

## The Amphibian Checklist of Bukit Larut, Perak, Malaysia

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### ABSTRACT

One of the biodiversity hotspot areas in Peninsular Malaysia is Bukit Larut, which is located within the Banjaran Bintang (Range) near Taiping, Perak. The amphibian fauna in this area was investigated from February 2009 to June 2011 with a total of 10 observation nights. A total of 43 species of amphibians from 24 genera and seven families were recorded in this area including two species of caecilians, *Caudacaecilia larutensis* and *Ichthyophis* sp. This number constitutes 40% out of 107 amphibian species that were found throughout Peninsular Malaysia. Most of the species are from the family of Ranidae (23.3%), followed by Dicroglossidae (18.6%), Microhylidae (16.3%), Rhacophoridae (16.3%), Megophryidae (11.6%), Bufonidae (9.3%) and Ichthyophiidae (4.7%). From this study, the number of amphibian species at Bukit Larut, Perak has increased from 36 to 56 species.

*Keywords:* Banjaran Bintang, frog species, river, biodiversity, lower part, upper part

### INTRODUCTION

Bukit Larut (Maxwell Hill) is the smallest and oldest hill station in Peninsular Malaysia, opened by the British in 1884 as a rest and recreation centre (Malaysia Vacation Guide, 2013). From the foothill, Bukit Larut peak can be reached by walking

or using a four-wheeled vehicle provided by the Taiping Municipal Council. The 13 km road to the top of Bukit Larut is very steep and narrow. Along the way, there are many forest streams and temporary puddles that provide suitable habitats for amphibians and reptiles.

Survey on amphibians and reptiles at Bukit Larut was started a century ago. Boulenger (1900) discovered 11 new species, namely, *Leptotalax heteropus*, *Amolops larutensis*, *Philautus vermiculatus*, *Microhyla butleri*, *M. annectens*,

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*Hemiphyllodactylus harterti*, *Draco fimbriatus*, *D. formosus*, *Sphenomorphus praesignus*, *Lygosoma stellatum* and *Lycodon butleri*. More recently, many new species, especially lizards have been discovered from Bukit Larut (Hallermann & McGuire, 2001; Grismer *et al.*, 2008; Grismer *et al.*, 2009; Wood *et al.*, 2009). The most recent faunal list by Grismer *et al.* (2010) reported 36 species of amphibians (34 frogs and two caecilians), and yet some areas remain unexplored.

Many potential areas around Bukit Larut should intensively and systematically be survey to discover more species. Hence, the main objective of this study were to observe and record as many as possible the amphibian species inhabiting Bukit Larut.

## MATERIALS AND METHODS

Bukit Larut (4° 86'N, /100° 79'E, 1036 m asl) (see Fig.1) is located within the Banjaran Bintang Range. The foothill of Bukit Larut is 4 and 72 km from Taiping and Ipoh, respectively. Several important rivers such as Sungai (Sg.) Kurau, Sg. Bubu, Sg. Batu Tugoh, Sg. Air Terjun and Sg. Ranting arise from Banjaran Bintang around the Bukit Larut areas. Another prominent peak, Gunung Hijau (1448 m asl) is located in the northeast of Bukit Larut. This peak can be reached by following the Gunung Hijau trail that begin near the Telecom communications tower. The vegetations of Bukit Larut range, from lowland dipterocarp forest at the foothill to montane forest at the top.

Study on amphibian fauna of Bukit Larut was conducted in a three-year period

starting from February 2009 until Jun 2011 with a total 10 nights of observation (10x consecutive visits, 2 days per visit). Sampling and observation were done at the lower (lowland dipterocarp forests below 300 m asl.) and upper (lower montane forests between 1000 and 1300 m asl.) parts of Bukit Larut. At the lower part, observations were done around the forest trails, forest streams, rivers, puddles and km 1-5 to the top of Bukit Larut. The three main rivers at the foothill (namely, Sg. Batu Tugoh, Sg. Air Terjun and Sg. Ranting) were intensively surveyed for amphibians. Sampling was done along the river transect (500 m) and within areas 3-4 m away from the rivers. At the upper part of Bukit Larut, sampling was done along the roadside (km 9-13), i.e. at a forest stream at km 9, puddles and rainpools at km 11-12 and a small forest stream at km 12.

