

REPORT OF A SURVEY OF FRESHWATER TURTLES  
AND LAND TORTOISES IN BANGLADESH

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DAS

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## INTRODUCTION

The meeting point of two of the largest rivers in the Indian subcontinent, the Ganga and Brahmaputra, People's Republic of Bangladesh ( $20^{\circ} 34'$  to  $26^{\circ} 37'$  N and  $88^{\circ} 45'$  to  $92^{\circ} 40'$  E, Fig. 1) is a land of paradoxes. It is one of the world's smallest countries, with a total land area of 142,771 sq. km, but has perhaps the highest human density, approximately 900 per sq. km. The country has one of the world's lowest per-capita income, but has a high faunal diversity. The large numbers of water bodies in this tiny country - rivers, ponds, lakes, estuaries, about 750 kilometres of coastline in the south, as well as numerous large, standing bodies of water in the north, that are locally called haors, may account for the incredible diversity of turtles in Bangladesh. For some 25 species, nearly a tenth of the world figure (Fig. 2) are known to inhabit this region.

In December, 1988 and January-February, 1989, I made two visits to Bangladesh. My purpose was two-fold: to collect as much biological data on the freshwater and terrestrial species of chelonians as possible, and to obtain the latest trade and status information on these groups, both essential to formulating comprehensive management plans for the resource.

Methods include visits to landing centres, suitable habitats and Hindu villages (for the reason given subsequently). Data on trade - current figures, species involved, trends, export procedures and legislation were obtained from personal observations at the landing centres and stocking sites, published sources and interviews with exporters. Specimens collected have been deposited at the Bangladesh National Museum, Shahbagh, Dhaka and the Indian National Zoological Collection, Zoological Survey of India, Calcutta. Nomenclature follows Iverson (1986).

## FAUNAL ANALYSIS

Eighteen species of freshwater turtles - 11 emydids (hardshells) and 7 trionychids (softshells), two testudinids (land tortoises) and marine turtles of five species, belonging to two families that are not included in the subsequent sections, constitute the chelonian resource of Bangladesh (Fig. 3, Appendix I). Reports of certain of the marine turtle species from the country is unreliable, and their status and distribution has been reviewed elsewhere (Das 1989). On the other hand, further field surveys in the north-east, north-west and south-

east Bangladesh should increase the total number of non-marine chelonians from Bangladesh; for several species of emydids and one testudinid have distributions closely approaching the political limits of the country. A list of such species, along with their known distribution and likely areas of occurrence within Bangladesh has been appended (Appendix II).

An analysis of the faunal composition indicates that elements from both Indian and Indo-Malayan subrealms are represented (Fig. 4). Five species of freshwater turtles, including 3 emydids (Batacur baska, Morenia petersi and Cuora amboinensis) and 2 testudinids (Manouria emys and Indotestudo elongata) are considered here as belonging to the eastern (Indo-Malayan) subrealm, together comprising 25% of the non-marine chelonian fauna of Bangladesh. Both the testudinid species also occur in India, but with rather restricted distributions. Two other species of testudinids, the Indian star tortoise (Geochelone elegans) and Travancore tortoise (Indotestudo forstenii) are found in India, but do not occur naturally in Bangladesh. The sight record of G. elegans from Dhaka district, cited by Jayakar and Spurway (1966) have not been verified, and may have resulted from introductions. Most recently, Frazier (1987) has shown that this species is distributed over north-western India and eastern Pakistan, and in peninsular India and Sri Lanka, in two well separated zones.

The composition of trionychids of Bangladesh is almost similar to that of India. Possible exceptions is Trionyx nigricans, supposedly endemic to the country, though its taxonomic status and relationships are still unclear. The form is restricted to a single tank attached to the 'mazar' (cemetery) of Byazid Bostami, a Mohammedan saint, on the outskirts of Chittagong city. Pelochelys bibroni, the saline-resistant trionychid, and its close relative, Chitra indica, a riverine form, are considered common to both the subrealms, since they are widely distributed in the Indian as well as south-east Asian regions (maps in Das 1987, Iverson 1986).

Among the 12 emydids of Bangladesh, only 3 (25%) may be considered elements of the Indo-Malayan subrealm : Morenia petersi, found also in the north Indian state of Bihar (Moll and Vijaya 1986), but considered here to have Indo-Malayan affinities, since it is also known from Assam, another region where the fauna of both subrealms mix, and more importantly, because the only other member of the genus, M. ocellata is found in Burma. Batacur baska,

is found over much of coastal south-east Asia, and is definitely a member of the eastern realm, though it extends west to the Sunderbans region of India, and possibly upto northern Orissa, in India. The third Indo-Malayan species is Cuora amboinensis, widespread in south-east Asia, and also occurring in the Indian state of Assam. Among the riverine turtles of the family Emydidae, all species found in the north Indian rivers Indus, Ganga and Brahmaputra, occur in Bangladesh. These include members of the genera Hardella and Kachuga, as well as the more lentic Geoclemys. Thus, Indian turtles that certainly do not extend into Bangladesh are : Trionyx leithii (restricted to the rivers and reservoirs of peninsular India), Geochelone elegans (a dweller of scrub-forests in north-western and peninsular India), Geomyda silvatica and Indotestudo forsterii (both restricted to the evergreen forests of the Western Ghats, in south-western India).

