

Observations on the Natural History and Exploitation of the Turtles of Nepal, with Life History Notes on *Melanochelys trijuga*

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ABSTRACT. – We present observations on the natural history, distribution, morphology, ecology, and exploitation of the freshwater and terrestrial chelonians of Nepal. We include data on ten of the eleven species of chelonians recorded from Nepal and confirm the previously presumed presence of *Melanochelys tricarinata* and *Aspideretes hurum*. An additional six species may occur in Nepal as well. We document a range extension for the flapshell turtle, *Lissemys punctata*, and provide new information on the life history and growth of the black pond turtle, *Melanochelys trijuga*, and the tricarinata hill turtle, *M. tricarinata*. Exploitation of native chelonian species for the curio artifact trade in Kathmandu is also described.

KEY WORDS. – Reptilia; Testudines; Bataguridae; Trionychidae; Testudinidae; *Melanochelys*; *Lissemys*; turtle; tortoise; distribution; ecology; growth; exploitation; Terai; Nepal

Although known for the highest mountains in the world, Nepal also contains a strip of lowlands along its southern border with India. The lowlands, part of the broad Ganges plain called the Terai, range in elevation from 150 to 600 m. The remaining undeveloped Terai consists of riverine grasslands dominated by elephant grass (*Saccharum* spp. and *Phragmites karka*) and parklike forests with trewia (*Trewia nudiflora*) and silk cotton trees (*Bombax malabaricum*). The higher elevations of the Terai lie within the foothills of the Himalayas called the Siwalik Hills (Churia Range in Nepal), formerly forested primarily by sal trees (*Shorea robusta*). The tributaries of the Ganges River have meandered through the Terai for millenia and have formed numerous oxbow lakes (locally called tals). Rivers and tals in the Nepal Terai support a freshwater turtle fauna characteristic of northern India.

Freshwater turtles in Nepal have received little scientific attention. Günther (1861, 1864) first listed five species of freshwater turtles from central Nepal without specific locality data. These were *Batagur lineatus* (= *Kachuga kachuga*), *Batagur dhongoka* (= *Kachuga dhongoka*), *Trionyx gangeticus* (= *Aspideretes gangeticus*), and *Chitra indica*, with *Testudo horsfieldii* listed as questionable, evidently based on a misidentified drawing of *Indotestudo elongata*. He based his list on specimens collected by Bryan H. Hodgson in the 1840s and donated to the British Museum of Natural History, all of which were attributed by Swan and Leviton (1962) to the vicinity of the capital city, Kathmandu (elev. 1300 m). However, Hodgson's original catalogues (Hodgson, 1846) indicate that he collected from both the hills and plains of Nepal, and we can surmise based on the known distribution of Nepal turtles (Moll, 1986, 1987; Moll and Vijaya, 1986; Das, 1991; Iverson, 1992) that he probably collected or obtained most of his turtles from the Terai plains rather than the hills around Kathmandu. Smith (1931) also listed only five chelonian species from Nepal, but

recognized *Testudo elongata* (= *Indotestudo elongata*), not *T. horsfieldii*, as being the one testudinid present. Swan and Leviton (1962) did not expand on the list, but they noted an additional seven taxa as possibly occurring in Nepal, based on their known occurrence in nearby India: *Geoclemys hamiltonii*, *Hardella thurjii*, *Kachuga smithii*, *Kachuga tecta*, *Lissemys punctata*, *Trionyx hurum* (= *Aspideretes hurum*), and *Trionyx leithii* (= *Aspideretes leithii*).

Hall (1980) subsequently confirmed the presence of *Kachuga tecta* in southeastern Nepal near the Indian border. Webb (1980) added *Lissemys punctata* and described the subspecies *L. p. andersoni* with its type locality at "Belbari, Terai, southeastern Nepal, elevation 210 m." Moll (1987) recorded the presence of *Kachuga smithii* in western Nepal at the Royal Bardia Wildlife Reserve on the Karnali River as the new subspecies *K. s. pallidipes* with its type locality in nearby India at "Gandak River, Bherihari Wildlife Sanctuary, Bettiah (West Champaran) District, Bihar." Dinerstein et al. (1988) added *Melanochelys trijuga* to the Nepalese fauna, collecting specimens from both Chitwan National Park in the south-central Terai and Royal Bardia Wildlife Reserve. They also recorded *Melanochelys tricarinata* from Chitwan National Park, based on circumstantial evidence by E.O. Moll and J. Vijaya (*pers. comm.* in Dinerstein et al., 1988).

