

## First record and taxonomic status of *Megaderma lyra* from Vietnam (Mammalia, Chiroptera)\*

by G. CSORBA & Gy. TOPÁL, Budapest

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**Abstract** – The description and morphometric characteristics of the recently discovered Vietnamese population of *Megaderma lyra sinensis*, in comparison with the Indian subspecies *M. lyra lyra* is given. With 8 figures and 2 tables.

### INTRODUCTION

The family of false vampires (Megadermatidae) consists of 5 species, two of which occur in the Oriental Region (CORBET & HILL 1991, KOOPMAN 1993). The larger oriental species, *Megaderma lyra* GEOFFROY, 1810, differs from *Megaderma spasma* by its longer forearm, short and broad tragus, deep prenasal notch and smaller postorbital process. Because of these differences *M. lyra* has been placed in a separate subgenus, *Lyroderma* (LEKAGUL & McNEELY 1977). According to ANDERSEN & WROUGHTON (1907), the species (under the generic name *Eucheira*) can be divided into two subspecies, *E. lyra lyra* and *E. lyra caurina*, both of which are found in and near the Indian Peninsula, and the specimens derived from South China (characterized by larger skull and narrower prenasal notch) belong to a different species, *E. sinensis*. Since the differences are very slight between *E. lyra lyra* and *E. lyra caurina*, we agree with BROSSET (1962) and SINHA (1970, 1977) who recognised only the nominate subspecies *M. lyra lyra* in India, Pakistan, Bangladesh and Sri Lanka. *E. sinensis* is generally accepted as a subspecies of *M. lyra* (ELLERMANN & MORRISON-SCOTT 1951) and distributed in South China, Burma, Thailand and Malaysia. The area of *M. lyra* was figured by LEKAGUL & McNEELY (1977), but with some inaccuracy, since the species is living in Pakistan (ROBERTS 1977), in Afghanistan (GAISLER 1970) and until very recently there was no record of *M. lyra* from Vietnam.

