral and abdominal region.

This species was relatively common during the day on shrubs and fences in Aural Village and in the branches of small trees in the disturbed forest between Aural Village and the base on Phnom Aural. *Calotes versicolor* is common in anthropogenically modified habitats. The specimens collected at Camp I were found on logs and branches or in grassy areas in forest edge situations.

Draco maculatus (Gray, 1845)

LSUHC 7321–22: between Aural Village and base of Phnom Aural, 5 August. LSUHC 7342–44, 7389–90: Camp I, 6 August and LSUHC 7411, 7 August.

Eight specimens (five males, SVL 34–70 mm; three females, SVL 66–72) agree closely with Muster's (1983) diagnosis in having outwardly directed nostrils; a series of keeled scales on the rostrum forming an inverted Y; two enlarged, median, maxillary teeth; 9–11 (instead of 7–11), smooth supralabials; a low superciliary spine; tympanum covered in scales; lateral pouches with enlarged scales; nuchal crest present; unequal dorsals; five ribs in patagium; hind limbs

as long as distance between limbs; and strongly keeled caudal scales with a low crest.

All specimens were found 3–8 m up on the sides of trees. We noted considerable variation in wing pattern between males and females (Figs. 22, 23) not reported in Taylor (1963) or Musters (1983), both of whom described only males. Males had sulphur yellow patagia with orange outer margins, whereas females had grey patagia with thin, white lines and large, dull, yellow blotches. Males reported by Stuart and Emmett (2006) from the central Cardamoms and Elephant Mountains apparently lacked the extensive red and orange reported here.

Draco taeniopterus Günther, 1861

LSUHC 7332: base of Phnom Aural, Camp I, 6 August: LSUHC 7336, 7340, 7366–68, 7372–73, 6 August. LSUHC 7412–19: between Camp I and Camp II between 847 and 913 m, 7 August. LSUHC 7456: Camp II, 8 August.

A series of 13 males (SVL 71–83 mm) and four females (SVL 74–78 mm) agrees closely with Muster's (1983) diagnosis in having upwardly directed nostrils; a row of keeled scales on the rostrum; two enlarged, median maxillary teeth; 7–10 (instead of 6–10) keeled supralabials; no superciliary spine; tympanum naked; lateral pouches with enlarged scales in both sexes; nuchal fold present in males; unequal, weakly-keeled dorsals; five ribs in patagium; hind limbs as long as distance between limbs; and strongly keeled caudal scales with no crest. Muster (1983) reports 77 mm as the largest male SVL. LSUHC 7412 SVL 83 mm.

All specimens were observed during the day on tree trunks, 3–10 m above ground. *Draco taeniopterus* was most common in undisturbed forest between Camps I and II.

Physignathus cocincinus Cuvier, 1829

LSUHC 7486: between Aural Village and base of Phnom Aural, 10 August.

A juvenile specimen agrees with Taylor's (1963) diagnosis and Stuart and Emmett's (2006) slightly expanded description of specimens from the central Cardamoms in having a laterally compressed body and tail; continuous nuchal and dorsal crests separated from caudal crest by a hiatus of smaller scales; sublabials larger than infralabials; tympanum partly covered with scales; enlarged scales posterior to angle of jaw; nuchal fold present; femoral pores in short series; keeled subcaudals; and dorsum green with four, oblique, thin, white bands.

This specimen was collected during the day, while resting on a branch overhanging a small stream.

Gekkonidae

Cosymbotus platyurus (Schneider, 1792)

LSUHC 7323–24: between Aural Village and base of Phnom Aural, 5 August.

Two adult females (SVL 31–33 mm) match Taylor's (1963) diagnosis of Thai specimens and material from Malaysia (LSUHC 3874, 5564, 6430, 6636, 6732, 7146) in having partially webbed digits with expanded lamellae on the proximal half of toes; distal phalanges long, slender, arising from an angle from the toe pads; two pairs of chin shields; a fringe of skin from axilla to groin covered with small scales; no fringe on the neck or head; and a broad fringe along the posterior margin of the hind limb.

Both specimens were found during the day, on the trunks of trees, approximately 3 m above the ground. This species is common in anthropogenically modified environments throughout most of south-east Asia (Manthey and Grossmann, 1997).

Cyrtodactylus intermedius (Smith, 1917)

LSUHC 7346, 7365: Camp I, 5 August. LSUHC 7396–7401, 7490–10: Camp II, 8 August. LSUHC 7459: Camp II, 8 August.

A series of 11 specimens match the original description of Smith (1917) based on Thai material, the diagnosis of Taylor (1963) based on a topotype, and the abbreviated description of Stuart and Emmett (2006) based on a large series from the central Cardamoms, in adult males having 8 or 9 preanal pores in an angular series; enlarged preanal scales; 7–12 enlarged femoral scales in adult males lacking pores which may or may not be continuous with the preanal pore series; distinct ventrolateral folds; ear opening less than half diameter of eye; transversely enlarged subcaudals; preanal groove absent; cream-edged, dark-brown, wide nuchal loop;

four dark body bands edged in yellow to white; and dark and light bands on the tail.

All specimens were collected at night in microhabitats ranging from rocks along edges of streams, tree trunks, up to 2 m above ground in vegetation, to leaf litter. However, rocks were the most common substrate. This is in accord with the observations made by Stuart and Emmett (2006) of populations from the central Cardamoms. This species was far more abundant at Camp I than at Camp II.