All the captured specimens were fixed with 10% formalin and stored in 70% ethanol and later deposited at the School of Pharmaceutical Sciences for references. Each collected specimens were photographed before preservation. Berry (1975) and Norhayati *et al.* (2011) were used as reference to identify the amphibian species.

## RESULTS

Forty-three species of amphibians (41 frogs and two caecilians) from 24 genera and seven families were confirmed to inhabit Bukit Larut areas. These data constitute 40% of 107 amphibian species found throughout Peninsular Malaysia. Out of

this number, 24 species were found at the lower part (< 300 m asl), 11 species at the upper part (> 1000 m asl) and eight species at both lower and upper parts. The checklist and the number of amphibians observed are presented in Table 1. Ranidae constituted 23.3% of the amphibian species, followed by Dicroglossidae (18.6%), Rhacophoridae (16.3%), Microhylidae (16.3%), Megophryidae (11.6%), Bufonidae (9.3%) and Ichthyophiidae (4.7%). A comparison of the species obtained between Grismer *et al.* (2010) and this study is shown in Table 2.

## Species Account

### Bufonidae

*Ansonia malayana* (Inger, 1960) (Fig.2)

Two adult males (11USM-BL-AM01, 02) were caught in February 2011 while calling from a big boulder (app. 1 m above ground) near a small stream (3-4 m width) at km 9 from the foothill.

*Duttaphrynus melanostictus* (Schneider, 1799)

Four individuals (three adults and one juvenile) were observed near a fish pond and a ditch at the foothill of Bukit Larut. One gravid female (09USM-BL-DM01) was collected in February 2009 as a voucher.