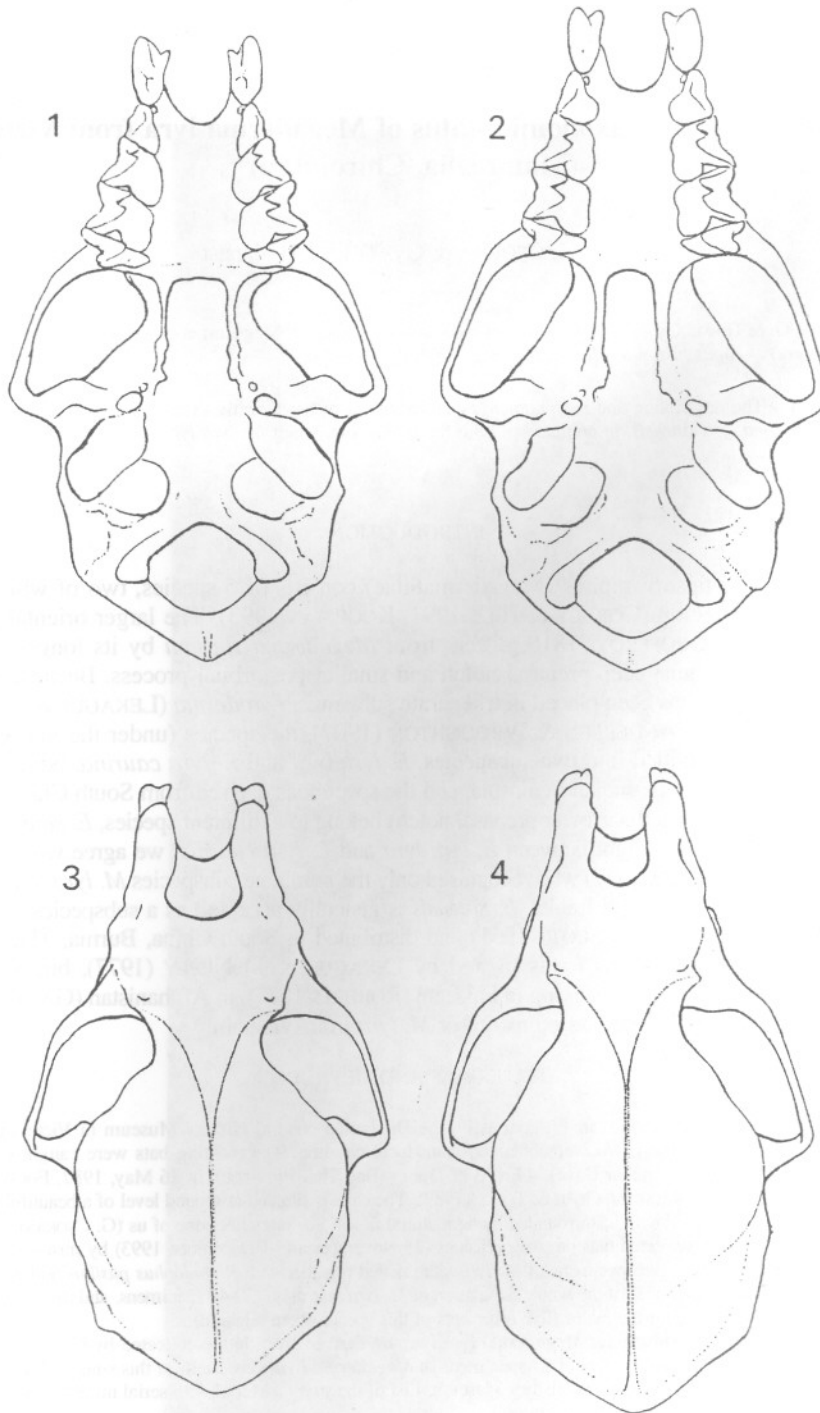
### MATERIALS AND METHODS

During the intensive zoological investigations by the Hungarian Natural History Museum in Vietnam, the first two specimens of *Megaderma lyra* were obtained from local children. The roosting bats were caught by hand at daytime in the Hang Neo (Anchor Cave), 4 km E of Duom (Bac Thai Province), in 26 May, 1987. For description of the collecting trip see MATSKÁSI, OLÁH & TOPÁL (1989). The cave is situated at ground level of a beautiful limestone rock at the elevation of 110 m a.s.l., surrounded by agricultural fields. Six years later one of us (G. CSORBA) also visited the very same cave, and collected bats on two occasions (28 November and 1 December, 1993) by mist-net, at the two entrances of the cave. The five specimens of *M. lyra* were netted together with *Rhinolophus pusillus* and *Rhinolophus marshalli*. The estimated number of the whole population of *M. lyra* was about 30–40 specimens, and the sex ratio of the captured animals was 4 : 1 for the males (five other bats of this species were released).

All the samples of the subspecies *Megaderma lyra lyra* are derived from India, collected by GY. TOPÁL.

External and cranial measurements of 31 specimens of *Megaderma lyra* were used for this study. All the materials are deposited in the Hungarian Natural History Museum. List of the study material with serial numbers and collecting localities are as follows (f = female, m = male):

\* Hungarian zoological studies in Vietnam No. 19.



