

## THE JAVAN PIPISTRELLE, *PIPISTRELLUS JAVANICUS* (MAMMALIA: CHIROPTERA: VESPERTILIONIDAE) IN SINGAPORE

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### INTRODUCTION

On the evening of 25 Jun.2009, a small brown bat was discovered clinging to the concrete wall just outside a window on the fourth storey of an office building along Ayer Rajah Crescent, in the Ayer Rajah Industrial Park, Singapore. Its small eyes; short, broad muzzle without noseleaves, tail entirely enclosed within the interfemoral membrane, and presence of a tragus in its ear were characteristics of an insectivorous bat (suborder Microchiroptera) in the family Vespertilionidae.

After closer examination, we identified the bat as the Javan pipistrelle, *Pipistrellus javanicus* (Gray), a species that has not been recorded in Singapore since 1878.

### SPECIMEN DETAILS

The specimen, a mature male (Figs. 1–3), was deposited in the Zoological Reference Collection (ZRC), Raffles Museum of Biodiversity Research (RMBR), Department of Biological Sciences, National University of Singapore, under the catalogue number ZRC 4.8633.



Fig. 1. *Pipistrellus javanicus* (ZRC 4.8633), in life. Photograph by: Chan Kwok Wai.



Fig. 2. *Pipistrellus javanicus* (ZRC 4.8633), view of head. Photograph by: Chan Kwok Wai.



Fig. 3. Lateral view of the penis of *Pipistrellus javanicus* (ZRC 4.8633), the proximal half of which is supported by a baculum (penis bone). Photograph by: Tan Heok Hui.

Members of the genus *Pipistrellus* are difficult to identify in the field, and even in the hand without a detailed examination of their morphological and dental features. The following characteristics of the present specimen fit the diagnosis of *Pipistrellus javanicus* by Medway (1983: 39), Payne et al. (1985: 205), Kingston et al. (2006: 40–44, 124), and Francis (2008: 237).

External characters were as follows: wrists and feet without thickened pads; metacarpal of fifth finger as long as metacarpal of fourth finger; ear short and rounded with a distinct fold at the hind edge; tragus long, relatively straight and rounded at the tip (Fig. 2); fur of upper-parts dark brown with much darker bases, fur of under-parts paler and also with darker bases; wing membranes and ears blackish-brown.

Genital characters (male) were as follows: baculum (penis bone) present in the proximal half of the relatively long penis (10.8 mm long when erected), a character consistent among members of the genus *Pipistrellus* (Francis, 2008: 236). In the relaxed state, half of the organ not supported by the baculum folded downwards (Fig. 3).

Dental characters were as follows: two pairs of upper incisors; narrow diastema present between outer upper incisor and upper canine tooth; two pairs of upper premolars, first premolar small and displaced inwards (as per illustration in Payne et al., 1985: 200, Fig. 23f; Corbet & Hill, 1992: 119, Fig. 16e).

Measurements taken of the specimen were as follows: head-body length 44.7 mm, forearm length 32.6 mm, tail length 28.9 mm, ear length 8.3 mm, tibia length 12.3 mm, penis length (erected) 10.8 mm; dry weight 5.6 grams.

Direct comparison of ZRC 4.8633 was also made with specimens identified as *Pipistrellus javanicus javanicus* in the ZRC (see **COMPARATIVE MATERIAL**). They were shown to be conspecific.

## DISCUSSION

The Javan pipistrelle was first reported from Singapore as “*Vesperugo abramus*” (non-Temminck) by Dobson (1878: 228) on the basis of an immature male specimen obtained by a “Dr. Meyer” in the collection of the British Museum (presently The Natural History Museum) in London, U.K. Subsequent citations of this species in Singapore all refer to this original record. These include Flower (1900: 345 as *Vesperugo abramus*), Chasen (1925: 85 as *Pipistrellus abramus*), Harrison (1974: 129 as *Pipistrellus javanicus*), Medway (1978: 39 as *Pipistrellus javanicus bancanus*) and Yang et al. (1990: 7, 20 as *Pipistrellus javanicus bancanus*). Baker & Lim (2008: 170) designated this species an indeterminate status in Singapore. Pottie et al., (2005: 246) considered this species “locally extinct”. *Pipistrellus abramus* (Temminck), the Japanese pipistrelle, is a valid and distinct species that occurs in north-eastern Asia as far south as Vietnam and Myanmar (see Francis, 2008: 238).