In terms of Chitwan National Park itself and the surrounding Narayani area of the south-central Terai, Das (1991) listed only four species as having been collected there: *Indotestudo elongata*, *Aspideretes gangeticus*, *Melanochelys tricarinata*, and *Melanochelys trijuga*. Mishra and Jefferies (1991) listed six turtle species from Chitwan, and Schleich and Maskey (1992) and Schleich (1993) listed seven turtles in the Park, based on an unpublished guide to its amphibians and reptiles by J.C. Mitchell and G.R. Zug.

Other than the above taxonomic and distributional notes and brief observations on reproduction and growth in

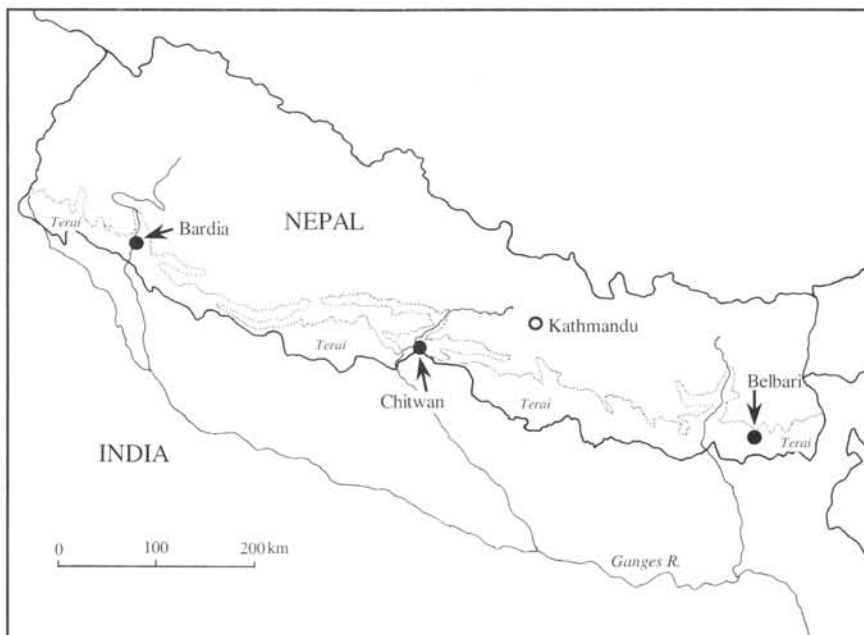


Figure 1. Map of Nepal and the northern Indian Ganges River drainage showing the location of the study sites at Royal Bardia Wildlife Reserve and Royal Chitwan National Park. Also shown is Belbari, the type locality for *Lissemys punctata andersoni*. The dotted line represents the 500 m contour separating the northern mountainous region from the southern Terai lowlands.

Melanochelys trijuga (Dinerstein et al., 1988), little has been reported on the biology and ecology of turtles in Nepal. In this report we now provide field notes from visits to the lowland Terai region of southern Nepal.

METHODS

Data we report here derive from observations made by the authors on two separate visits to Nepal, both towards the end of the dry season: JCM during 20–24 April 1985 in the Royal Bardia Wildlife Reserve near Thakurdwara on the Karnali River in western Nepal (ca. 28°30'N, 81°15'E, elev. ca. 400 m), and 14–19 April and 25 April – 2 May 1985 in the Royal Chitwan National Park near Bharatpur on the Narayani River in south-central Nepal (ca. 27°30'N, 84°10'E, elev. ca. 200–300 m), along the international border with India; AGJR during 12–15 April 1992 in the Royal Bardia Wildlife Reserve, 15–18 April 1992 in the Royal Chitwan National Park, and 23–25 April 1992 in Kathmandu. See Fig. 1 for localities mentioned. Sources of information include personal observations and specimens collected, reports from game wardens and field guides in the Royal Bardia Wildlife Reserve and Royal Chitwan National Park, and interviews with local fishermen using photographs of selected species. Several specimens were photographed, measured, and released back into their natural habitat.