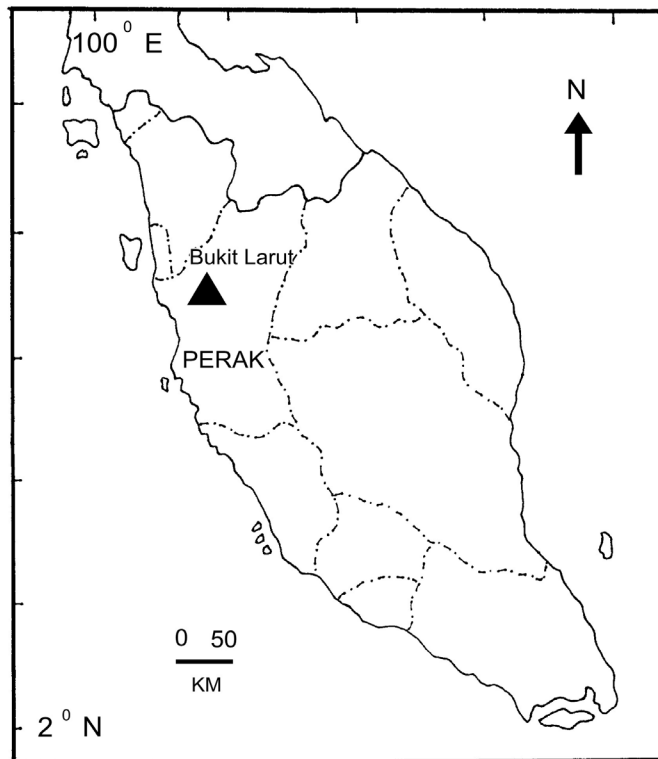


Fig.1: Location of Bukit Larut, Perak

TABLE 1  
Amphibian checklist of Bukit Larut, Taiping, Perak

Taxa	Number of individual										
	2009			2010			2011				Total
	(lower part, < 300m asl)			(lower part, < 300m asl)			(upper part, > 1000m asl)				
	Feb	Jun	Oct	Jan	May	Sep	Jan	Feb	Apr	Jun	
<b>Bufonidae (4)</b>											
<i>Ansonia malayana</i> +	0	0	0	0	0	0	1	2	0	1	4
<i>Duttaphrynus melanostictus</i>	3	1	0	2	2	3	0	0	0	0	11
<i>Ingerophrynus parvus</i>	0	0	2	1	0	2	0	0	0	0	5
<i>Phrynooidis aspera</i>	5	4	7	3	5	4	1	3	2	2	36
<b>Dicroglossidae (8)</b>											
<i>Fejervarya cancrivora</i>	0	0	1	2	1	0	0	0	0	0	4
<i>Fejervarya limnocharis</i>	4	2	3	5	3	2	0	0	0	0	19
<i>Limnonectes blythii</i>	0	1	2	0	1	3	2	3	1	0	13
<i>Limnonectes kuhlii</i>	0	0	1	2	0	1	2	3	2	1	12
<i>Limnonectes laticeps</i>	2	1	0	0	1	3	2	1	1	2	13
<i>Limnonectes malesianus</i>	1	0	0	0	1	1	0	0	0	0	3
<i>Occidozyga laevis</i>	3	0	0	1	2	3	0	0	0	0	9
<i>Occidozyga martensii</i>	1	1	0	0	2	1	0	0	0	0	5
<b>Megophryidae (5)</b>											
<i>Leptobrachium hendricksoni</i>	0	2	2	1	0	2	0	0	0	0	7
<i>Leptolalax heteropus</i>	0	0	0	0	0	0	1	2	1	0	4
<i>Megophrys nasuta</i>	0	2	1	3	1	3	0	0	0	0	10
<i>Xenophrys aceras</i>	0	0	0	0	0	0	0	0	0	1	1
<i>Xenophrys longipes</i> +	0	0	0	0	0	0	1	3	2	1	7
<b>Microhylidae (7)</b>											
<i>Kaluola pulchra</i>	2	1	1	3	0	1	0	0	0	0	8
<i>Metaphrynella pollicaris</i>	0	0	0	0	0	0	0	1	0	2	3
<i>Microhyla berdmorei</i>	0	0	1	0	0	0	0	0	0	0	1
<i>Microhyla butleri</i> +	7	5	3	4	3	6	0	0	0	0	28
<i>Microhyla fissipes</i>	1	0	0	1	0	0	0	0	0	0	2
<i>Microhyla heymonsi</i>	6	7	4	3	4	5	0	0	0	0	29
<i>Phrynella pulchra</i>	0	0	0	0	0	0	0	0	2	0	2
<b>Ranidae (10)</b>											
<i>Amolops larutensis</i> +	8	6	9	7	4	6	3	5	4	3	55
<i>Hylarana banjarana</i>	0	0	0	0	0	0	2	4	3	1	10
<i>Hylarana erythraea</i>	2	1	0	3	2	1	0	0	0	0	9
<i>Hylarana glandulosa</i>	1	4	3	1	2	3	0	0	0	0	14
<i>Hylarana labialis</i>	3	2	1	3	2	4	0	0	0	0	15
<i>Hylarana luctuosa</i>	0	0	0	0	0	1	0	0	0	1	2
<i>Hylarana laterimaculata</i>	0	0	1	1	0	0	0	0	0	0	2
<i>Hylarana nicobariensis</i>	1	0	0	1	0	0	0	0	0	0	2
<i>Hylarana picturata</i>	1	0	0	2	1	0	0	0	0	0	4
<i>Odorrana hosii</i>	2	0	0	3	1	2	0	1	1	0	10
<b>Rhacophoridae (7)</b>											
<i>Nyctixalus pictus</i>	1	0	0	0	1	0	0	0	0	0	2
<i>Philautus parvulus</i>	0	0	1	0	2	1	0	0	0	0	4
<i>Philautus petersi</i>	0	0	0	0	0	0	2	5	4	2	13
<i>Philautus vermiculatus</i> +	0	0	0	0	0	0	3	4	3	2	12
<i>Polypedates leucomystax</i>	1	3	2	1	2	1	1	2	1	0	14
<i>Polypedates macrootis</i>	0	0	1	0	0	1	0	0	0	0	2
<i>Rhacophorus prominanus</i>	0	0	0	0	0	0	1	0	0	0	1
<b>Ichthyophiidae (2)</b>											
<i>Caudacaeilia larutensis</i> +	0	0	0	0	0	0	0	4	2	0	6
<i>Ichthyophis</i> sp.	1	0	0	0	0	0	0	0	0	0	1
Number of individual	56	43	46	54	43	60	22	43	29	19	415
Number of species	21	16	19	23	21	24	13	15	14	12	43