All records of Indo-Malayan elements in the turtle fauna of Bangladesh are from the north-eastern (Sylhet and Moulvi Bazar districts) or south-eastern (Cox's Bazar and the three Hill Tracts districts of Chittagong) parts of the country, all once with a contiguous evergreen forest that are today fragmented and rapidly disappearing.

#### TRADITIONAL INTERACTIONS

Kassim (softshell turtle) and kautha (hardshell turtles) are everyday sights in rural Bangladesh, thanks to the numerous wetlands, and naturally feature prominently in local folklores and mythologies. Consumption of turtle meat is restricted to the ethnic minorities (total population an estimated 12 million), comprising Hindus, Christians and various aboriginals in the Chittagong Hill Tracts districts and the greater Sylhet districts. Islam, the state religion of Bangladesh, followed by about 80% of the population in the country, preaches abstinence from eating the flesh of amphibious vertebrates, a 'blessing' to wild turtle populations,

At Hindu and Buddhist settlements, live turtles were frequently found being kept for long periods, taking advantage of their ability to survive for weeks without food, before before their slaughter. The carapace of turtles are hung over doors of human-dwellings and on cow-sheds to scare away thieves, turtles being considered inauspicious. Yet, the act of placing a turtle shell over a cowshed is considered to bring wealth to the home, by transmitting the prolific nature of these animals to the cows. Anglers, sportsmen and gamblers, how-

ever, are offended at the sight of turtles, believing them to bring bad luck. In Chittagong district, pieces of turtle shells are tied to cast nets, to function as sinkers, used in catching both fish and turtles. A parallel of the western belief surrounding the albatross is to be found among the seafarers of Bangladesh, who consider harming sea turtles to bring ill luck. Prayers are said before offshore nets are set by fishermen, since entangled turtles damage costly nets, letting out fish and shrimps.

Perhaps the most interesting and visible of the human-turtle interactions are to be seen just outside the city of Chittagong, in south-eastern Bangladesh. At the mazar (cemetery) of Byazid Bostami, hundreds of pilgrims and tourists crowd over the steps leading to the large pond attached to the shrine, to see the large turtles, believed to be djinns or wicked men who had supposedly been thus converted as punishment for their deeds by the saint. Women and children especially crowd near the pond, and the prevailing belief is that mud eaten off the back of these turtles can make a barren woman conceive. The largest of the turtles, apparently being used to being handled, remain in the vicinity of the steps virtually at all times, to snap up any strip of beef, bread, banana or puffed rice offered to them by their admirers, mostly held hesitantly at the end of a wooden skewer. The turtle (Trionyx nigricans) is supposedly found nowhere else in the world, a nearby pond which had a small population of these turtles being recently drained. However, this unusual distribution appears natural, and only a detailed study of the bones, especially of the skull, utilizing a larger series than what is now available in the few museums in India and England, will perhaps answer the question of the validity of this taxon.

#### TRADE IN TURTLES

Export of live turtles, turtle meat, eggs, oil and various derivatives from the shell earns Bangladesh millions of Takas every year. Two species are involved in this trade - the Indian softshell turtle (Trionyx gangeticus), the kocha or 'green turtle' of the exporters, and the peacock softshell turtle (Trionyx hurum), known locally as lath, naqashi or bukum. Both are common in the larger rivers in the country.

The Bangladesh Forest Department sets the export target every year, by issuing a certain number of permits for the collection of the turtles. Fishermen are involved in the actual capture operations, who use nets and hooks to catch turtles, though some numbers are also caught by hand, in such areas as Sylhet, Noakhali,

Faridpur, Patuakhali, Basirhat and elsewhere. These are bought by middlemen who stitch the fore- and hind-limbs of the turtles together, and gather them in jute sacks, and when sufficient numbers have been accumulated, bring them to one of the several holding centres that are situated at Narayangunj and Mirpur, near the city of Dhaka. Here, turtles are weighed and purchased by the exporters, and let loose in small to medium-sized ponds, with the restraining strings on the limbs cut, prior to their shipment. Only live turtles exceeding one kilogram in weight can be legally exported, and a 'health certificate' accompanies each consignment, which is provided by the government veterinary officers. During winter months, supplies to the holding centres peak, and turtles are exported 6 days a week. Hong Kong, Singapore, Malaysia, South Korea and Japan are some of the south-east Asian countries that import live freshwater turtles from Bangladesh. Table I and Figure 6 shows the increase in export earnings from live freshwater turtles from Bangladesh, between 1972-73 and 1985-86 (Data from Anon. 1987).

Various other products derived from turtles have commercial value in the Far Eastern markets. Table II and Figure 5 shows the export earnings from turtle meat, eggs and 'fins', between the fiscal years 1977-78 and 1985-86 (Data from Anon. 1987). Japan, Hong Kong, and Singapore are the importers of turtle oil from Bangladesh, and badi, the cartilaginous flap of softshell turtles that have dried at the holding centres, are in demand in Japan and Hong Kong, presumably for making soaps and/or medicine. The carapace and plastral bones are also exported to several countries for the manufacture of fertilizers and poultry feed.