Specimens collected by JCM and AGJR were accessioned, respectively, into the collections of the U.S. National Museum of Natural History (USNM) and Chelonian Research Foundation (CRF). Data obtained by AGJR as photographic documentation or personal observations also received CRF database accession numbers. In addition, specimens were examined at the British Museum of Natural

History (BMNH), and data from a specimen at Bombay Natural History Society (BNHS). We also report vernacular names used in the central and western Terai by local Nepalis, the native Tharus, and in some cases the people of the Siwalik Hills.

RESULTS

The generalized vernacular name for turtle in Nepali is *kachhuwa*, in Tharu it is *kechuwi*, and the people of the Siwalik Hills call them *torturi* or *thotari*. Our data are presented as an annotated taxonomic list of the chelonians of Nepal, followed by a generalized section on exploitation.

Trionychidae

Aspideretes gangeticus. — Indian softshell turtle (central Terai = *ghidiya*, western Terai = *seto bahar* in Nepali and Tharu). Iverson (1992) shows a single Nepal locality near Chitwan on the Narayani River. Identification of specimens as *A. gangeticus* rather than *A. hurum* is difficult with bony carapaces, and we based our identifications on the known distribution and assumed abundance of these two species in southern Nepal. A carapace of what is presumably this species (USNM 267017) had been found in a local Tharu village near Chitwan. Another carapace of presumably this species (CRF 1876) had been collected by local Tharu fishermen in the Narayani River at the western end of Chitwan and then eaten. The species occurs primarily in the main channels of the fast-flowing rivers (Karnali and Narayani), rather than in the lentic backwaters and tals.

The Nepalis say the meat of this turtle is especially good to eat. The shell is ground up by local Tharus to make a

suspension that is said to ease (or cure) stomach problems. Chitwan residents have seen mugger crocodiles (*Crocodylus palustris*) eating softshell turtles.

One bony carapace (CRF 1876) has a carapace length (CL) of 308 mm and eight separate neurals, including two between the first pleurals (preneural and first neural of some authors, first and second neurals of others, e.g., Meylan, 1987, whom we follow). The neural formula is 4-6P-6P-5P-7P-6P-5P-4 (see Pritchard, 1988), indicating no neural reversal. All previous reported specimens of *A. gangeticus* or *A. hurum* have neural reversal at either neural position 6, 6/7, or 7 ($n = 12$; Meylan, 1987). The seventh and eighth pleurals meet in the midline behind the neural series.

Aspideretes hurum. — Indian peacock softshell turtle (central Terai = *katakhiri*, western Terai = *chartari* (Nepali) and *jougini* (Tharu). Chitwan fishermen, who identified this species from photos, reported that it occurs in rivers and tals, especially in areas with steep-sided sandy banks for basking. A single location is reported by Iverson (1992) near the Chitwan area on the India-Nepal border. Confirmation of the presence of *A. hurum* in Nepal is provided by E.O. Moll (*pers. comm.*), who collected an immature specimen (BNHS 1325) at Ramnagar, Gandak River, Nepal, opposite and 5 km south of Valmiti Nagar, West Champaran District, Bihar, India, on 24 May 1983.

Chitra indica. — Narrow-headed softshell turtle (central Terai = *badhar*, western Terai = *badar* in Nepali and Tharu). A skull of this species (BMNH 1849.2.5.1, presented by Hugh Falconer) is recorded as from Nepal in the modern BMNH catalogue but as from India in the original catalogue, and its exact provenance is a mystery. Iverson (1992) illustrates two localities across the India-Nepal border from Chitwan. We observed this species on a bank of the rapid and large Karnali River in Bardia on 23 April 1985.

Lissemys punctata. — Indo-Gangetic flapshell turtle. This species has previously been recorded in Nepal from a single location, Belbari in the southeastern Terai, the type locality of *L. p. andersoni* (Webb, 1980). The actual location of Belbari has not previously been clarified in the turtle literature, and it appears on no modern maps or gazetteers of Nepal. However, the holotype was collected by Alain Dubois in 1973, who maps Belbari's location (Dubois, 1980; Fig. 4) as ca. 25 km northeast of Biratnagar (ca. 26°40'N, 87°25'E) (see Fig. 1).