Note: + type locality

TABLE 2  
Comparison of amphibian species obtained from Bukit Larut

Taxa	Grismer <i>et al.</i> (2010)	This study	Taxa	Grismer <i>et al.</i> (2010)	This study
<b>Bufonidae</b>			<b>Ranidae</b>		
<i>Ansonia malayana</i>	+	+	<i>Amolops larutensis</i>	+	+
<i>Duttaphrynus melanostictus</i>	+	+	<i>Hylarana banjarana</i>	+	+
<i>Ingerophrynus parvus</i>	-	+	<i>Hylarana erythraea</i>	+	+
<i>Ingerophrynus quadriporcatus</i>	+	-	<i>Hylarana glandulosa</i>	-	+
<i>Phrynomantis aspera</i>	+	+	<i>Hylarana hascheana</i>	+	-
<b>Dicroglossidae</b>			<i>Hylarana labialis</i>	-	+
<i>Fejervarya cancrivora</i>	-	+	<i>Hylarana luctuosa</i>	+	+
<i>Fejervarya limnocharis</i>	+	+	<i>Hylarana laterimaculata</i>	-	+
<i>Limnonectes blythi</i>	+	+	<i>Humerana miopus</i>	+	-
<i>Limnonectes kuhlii</i>	+	+	<i>Hylarana nicobariensis</i>	-	+
<i>Limnonectes laticeps</i>	+	+	<i>Hylarana nigrovittata</i>	+	-
<i>Limnonectes malesianus</i>	-	+	<i>Hylarana picturata</i>	-	+
<i>Limnonectes plicatellus</i>	+	-	<i>Odorrana hosii</i>	+	+
<i>Occidozyga laevis</i>	-	+	<b>Rhacophoridae</b>		
<i>Occidozyga martensii</i>	-	+	<i>Nyctixalus pictus</i>	+	+
<b>Megophryidae</b>			<i>Philautus parvulus</i>	-	+
<i>Leptobrachium hendricksoni</i>	-	+	<i>Philautus petersi</i>	+	+
<i>Leptolalax heteropus</i>	+	+	<i>Philautus vermiculatus</i>	+	+
<i>Leptolalax pelodytoides</i>	+	-	<i>Polypedates leucomystax</i>	-	+
<i>Megophrys nasuta</i>	-	+	<i>Polypedates macrotis</i>	-	+
<i>Xenophrys aceras</i>	+	+	<i>Rhacophorus bipunctatus</i>	+	-
<i>Xenophrys longipes</i>	+	+	<i>Rhacophorus cynaopunctatus</i>	+	-
<b>Microhylidae</b>			<i>Rhacophorus prominanus</i>	+	+
<i>Chaperina fusca</i>	+	-	<i>Theloderma asperum</i>	+	-
<i>Kaloula pulchra</i>	-	+	<i>Theloderma leprosa</i>	+	-
<i>Metaphrynella pollicaris</i>	+	+	<b>Ichthyophiidae</b>		
<i>Microhyla annectens</i>	+	-	<i>Caudacaecilia larutensis</i>	+	+
<i>Microhyla berdmorei</i>	-	+	<i>Ichthyophis sp.</i>	+	+
<i>Microhyla butleri</i>	+	+	Note:		
<i>Microhyla fissipes</i>	-	+	+ = Present		
<i>Microhyla heymonsi</i>	-	+	- = Absent		
<i>Phrynella pulchra</i>	+	+			

*Ingerophrynus parvus* (Boulenger, 1887)  
Two adult males (09USM-BL-IP01, 02) were captured in October 2009, hiding under dead leaves in the cement ditch along the road to Bukit Larut (km 1.5-2).

*Phrynooidis aspera* (Gravenhorst, 1829)  
This is the Common river toad, which could easily be found at the upper and lower hill. This species was observed in all the months during the sampling period, with two adult males were collected as vouchers. A single specimen (09USM-BL-PA01) was captured in June 2009, while calling from a big rock near Sg. Batu Tugoh (4-5 m width) at the foothill, while the other (11USM-BL-PA01) was captured in January 2011 near a small stream (km 9, 3-4 m width) at upper hill.

### **Dicroglossidae**

*Fejervarya cancrivora* (Gravenhorst, 1829)  
An adult male (09USM-BL-FC01) was caught in October 2009 on the forest floor near Sg. Batu Tugoh at foothill of Bukit Larut.

*Fejervarya limnocharis* (Gravenhorst, 1829)  
Two adult males and one gravid female (10USM-BL-FL01, 02, 03) were collected in May 2010 sitting on the ground at the car park after heavy rain. Another eight specimens, including a single amplexant pair, were observed at the same area.

*Limnonectes blythii* (Boulenger, 1920)  
This species was observed both in lower and upper hill in almost all months. An adult male (09USM-BL-LB01) was captured in

June 2009 near Sg. Air Terjun (3-4 m width) at lower part, while another adult male (11USM-BL-LB01) was captured in April 2011 beside a road (km 9.5- 10) at upper part in April 2011.