On export days, turtles are recaptured from the ponds at the holding centres, reweighed, and placed in wicker-baskets, at the rate of 1-7 turtles to a basket, depending on the size and weight of the animal and the size of the basket. The filled baskets are then transported by tempos to the International Airport at Dhaka. Improper capture, storage and transport methods are thought to be the causes of the mortality (estimated to be around 5% by the exporters) during the winter months, but rising several-fold during the summer.

Oliver (1979) wrote that the legal trade represents the proverbial 'tip of the iceberg', and much larger numbers are smuggled out to the nearby Indian states, a fact confirmed to me by people in business, both in Bangladesh and in India.

## CONSERVATION AND MANAGEMENT

The Bangladesh Wildlife (Preservation) Act of 1974 lists both species of softshell turtles that are exported, Trionyx gangeticus and I. hurum in Schedule III, indicating that they may not be legally captured, killed or traded in. Permits for export, according to a government notification, are issued for 3 species of turtles - Trionyx leithii, restricted to the rivers and reservoirs of southern India, I. cartilagineus, widespread in southeast Asia, but not occurring within the political boundaries of Bangladesh and I. certilifionus, a 'species' not recognised in any scientific work I am aware of.

Schedule III of the Wildlife Act lists 3 species of emydid - Geoclemys hamiltoni, Morenia ~~obesa~~<sup>occelata</sup> (a taxon unrepresented in Bangladesh) and Melanochelys tricarinata, besides Trionyx gangeticus, I. hurum and I. nigricans. Other taxa protected under the Act include Schedule I Kachuga tecta, Lissemys punctata and Indotestudo elongata, all found to be exploited for food (see collection data, Appendix III). Interestingly, none of the 5 marine turtles of Bangladesh which are considered to be threatened worldwide, are listed in the Wildlife Act.

Thus, a revision of the existing Schedules of the Act is considered to be a necessary prelude to real conservation action, for the freshwater turtles and land tortoises of Bangladesh. This would also allow monitoring of trade in the common species of freshwater turtles. Appendix IV lists species of non-marine chelonians of Bangladesh, their current status in the Wildlife Act and their proposed listing, along with remarks on status. Information on status was obtained during fieldwork as well as from Khan (1982) and Fugler (1984).

The fact that turtles and turtle-derived products earn Bangladesh a significant foreign-exchange is clear from data provided by Anon (1987) (see also Tables I and II, Figs. 5 and 6). However, more extended surveys need to be conducted on the major river systems and around the landing centres elsewhere to determine with more precision, the status of the commercially valuable species, before quotas are set up for capture. During my surveys, I found Trionyx hurum to be abundant in many of the areas visited. A village of turtles exist at Gayashi, in Sylhet district, for whom catching turtles is the primary source of income. I. hurum is the favourite species, owing to its large size, though Chitra indica, Hardelle thurii, Lissemys punctata and some of the larger Kachugas are also caught. The Sylhet wetlands supply most of the turtles for

export to southeast Asia and are also smuggled across the border to Shillong in Meghalaya, India, besides supplying the local markets frequented by Bengali Hindus, as well as tea garden labourers, mostly from India's Chota Nagpur region.

Modern methods of capture, storage and transfer should reduce mortality rates. 'Closed seasons', as practised for so many game species elsewhere, may be introduced, allowing the commercially valuable turtle species to breed safely. Both species of Trionyx in the export trade nests between the monsoons and early winters, and during this period, permits for export may be temporarily suspended and the local markets checked to stop internal commercialisation. During this period, hardshell turtles, which breed from late winters to early summers, may be allowed to be harvested.

A small- or medium-sized turtle farming project may be initiated in Bangladesh, to examine the feasibility of farming to supply the markets, perhaps funded by one or more international organisations concerned with conservation, food production or general self-help for developing countries. Processing of frozen turtle meat, as suggested by Fugler (1984) will cut down losses due to mortality in transit. Investigations on production of commercially valuable by-products should also be initiated as extension work of these proposed 'farms' - turtle oil, poultry feed and fertilizers already have markets both within the country and abroad.

Oliver (1979) suspected the illegal freshwater turtle trade between Bangladesh and India to be significant. My observations indicate that several softshell species are traded in - Lissemys punctata, Trionyx gangeticus and I. hurum. Hardshells are not much preferred in India owing to their usually smaller size and low flesh-to-body ratio. These are generally sold locally, and Sylhet market is perhaps the largest market in the country for turtles, where several hundred turtles, both hardshells and softshells are sold every day during the winter months.

Many of the species not exported are also in need of conservation action due to threats from habitat modification and/or local consumption. Bataqur baska, the estuarine emydid listed as 'endangered' by the IUCN Red Data Book (Groombridge and Wright 1982), was reported by Whitaker (1982) to be caught in the Sunderbans of Bangladesh by the locals using hooks baited with mangrove fruits in large numbers. The species, which is restricted to these mangrove tracts, is also suspected to be threatened in the country due to degradation of its

habitat due to lumbering. A Schedule III listing for the species is thus warranted, as this will help in controlling the unregulated exploitation of adult turtles and also strengthen efforts to protect mangrove ecosystems in Bangladesh.