A single specimen of this species (CRF 1870; a desiccated shell, CL 183 mm) was collected at Bardia in the western Terai, extending the range westward in Nepal by about 600 km and northward from the nearest recorded locality in adjacent India by ca. 50 km (Das, 1991; Iverson, 1992). It was found near the shore of a partially dry tal just west of the main Khaura River channel, ca. 2 km west of Chitkaya village and ca. 5 km north of Thakurdwara. The carapace has eight separate neurals, two between the first pleurals, the seventh (partial) and eighth pleurals meet in the midline. The neural formula is 4-6P-6P-6P-6P-6P-6P-3 without neural reversal. Eight neurals without reversal is the most common condition for this species ($n = 11$ of 19; Meylan, 1987). The

specimen was found in the same microhabitat as *Melanochelys trijuga* (see below).

Testudinidae

Indotestudo elongata. — Elongated tortoise (central Terai = *ageri*, western Terai = *padini* in Nepali and Tharu). Frazier (1992) reviewed published and unpublished information on tortoises in Nepal and concluded that only *I. elongata* occurred in the country. The discovery of a shell in the vicinity of the village of Sauraha, Chitwan, Narayani district (USNM 267020) with its anterior end sliced by a *kukri* or axe suggests that they are killed by local people and possibly eaten. Zug and Mitchell (1995) reported observations of shells tacked on walls in Sauraha houses. Another shell (CRF 1871) of an adult female that had been collected in the sal forest of western Chitwan near Temple Tiger resort measured 250 mm CL, 160 mm carapace width (CW), and had 8 neurals, with a typical pattern of 4-8-4-8-4-6A-6A-6A (Pritchard, 1988).

Annual burning of the grass understory in sal forests in the Terai may cause mortality of this species. The fires are usually set from December through February but often continue burning sporadically through the entire dry season which extends until May or June when the monsoon brings heavy rain. Local game wardens in Bardia reported that the fires in 1985 were hotter than usual and large numbers of tortoises were killed, but the long term effect of fire on the natural history of *I. elongata* is unknown. Local Nepalis believe that the species is common in the sal forests of the Terai.

In Kathmandu, there is a temple devoted to tortoises (Bijeshwari Temple above the Vishnumanti River, Swayambhunath, just west of Kathmandu). Visitors bring live *I. elongata*, some of which are left free to roam the temple grounds, while others are kept caged. A visit to the temple confirmed the presence of several tortoises, but in less abundance than sometimes encountered in temples of India or Thailand.

Bataguridae

Kachuga dhongoka. — Three-striped roofed turtle (central Terai = *dhodari*, western Terai = *puberi* in Nepali and Tharu; all *Kachuga* species have the same vernacular names in Nepali.) Hodgson collected three specimens of this species in Nepal (BMNH 1845.1.12.418, 350 mm CL; BMNH 1845.1.12.417, 367 mm CL; and BMNH 1848.2.1.29). Iverson (1992) illustrates two localities in India across the border from Chitwan. Chitwan fishermen identified photographs of this species, although we saw no specimens.

Kachuga kachuga. — Red-crowned roofed turtle. Hodgson collected three specimens in Nepal (BMNH 1848.2.1.28; BMNH 1947.3.4.30, 385 mm CL, syntype of *Kachuga fusca*; and BMNH 1947.3.4.59, type of *Kachuga hardwickii*). Iverson (1992) noted two localities in India, near Chitwan. Local fishermen report this species from the vicinity of Bardia and Chitwan. An adult male (shell only)

