159.2) % disc width; longer predorsal, its length 50.7 (47.1-58.3) vs 49.5 (41.5-53.4); head height 62.6 (55.7-75.8) vs 57.4 (53.9-63.5); shorter snout, its length 30.1 (28.6-32.9) vs 47.2 (44.2-50.8); gill rakers (10 vs 7-9); distance between vent and anal fin origins 38.5 (34.0-43.4) vs 34.9 (31.5-41.5) % distance between pelvic and anal fin origin.

In *Garra*, shifting of vent forward is considered to be an adaptation to torrential water current and is of systematic significance (Menon, 1964). The present species has more forwardly placed vent than in *G. lissorhynchus* and *G. rupecula;* distance between vent and anal fin origins in distance between ventral and anal fin origins 38.5 (34.0-43.4) vs 34.7 (31.9-39.2) and 34.9 (31.5-41.5). The mental disc is also better developed than the two species under comparison, disc width in % of Head width 88.3 (83.5-100) vs 85.9 (80.3-93.6) and 84.9 (76.3-94.1). Thus, the fish is probably more adapted towards torrential habit.

Differences have been found between the data of Menon (1964) and present examination of specimens of *G. lissorhynchus* and *G. rupecula* collected from Manipur. These variations are mostly on body proportions. In hill streams, fishes face various hardships, i.e., food availability and interspecies competitions. There may be variations in the body proportions depending upon the ecological and physiological conditions of the fish. However, not much variation has been seen in meristic counts and position of vent etc. The observations may be regarded as intraspecific variations.

References

Hora, S.L. (1921). India cyprinoid fishes belonging to the genus *Garra* with notes on related species from other countries. *Records of the Indian Museum* 22: 633-689.

Menon, A.G.K. (1964). Monograph of the cyprinid fishes of the genus *Garra* Hamilton. *Memoirs of the Indian Museum* 14(4): 173-260.

Vishwanath, W. (1993). On a collection of fishes of the genus *Garra* Hamilton from Manipur, India with description of a new species. *Journal of Freshwater Biol*ogy 5(1): 59-68.

Vishwanath, W. and Ch. Sarojnalini (1988). A new cyprinid fish, *Garra manipurensis*, from manipur, India. *Japanese Journal of Ichthyol*ogy 35(2): 124-126.

VIshwanath, W. and L. Kosygin (1998). A new cyprinid fish *Garra compressus* from Manipur, India. *Journal of Freshwater Biology* 10(1-2): 45-48.

Vishwanath, W. and L. Kosygin (2000). *Garra elongata*, anew species of the family garrinae from Manipur, India (cyprinid, cypriniformes). *Journal of the Bombay Natural History Soc*iety 97(3): 408-414.

Acknowledgements

We are thankful to NBFGR (National Bureau of Fish Genetic Resources), Lucknow, for financial assistance through ICAR-NATP.

NOTE **ZOOS' PRINT JOURNAL 20(4): 1834-1835**

EVIDENCE OF FISH IN THE DIET OF GREATER FALSE VAMPIRE BAT *MEGADERMA LYRA* IN SRI LANKA

M.R.M.P.N. Goonatilake, W.B. Yapa* and W.D. Ratnasooriya

Department of Zoology, University of Colombo, Colombo 03, Sri Lanka.
Email: * (corresponding author) wipula@zoology.cmb.ac.lk

Being the second largest order of mammals, bats show an array of diverse feeding habits. Although frugivory and insectivory are the commonest forms of diet in majority of the species, some bats are highly specialized in diet *viz.* sanguinivory (feeding on blood) and picivory (feeding on fish). Fish eating bats are included in the family Noctilionidae (French, 1997), however members of three other families, *viz.* Vespertilionidae, Megadermatidae and Phlostomidae are also known to feed on fish (Grzimek, 1990). Megadermatids are referred to as typically carnivorous with proven records of fish eating (Advani, 1981), who found upon examination of stomach contents, fish to constitute10% of the diet of *M. lyra* in India. Bates and Harrison (1997) stated that since *M. lyra* is a semi carnivorous species, which feed on many species of invertebrates as well as vertebrates, this is undoubtedly a high proportion for a particular prey category. This could be due to either high availability of fish in the study area, or scarcity of other prey items, or that fish constituted a consistent food category in the diet of *M. lyra*.

We wanted to examine whether *M. lyra* regularly feeds on fish and if so estimate the proportion of fish in its diet. We studied the diet of *M. lyra* by examining fecal droppings collected from two geographically isolated day roost colonies in Sri Lanka. Both these colonies were single species assemblages, only with the *M. lyra.*

Lawalhena day roost, Baddegama, Southern Province ($6^0$16'N & $80^0$20'E) -- located in the wet zone this roost site was in an old bungalow and consisted of 80-100 individuals. This is one of the largest colonies recorded for this species in Sri Lanka (Yapa *et al.* 2000). This bungalow is surrounded by a large cultivation of tea, rubber and paddy. Several bats in this colony brought the captured prey to the bungalow and used specific locations as their feeding perches. The faecal pellets were collected randomly in different areas of the bungalow between January 2001 and April 2002. During the entire period of study the house was not occupied (except for brief periods by the researchers).

Lunuwila day roost, North Western Province ($7^0$21'N & $79^0$53'E) -- located in the intermediate zone this colony was also located in a bungalow and consisted on average only 20 individuals. The bungalow is surrounded by coconut cultivations, home

Manuscript 1259; Received 15 September 2004; Finally accepted 2 February 2005; Date of publication 21 March 2005

gardens and paddy fields. Faecal pellets were collected from this bungalow between May 2002 and August 2003.