Habitat loss is also suspected to threaten several of the forest-dwelling emydids (eg. Melanochelys tricarinata) and testudinids (Indotestudo elongata and Manouria emys). At the West Bhanugach Reserve Forest, Moulvi Bazar district a 27 km<sup>2</sup> area of degraded evergreen forest, scrublands and plantations, a carapace of an I. elongata was found at a Khasia tribal village, where the flesh was consumed. The tortoise was reportedly rare in the forest, which, because of logging operations, itself have no future. Large forested tracts survive in the 3 south-eastern districts, collectively known as the Chittagong Hill Tracts, largely because of rebellion by the Chakma tribals. However, verbal information received indicates that turtles and tortoises in the areas are avidly sought after by the locals. Allowing large forested tracts to remain, to me, appears a more sensible strategy for conserving terrestrial and semi-aquatic chelonian species than complicated rehabilitation programmes by captive breeding for introductions and reintroductions, which have roles to play if and when more simple techniques fail to work.

Trionyx nigricans, one of the world's least known turtles occur in Bangladesh, and is confined to a single tank attached to an Islamic shrine. A study of its reproductive biology, shell morphometrics and ecology has been recently conducted by Ahsan and Haque (1987). In the draft action plan for freshwater turtles and tortoises, Stubbs (1987) recommended creation of a second population presumably by introduction from the stock at the shrine site. Important as it might be, removal of any of the turtles is unlikely to be permitted by the custodians of the shrine and devotees. No other population of the turtle exists at present, the nearby pond which had several being recently drained (Ahsan pers. comm.).

Since increased funding is now available for conservation education, such publicity material as audio-visuals, documentary films and posters may be prepared, highlighting the status of turtles and tortoises in Bangladesh, and their role in ecosystems (scavengers of dead animal matter, weed control, checking populations of disease-transmitting aquatic insects, etc.). Capable organisations exist in Bangladesh to organise workshops and symposiums, should funding be available, and a larger project to train local biologists and wildlife enforcement officials in identification and survey techniques as well as assess the stock of this valuable resource needs to be urgently conducted.

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APPENDIX II

TURTLES LIKELY TO OCCUR IN BANGLADESH

<u>SL. NO.</u>	<u>SPECIES</u>	<u>DISTRIBUTION IN NEARBY AREA(S)</u>	<u>AREA(S) OF LIKELY OCCURRENCE</u>
1.	<u>Pyxidea mouhotii</u>	Meghalaya, Assam (India)	Mymensingh, Sylhet, Moulvi Bazar, Chittagong Hill Tracts, Cox's Bazar
2.	<u>Cyclemys dentata</u>	Northern West Bengal, Assam, Meghalaya (India)	Rangpur, Mymensingh, Sylhet, Moulvi Bazar, Chittagong Hill Tracts, Cox's Bazar
3.	<u>Melanochelys trifluga</u>	Northern West Bengal, Assam, Meghalaya (India), Bhamo, Arakan (Burma)	Rangpur, Chittagong Hill Tracts, Cox's Bazar, Sylhet, Mymensingh, Moulvi Bazar
4.	<u>Heosemys depressa</u>	Arakan (Burma)	Cox's Bazar
5.	<u>Manouria impressa</u>	Karenni Hills (Burma)	Cox's Bazar

<u>FIELD NO.</u>	<u>SPECIES</u>	<u>LOCALITY</u>	<u>DATE</u>	<u>REMARKS</u>
10/8GD 01	<u>Indotestudo elongata</u>	West Bhanugach Reserve Forest, Moulvi Bazar district	11 Jan., 1989	First record from north-eastern Bangladesh. Khan (1982) mentioned of its occurrence in the south-eastern districts.
10/8GD 02	<u>Kachuga tecta</u>	Hael Haor, Moulvi Bazar district	11 Jan., 1989	First record from north-eastern Bangladesh, and the second from the Brahmaputra drainage. Moll (1987) reported of one from Chhaprunji, in India.
10/8GD 03	<u>Hardella thurii</u>	Hael Haor, Moulvi Bazar district	11 Jan., 1989	Along with AM(NH) 85774 (Sylhet) are the only records from north-eastern Bangladesh.
10/8GD 04	<u>Coora amboinensis</u>	Erali Beel, Golapgunj, Sylhet district	16 Jan., 1989	First record from north-eastern Bangladesh, and second from the country, the first being from Cox's Bazar district, by Khan (1982).
10/8GD 05	<u>Morenia petersi</u>	Salutikor, north of Sylhet, Sylhet district	16 Jan., 1989	First record from north-eastern Bangladesh. Reportedly widespread in Bangladesh (Khan 1982).
10/8GD 07	<u>Trionyx hurum</u>	Jagannathpur, south-west of Sylhet city, Sylhet district	16 Jan., 1989	Southern-most record for the species and the first from the Sangu river. Suggests its occurrence in northern Burma.
10/8GD 08	<u>Lissemys punctata</u>	Sangu river, Dohazari, Chittagong district	23 Jan., 1989	Southern-most record from the Asian mainland.
10/8GD 06	<u>Lissemys punctata</u>	Machkharria Depa, Ukhia, Cox's Bazar district	27 Jan., 1989	Southern-most record from the Asian mainland.

## Acronyms used :

10/8GD : Author's Bangladesh field number. Material collected during the survey have been deposited at the National Zoological Collection, Zoological Survey of India, Calcutta, except ID/8GD 05, which was deposited at the Bangladesh National Museum, Shahabagh, Dhaka.