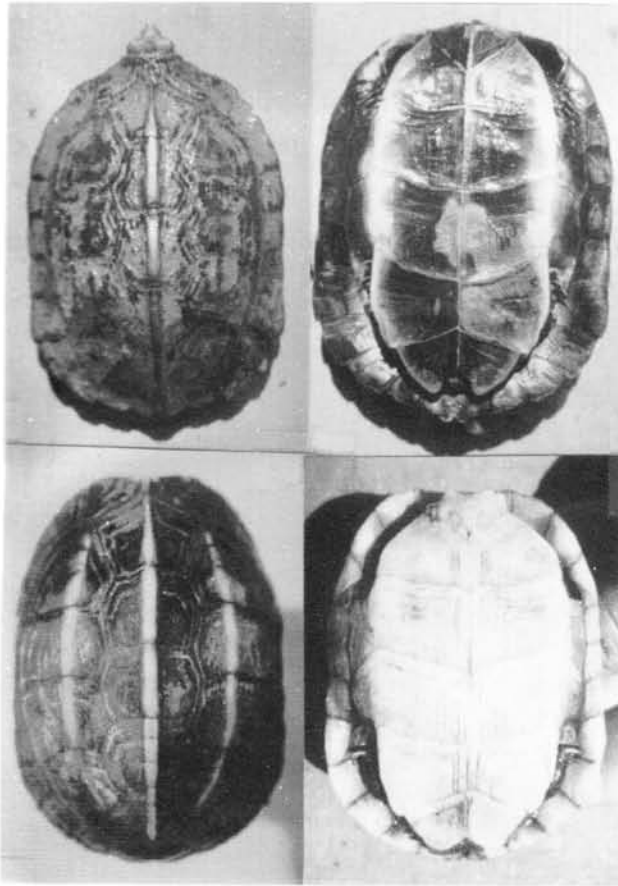


Figure 2. Juvenile *Melanochelys* collected in Royal Chitwan National Park. **Upper left and right:** *M. trijuga*, two years old, CL 97 mm. **Lower left and right:** *M. tricarinata*, three years old, CL 82 mm. Photos by A.G.J. Rhodin.

found near Thakurdwara, Bardia, in the western Terai (USNM 267019) measured 276 mm plastron length (PL).

Kachuga smithii pallidipes. — Pale-footed roofed turtle. Moll (1987) described this subspecies from the northern tributaries of the Ganges River in India and Nepal based on the lack of prominent plastral markings. A single specimen collected under debris in a shallow pool along the Karnali River in Bardia on 23 April 1985 (USNM 257779) has an immaculate plastron and was described by Moll (1987) as one of the paratypes of *K. s. pallidipes*. The specimen is a female measuring 155 mm CL, 146 mm total PL, 139 mm midline PL, that weighed 453 g upon capture. These shell measurements were obtained on the preserved specimen with calipers (A. Wynn, *pers. comm.*) and differ slightly from the measurements originally published by Moll (1987:8).

Several specimens of this species were observed on 14 April 1992 basking on emergent deadwood along the edge of the rapidly flowing Karnali River (eastern Garwi River branch) at Thakurdwara, Bardia. Video footage of these animals (CRF 1869) identifies clearly the brown shell, dorsal blackish vertebral crest, and light-colored soft parts with large pale markings on the feet typical for the subspecies. In Bardia this species is apparently restricted to the lotic habitat of the rapidly flowing major rivers. It shares this

habitat with the large softshells *Aspideretes* sp. and *Chitra indica*, whereas *Lissemys punctata* and *Melanochelys trijuga* are found together in the lentic backwater streams and tals (see below).

Kachuga tecta. — Indian roofed turtle. Reported from Nepal from a single locality in the southeastern Terai at Janakpur, Dhanusa district (Hall, 1980). We did not observe this species.

Melanochelys tricarinata. — Tricarinate hill turtle (Fig. 2). Not recorded from Nepal until reported from Chitwan based on circumstantial evidence provided by E.O. Moll and J. Vijaya as a *pers. comm* in Dinerstein et al. (1988). They had seen photographs of *M. tricarinata* supposedly taken in Royal Chitwan National Park. Schleich and Maskey (1992) reported a voucher specimen from Chitwan.

A juvenile *M. tricarinata* (CRF 1873, Fig. 2) was collected at Temple Tiger resort in western Chitwan (near Chamka, 7 km west of Tiger Tops resort) on 16 April 1992, less than 2 km north of the Indian border. It was collected by a Tharu villager along the edge of a small, partially drying hillside streambed descending through the forest just before it entered the broad open floodplain. The villagers considered the specimen as unusual and uncommon for the area. Measurements of this animal were: CL 82 mm, CW 60 mm, CD [carapace depth] 43 mm, PL-M [plastral length - midline] 73 mm, PL-T [plastral length - total] 78 mm. Plastral scute annuli were visible and clearly demarcated, showing that the animal was at the end of its third growing season. Measurements of the earlier growth annuli allowed calculation of CL at the end of each of the previous growing seasons (Table 1). Chitwan experiences distinct wet and dry seasons; growth probably stops or slows during the driest months of March and April. This animal would have been three years old, with a calculated hatchling CL of ca. 41 mm. Das (1991) reported that eggs of this species measured 44.4 x 25.4 mm but gave no data on hatchling size or subsequent growth.