Dixonius siamensis (Boulenger, 1898)

LSUHC 7328: base of Phnom Aural, 5 August. LSUHC 7378: Camp I, 6 August.

One adult male (LSUHC 7378, SVL 40 mm) and one subadult female (LSUHC 7328 SVL 28 mm) agree closely with the original description of Boulenger (1898) of a specimen from the Dong Paya Fai Mountains in eastern Thailand, the extended description of Smith (1935) based on a series of approximately 80 specimens from throughout Thailand (see Smith, 1930), and the diagnosis of Taylor (1963) in having expanded subdigital lamellae at the tip of the digit only; a vertebral series of fine body scales flanked by 5–7 rows of enlarged, keeled scales that blend ventrally into the large, imbricate, cycloid ventral scales; ventral scales with minute posterior serrations, 18 and 20 longitudinal rows (20–25 in Smith, 1935); six preanal pores in an angular series; caudal scales irregular (as in Smith [1935], not in segmented whorls as in Taylor [1963]) and keeled; subcaudals transversely widened; and head, back and sides with numerous black spots and lacking a dark lateral stripe on head.

Both specimens were found during the day on rocks. Smith (1935) and Taylor (1963) mentioned that this species is widespread throughout Thailand.

Gehyra cf. *fehlmanni* Taylor, 1962

LSUHC 7376, 7379, 7392: Camp I, 6 August.

Two subadult females (SVL 34 and 45 mm) and one adult male (SVL 47 mm) agree with Taylor's (1962a, 1963) descriptions of specimens from Ronpibon, Nakhon Si Thammarat, western Thailand in having flat dorsal body scales; scales of snout twice the size of those in interorbital region and occiput; slight webbing on hands and feet; medial row of enlarged subcaudals; largest body scales in preanal region; dorsal caudals somewhat irregular not forming distinct transverse rows; and third pair of chin shields separated from the infralabials. They differ, however, from Taylor's (1962a, 1963) descriptions as follows: the scales on the snout are granular as opposed to being subimbricate; the subcaudal scales at the base of the tail are not enlarged; the femoropreanal pore series extends nearly the entire length of the femurs, as opposed to just one-half their lengths and is composed of 37, rather than 22 pores; the seventh, eighth, or ninth supralabial is below the pupil, as opposed to only the seventh; and the fifth, sixth, or seventh infralabial is below the pupil as opposed to only the seventh.

All three specimens were collected during the day beneath loose bark. Additional specimens were observed at night on rocks. *Gehyra fehlmanni* is known from Thailand and Vietnam (Manthey and Grossmann, 1997) so it would be expected to occur in Cambodia and this series may constitute the first record. The differences in scale morphology and femoropreanal pore characters between these specimens and the type require further study to adequately ascertain the species status of this population.

Gekko gecko (Linnaeus, 1758)

LSUHC 7364: Aural Village, 4 August.

An adult female (SVL 142 mm) matches Taylor's (1963) diagnosis of Thai specimens in having a head covered with polygonal scales; rostral scale not bordering nostril; 3–5 small dorsal scales between larger tubercles; no webbing; undivided subdigital lamellae; 5 or 6 transverse scale rows in caudal segments; and a grey dorsum with orange and white spots.

This specimen was found in the wood rafters of a hut in Aural Village. This species is a common human commensal.

Hemidactylus frenatus (Schlegel, 1863)

LSUHC 7361: Aural Village, 6 August.

An adult male with a continuous series of 28 femoropreanal pores agrees with Taylor's (1963) diagnosis of Thai specimens in having

small dorsal body granules intermixed with larger tubercles; two pairs of equally sized postmentals contacting the labials; and whorls of caudal spines.

Besides the specimen collected in Aural village, many others were seen at Camp I beneath bark, under logs, on tree trunks and rocks. This species is a common human commensal and an inhabitant of anthropogenically modified environments.

Scincidae

Eutropis macularius (Blyth, 1853)

LSUHC 7329: Camp I, 5 August, LSUHC 7331, 6 August, LSUHC 7430, 7 August. LSUHC 7363: between Aural Village and base of Phnom Aural, 4 August. LSUHC 7482: base of Phnom Aural, 8 August.

Five specimens (three juveniles, SVL 27–36 mm; one gravid female, SVL 62 mm; one adult male, SVL 62 mm) agree with Smith's (1935) description of his number "1" population in having a scaly lower eyelid; a postnasal; small anterior loreal and large posterior loreal; dorsal scales with 5–9 keels; 14–15 lamellae beneath fourth toe; a mite patch on the thigh; bronze above with small, black spots; light, anterior dorsolateral stripe; flanks dark with light spots; and a white line from angle of jaw to anterior margin of flanks.

Eutropis macularius is a widely distributed, highly variable species (Smith, 1935) ranging from Pakistan to Indochina and throughout south-east Asia (Manthey and Grossmann, 1997) that is common in anthropogenic habitats. Ota et al. (2001) demonstrated that populations from eastern and western Thailand had trenchant differences in karyotype morphology and suggested they were probably different species. One of the eastern populations they sampled came from Sakaerat, just north of the Chanthaburi Mountains of southern Thailand which are continuous with the Cardamom Mountains. It is likely the *E. macularius* from the Cardamom Mountains has the same karyotype as those from eastern Thailand.

Eutropis multifasciatus (Kuhl, 1820)

LSUHC 7370: Camp I, 6 August.