Fecal analysis: Faecal pellets were collected twice a month and each time 20 pellets were randomly collected from the floor of the roost (40 pellets per month). The droppings were dried in shade in the field and stored in airtight containers with screw caps (Gallenkamp, hotbox,UK) and oven dried at 50^0C for analysis. Prior to examination of the pellets, they were softened for at least 24 hours in a petri dish, placed between two layers of cotton wool saturated with 70% alcohol. After softening, each pellet was transferred to a clean petri dish and 20ml of water was added. Thereafter, the pellets were teased apart carefully with a fine pair of forceps under a dissecting microscope (Nikon, SMZ-2B, Tokyo, Japan). All identifiable prey items such as scales, feathers, hairs, and bones were removed and selected items were then mounted in DPX under cover slip on a microscope slide. The mounted items were measured with a graticular lens on microscope and photographed (Nikon, Microflex AFX-DX, Tokyo, Japan).

Results: A total of 1040 pellets, 520 from each site were analyzed. In Lawalhena roost site fish scales were recorded only in two pellets (0.003%) while in Lunuwila only one pellet included fish scales. It was also found that the pellets containing fish scales never contained feathers or hairs. The fish scales found in the pellet were cycloid type. Thirteen cycloid scales with a mean size of 2.2±0.3 (mm), were found in the two Lawalhena droppings, while eight scales with a mean of 2.1±0.3 (mm) were found in Lunuwila dropping. Ctenoid scales were not found in the pellets.

Discussion: Cycloid and ctenoid scales are dermal scales present among bony fishes, which live in marine and freshwater (Kent 1987). These two types are structurally distinct with cycloid scales being round, thick in the centre and thin towards the margins while ctenoid scales are very similar to cycloid, but differ in having small teeth or cteni on their free posterior edge (Jordan & Verma, 1993). In Sri Lanka, 114 species of inland fish belonging to 35 families have been recorded among which some fish families have only one type of scales whilst some contain both cycloid and ctenoid, while the rest do not have scales (Pethiyagoda, 1991).

During our study only cycloid scales were found in the droppings and since both the roost sites in our study are located >5km away from sea, the scales likely belonged to an inland bony fish. Normally the home range of *M. lyra* is around 1-2km away from the day roost (Yapa, *pers. observation*). The scales recorded in this study were not traced to the species level. However, in view of the foraging behavior of *M. lyra* the scales are likely to be from a surface dwelling fish species. And it appears that the bats caught fish in the paddy fields surrounding the roost sites, where they were observed hunting. By considering the habitat as well as the size of the scales (diameter 2.12mm), the recorded scales were probably from a species belonging to one of the following families: Aplochelidae (*Aplochielus* spp.), Oryzidae (*Oryzius* sp.) or subfamily Rasborine (*Rasbora* spp., *Danio* sp. *Esomus* sp. *Chela* sp. or *Horadandia* sp.). However, further observations are necessary to identify the fish species that are eaten by *M. lyra*. Advani (1981) claimed *M. lyra* to feed on fish, although identification had not preceeded beyond the class level. In Sri Lanka, Nandasena *et al.* (2000, 2002) also reported fish in the diet of *M. lyra* along with mammals, birds and invertebrates from Baddegama and Lunuwila.

In view of *M. lyra*'s home ranges and foraging behaviour, it appears that they feed opportunistically on fish, albeit in small numbers.

References

Advani, R. (1981). Seasonal fluctuations in the feeding ecology of the Indian false vampire *M.lyra*. *Zsaugetierkd* 46:90-93.

Bates, P.J.J. and D.L. Harrison (1997). *Bats of the Indian subcontinent*. Harrison Zoological Museum, Kent, 258pp.

French, B. (1997). False Vampires and other carnivores. *Bats* 15(2): 11-14.

Grzimek, B. (1990). *Grzimek's Encyclopedia of Mammals*, Vol 1. McGraw-Hill, 648pp.

Kent, G.C. (1987). *Comparative Anatomy of the Vertebrates*. Wm.c. Brown publishers, 681pp.

Jordan, E.L. and P.S. Verma (1993). *Chordate Zoology and Elements of Animal Physiology*. S.Chand & Company Ltd., New Delhi, 1151pp.

Nandasena, M.R.M.P., W.B. Yapa, S. Schmidt and W.D. Ratnasooriya (2000). Diet composition of Greater False Vampire Bat, *Megaderma lyra* at Baddegama Sri Lanka. *Proceedings of the 20th Annual session of Biology*, Sri Lanka, 38pp.

Nandasena M.R.M.P., W.B. Yapa, S. Schmidt and W.D. Ratnasooriya (2002). Diet of the Greater False Vampire bat, *M. lyra* Geoffrey, 1810, (Chiroptera; Megadermatidae) in Sri Lanka determined by faecal analysis. *Proceedings of IOB 22nd Annual Sessions*, 21pp.

Pethiyagoda, R. (1991). *Freshwater fishes of Sri Lanka*. Wildlife Heritage Trust of Sri Lanka, 361pp.

Yapa, W.B., P.V. Randeniya, and W.D. Ratnasooriya (2000). *Ecology and Biology of Sri Lankan Bats*. Final Report of NSF Reseach Grant No. RG/95/B/5. 167pp.

Acknowledgement

This research was funded by NSF Research Grant No. RG/2001/B/7.