Melanochelys trijuga. — Black pond turtle (central Terai = *thotori* in Nepali) (Fig. 2). First reported from Nepal by Dinerstein et al. (1988). Five skeletons of this species were collected at Bardia on 13 April 1992 near the shore of a partially dry tal just west of the main Khaura River channel, just north of Thakurdwara, the same site as the specimen of *Lissemys punctata*. All were found from 3 to 25 m from the edge of the water in areas exhibiting evidence of recent burning, and all were burned. Three were females with flat plastrons, one was a male with a concave plastron, and one was too fragmented to sex. Most were only partially burned on the outside of the shell and exposed anterior skull surfaces, suggesting that they had been exposed to fire while alive as opposed to being depredated and then burned. One female was found about 25 m from water within thick lowland riverine forest consisting of simal (*Bombax ceiba*), shisham (*Dalbergia sissoo*), and khair (*Acacia catechu*) trees. One female, one male, and the fragmented shell were found along the edge of the riverine forest and the open scrub and elephant grass (*Saccharum* spp.) about 15–20 m from

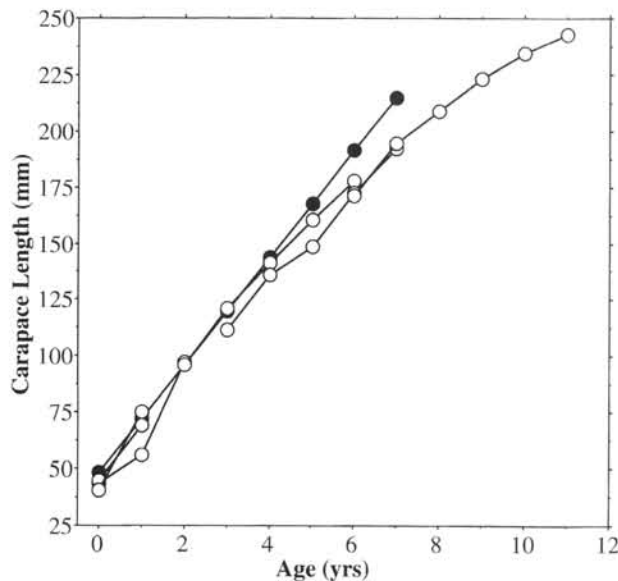


Figure 3. Growth of individual *Melanochelys trijuga* from Chitwan and Bardia, as calculated from measurements of growth annuli. Open circles represent six animals measured in the present study, solid dots represent the average annual growth of a single animal reported by Dinerstein et al. (1988).

water, and another female was found in open grass about 3 m from water.

Fires in this area occur regularly and are legally started by villagers primarily during January and February but sometimes in March and April. The animals probably died during one of these preceding months; one of the females still had areas of moist mold covering some of the interior bones, despite several months of extreme heat and dry-season weather. The females may have been on land for nesting purposes. Dinerstein et al. (1988) reported finding undeveloped eggs of this species in November and March in Chitwan. Das (1991) reports that the species nests in India from October through April, with hatching occurring in May and June, just before the onset of the monsoon season. The male in the sample may have been foraging on land, a practice described for the species by Das (1991).

Morphometrics of the four whole shells (in mm) were as follows: male (CRF 1865), CL 243, CW 182, PL-T 225; female (CRF 1868), CL 197.5, CW 143.5, PL-T 192; female (CRF 1866), CL 192; female (CRF 1864), CL 177.5, CW

Table 1. Growth of individual *Melanochelys tricarinata* ($n = 1$) and *M. trijuga* ($n = 3$) collected at Chitwan, Nepal, on 16 April 1992. Actual measurements made at end of most recent growing season, earlier size and growth calculated from measured plastral growth annuli.