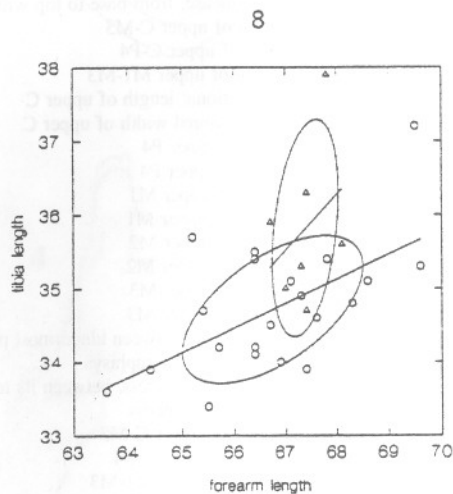
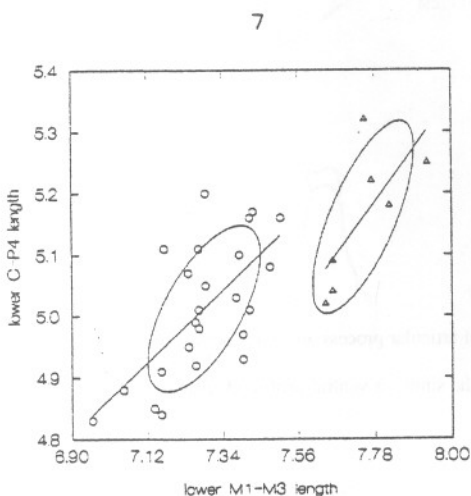
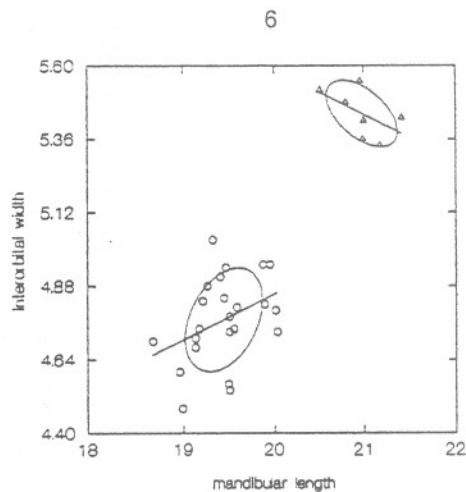
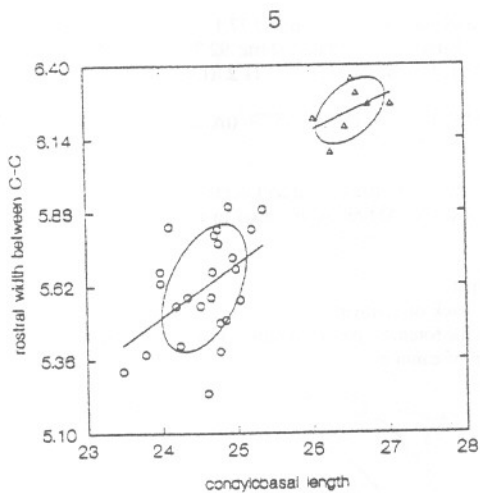
Figs 1-4. Skulls. 1 = *M. lyra lyra* from India, basal view, 2 = *M. lyra sinensis* from Vietnam, basal view, 3 = *M. lyra lyra* from India, dorsal view, 4 = *M. lyra sinensis* from Vietnam, dorsal view

**Megaderma lyra lyra:** 92.76.1. - 92.76.5. (f,f,m,m,f) Birsivpur, West Bengal; 92.77.1. - 92.77.4. (f,m,m,m) Barkalikapur, West Bengal; 92.78.1. - 92.78.6. (m,m,m,m,f,f) Ellora Cave, Maharashtra; 92.79.1. - 92.79.2. (m,f) Ajanta Cave, Maharashtra; 93.10.1. - 93.10.3. (m,f,f) Falta, West Bengal; 93.11.1. - 93.11.2. (f,m) Jog Falls, Karnataka; 93.13.2. - 93.13.3. (f,f) Madras, Tamil Nadu.

**Megaderma lyra sinensis:** 10493 (f), 10495 (f), 15525 - 15527 (m,m,f), 15529 - 15530 (m,m) Hang Neo (Anchor Cave), 4 km E of Duom, 110 m, Bac Thai.

The external measurements were taken in the field by vernier caliper, the cranial and dental ones were measured by digimatic caliper to 0.01 mm accuracy under a stereomicroscope. Abbreviations used in this paper along with explanations are as follows:

SKUTOTL total length of skull, from front of canines to occiput  
 CONDBAL condylar length of skull, from front of canines to back of condyles  
 SBASALL basilar length of skull from frontal edge of palate to the foremost part of ventral incision between condyles  
 ROSTCCW width of rostrum between outer margins of crown of canines  
 ROSTMMW width of rostrum between outer crowns of M3  
 PALEMAL length of anterior palatal emargination  
 PALEMAW width of anterior palatal emargination  
 LACRIMW width of rostrum between lacrymal knobs  
 INTEROW width of interorbital constriction  
 ZYGOMAW width of skull between zygomata  
 MASTOIW mastoid width of skull  
 PALBRIL length of palatal bridge  
 BULLATL greatest length of bulla  
 BRCASEW width of braincase, above the mastoid knob  
 BRCASEH height of braincase, from base to top with sagittal crest  
 UPPCM3L crown length of upper C-M3  
 UPPCP4L crown length of upper C-P4  
 UPMIM3L crown length of upper M1-M3  
 UPCANIL basal cross-sectional length of upper C  
 UPCANIW basal cross-sectional width of upper C  
 UPPEP4L crown length of upper P4  
 UPPEP4W crown width of upper P4  
 UPPEM1L crown length of upper M1  
 UPPEM1W crown width of upper M1  
 UPPEM2L crown length of upper M2  
 UPPEM2W crown width of upper M2  
 UPPEM3L crown length of upper M3  
 UPPEM3W crown width of upper M3  
 MANDIBL length of mandible, between hindermost portion of articular process and anteriormost edge of I1 alveolus  
 SYMPHIL length of mandibular symphysis  
 PROCCOH height of coronoid process, between its top and the sinus on ventral profile of mandibular body  
 PROCARW width of articular process  
 LOWCM3L crown length of lower C-M3  
 LOWCP4L crown length of lower C-P4  
 LOMIM3L crown length of lower M1-M3  
 LKANINL basal cross-sectional length of lower C  
 LKANINW basal cross-sectional width of lower C  
 LOWEP3L crown length of lower P3  
 LOWEP3W crown width of lower P3  
 LOWEP4L crown length of lower P4  
 LOWEP4W crown width of lower P4  
 LOWEM1L crown length of lower M1  
 LOM1TAW talonid width of lower M1  
 LOWEM2L crown length of lower M2  
 LOM2TAW talonid width of lower M2  
 LOWEM3L crown length of lower M3  
 LOM3TRW trigonid width of lower M3  
 FORARML length of forearm  
 TIBIALL length of tibia  
 EARCONL length of ear conch



Figs 5-8. Scatterplots. 5 = condylobasal length versus rostral width in *M. lyra lyra* (circles) and *M. lyra sinensis* (triangles), 6 = mandible length versus interorbital width in *M. lyra lyra* (circles) and *M. lyra sinensis* (triangles), 7 = lower M1-M3 length versus lower C-P4 length in *M. lyra lyra* (circles) and *M. lyra sinensis* (triangles), 8 = external measurements, forearm length versus tibia length in *M. lyra lyra* (circles) and *M. lyra sinensis* (triangles)

For the statistical analyses of available variables the SYSTAT statistical computer programme (WILKINSON 1990) was used. In the scatterplots the straight lines represent the respective linear regression for the samples, ellipses for the 50% probabilities for the bivariate clouds of points.

#### ANALYSES OF THE SCATTERPLOTS OF CRANIAL AND DENTAL CHARACTERS

The Vietnamese and Indian samples are distinct in scatterplots of values of basal length versus rostral width between canines, basal length v. braincase height, condylobasal length v.

rostral width between canines (see Fig. 5), mandible length v. interorbital width (see Fig. 6), mandible length v. palatal bridge length. In all these cases the two samples are more or less well separated and, of course, the Vietnamese specimens are clearly the greater.

In scatterplots analyzed and listed below, there is no overlap of values in condylobasal length (v. rostral width at the outer margins of molars, upper C-P4 length and upper C-M3 length), basal length (v. braincase width and lacrymal width). In these latter two (the South Indian No 93.11.1. and the North Indian No 93.10.2.) specimens approach the Vietnamese sample, and also in the scatterplots of interorbital width (v. upper M1-M3 length, bulla length and processus coronoideus height). The lower M1-M3 length is different without overlap in the two forms in many scatterdiagrams (e.g. versus lower C-P4 length (see Fig. 7), lower canine width, lower M1 length, lower M3 length, upper M3 width, etc.), however, two North Indian specimens (Nos 92.77.3. and 93.10.2.) seem to approach the values of the Vietnamese animals. Finally, according to some other scatterdiagrams analyzed, the palatal bridge length (v. upper M1-M3 length and processus coronoideus height), and braincase height (v. upper M1-M3 length) are different without overlap.

Other diagrams (numerous diagrams have been analyzed) clearly show that in the lower C-M3 length but the single (No 93.10.2.) specimen overlaps the values of the Vietnamese sample, otherwise, the two samples are divided by a narrow strip. The upper C-M3 length (v. lower M1 length and processus coronoideus height), again the North Indian No 93.10.2. and the South Indian No 93.11.1. overlap the Vietnamese sample. The mastoid width overlapped by only one Indian specimen.