The present specimen represents a rediscovery of *Pipistrellus javanicus* in Singapore after 131 years. In this respect, it mirrors the local rediscovery of the bicoloured roundleaf bat, *Hipposideros bicolor*, at the Bukit Timah Nature Reserve (Leong & Lim, 2009: 84).

The other species of *Pipistrellus* recorded from Singapore is *Pipistrellus stenopterus* (Dobson), the narrow-winged pipistrelle. This species is distinctly larger with forearm length between 39 and 42 mm, has reddish-brown fur, and narrower wings from the considerably shorter fifth finger (metacarpal of fifth finger much shorter than metacarpal of fourth finger, and entire fifth finger only slightly longer than metacarpal of fourth finger). Like the Javan pipistrelle, the narrow-winged pipistrelle has not been seen since 1986, although it was recorded roosting in houses (Pottie, 1996: 102; Yang et al., 1990: 7).

According to Corbet & Hill (1992: 136, Map 63 on p. 135), *Pipistrellus javanicus* has a wide distribution. It ranges from eastern Afghanistan, northern Pakistan, north and central India, southeastern Tibet, through Myanmar, the Andaman and Nicobar Islands, Thailand, Vietnam, east to the Philippines, south through the Malay Peninsula, Sumatra, Borneo, Java, Sulawesi, and the Lesser Sunda Islands, and possibly to Aru Island off New Guinea. The subspecies occurring on Borneo is *Pipistrellus javanicus javanicus* (Payne et al., 1985: 205), and Medway (1983: 39) stated that Peninsular Malaysia and Singapore is inhabited by *Pipistrellus javanicus bancanus* Sody. However, *Pipistrellus javanicus bancanus* is presently not recognized as one of the five valid subspecies of *Pipistrellus javanicus*, and considered a synonym of *Pipistrellus javanicus javanicus* (see Simmons, 2005: 475).

The Javan pipistrelle flies and hawks high up over open spaces, and has been recorded frequenting a wide range of habitats, from lowland and mangrove forests to primary hill forest up to 2,000 m elevation, to heavily disturbed environments such as rubber plantations and towns. It has been found roosting in tree-ferns, fallen logs, caves, and buildings in urban areas (Medway, 1978: 39; Kingston et al., 2006: 124; Francis, 2008: 237). The retrieval of the present specimen from a building in an industrial park is therefore, not unusual. The individual was probably disoriented, as it was found in the open, and there was no external injury. Javan pipistrelle roosts have never been

reported from Singapore. In spite of this, the species may be more locally common than it appears. Teo & Rajathurai (1997: 367, 413 indicating “?Pipistrellus sp.”) recorded 29 observations of an unidentified vespertilionid, suspected to be the Javan pipistrelle, foraging over open areas in the Central Nature Reserves at Bukit Timah, Mandai, Upper Seletar and MacRitchie. It is extremely difficult to collect microchiropteran bats flying over open spaces. Unless their roosts are known, or injured or disoriented individuals are obtained, it is not possible to visually identify all flying bats. It is likely that the Javan pipistrelles have been flying over Singapore unrecognised all this while.

It is possible to identify flying bats by analysing their echolocation calls through a bat detector. In fact, Pottie (1996: 100) suspected that *Pipistrellus javanicus* could be the source of the echolocation call of an unidentified vespertilionid bat that she had occasionally recorded in Singapore. However, as she did not manage to collect any Javan pipistrelles to make recordings with, she was unable to identify the call. A description of the call of *Pipistrellus javanicus* from Peninsular Malaysia is found in Kingston et al. (2006: 124).

## CONCLUSION

The present specimen obtained at the Ayer Rajah Industrial Park shows that *Pipistrellus javanicus* is still extant in Singapore after an absence of records for over 131 years. Owing to the difficulty of identifying the smaller aerial hawking microchiropteran bats, it would not be possible to assess the abundance of this species here unless a roost is found, or flying individuals are identified with the aid of a bat detector and reliable recordings from an accurately identified *Pipistrellus javanicus*.