Species	Age (yrs)	CL (mm)	Increase (mm)	% Increase
<i>tricarinata</i>	0 (hatchling)	41.0	—	—
	1	56.8	15.8	38.5
	2	72.5	15.7	27.6
	3	82.0	9.5	13.1
<i>trijuga</i>	0 (hatchling)	43.7	—	—
	1	55.8	12.1	27.7
	2	97.0	41.2	73.8
<i>trijuga</i>	0 (hatchling)	44.4	—	—
	1	69.0	24.6	55.4
<i>trijuga</i>	0 (hatchling)	40.6	—	—
	1	75.0	34.4	84.7

137.5, PL-T 177.5. Another shell (USNM 267018) that had been found at an earlier, unknown date in the refuge, measured 114.3 mm CL and 109.9 mm PL.

Intercostal fontanelles were still wide open in the 177.5 mm CL female, barely open (nearly fused) in the 192 mm CL female, and completely fused in the 197.5 mm CL female and the 243 mm CL male. Neurals numbered eight in all four shells, with the pattern 4-8-6P-6P-4-6A-6A-6A in three, and 4-8-6P-6P-6P-4-6A-6A in one. These are the two previously described patterns for the species as reported by Pritchard (1988). Sexual dimorphism for the species in Nepal is unknown, but our data suggest that males may be larger than females, with our single male measuring 243 mm CL, our largest female measuring 197.5 mm CL, and the largest reported female being 215 mm CL (Dinerstein et al., 1988). Das (1991) reports that *M. trijuga indopeninsularis* can reach 342 mm CL in India.

Three of the burned shells still retained some undamaged plastral scutes with discernible growth annuli that allowed for the measurement and calculation of previous growth. Bardia also has a distinct wet and dry season, yielding a single annual growth cycle. Data from this analysis are plotted in Fig. 3, which also includes measurements from three juvenile specimens from Chitwan (discussed below and recorded in Table 1), as well as the calculated annual growth of a seven-year-old female reported from Chitwan by Dinerstein et al. (1988). Their measurements of this one animal were reported based on PL but were converted here to CL based on regression analysis for PL on CL calculated from our combined data. Our measured animals had all grown at about the same rate but slightly slower than the rate calculated by Dinerstein et al. (1988).

Three juvenile specimens were collected alive in the forests of western Chitwan on 16 April 1992. Growth annuli were clearly visible and measured, with the resultant growth measurements presented in Table 1 and Fig. 3. Two of the animals were yearlings at the end of their first full season of growth, and the third was a juvenile at the end of its second growth season. Carapace lengths measured 69.0 and 75.0 mm in the one-year old animals and 82.0 mm in the two-year old (Fig. 2). Calculated hatchling sizes of these individuals were 43.7, 44.4, and 40.6 mm CL.

All three juvenile specimens were associated with a small partially drying hillside streambed descending through the sal forest before it entered the broad open Narayani River floodplain with its associated elephant grass and rhinoceros wallows. One yearling was found in a relatively large but shallow water pool at the mouth of the stream just before it entered the floodplain. The second yearling was found in a small puddle of water in the middle of the otherwise totally dry streambed about 100 m uphill from the floodplain mouth. This puddle was about 15 cm in depth and about 5 x 2 m in size, with the turtle found hiding under a thin layer of dead leaves at the bottom of the puddle. The turtle was immediately active when collected and did not appear to be estivating. The two-year-old juvenile was found in the middle of the totally dry streambed about 400 m uphill from



Figure 4. Ceremonial artifact mask made from carapace of *Melanochelys tricarinata* and sold in Kathmandu. Photo by A.G.J. Rhodin.

the mouth, hiding under moist leaf-litter under the eroded down-stream side of a large log laying transversely across the streambed. This animal was also alert when found and did not appear to be estivating.

Three eggs presumed to be of this species (USNM 267025) were found in a rhinoceros latrine in the grasslands of Chitwan in March 1985, and another clutch of six eggs was discovered on 15 November 1985 (Dinerstein et al., 1988). The eggs had average dimensions of 48.0 x 27.4 mm (range 44.6–51.3 x 26.7–28.3 mm). Local fishermen in Chitwan noted that *Melanochelys* lays eggs in December

Table 2. Relative abundance and approximate prices of 120 decorated turtle and tortoise artifact masks for sale in Kathmandu, April 1992.