An adult female (SVL 87 mm) is largely in accord with Taylor's (1963) diagnosis of Thai specimens and a series from northern Malaysia (LSUHC 6811, 6843, 7080, 7101, 7106, 7113–14, 7118–19, 7121–22, 7151, 7170–72) in having the supranasals slightly separated; a postnasal; prefrontals in contact; first loreal higher than second; no transparent disc in lower eyelid; dorsals tricarinate; 31 longitudinal scale rows around midbody (30–34 in Taylor's material); and sides dark with ocelli.

The specimen was observed foraging in an open area near small rocks. This species is common in both disturbed and undisturbed environments.

Lipinia vittigera (Boettger, 1901)

LSUHC 7375, 7391: Camp I, 6 August.

An adult male (SVL 43 mm) and female (SVL 38 mm) closely match Taylor's (1963) diagnosis of Thai specimens and Stuart and Emmett's (2006) description of material from the central Cardamoms in having a pointed snout; prefrontals in contact; ear opening smaller than lower eyelid disc and lacking lobules; median pair of dorsal vertebral scales widened; two large preanals; transversely widened subcaudals; light golden vertebral stripe extending from tip of snout to base of tail bordered by black body fields; and flanks light with black flecks.

Both specimens were collected during the day, one specimen was collected 3 m above the ground on trunk of a tree and the other was caught while foraging in an open area on the ground.

Lygosoma bowringii (Günther, 1864)

LSUHC 7325: between Aural Village and base of Phnom Aural, 5 August, LSUHC 7362, 4 August. LSUHC 7730: Camp I, 5 August.

Three specimens (two adult females, SVL 33–32 mm and one juvenile, SVL 24 mm) match Taylor's (1963) diagnosis of Thai specimens and specimens from northern Malaysia (LSUHC 6837–38) in having limbs separated by one arm length when adpressed; a pair of nuchals present; lower eyelid scaly; 27–28 longitudinal scale rows around midbody; dorsal scales smooth; and a black dorsolateral stripe.

All specimens were found beneath surface debris in disturbed areas.

Scincella melanosticta (Boulenger, 1887)

LSUHC 7334–35, 7374, 7380–82, 7386, 7402–05, 7407: Camp I, 6 August. LSUHC 7452–53, 7458: Camp II, 8 August.

Eighteen specimens (eight adult females SVL 44–52 mm; two adult males SVL 52–54 mm; eight juveniles, SVL 23–33 mm) agree with the Ouboter's (1986) diagnosis of material from Myanmar, Thailand, and southern Vietnam and Stuart and Emmett's (2006) description of specimens from the central Cardamoms in having a robust head; relatively long limbs; prefrontals in broad contact; small scales between the fifth supralabial and the granules of the lower eyelid; eyes visible as a dark area through the supraoculars; 23–38 scales around midbody; and white markings on dark flanks.

All individuals were collected during the day and were observed foraging in the leaf litter in both open and dense areas of the forest. They were observed in highest concentrations in the vicinity of rocks and logs. LSUHC 7374, 7386, and 7404 were gravid and LSUHC 7407, an adult male, had bright-orange breeding colours on its head, neck, and throat (Fig. 29 upper).

Ouboter (1976) regarded all continental populations of *Scincella melanosticta* as *S. m. melanosticta* and considered its range to extend from eastern Myanmar through all of Thailand and also in southern Vietnam, noting its likely occurrence in Laos and Cambodia. Although not reported by Teynie et al. (2004) from an extensive collection made in southern Laos, it was reported from the central Cardamoms by Stuart and Emmett (2006). Ouboter (1986) listed a number of discrete (*sensu* Grismer 1999, 2000) morphological characters separating *S. m. melanosticta* from *S. m. kohtaoensis,* an endemic to Koh Tao Island in the Gulf of Thailand. Based on this, and its insular distribution, we treat it here as a full species.

Sphenomorphus indicus (Gray, 1853)

LSUHC 7341, 7345, 7369, 7371, 7377: Camp I, 6 August. LSUHC 7445: between Camp I and Camp II at 850 m, 7 August. LSUHC 7454, 7462: Camp II, 8 August.

Two adults (LSUHC 7462, male, SVL 78 mm; LSUHC 7445, female, SVL 84 mm), two juveniles (LSUHC 7454, female, SVL 45 mm; LSUHC 7377, male, SVL 60 mm), and four near hatchlings (SVL 23–29 mm) closely match Taylor's (1963) description of material from northwestern Thailand in having a convex rostral in contact with frontonasal; prefrontals not in contact; 34–36 longitudinal scale rows around midbody; tubercles on soles and palms; limbs well-developed and overlapping when adpressed; and a dark lateral stripe edged above with white (most distinctive in small individuals).

All individuals were collected during the day on the forest floor in leaf litter, usually in the vicinity of rocks or logs.

Leiolepididae

Leiolepis cf. *belliana* (Hardwicke & Gray, 1827)

Several individuals were observed in disturbed areas along the dirt road leading toward the base of Phnom Aural from Aural Village. No specimens were collected and their identification is tentative.

Colubridae

Ahaetulla nasuta (Lacépède, 1789)

LSUHC 7333: Aural Village, 4 August.

An adult female (SVL 654 mm) agrees with Taylor's (1963) description of a specimen from Bangkok, Thailand in having a dermal process on the upper lip extending far beyond the lower jaw and formed entirely from the rostral; loreals absent; canthus rostralis sharp; one preocular contacting the frontal; and eight supralabials. It differs from Taylor's (1963) description in the length of the snout being just over three times the diameter of the eye as opposed to being 2–2.5 times the diameter and the fifth and sixth supralabials contacting the orbit rather than the third and fourth. LSUHC 7333 is lime green in colour with a white, ventrolateral stripe beginning at the angle of the jaw and extending nearly to the tip of the tail.