## COMPARATIVE MATERIAL

*Pipistrellus javanicus javanicus*. – 1 male (ZRC 4.5558), Peninsular Malaysia: Butterworth, 9 Jun. 1965, identified by Darrell Kitchener in 1985; 1 female (ZRC 4.5642), Peninsular Malaysia: Pulau Ketam in Johore Straits, 5 Jul. 1916, identified by Karl Koopman in 1989; 10 specimens (ZRC 4.5632–5641), West Java: Cibodas, 1916, identified by Karl Koopman in 1989; 4 specimens (ZRC 4.5598–5601), West Java: Bogor, 12 Sep. 1927, identified by Karl Koopman in 1989; 26 specimens (ZRC 4.5602–5625, 5629–5630), West Java: Garoet, Nov. 1927–May 1928, identified by Karl Koopman in 1989.

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## LITERATURE CITED

- Baker, N. & K. K. P. Lim, 2008. *Wild Animals of Singapore. A Photographic Guide to Mammals, Reptiles, Amphibians and Freshwater Fishes*. Draco Publishing and Distribution Pte. Ltd. and Nature Society (Singapore), Singapore. 180 pp.
- Chasen, F. N., 1925. A preliminary account of the mammals of Singapore Island (concluded). *The Singapore Naturalist*, **5**: 74–89.
- Corbet, G. B. & J. E. Hill, 1992. *The Mammals of the Indomalayan Region: A Systematic Review*. Natural History Museum Publications & Oxford University Press, Oxford. 488 pp.
- Dobson, G. E., 1878. *Catalogue of the Chiroptera in the Collection of the British Museum*. Taylor & Francis, London. xlii + 567 pp., 30 pls.
- Flower, S. S., 1900. On the Mammalia of Siam and the Malay Peninsula. *Proceedings of the Zoological Society of London*, **1900**: 306–379.
- Francis, C. M., 2008. *A Field Guide to the Mammals of South-east Asia*. New Holland Publishers (UK) Ltd, London. 392 pp.
- Harrison, J., 1974. *An Introduction to Mammals of Singapore and Malaya*. 2<sup>nd</sup> impression. Singapore Branch, Malayan Nature Society, Singapore. 340 pp.
- Kingston, T., B. L. Lim & Zubaid Akbar, 2006. *Bats of Krau Wildlife Reserve*. Universiti Kebangsaan Malaysia, Bangi, Malaysia. 145 pp.
- Leong T. M. & K. K. P. Lim, 2009. Noteworthy microchiropteran records from the Bukit Timah and Central Catchment Nature Reserves, Singapore. *Nature in Singapore*, **2**: 83–90.
- Medway, Lord, 1983. *The Wild Mammals of Malaya (Peninsular Malaysia) and Singapore*. 2<sup>nd</sup> Edition. Reprinted with corrections. Oxford University Press, Kuala Lumpur. xxiii + 131 pp.

- Payne, J., C. M. Francis & K. Phillipps, 1985. *A Field Guide to the Mammals of Borneo*. The Sabah Society with World Wildlife Fund Malaysia, Kota Kinabalu, Sabah. 332 pp.
- Pottie, S. A., 1996. *Studies of the Ecology and Behaviour of Insectivorous Bat Species in Singapore*. Unpublished MSc. thesis, Department of Zoology, National University of Singapore, Singapore. vi + 126 pp.
- Pottie, S. A., D. W. J. Lane, T. Kingston & B. P. Y.-H. Lee, 2005. The microchiropteran bat fauna of Singapore. *Acta Chiropterologica*, **7**(2): 237–247.
- Simmons, N. B., 2005. Order Chiroptera. In: Wilson, D. E. & D. M. Reeder (eds.). *Mammal Species of the World. A Taxonomic and Geographic Reference. 3<sup>rd</sup> Edition*. The Johns Hopkins University Press, Baltimore, Maryland. Pp. 312–529.
- Teo, R. C. H. & S. Rajathurai, 1997. Mammals, reptiles and amphibians in the nature reserves of Singapore—diversity, abundance and distribution. *The Gardens' Bulletin, Singapore*, **49**(2): 353–425.
- Yang C. M., K. Yong & K. K. P. Lim, 1990. Wild mammals of Singapore. In: Chou L. M. & P. K. L. Ng (eds.), *Essays in Zoology: Papers Commemorating the 40<sup>th</sup> Anniversary of the Department of Zoology, National University of Singapore*. Department of Zoology, National University of Singapore, Singapore. Pp. 1–23.