Species	Masks (n)	Percent	Price (Rp) ¹	Price (\$)
<i>Indotestudo elongata</i>	38	31.7	400	8.00
<i>Lissemys punctata</i>	26	21.7	150	3.00
<i>Aspideretes</i> sp. ²	23	19.2	300	6.00
<i>Melanochelys tricarinata</i>	22	18.3	300	6.00
<i>Melanochelys trijuga</i>	3	2.5	400	8.00
<i>Kachuga kachuga</i>	2	1.7	800	16.00
<i>Kachuga smithii</i>	2	1.7	300	6.00
<i>Kachuga dhongoka</i>	1	0.8	300	6.00
<i>Cyclemys dentata</i>	1	0.8	300	6.00
<i>Hardella thurjii</i>	1	0.8	500	10.00
<i>Pyxidea mouhotii</i>	1	0.8	200	4.00

¹ Price after bargaining, original price ca. twice as high.

² *A. gangeticus* and *A. hurum* not differentiated.

through January during the dry season, whereas river turtles lay eggs in June through July during the monsoon.

Other Species. — The following six batagurid species have been documented near the India-Nepal border on the major tributaries of the Ganges River (Iverson, 1992): *Cyclemys dentata*, *Geoclemys hamiltonii*, *Hardella thurjii*, *Kachuga tentoria*, *Morenia petersi*, and *Pyxidea mouhotii*. No verified records are yet available for these species in Nepal. However, artifact shell masks of *Cyclemys dentata*, *Hardella thurjii*, and *Pyxidea mouhotii* have been recorded for sale in Kathmandu (see below). In addition, Shrestha (1993) lists both *Geoclemys hamiltonii* and *Hardella thurjii* as occurring in Nepal but provides no supporting documentation. The chelonian fauna of Nepal, therefore, consists of 11 confirmed species and potentially a total of 17.

Exploitation

There is a thriving curio trade in Kathmandu dealing in decorated artifact masks made from turtle and tortoise shells (Fig. 4). They are sold at most tourist locations, including many Buddhist *stupas* and souvenir stores. Most are decorated with what appear to be tin or low-grade silver alloy decorations in the form of a stylized face with a border composed of numerous small decorative human skulls. In the Thamel section of Kathmandu there are many artifact stores that sell these masks to tourists. Often plain shells are also sold, but decorative masks are more common. They are said to be manufactured in artisan centers in Bodhnath, a village ca. 6 km east of Kathmandu, utilizing turtle and tortoise shells brought in from the southern Terai of Nepal and possibly the northern areas of India just south of the Nepal border.

During a survey in April 1992, as many stores as possible were visited in Kathmandu and 120 turtle shells for sale were documented. All shells were identified as to species and roughly priced. The results of this survey are presented in Table 2.

Masks made from 11 turtle species were seen, but just four species represented about 91% of the total — *Indotestudo elongata*, *Lissemys punctata*, *Aspideretes* sp. (we did not differentiate *A. gangeticus* from *A. hurum*), and *Melanochelys tricarinata*. Other shells, representing 9% of the total, were *Melanochelys trijuga*, *Kachuga kachuga*, *Kachuga smithii*, *Kachuga dhongoka*, *Cyclemys dentata*, *Hardella thurjii*, and *Pyxidea mouhotii*. The last three species have not been recorded from Nepal, although all occur in India not far from Nepal.

SUMMARY

Eleven species of turtles and tortoises are now confirmed from Nepal and an additional six species are likely to occur there. A range extension in Nepal for *Lissemys punctata* is documented, and the presence of *Melanochelys tricarinata* and *Aspideretes hurum* confirmed. Life history notes on *Melanochelys trijuga* suggest a pattern of differential habitat

use for juveniles and adults, with juveniles utilizing hillside streambeds in a semi-terrestrial mode, and adults preferring lentic backwaters and oxbow lakes. Growth data for *M. trijuga* demonstrate relatively fast growth to adulthood, with marked seasonality in growth annuli probably associated with the distinct wet and dry seasons in southern Nepal. Exploitation of all of Nepal's chelonians for local consumption and a thriving curio mask trade may threaten many populations before basic ecological and systematic data can be obtained.

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