This species was brought to us by a resident of Aural Village who caught it in some vines near his house. This is the first report of this species from the Cardamom Mountains.

Amphiesma cf. *khasiensis* (Günther, 1875)

LSUHC 7442–44: 7 August, LSUHC 7464–65, 9 August; LSUHC 7484: 19 August; all from Camp II.

The taxonomy of *Amphiesma* in this part of south-east Asia is problematic. Smith (1943) considered *A. modestum* (Günther, 1875) a widespread, highly variable species. Taylor (1934) described *A. deschauenseei* from Chiang Mai in northern Thailand, which he later demonstrated to include part of Smith's (1943) series of *A. modestum* from "N. Siam" [northern Thailand] (Taylor 1965). Additionally, we could find no reliable characters from the literature that differentiate *A. khasiensis* (Boulenger 1890) from *A. modestum,* although *A. deschauenseei* can be separated on the basis of colour pattern (Taylor 1965) and having 140 subcaudal scales as opposed to 143–168 in *A. modestum* and 94–110 in *A. khasiensis*. Smith (1943:283) erroneously indicated that *A. modestum* and *A. khasiensis* could be separated on the basis of labial colouration although his description of this character clearly allows for considerable overlap. Our six specimens closely match the description of *A. modestum* and *A. khasiensis* except in having more ventral scales (163–176) than either species (144–155 in *A. khasiensis* and 148–168 in *A. modestum* [Smith, 1943]). They also do not conform to the original description of *A. khasiensis* (Boulenger, 1890) or Smith's (1943) description of this taxon because they have 112–123 subcaudals as opposed to 80–110. Stuart and Emmett (2006) report a specimen from the central Cardamoms with 160 ventral scales which they refer to as *A. khasiensis.* They indicated that it differs from Boulenger's (1890) description of the type series in having 160 ventral scales (vs. 150–154) and that the light-coloured nuchal stripe arises from the posterior margins of the eyes instead of from the supralabials. The nuchal stripe does arise from the posterior margin of the eyes but then it continues across the posterior three supralabials (seven, eight, and nine), thus "forming a continuation of the series of yellow labial spots" (Boulenger, 1890). This is visible in Boulenger (1893:Plate XIII; Fig. 3) and is the condition observed here in our eastern Cardamom specimens (Fig. 35).

Patrick David (in lit., 2005, 2006) indicates that the Cardamom populations are not *A. modestum* which has a different head and body colour pattern and characters of scalation but are closer to *A. khasiensis* in colour pattern. Therefore, we elect to refer to this population as *A.* cf. *khasiensis* until further investigation.

All specimens were collected along edges of or within a shallow stream near camp, during both day and night.

Chrysopelea ornata (Shaw, 1802)

LSUHC 7387: between base of Phnom Aural and Aural Village, 5 August.

A juvenile female (SVL 323 mm) matches Taylor's (1965) diagnosis of Thai specimens and material from northern Malaysia (LSUHC 7158, 7387) in having median maxillary teeth no larger than the series preceding the enlarged rear teeth; 20–22 maxillary teeth, the last three or four larger and grooved; ventral scales laterally notched; anal shield divided; all light scales of dorsum having a black, median line; and head banded in black and yellow.

This specimen was collected during the day approximately 2 m above ground, while ascending a tree along a road.

Dendrelaphis subocularis (Boulenger, 1888)

LSUHC 7429: on a ridge west of Camp I at 710 m elevation, 7 August.

A juvenile female (SVL 233 mm) matches Taylor's (1965) description of a specimen from northern Thailand in having 15 dorsal scales; eight supralabials; an elongate supralabial bordering the ventral margin of the orbit; single row of slightly enlarged vertebral scales; anterior median series of scales with a series of light-coloured dots tending to form a stripe; and a yellow lateral stripe.

This specimen was collected during the day, while it was crossing a trail in a heavily disturbed secondary forest.

Pareas margaritophorus (Jan, 1866)

LSUHC 7463: Camp II, 8 August.

A juvenile (sex undeterminable, SVL 105 mm) matches Grossmann and Tillack's (2003) generic concept of *Pareas* and is in accord with Taylor's (1965) description of two specimens from northern Thailand and a specimen from northern Malaysia (LSUHC 6876) in having 15 rows of smooth dorsal scales at midbody; an enlarged row of vertebral scales; one or two preoculars; prefrontals not excluded from orbit; two preoculars; suboculars preventing supralabials from contacting eye; three inframaxillaries (= chinshields) with first pair being longer than wide; 151 ventral scales; and a wide nuchal band.

This specimen was collected during the day, while it was moving on the forest floor.

Psammodynastes pulverulentus (Boie, 1827)

LSUHC 7480: on a ridge west of Camp I at 760 m elevation, 10 August.

A juvenile female (SVL 155 mm) matches Smith's (1943) description and Taylor's (1965) diagnosis of Thai specimens in having two enlarged, fang-like, anterior maxillary teeth followed by a diastema; last series of maxillary teeth enlarged, grooved, and fang-like; canthus angular; frontal narrow; internasals smaller than prefrontals; single preocular; eight supralabials with third, fourth, and fifth contacting orbit; and eight infralabials.

This specimen was collected during the day in disturbed forest along a trail on a steep slope, while it was coiled on the surface of a cut tree stump.