AM(NH) : American Museum of Natural History, New York.

### CAPTIONS

- FIG. 1 : Map of Bangladesh, showing principal cities. Inset : Position of Bangladesh in South Asia.
- FIG. 2 : Families of living turtles of the world. Darkened areas represent species found in Bangladesh.
- FIG. 3 : Taxonomic composition of the turtle fauna of Bangladesh.
- FIG. 4 : Analysis of the affinities of the turtle fauna of Bangladesh.
- FIG. 5 : Export earnings from turtle meat, eggs and 'fins', between fiscal years 1977-78 and 1985-86, for Bangladesh. Data derived from Anon. (1987).
- FIG. 6 : Export earnings from live turtles, between fiscal years 1972-73 and 1985-86, for Bangladesh. Data derived from Anon. (1987).

## APPENDIX IV

<u>FRESHWATER/TERRESTRIAL SPECIES</u>	<u>CURRENT LISTING IN WILDLIFE ACT</u>	<u>PROPOSED LISTING IN WILDLIFE ACT</u>	<u>REMARKS</u>
FAMILY : EMYDIDAE			
1. <u>Cuora amboinensis</u>	---	I	Small population, exploited for food
2. <u>Morenia petersi</u>	---	I	Common, but exploit for food
3. <u>Melanochelys tricarinata</u>	III	III	Presumably rare
4. <u>Geoclemys hamiltonii</u>	III	III	Presumably rare
5. <u>Hardella thurii</u>	---	I	Common, but exploit foodfood
6. <u>Kachuga tecta</u>	I	---	Very common, exploit occasionally for food
7. <u>Kachuga tentoria</u>	---	---	No good data on status Reportedly common
8. <u>Kachuga smithii</u>	---	I	No good data on status Localised distribution
9. <u>Kachuga sylhetensis</u>	---	III	Presumably rare
10. <u>Kachuga dhongoka</u>	---	III	Common nowhere, and presumably exploited
11. <u>Kachuga kachuga</u>	---	III	Reportedly rare, and presumably exploited
12. <u>Batakur baska</u>	---	III	Exploited for food, habitat loss
FAMILY : TESTUDINIDAE			
13. <u>Indotestudo elongata</u>	I	III	Exploited for food, habitat loss
14. <u>Manouria emys</u>	---	III	Exploited for food, habitat loss
FAMILY : TRIONYCHIDAE			
15. <u>Lissemys punctata</u>	I	III	Common, but exploit for food
16. <u>Pelochelys bibroni</u>	---	III	Reportedly rare
17. <u>Chitra indica</u>	---	III	Widespread, but now rare common, exploited for food
18. <u>Trionyx gangeticus</u>	III	I	Common, but exploited for food
19. <u>Trionyx hurum</u>	III	I	Common, but exploited for food
20. <u>Trionyx nigricans</u>	III	III	Restricted to a single tank at a religious site