There are more overlaps (three Indian animals) in the upper M1-M3 length and symphysis length. There are no practical differences in upper and lower C-P4 lengths (both show the slightest differences when we regard the dental-row measurements). In other scatterplots analyzed, in the values of single teeth (both length and width), because of the more pronounced overlaps, slight differences appear between the two forms.

The external measurements analyzed (forearm length, tibia length and ear length) show extensive overlaps between the Vietnamese and Indian samples (see Fig. 8), though, amongst the Vietnamese *Megaderma* relatively more specimens have longer tibia and shorter ear than those of the majority of the Indian animals.

## RESULTS

According to the analyses there is no sexual dimorphism in the present Indian and Vietnamese material. The external measurements also do not differ in the two forms. It is clearly seen that the skull-length values (condylobasal length and basal length) differ in the two samples. The interorbital constriction clearly differs in the two forms, that is narrower in the Indian animals and wider in the Vietnamese specimens. The lower M1-M3 length is apparently the only dental-row character which distinctly diverges in the specimens studied.

Based on the above-mentioned morphological characteristics, larger size in some principle skull measurements, the Vietnamese *Megaderma lyra* population clearly belongs to the *M. lyra sinensis* subspecies.

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Authors' address: GÁBOR CSORBA  
Dr. GYÖRGY TOPÁL  
Department of Zoology  
Hungarian Natural History Museum  
H-1088 Budapest, Baross u. 13  
Hungary

Table 1. Basic statistical data of *M. lyra sinensis* from Vietnam

	SKUTOTL	CONDBAL	SBASALL	ROSTCCW	ROSTMMW
N OF CASES	7	7	7	7	7
MINIMUM	28.570	26.040	20.990	6.090	9.670
MAXIMUM	30.080	27.050	21.560	6.350	10.520
MEAN	29.276	26.533	21.339	6.236	10.127
STD.DEV.	0.500	0.329	0.232	0.085	0.296
	PALEMAL	PALEMAW	LACRIMW	INTEROW	ZYGOMAW
	7	7	7	7	7
	2.350	2.710	7.600	5.340	16.470
	2.930	3.300	8.280	5.550	17.550
	2.679	2.986	7.850	5.443	17.080
	0.187	0.211	0.255	0.078	0.424
	MASTOIW	PALBRIL	BULLATL	BRCASEW	BRCASEH
	7	7	6	7	7
	13.060	8.270	4.430	12.340	10.550
	13.780	8.980	4.890	12.880	11.190
	13.414	8.749	4.702	12.587	10.879
	0.285	0.226	0.169	0.206	0.228
	UPPCM3L	UPPCP4L	UPM1M3L	UPCANIL	UPCANIW
	7	7	7	7	7
	11.500	5.110	6.480	2.700	1.590
	12.080	5.720	6.780	3.050	1.710
	11.814	5.397	6.626	2.857	1.644
	0.235	0.218	0.103	0.105	0.041
	UPPEP4L	UPPEP4W	UPPEM1L	UPPEM1W	UPPEM2L
	7	7	7	7	7
	2.480	2.030	2.630	3.070	2.410
	2.810	2.210	2.820	3.280	2.630
	2.610	2.129	2.730	3.149	2.539
	0.110	0.077	0.073	0.068	0.067
	UPPEM2W	UPPEM3L	UPPEM3W	MANDIBL	SYMPHIL
	7	7	7	7	7
	3.180	1.460	3.140	20.510	4.510
	3.460	1.610	3.440	21.420	4.960
	3.336	1.514	3.261	20.980	4.714
	0.088	0.062	0.107	0.285	0.154
	PROCCOH	PROCARW	LOWCM3L	LOWCP4L	LOM1M3L
	7	7	7	7	7
	5.120	2.910	12.550	5.020	7.640
	5.360	3.490	13.120	5.320	7.930
	5.259	3.089	12.849	5.160	7.747
	0.076	0.192	0.230	0.113	0.105
	LCANINL	LCANINW	LOWEP3L	LOWEP3W	LOWEP4L
	7	7	7	7	7
	2.060	1.800	1.730	1.360	1.860
	2.120	1.940	1.820	1.510	2.130
	2.081	1.871	1.764	1.453	1.974
	0.021	0.051	0.036	0.055	0.094
	LOWEP4W	LOWEM1L	LOMITAW	LOWEM2L	LOM2TAW
	7	7	7	7	7
	1.230	2.430	1.490	2.580	1.580
	1.320	2.600	1.740	2.690	1.800
	1.276	2.524	1.574	2.630	1.681
	0.043	0.067	0.085	0.038	0.073
	LOWEM3L	LOM3TRW	FORARML	TIBIALL	EARCONL
	7	7	7	7	7
	2.750	1.750	66.700	34.700	36.700
	2.940	1.870	68.100	37.900	38.400
	2.820	1.800	67.386	35.814	37.500
	0.069	0.046	0.467	1.065	0.781