Rhabdophis chrysargos (Schlegel, 1837)

LSUHC 7461: Camp II, 8 August.

A juvenile female (SVL 180 mm) matching Smith's (1943) description, Taylor's (1965) diagnosis of Thai material, Stuart and Emmett's (2006) abbreviated description of a specimen from the central Cardamoms, and specimens from Malaysia, (LSUHC 4791, 4955, 5013, 5174, 5176, 6148, 6255, 7252, 7308–10) in lacking nuchal glands and light vertebral and lateral stripes but having 28 maxillary teeth; nine supralabials with the fourth, fifth, and sixth entering the orbit; four post oculars (three in Stuart and Emmett [2006] and Taylor [1965]); 2 + 2 temporals; 19 keeled dorsal scale rows; 155 ventrals; 91 subcaudals; olive-brown dorsum with a row of black-edged, light-coloured, dorsolateral spots connected transversely by a faded dark bar; darkly-edged, yellow supralabials; thin, white, posteriorly-pointed, nuchal band extending posteriorly form the corners of the mouth and confluent with light-coloured supralabials; venter beige with dark lateral spots but lacking the thin mid-ventral stripe described in Taylor (1965).

This specimen was found at night, while crawling on the forest floor near the base of a tree, away from water.

Viperidae

Cryptelytrops albolabris (Gray, 1842)

LSUHC 7468, 7485: Camp I, 6 August.

Two adult females (SVL 384 and 522 mm) match Malhotra and Thorpe's (2004) characterization of the genus in having a fused nasal and first supralabial (no males were collected, hence hemipenis morphology not examined). Additionally, they are in general accord with Taylor's (1965) description in having 10 supralabials; internasals in contact (LSUHC 7468) or not (LSUHC 7485); supraocular narrow (divided on right side in LSUHC 7485); diameter of eye roughly equal to distance from ventral edge of eye to margin of upper lip; 183–186 ventrals; 60–62 subcaudals; head and body uniform lime-green with a cream-coloured to white ventrolateral stripe; venter light-green; tail reddish-brown.

Both specimens were found at night, while coiled in the branches of small trees in a disturbed portion of the forest, 1.5–3 m above ground. Stuart and Emmett (2006) report on a specimen from the central Cardamoms with 160 ventrals.

Viridovipera vogeli (David, Vidal & Pauwels, 2001)

LSUHC 7467: Camp II, 9 August.

A juvenile female (SVL 298 mm) matches Malhotra and Thorpe's (2004) characterization of the genus in part in that the nasal and first supralabial are not fused (no males were collected so hemipenis morphology could not be checked). Additionally, it is in accord with David et al.'s

(2001) description and Malhotra et al.'s (2004) re-description in having separated internasals; 12 supralabials; 21 dorsal scale rows; 172 ventrals; 60 subcaudals; body generally uniform, light-green with faint banding anteriorly; a white, ventrolateral line; ventral scales yellowish laterally and pale green centrally; tail brick-red. David et al. (2001) noted that the holotype from Thailand has two small triangular postnasal scales whereas LSUHC 7467 has one. Stuart and Emmett (2006) reported on a specimen from the central Cardamom Mountains which has 163–165 ventrals as opposed to 172 ventrals in LSUHC 7467.

This specimen was collected at night just above Camp II, while coiled on the branch of a small tree, 1 m above the ground.

DISCUSSION

We report 16 species of frogs representing five families, one species of turtle (Testudinidae), 18 species of lizards representing four families, and nine species of snakes representing two families (Table 1). All four species of microhylids, as well as *Occidozyga lima, O. martensii* and *Polypedates* cf. *leucomystax* are species common to anthropogenically modified habitats and have previously been reported as occurring

Table 1. Checklist of the herpetofauna of the Cardamom Mountains. Each species is followed by the most recent or first reporting author. 1 = Daltry and Chheang (2000); 2 = Ohler et al., (2002); 3 = Stuart and Emmett (2006); 4 = this report; 5 = Stuart and Platt (2004); 6 = seen during survey but not vouchered; 7 = Long et al. (2001); 8 = Swan and Daltry (2002); 9 = Daltry and Traeholt (2003); and 10 = Chuaynkern et al. (2004).

	Northwestern Cardamoms	Central Cardamoms	Northeastern Cardamoms	Southeastern Cardamoms
CAECILIANS				
Ichthyophiidae				
Icthyophiid sp.		BMNH 2005. 1498–99		
FROGS				
Megophryidae				
Leptolalax sp.			2,8	
Megophrys auralensis Ohler, Swan & Daltry 2002		3	2,8	
Bufonidae				
Bufo macrotis Boulenger 1887	2	2,3,7,9	2,4	
Bufo melanostictus Schneider 1799	2	2,3,7	2,4,8	
Bufo parvus Boulenger 1887	2	9		
Microhylidae				
Calluela guttulata (Blyth 1855)		3		
Kalophrynus interlineatus (Blyth 1855)		2,3,7	2	
Kaloula pulchra Gray 1831	2	2,7,9	2,4,8	
Microhyla annamensis Smith 1923	2	2		
Microhyla berdmorei (Blyth 1856)	2	2		3
Microhyla butleri Boulenger 1900		2,3,7	2,4,8	
Microhyla heymonsi Vogt 1911	2	2,3,7	2,4,8	
Microhyla fissipes (Duméril, Bibron & Duméril 1841)	2	2		
Microhyla pulchra (Hallowell 1861)	2	2,3	2,4,8	
Micryletta inornata (Boulenger 1890)	2	3		
Ranidae				
Fejervarya cancrivora (Gravenhorst 1829)			4	
Fejervarya limnocharis (Gravenhorst 1829)	1,2	2,7,9	2,8	
Hoplobatrachus chinensis (Osbeck 1765)	2	7	2,8	