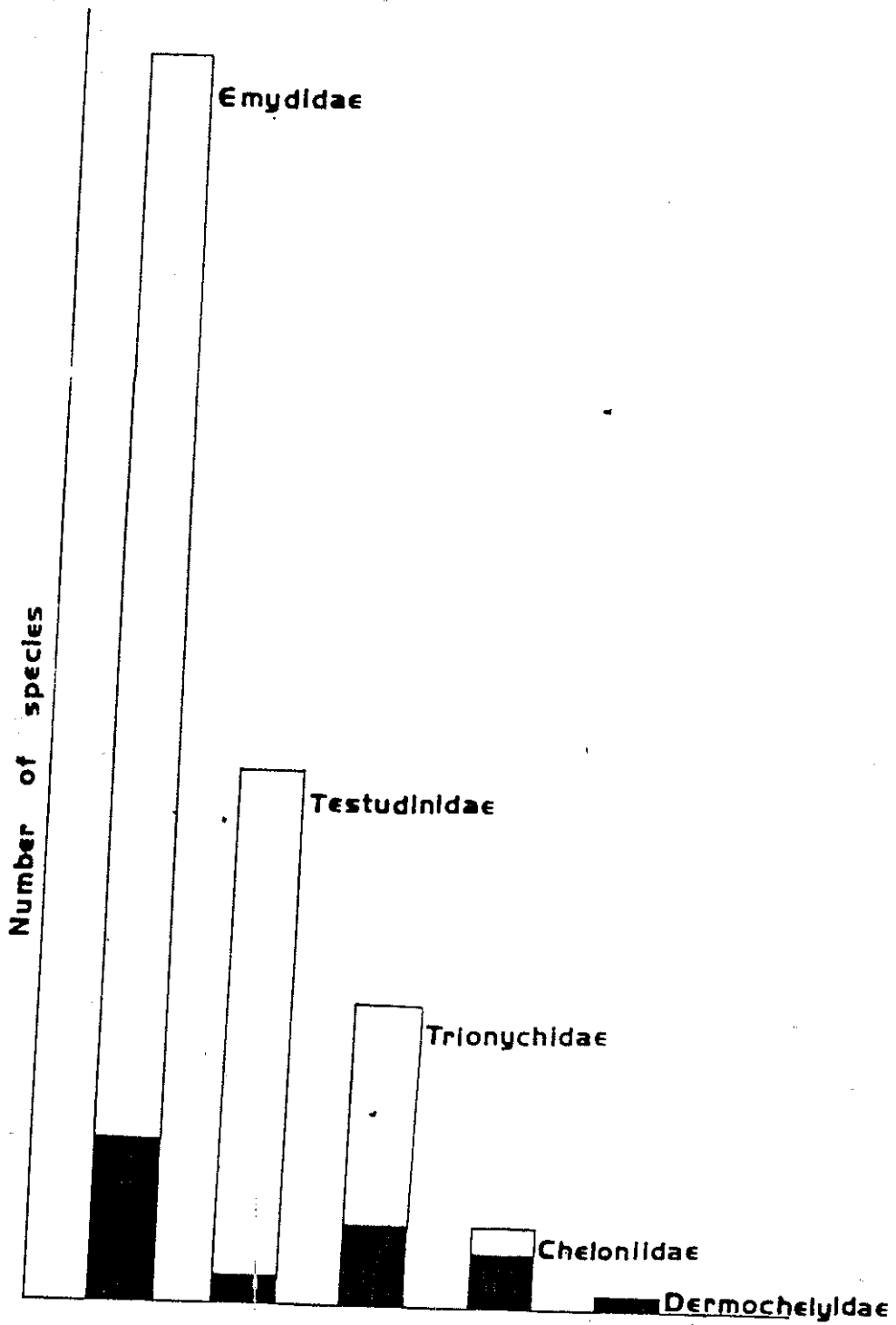


FIG. 2: Families represented  
in Bangladesh

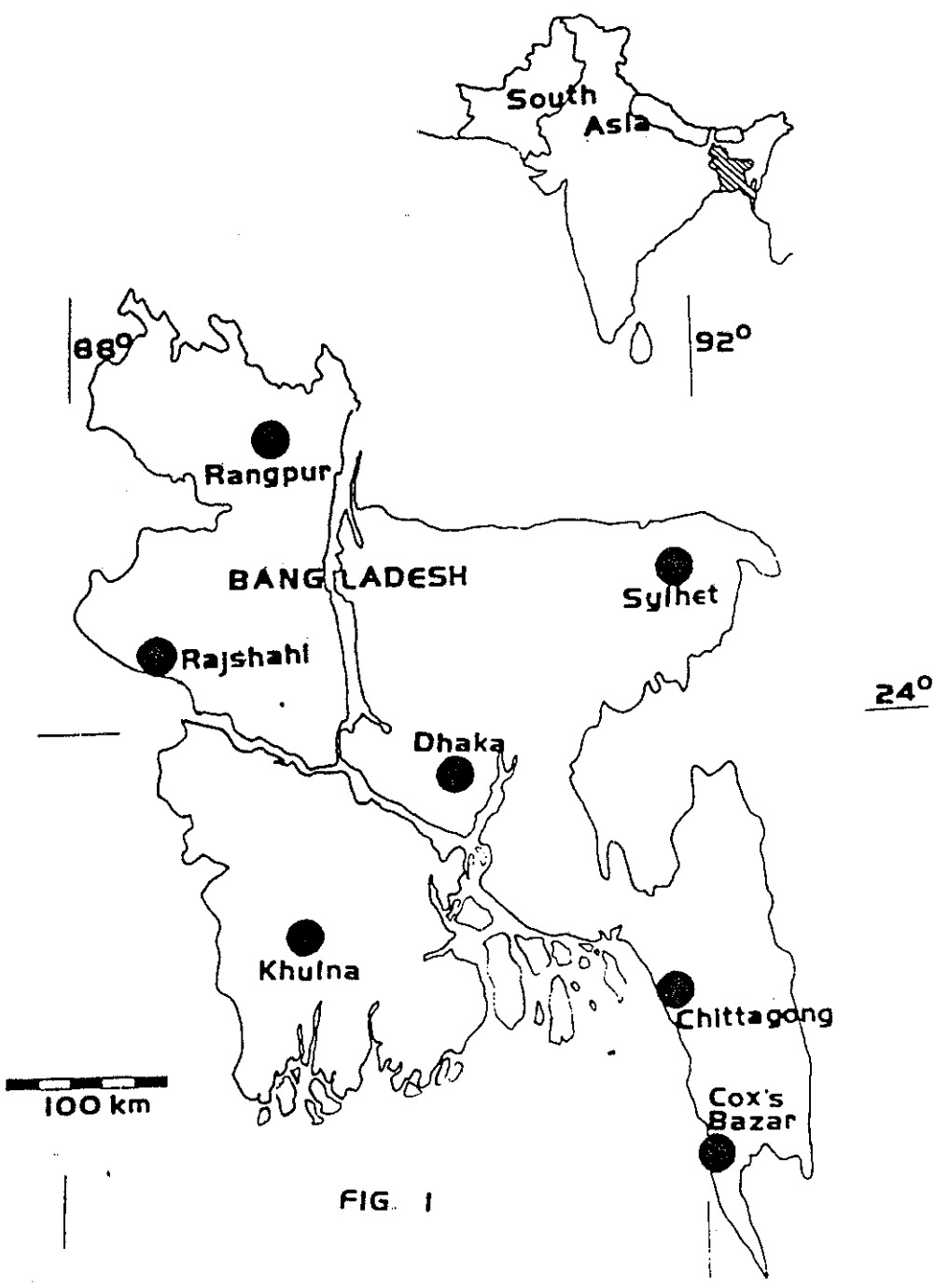