*Limnonectes kuhlii* (Tschudi, 1838) (Fig.3)  
A single juvenile (09USM-BL-LK01) was caught in October 2009 among leaf litter near Sg. Batu Tugoh, while an adult male (11USM-BL-LK01) was caught in January 2011 in shallow puddles (km 9.5-10) at upper part of Bukit Larut.

*Limnonectes laticeps* (Boulenger, 1882)  
Two adult males (09USM-BL-LL01, 02) were captured in February 2009 perched on the rock at Sg. Ranting (4-5 m width) and another adult male (11USM-BL-LL01) in April 2011 near a small forest stream (km 9) at upper part.

*Limnonectes malesianus* (Kiew, 1984)  
An adult male (10USM-BL-LM01) was collected in May 2010 on forest floor near Sg. Air Terjun.

*Occidozyga laevis* (Gunther, 1858)  
Two adult males and a single adult female (09USM-BL-OL01, 02, 03) were caught in February 2009 in small water puddles near Sg. Batu Tugoh. An amplexant pair was also observed at the same site but we did not collect it.

*Occidozyga martensii* (Peters, 1867)  
An adult male (09USM-BL-OM01) was captured in June 2009 hiding under a dead wood near Sg. Air Terjun.

### Megophryidae

*Leptobrachium hendricksoni* (Taylor, 1962)  
Two adult males (09USM-BL-LHen01, 02) were collected in Jun 2009 among the leaf litter in a cement drain at km 0.5-1 after evening rain. Their tadpoles were also observed in Sg. Batu Tugoh.

*Leptolalax heteropus* (Boulenger, 1900)  
A single adult was observed in January 2011 perched on dead woods near a small forest stream (km 9) at upper part.

*Megophrys nasuta* (Schlegel, 1858)  
Two adult males (09USM-BL-MN01, 02) were captured in Jun 2009 while calling under a big rock and a wood near a small forest stream (km 0.5-1) along the way to the peak of Bukit Larut. Several other specimens were heard calling at the same area in the late evening.

*Xenophrys aceras* (Boulenger, 1903) (Fig.4)  
A single adult male (11USM-BL-XA01) was collected in Jun 2011 perched on a wet rock near a small forest stream (km 11.5-12) at the upper part after rain.

*Xenophrys longipes* (Boulenger, 1886) (Fig.5)  
A single juvenile (11USM-BL-XL01) was caught in January 2011 perched on a mossy rock near a forest stream (km 9) while a gravid female (11USM-BL-XL02) was caught in Jun 2011 beside the road (km10-10.5) at the upper part after evening rain.

### Microhylidae

*Kaloula pulchra* (Gray, 1831)  
An amplexant pair (09USM-BL-KP01, 02) was captured in February 2009 in a ditch near the toilet at the foothill of Bukit Larut after heavy rain. Several calling males were also heard around the area.

*Metaphrynella pollicaris* (Boulenger, 1890)  
An adult male was observed in February 2011 calling from the tree branches (app. 1.5 m above ground) at upper part (km 10.5-11). Several other males (6-8 individuals) were heard calling from tree branches (1-2.5 m above ground) at the same area.

*Microhyla berdmorei* (Blyth, 1856) (Fig.6)  
An adult was collected (09USM-BL-MBer01) in October 2009 on the forest floor near a small forest stream (km 0.5-1) along the way to the peak of Bukit Larut.

*Microhyla butleri* (Boulenger, 1900)  
This species was found in all months at the lower part but did not found it at the upper part of Bukit Larut. Two adult males (10USM-BL-MBut01, 02) were collected in September 2010 among the leaf litter at the foothill after evening rain. An amplexant pair was also found at the same site but we did not collect it.

*Microhyla fissipes* (Boulenger, 1884)  
An adult (09USM-BL-MF01) was collected in February 2009 hiding among the leaf litter near Sg. Air Terjun.

*Microhyla heymonsi* (Vogt, 1911)

This species was also found in all months at the lower part but did not found at the upper part. Four specimens (09USM-BL-MH01, 02, 03, 04) including three adult males and one adult female were captured in October 2009 hiding under the tall grass and leaf litter at the foothill. Several other individuals (6-8 males) were actively calling from the shrubs at the same site.