Limnonectes gyldenstolpei (Anderson 1916)	1,2			
Limnonectes kochangae (Smith 1922)	2	2,3,9	2,4,8	3
Occidozyga lima (Gravenhorst 1829)	2	3	2,4,8	
Occidozyga martensii Peters 1867	2	2,3,7,9	2,4,8	
Paa fasciculispina (Inger 1970)	2	3	2,8	
Rana erythraea (Schlegel 1837)		2,3,7,9	2,8	
Rana faber Ohler, Swan & Daltry 2002	2	2,3,7	2,8	3
Rana macrodactyla (Günther 1859)		2,7		
Rana milleti Smith 1921		3	10	
Rana mortenseni Boulenger 1903	2	2,7	2,8	3
Rana taiphensis van Denburgh 1909	2	2		
Rhacophoridae				
Chirixalus doriae Boulnger 1893		2,7		
Chirixalus nongkhorensis (Cochran 1927)		3	4	3
Chirixalus vittatus (Boulenger 1887)	2	3,7	2,8	
Philautus cardamonus Ohler, Swan & Daltry 2002	2			
Philautus parvulus (Boulenger 1893)		1	2,4,8	3
Polypedates cf. leucomystax (Gravenhorst 1829)		2	2,4,8	
Rhacophorus bipunctatus Ahl 1927		3	2,4,8	
Rhacophorus bisacculus Taylor 1962	2	3		3
Theloderma asperum (Boulenger 1886)			2,8	
Theloderma stellatum Taylor 1962		3		
TURTLES				
Bataguridae				
Batagur baska (Gray 1831 "1830–35")		5		
Cuora amboinensis (Daudin 1802)	1	1,5	4,8	
Cyclemys atripons Iverson and McCord 1997		1,5,7		
Heosemys grandis (Gray 1860)		5		
Malayemys subtrijuga (Schlegel and Müller 1844)		5		
Siebenrockiella crassicollis (Gray 1831)		5		
Testudinidae				
Indotestudo elongata (Blyth 1853)	1	1,5,7	4,8	
Manouria impressa (Günther 1882)	1	1		
Trionychidae				
Amyda cartilaginea (Boddaert 1770)	1,5	1,9	8	
Pelochelys cantori Gray 1864		1		
CROCODYLIA				
Crocodylidae				
Crocodylus siamensis (Müller 1838)	unpubl. data	1,7,9		
SQUAMATA (LIZARDS)				
Agamidae				
Acanthosaura crucigera Boulenger 1885	1	3,9	4,8	3
Calotes emma Gray 1845	1	1,3,7,9	8	
Calotes mystaceus Duméril & Bibron 1837	1	3,9	8	3
Calotes versicolor (Daudin 1802)	1	3,7,9	4,8	
Draco maculatus (Gray 1845)	1	3,9	4,8	3
Draco taeniopterus Günther 1861	1	3	4,8	

Physignathus cocincinus Cuvier 1829	1	1,3,7	4,8	3
Lacertidae				
Takydromus sexlineatus Daudin 1802		3		3
Gekkonidae				
Cosymbotus platyurus (Schneider 1792)			4	
Cyrtodactylus intermedius (Smith 1917)	1	3	4,8	3
Dixonius siamensis (Boulenger 1898)	1	1,7	4	
Gehyra cf. fehlmanni (Taylor 1962)			4	
Gekko gecko (Linnaeus 1758)	1	3,7	4,8	
Hemidactylus frenatus Duméril & Bibron 1836	1	1	4,8	
Ptychozoon lionatum Annadale 1905		3		3
Scincidae				
Eutropis macularius (Blyth 1853)	1	3,7,9	4,8	
Eutropis multifasciatus (Kuhl 1820)		1,3,7,9	4	
Lipinia vittigera (Boulenger 1894)	1	1,3,7	4,8	3
Lygosoma bowringii (Günther 1864)	1	3	4,8	3
Lygosoma quadrupes (Linnaeus 1766)	1			
Scincella melanosticta (Boulenger 1887)	1	1,3,7,9	4	3
Scincella rufocaudata (Darevsky & Nguyen 1983)		3		
Sphenomorphus indicus (Gray 1853)	1	9	4,8	
Sphenomorphus maculatus (Blyth 1853)	1	3,7	8	3
Sphenomorphus stellatum (Boulenger 1900)		3		
Leiolepdidae				
Leiolepis cf. belliana (Lacépede 1789)			6	
Leiolepis reevesii (Gray 1831)			8	
Varanidae				
Varanus salvator Laurenti 1768	1	1,7	8	
Varanus nebulosus Gray 1831	1		8	
SQUAMATA (SNAKES)				
Typhlopidae				
Ramphotyphlops braminus (Daudin 1803)	1			
Typhlops muelleri Schlegel 1839		1,3,7		3
Xenopeltidae				
Xenopeltis unicolor Reinwart in Boie 1827		3		3
Colubridae				
Ahaetulla nasuta (Lacépede 1789)	1		4	
Ahaetulla prasina (Reinwart in Boie 1827)	1	1,3,7	8	
Amphiesma cf. khasiensis (Boulenger 1890)	1	3	4	
Boiga cyanea (Duméril, Bibron & Duméril 1854)		3		3
Boiga dendrophila (Boie 1827)		3		3
Boiga multomaculata (Boie 1827)		3	8	3
Boiga siamensis Nootpand 1971		3		
Chrysopelea ornata (Shaw 1802)	1	3	4	3
Dendrelaphis pictus Gmelin (1789)	1		8	
Dendrelaphis subocularis (Boulenger 1888)			4	