Table 2. Basic statistical data of *M. lyra lyra* from India

	SKUTOTL	CONDBAL	SBASALL	ROSTCCW	ROSTMMW
N OF CASES	24	24	24	24	24
MINIMUM	26.050	23.480	18.860	5.240	9.520
MAXIMUM	28.140	25.350	20.650	5.900	10.240
MEAN	27.257	24.563	19.682	5.615	9.852
STD.DEV.	0.534	0.463	0.371	0.185	0.220
	PALEMAL	PALEMAW	LACRIMW	INTEROW	ZYGOMAW
	24	24	24	24	24
	2.260	2.500	7.460	4.480	15.750
	3.090	3.040	8.360	5.030	12.290
	2.645	2.738	7.912	4.770	16.422
	0.184	0.143	0.230	0.138	0.360
	MASTOIW	PALBRIL	BULLALL	BRCASEW	BRCASEH
	24	24	24	24	24
	12.030	7.310	4.510	11.800	9.480
	13.200	8.220	5.260	12.640	10.480
	12.554	7.654	4.840	12.231	10.114
	0.279	0.222	0.159	0.252	0.282
	UPPCM3L	UPPCP4L	UPM1M3L	UPCANIL	UPCANIW
	24	24	24	24	24
	10.760	4.780	6.110	2.620	1.420
	11.570	5.330	6.550	2.920	1.640
	11.180	5.067	6.311	2.780	1.549
	0.206	0.154	0.133	0.082	0.059
	UPPEP4L	UPPEP4W	UPPEM1L	UPPEM1W	UPPEM2L
	24	24	24	24	24
	2.290	1.650	2.440	2.800	2.310
	2.680	2.090	2.770	3.310	2.600
	2.487	1.868	2.597	3.101	2.465
	0.105	0.119	0.094	0.137	0.083
	UPPEM2W	UPPEM3L	UPPEM3W	MANDIBL	SYMPHIL
	24	24	24	24	24
	3.220	1.340	2.990	18.680	4.030
	3.620	1.690	3.450	20.030	4.560
	3.390	1.529	3.184	19.440	4.313
	0.111	0.084	0.137	0.346	0.130
	PROCCOH	PROCARW	LOWCM3L	LOWCP4L	LOM1M3L
	24	24	24	24	24
	4.720	2.670	11.670	4.830	6.960
	5.320	3.020	12.610	5.200	7.510
	4.966	2.812	12.140	5.013	7.286
	0.165	0.090	0.228	0.110	0.136
	LCANINL	LCANINW	LOWEP3L	LOWEP3W	LOWEP4L
	24	24	24	24	24
	1.950	1.640	1.570	1.320	1.750
	2.170	1.910	1.810	1.590	2.090
	2.059	1.760	1.655	1.459	1.935
	0.053	0.067	0.060	0.063	0.090
	LOWEP4W	LOWEM1L	LOMITAW	LOWEM2L	LOM2TAW
	24	24	24	24	24
	1.070	2.210	1.440	2.320	1.420
	1.250	2.520	1.730	2.650	1.700
	1.178	2.353	1.540	2.517	1.597
	0.048	0.064	0.083	0.084	0.080
	LOWEM3L	LOM3TRW	FORARML	TIBIALL	EARCONL
	24	24	22	22	22
	2.580	1.650	63.600	33.400	36.800
	2.900	1.850	69.600	37.200	40.000
	2.747	1.741	66.755	34.714	38.127
	0.070	0.057	1.498	0.857	0.837