*Phrynella pulchra* (Boulenger, 1887) (Fig.7)

Two adult specimens (11USM-BL-PP01, 02) were collected in April 2011 perched on fern tree (app. 1 m above ground), while another in a cement drain (km 11-11.5) along the way to the peak of Bukit Larut. Both of the specimens were not calling then and were collected after evening rain.

## Ranidae

*Amolops larutensis* (Boulenger, 1899)

This species was found in all months, both at upper and lower part. Two adult males (09USM-BL-AL01, 02) were caught in February 2009 perched on a big boulder at Sg. Ranting and another two juveniles (11USM-BL-AL01, 02) were caught in June 2011 sitting on a wet rock in a forest stream (km 9) at upper part. Several other specimens (6-10 individuals) were found at both sites but we did not collect them.

*Hylarana banjarana* (Leong & Lim, 2003) (Fig.8)

Two adult males (11USM-BL-HB01, 02) were captured in February 2011. One specimen was captured sitting on a mossy

rock near a forest stream (km 9), while another one in the wet cement drain (km 11-11.5) at the upper part. Both specimens were actively calling when captured.

*Hylarana erythraea* (Schlegel, 1837)

Four specimens were observed near a fish pond at the foothill but only a single gravid female (09USM-BL-HE01) was collected in June 2009 as a voucher.

*Hylarana glandulosa* (Boulenger, 1882)

An adult male (10USM-BL-HG01) was captured in January 2010 near a small forest stream at the foothill. Several other males were actively calling at the same sites.

*Hylarana labialis* (Boulenger, 1887)

Three specimens (09USM-BL-HLab01, 02, 03) including two adult males and one adult female were caught in February 2009 perched on tree branches and wet rock near Sg. Ranting. Several other specimens were also observed at Sg. Air Terjun.

*Hylarana luctuosa* (Peters, 1871) (Fig.9)

An adult male (11USM-BL-HLuc01) was collected in June 2011 among the leaf litter in a wet cement drain (km 11-11.5) at upper part after raining.

*Hylarana laterimaculata* (Barbour and Noble, 1916)

One adult male (10USM-BL-HLat01) was captured in January 2010 while calling from a fern tree (0.5 m above ground) at the river bank of Sg. Batu Tugoh.





Fig.2: *Ansonia malayana*



Fig.3: *Limnonectes kuhlii*



Fig.4: *Xenophrys aceras*



Fig.5: *Xenophrys longipes*



Fig.6: *Microhyla berdmorei*



Fig.7: *Phrynella pulchra*



Fig.8: *Hylarana banjarana*



Fig.9: *Hylarana luctuosa*

*Hylarana nicobariensis* (Stoliczka, 1870)  
A single adult male (09USM-BL-HN01) was captured in February 2009 in a puddle near Sg. Air Terjun.

*Hylarana picturata* (Boulenger, 1920)  
Two adult males were captured. One specimen (09USM-BL-HP01) was caught in February 2009 perched on a dead twig near Sg. Ranting and another specimen (10USM-BL-HP01) was caught in January 2010 on the forest floor near Sg. Air Terjun. Both specimens were actively calling when captured.

*Odorrana hosii* (Boulenger, 1891)  
This species was found both at the lower and upper parts. An adult male (10USM-BL-OH01) was collected in May 2010 perched on a big boulder at Sg. Batu Tugoh and another adult female (11USM-BL-OH01) was collected in February 2011 sitting on a wet rock near a forest stream (km 9) at the upper part.

### **Rhacophoridae**

*Nyctixalus pictus* (Peters, 1971)  
A juvenile was observed in February 2009 perched on tree leaves (0.5 m above ground) near a small puddle at the foothill.

*Philautus parvulus* (Boulenger, 1893)  
An adult (09USM-BL-PPar01) was collected in October 2009 perched on a fern tree near a small stream (km 0.5-1) after evening raining.

*Philautus petersi* (Boulenger, 1900) (Fig. 10)

Two adults (11USM-BL-PPet01, 02) including a male and female were caught in February 2011 perched on a fern tree (app. 2 m above ground, km 9.5-10) and another two adult males (11USM-BL-PPet03, 04) were caught in Jun 2011 perched on tree leaves (app. 1-2 m above ground, km 10.5-11) at upper part. An amplexant pair and several calling males were also observed at the same area.

*Philautus vermiculatus* (Boulenger, 1900)  
Two adult males (11USM-BL-PV01, 02) were captured in January 2011, perched on leaves and fern tree (app. 1.5-2 m above ground, km 11.5-12) at the upper part after evening rain. Several other males (5-7 individuals) were actively calling at the same area.