Dryocalamus davisonii (Blanford 1878)		3		3
Dryophiops rubescens (Gray in Gray and Hardwicke 1835)			1	
Elaphe porphyracea	1			
Elaphe radiata (Boie 1827)		1,7		
Elaphe taeniura (Cope 1861)	1			
Enhydris plumbea (Boie 1827)		1,7,9		
Enhydris bocourti (Jan 1865)		3		
Gonyosoma oxycephalum (Boie 1827)		1,3		
Homalopsis buccata (Linnaeus 1758)	1	1,3,7		3
Lycodon cardamomensis Daltry & Wüster 2002	1			
Lycodon laoensis Günther 1864			8	
Oligodon barroni (Smith 1916)	1			
Oligodon inornatus (Boulenger 1914)	1	3		
Pareas carinatus (Boie 1828)		1,3,9		3
Pareas margaritophorus (Jan 1866)		3	4	
Psammodynastes pulverulentus (Boie 1827)	1	1,3,7,9	4	
Ptyas korros (Schlegel 1837)	1	9	8	
Ptyas mucosus (Linnaeus 1758)	unpubl. obs.			
Rhabdophis chrysargos (Schlegel 1837)	1	1,3,7	4	
Rhabdophis nigrocinctus (Blyth 1856)	1	3	unpubl. obs.	
Rhabdophis subminiatus (Schlegel 1837)	1	1,7	8	
Sibynophis collaris (Gray 1853)	1			
Xenochrophis flavipunctatus (Hallowell 1860)	1	1,7	8	
Xenochrophis trianguligerus (Boie 1827)		3		
Elapidae				
Bungarus candidus (Linnaeus 158)	1	1,7		
Bungarus fasciatus (Schneider 1801)	1	unpubl. obs.		
Naja kaouthia Lesson 1831	1		8	
Ophiophagus hannah (Cantor 1836)	1			
Viperidae				
Calloselasma rhodostoma (Boie 1827)	unpubl. obs.	3	8	
Cryptelytrops albolabris (Gray 1842)	1	3	4,8	
Cryptelytrops macrops (Kramer 1997)	1	3	8	3
Viridovipera vogeli (David, Vidal & Pauwels 2001)	1	3	4,8	

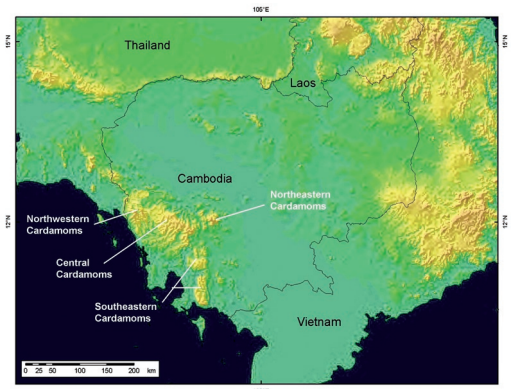

Figure 1. Location of the three sections of the Cardamom Mountains and Phnom Aural. Area above 330 m only is shown. Map adapted from Daltry and Momberg (2002).

Figure 2. Habitat along the road in Aural Village at 100 m elevation.

Figure 3. Camp I at 500 m elevation in hill evergreen forest.

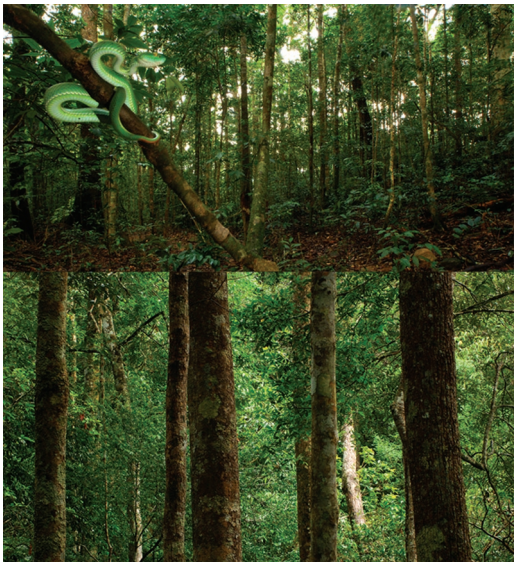

Figure 4. Camp II at 1,100 m elevation on the edge of montane evergreen forest. Upper: open understory of forest. Lower: large dipterocarp trees common at this elevation.

Figure 5. Summit of Phnom Aural at 1,813 m in elevation in cloud forest of the montane evergreen forest.

Figure 6. *Bufo macrotis* from the base of Phnom Aural. Upper; adult male (LSUHC 7470) and lower; adult female (LSUHC 7469).

Figure 7. Juvenile *Megophrys aurelensis* from Camp II (LSUHC 7428).

Figure 8. Adult female *Kaloula pulchra* (LSUHC 7359) from Aural Village.

Figure 9. Adult male *Microhyla heymonsi* (LSUHC 7356) from Aural Village.

Figure 10. Adult male *Microhyla pulchra* (LSUHC 7338) from Aural Village.