FIG. 1

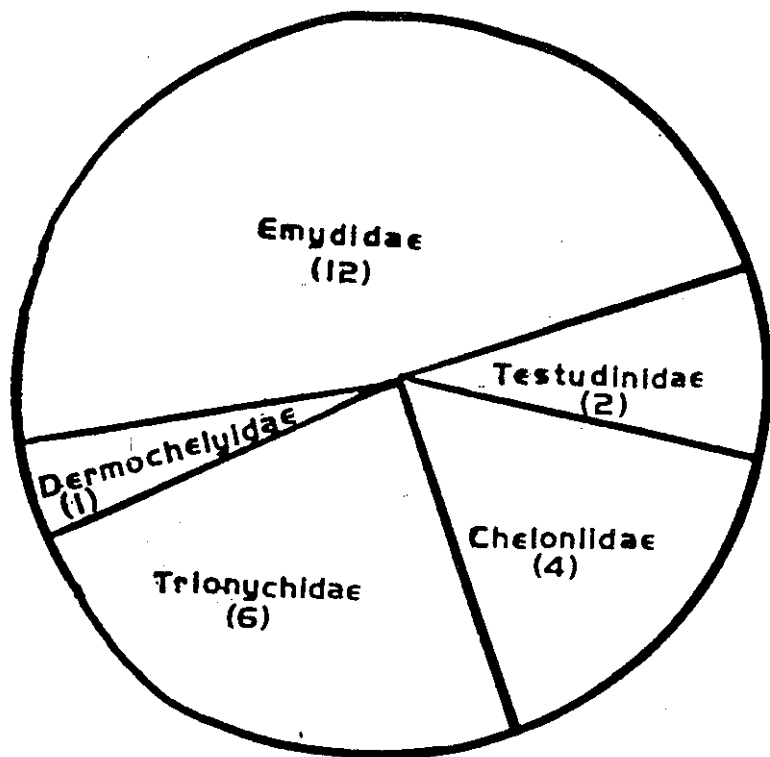


FIG. 3



KEY AND FAUNAL ANALYSIS

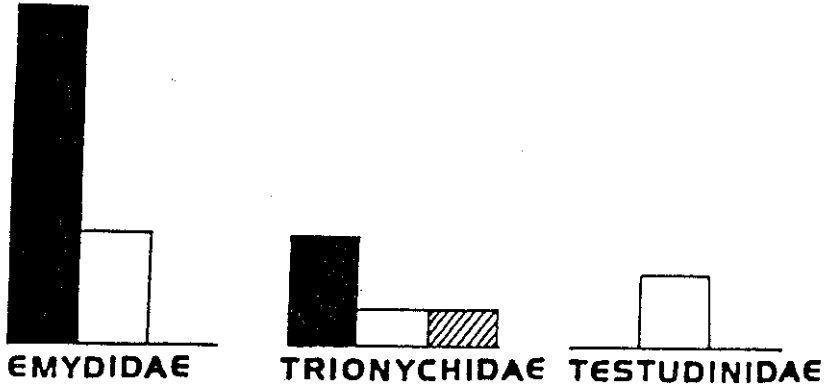


