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**BRIEF COMMUNICATION PRELIMINARY INVESTIGATION ON THE  
RELATIONSHIP OF THE NOMINATE *C. BRACHYOTIS* WITH THE SMALL-SIZED  
AND LARGE-SIZED *C. BRACHYOTIS* USING CLUSTERING ANALYSIS****M.T. Abdullah and V.K. Jayaraj****ABSTRACT**

Previous studies have shown that ecological habitats are the driving force that lead to genetic and morphological divergence in *Cynopterus brachyotis* populations in Malaysia. In this study, we have shown that the type specimen is clustered with a large-sized *C. brachyotis* which is normally found in open habitats. Further clustering analysis is necessary to include the five species of *Cynopterus* in order to verify if there is a new species within the *C. brachyotis* populations.

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Previous studies have shown that ecological habitats are the driving force that lead to genetic and morphological divergence in *Cynopterus brachyotis* populations in Malaysia. In this study, we have shown that the type specimen is clustered with a large-sized *C. brachyotis* which is normally found in open habitats. Further clustering analysis is necessary to include the five species of *Cynopterus* in order to verify if there is a new species within the *C. brachyotis* populations.

INTRODUCTION

Dog-faced fruit bats in the genus *Cynopterus* are widely distributed in the Indomalayan region (Corbet and Hill, 1992). These bats are easily recognisable by their short stout muzzle, brown fur with a yellowish or reddish tinge and contrasting whitish wing bones and rim to the ears (Payne *et al.*, 1985). The genus *Cynopterus* is limited to the five species that are generally recognised and is represented in the Indo-Malayan region by *C. brachyotis*, *C. horsfieldi*, *C. sphinx*, *C. titthaechilus*, and *C. nusatenggara* (Corbet and Hill, 1992; Wilson and Reeder, 2005).

The nominate *C. brachyotis* type specimen was collected from Dewei River in Borneo and described by Müller in 1938. It is a small bat (weight 21 to 32g) that occurs in most habitats (but most frequently in disturbed forest) including lower montane forest, dipterocarp forest, gardens, mangrove and strand vegetation (Payne *et al.*, 1985). It prefers to roost in small groups in trees, under leaves, and in caves. The species feeds on the fruits of 54 plant species, the leaves of 14 species and the flower parts of four species (Tan *et al.*, 1998). As the understorey fruits are scarce, the species feed in the subcanopy or canopy (Francis 1994; Mohd. Azlan *et al.*, 2000). The role of *C. brachyotis* as a seed disperser in secondary habitats have been studied by Phua and Corlett (1989), Fujita and Tuttle (1991), Tan *et al.* (1998) and Hodgkison *et al.* (2003). *C. brachyotis* is widely distributed in Sri Lanka, southwest India, northeast India, Andaman and Nicobar islands, southern China, southern Burma, Indochina, Thailand, Malay Peninsula, Sumatra, Java, Bali, Sulawesi, the Philippines and also on Lesser Sunda islands (Fig. 1); from sea level up to 1600 m in Borneo (Lekagul and McNeely, 1977; Medway, 1978; Bergmans and Rozendall, 1988; Corbet and Hill, 1992; and Peterson and Heaney, 1993). The variation in morphological measurements of *Cynopterus* species from several geographical areas is shown in Table 1.

The taxonomic status of *C. brachyotis* is still uncertain given the many variations that exist within the species, which involves variation in size and colour (Corbet and Hill, 1992). The earliest classification by Andersen (1912) described the phylogeny of the Cynopterine section is represented by 11 genera, five of which occur in Malaysia, namely, *Chironax*, *Balionycteris*, *Penthetor*, *Dyacopterus* and *Cynopterus*. Andersen (1912) also proposed 30 names for *Cynopterus* species but only 16 are taxonomically valid forms (Kitchener and Maharadatunkamsi, 1991). However, Corbet and Hill (1992) listed 19 synonyms of *C. brachyotis* and of which nine are recognised subspecies by Mickleburgh *et al.* (1992) namely; *C. b. altitudinis*, *C. b. brachyotis*, *C. b. brachysoma*, *C. b. ceylonensis*, *C. b. concolor*, *C. b. hoffeti*, *C. b. insularum*, *C. b. javanicus* and *C. b. minutus*. Most of these lack complete data on status and distribution, but are known to show morphological differences across their geographic



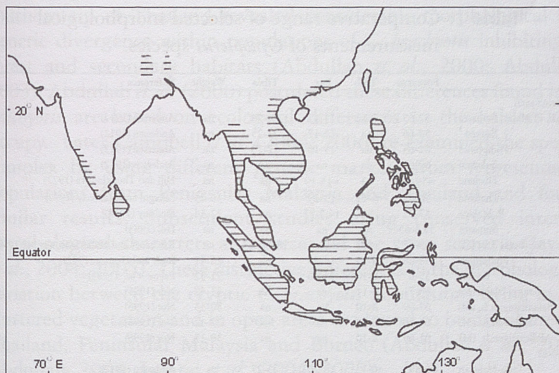


Fig. 1: Distribution of *C. brachyotis* in Indo-Malayan region (after Corbet and Hill, 1992). Mickleburgh *et al.* (1992) listed the distribution for the subspecies as the following; *C. b. altitudinis* in highlands of Peninsular Malaysia, *C. b. brachyotis* in Borneo, the Philippines, Sulawesi, Sumatra and Thailand; *C. b. brachysoma* on Andaman Islands; *C. b. ceylonensis* in Sri Lanka; *C. b. concolor* in Enggano Island; *C. b. hoffeti* in Vietnam; *C. b. insularum* on Kangean Island and Pulau Laut Kecil; *C. b. javanicus* in Bali, Java, Madura and Penida; and *C. b. minutus* on Nias Island.

distribution (Mickleburgh *et al.*, 1992). The nominate subspecies *C. b. brachyotis* is distributed from Myanmar, Thailand, Peninsular Malaysia, Borneo, Philippines and Indonesia (Mickleburgh *et al.*, 1992).

Records of morphological variation in *C. brachyotis* were documented by previous authors (Hill and Thonglongya, 1972; Lekagul and McNeely, 1977; Medway, 1978; Payne *et al.*, 1985; Ingle and Heaney, 1992; Nor, 1996). However, the forearm length differences of this species found in the primary forest and secondary habitats was first tested to be statistically significant by Francis (1990) in his work at Sepilok, Sabah in Malaysian Borneo. The earliest significant molecular and external morphometrics data on the existence of these two forms were conducted by Abdullah *et al.* (2000) and Abdullah (2003). Representatives of *C. brachyotis* populations sampled across Borneo, Peninsular Malaysia to the