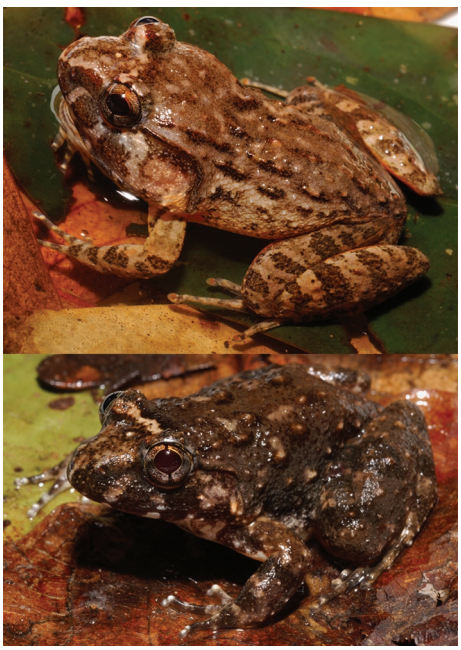

Figure 11. *Limnonectes kohchangae* from Camp II. Upper; adult male (LSUHC 7431) and lower; adult female (LSUHC 7448).

Figure 12. Adult female *Occidozyga lima* (LSUHC 7358) from Aural Village.

Figure 13. Adult male *Occidozyga martensii* (LSUHC 7477) from between Aural Village and Phnom Aural.

Figure 14. Adult male *Paa fasciculispina* (LSUHC 7339) from Camp I.

Figure 15. Adult male *Chirixalus nongkhorensis* (LSUHC 7349) from Aural Village.

Figure 16. Adult male *Philautus parvulus* (LSUHC 7423) from Camp II.

Figure 17. Adult male *Rhacophorus bipunctatus* (LSUHC 7420) from Camp II.

Figure 18. Adult male *Indotestudo elongata* (LSUDPC 1202) from Camp I.

Figure 19. *Acanthosaura crucigera* from Camp I. Upper, adult male (LSUHC 7447); middle, adult female (LSUHC 7393) and lower, juvenile female (LSUHC 7395).

Figure 20. Juvenile *Calotes versicolor* (LSUHC 7408) from Camp I.

Figure 21. *Draco maculatus* from Camp I. Left, adult male (LSUHC 7389) and right, adult female (LSUHC 7411).

Figure 22. Adult male *Draco taeniopterus* (LSUHC 7456) from Camp II.

Figure 23. Juvenile female *Physignathus cocincinus* (LSUHC 7486) from between Aural Village and base of Phnom Aural.

Figure 24. *Cyrtodactylus intermedius* from Camp I. Upper, adult male (LSUHC 7346) and lower, juvenile female (LSUHC 7365).

Figure 25. Adult female *Dixonius siamensis* (LSUHC 7328) from Camp I.

Figure 26. Adult female *Gehyra* cf. *fehlmanni* (LSUHC 7376) from Camp I.

Figure 27. Adult male *Eutropis macularius* (LSUHC 7482) from base of Phnom Aural.

Figure 28. Adult female *Lipinia vittigera* (LSUHC 7375) from Camp I.

Figure 29. *Scincella melanosticta* from Camp I. Upper, adult male (LSUHC 7407) and lower, adult female (LSUHC 7402).

Figure 30. Adult male *Sphenomorphus indicus* (LSUHC 7445) from between Camps I and II at 850 m.

Figure 31. Adult female *Amphiesma modestum* (LSUHC 7442) from Camp II.

Figure 32. Juvenile female *Chrysopelea ornata* (LSUHC 7387) from between Aural Village and the base of Phnom Aural.

Figure 33. Juvenile female *Dendrelaphis subocularis* (LSUHC 7429) from a ridge west of Camp I at 710 m.

Figure 34. Juvenile *Pareas margaritophorus* (LSUHC 7463) from Camp II.

Figure 35. Juvenile female *Psammodynastes pulverulentus* (LSUHC 7480) from a ridge west of Camp I at 760 m.

Figure 36. Juvenile female *Rhabdophis chrysargos* (LSUHC 7461) from Camp II.

Figure 37. Juvenile female *Cryptelytrops albolabris* (LSUHC 7485) from Camp I.

Figure 38. Juvenile female *Viridovipera vogeli* (LSUHC 7467) from Camp II.

throughout the Cardamom Mountains (Table 1). We report *Fejervarya cancrivora* as a new record for the Cardamom Mountains which is also common in anthropogenically altered environments. Of the 18 species of lizards collected, five (*Cosymbotus platyurus*, *Dixonius siamensis, Gehyra* cf. *fehlmanni, Eutropis multifasciatus,* and *Scincella melanosticta*) were new to the eastern Cardamoms and *C. platyurus* is the first record from the Cardamom Mountains (Table 1). Of the nine species of snakes recorded, seven (*Ahaetulla nasuta, Amphiesma* cf. *khasiensis, Chrysopelea ornata, Dendrelaphis subocularis, Pareas margaritophorus, Psammodynastes pulverulentus* and *Rhabdophis chrysargos*) are new for the eastern Cardamoms. *Ahaetulla nasuta* is common to anthropogenically-modified habitats and this is the first record of *D. subocularis* from the Cardamom Mountains.

Stuart and Emmett (2006) demonstrated that the herpetofauna of the Cardamom and Elephant Mountains showed a higher biogeographic affinity with each other than to the different herpetofauna of hilly, eastern Cambodia (Stuart et al., 2006). The additional records reported here support this observation.

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