*Polypedates leucomystax* (Gravenhorst, 1829)

This species was found both at the lower and upper parts. We collected two specimens (11USM-BL-PL01, 02) including a male and a gravid female in February 2011 near a fish pond (Beringin bungalow) at the upper part. Two foam nests were also observed at the same site.

*Polypedates macrotis* (Boulenger, 1891)  
An adult male (09USM-BL-PM01) was caught in October 2009 perching on a dead twig near the puddles at the foothill.

*Rhacophorus prominanus* (Smith, 1924)

An adult (11USM-BL-RP01) was captured in January 2011 perched on leaves (app. 2 m above ground) near a forest stream (km 9) at the upper part after evening rain.

**Ichthyophiidae**

*Caudacaecilia larutensis* (Taylor, 1960) (Fig.11)

One juvenile (11USM-BL-CL01) was collected in April 2011 in a wet cement drain accumulated with dead leaves (km 9) at the upper part after rain.

*Ichthyophis* sp. (Taylor, 1960)

A juvenile specimen (09USM-BL-Csp01) was collected in February 2009 in the puddles accumulated with dead leaves near Sg. Batu Tugoh. This specimen has a yellow stripe on both sides of the body.

**DISCUSSION**

The pristine and undisturbed forest of Bukit Larut is very rich with amphibian and reptile species. A previous study by Grismer *et al.* (2010) reported 36 species of amphibians at Bukit Larut, although their study was

focused on species of higher elevations (Bukit Larut at 800-1300 m and Gunung Hijau Trail at 1200-1448 m asl). In this study, both the lower (< 300 m asl) and upper (1000-1300 m asl) parts of Bukit Larut were covered, and more amphibian species were discovered from the lower altitudes. Twenty species of amphibians from the lowland forest (< 300 m asl) were added to the list prepared by Grismer *et al.* (2010), increasing the number of amphibian species at Bukit Larut from 36 to 56.

The amphibian species from the lower part of Bukit Larut included *I. parvus* from Bufonidae, *F. cancrivora*, *L. malesianus*, *O. laevis* and *O. martensii* from Dicroglossidae, *L. hendricksoni* and *M. nasuta* from Megophryidae, *K. pulchra*, *M. berdmorei*, *M. fissipes* and *M. heymonsi* from Microhylidae, *H. glandulosa*, *H. labialis*, *H. laterimaculata*, *H. nicobariensis* and *H. picturata* from Ranidae, *P. parvulus*, *P. leucomystax* and *P. macrotis* from Rhacophoridae, and *Ichthyophis* sp. from Ichthyophiidae. All these species were found only at the lower part, except for *P. leucomystax*, which was also found at the



Fig.10: *Philautus petersi*



Fig.11: *Caudacaecilia larutensis*

upper hill. Generally, the species mentioned above are lowland species and can easily be found at an altitude below 300 m asl. Previous studies by Ibrahim *et al.* (2012a,b) at Sg. Sedim (compartment 15) and Bukit Perangin and Shahriza *et al.* (2011) at Bukit Hijau also recorded the occurrence almost of these species at elevation 100, 105 and 300 m asl. However, other studies recorded some of these species at higher elevation. For example, Norhayati *et al.* (2011) found two species of frogs, *M. nasuta* and *H. labialis* at Fraser hill (1448 m asl). The lower part, especially at the foothill area is more disturbed, and three commensal species that associated with human, *K. pulchra*, *M. heymosi* and *P. leucomystax* are easily to find. Other, are typical forest frogs that inhabit in the lowland forest and need more specific and clean environments that cannot be found in the disturbed areas.

Bukit Larut is the type locality for several species of frogs, such as *Ansonia malayana*, *Xenophrys longipes*, *Microhyla butleri*, *Amolops larutensis*, *Philautus vermiculatus* and *Caudacaecilia larutensis* (Grismer *et al.*, 2010). In this survey, we could find all of these species, which indicated that these species have survived in Bukit Larut forest for a long time.

Observation and sampling at Bukit Larut were done around easily accessed areas and did not covered the areas deep in the forest such as old forest trails, forest floors, tree canopy, forest streams, swamps and waterfalls because of the lacking of manpower and time. In the future, there is a need to explore more undisturbed areas to

get the overall picture of the occurrence of amphibians at Bukit Larut.

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