FIG.4

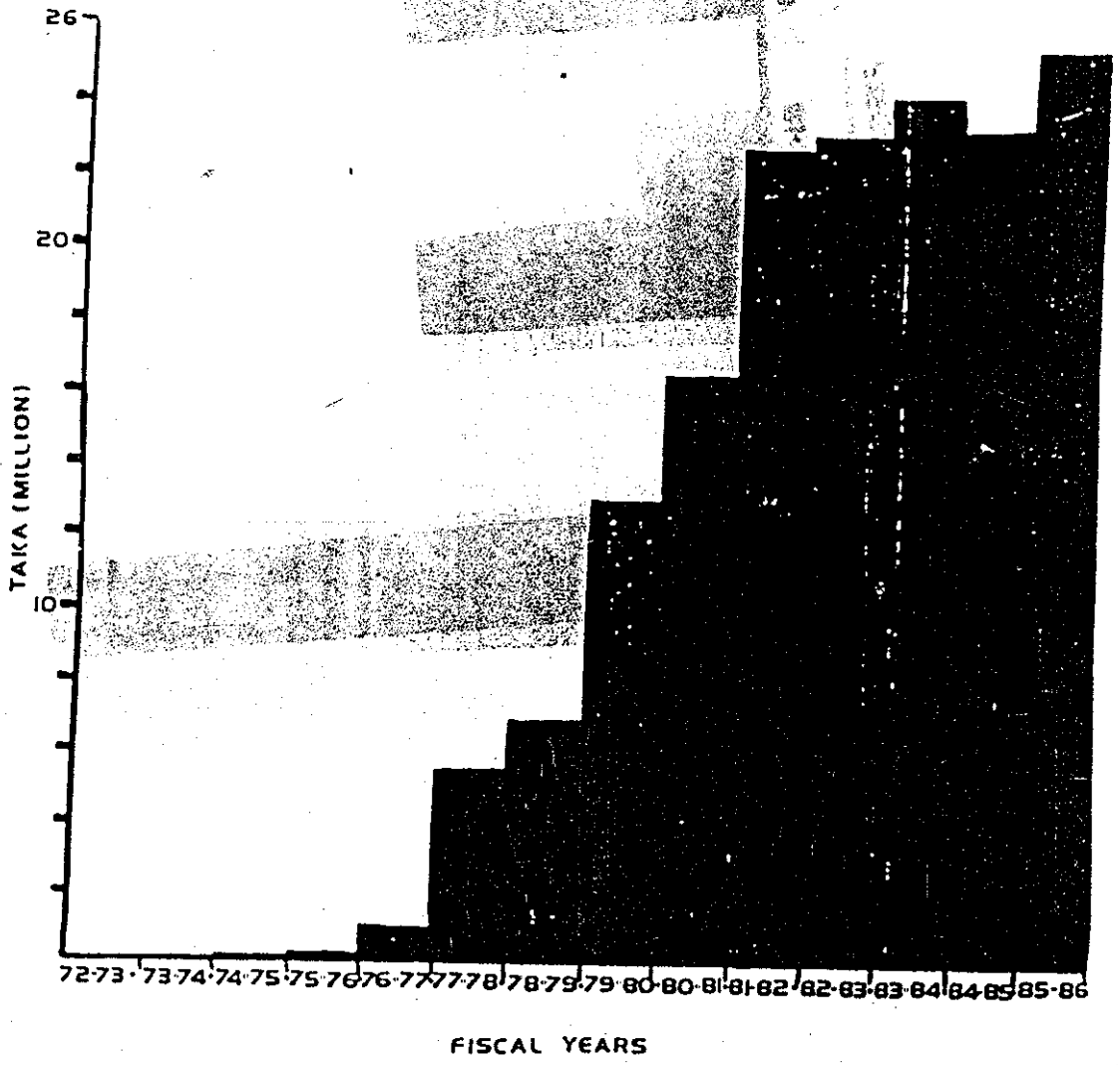


FIG. 6

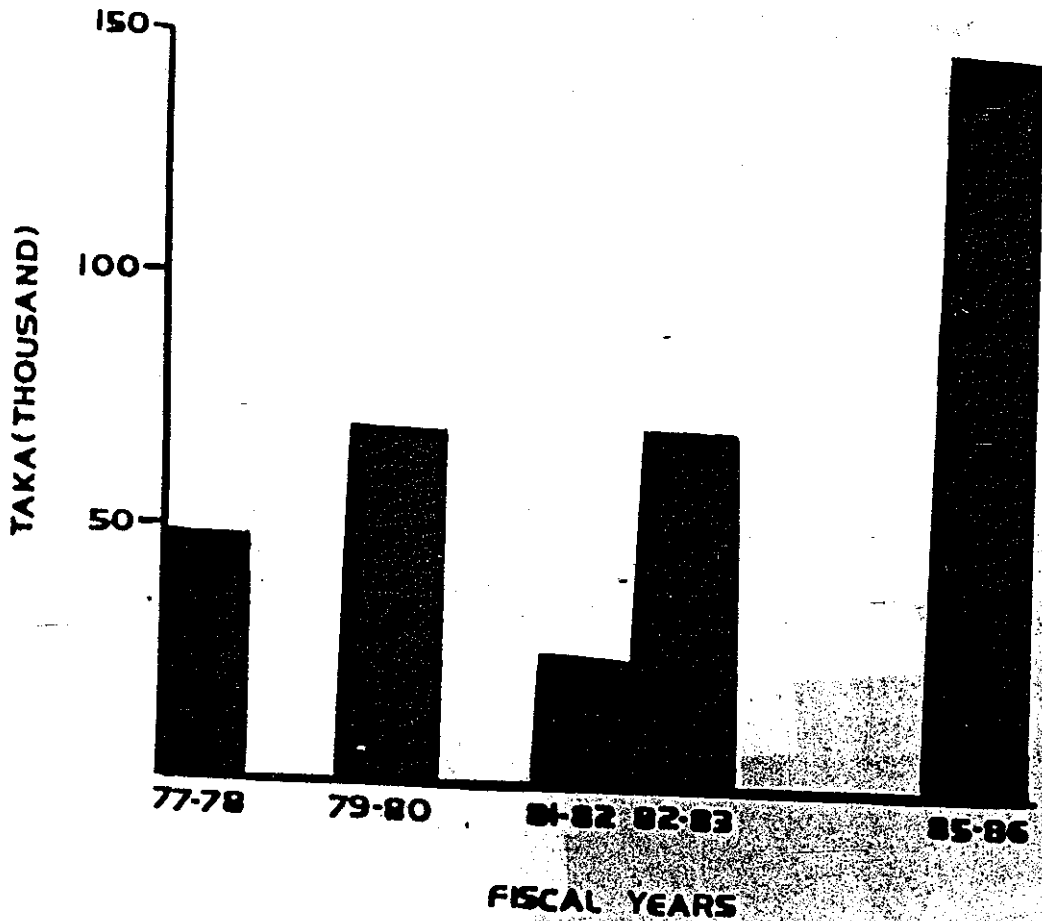


FIG. 5