

“Quack quack quack” - revealing the strange advertisement call of *Leptobrachium smithi* (Anura: Pelobatidae): a bioacoustic analysis

H. T. Lalremsanga^{1*}, Saipari Sailo² and H. T. Zonunsanga³

¹ Department of Zoology, ³ Department of Forestry, Mizoram University, Aizawl 796009, India

² Department of Zoology, North Eastern Hill University, Shillong 793022, India

E-mail: spsailo@yahoo.co.in

For correspondence e-mail: htlsa@yahoo.co.in

Mizoram ramhnuai hmun thenkhata lui lian leh a fintu kawrte chhehvêla thing leh mau hmun zingah thlasik leh thâl laiin rannung hrâm danglam, fiah leh langsâr tak hriat a ni thîn a. Thingtlâng mi tam takte chuan eng rannung hrâm ri nge a nih hre lovin an inrinsiak vêl mai mai thîn a. He thil finfiah tûr hian a ri an hriatna hmun remchâng deuh deuh luite, heng Tlâwng, Durlui, Herhse leh Tuitun dung leh vângte vehin ri chhinchhiahna khâwl Acoustic Encounter Surveys (AES) hmangin chhui a ni. He hna aţanga hmuhchhuah chu rannung hrâm mak tak hi uchang chi khat, *Leptobrachium smithi*, hrâm a ni tih hriat a ni a, a hrâm ri hi ngun taka zir chian zui a ni. An hrâm ri aţang hian an chênna hmun (habitat) leh an inthlah hun lai (breeding season) te chiang takin a hriat theih a. Tin, an ulâwng (tadpole)-te zir chian a ni a, Thailand rama an chipuite hrâm dân nên khaikhin a ni bawk.

Key words: Advertisement calls, hrâm ri, *Leptobrachium smithi*, Tuitun, uchang.

Introduction

Kum 2003 aţanga Mizoram hmun hrang hranga herpetofaunal survey kan neih laiin, hmun thenkhatah zâna chakai meichher chhite leh sangha man thinten rannung hrâm ring lêng lâwng tak, a khât tâwka, “Quack quack quack,” tia hrâm ri thîn, lui leh kawrte chhehvêlah an hriat thîn thu an sawi thîn a. Chiang taka a tak hmu an la awm loh avângin thenkhatin ramvarak hrâm nia an sawi laiin thenkhatin rûlngân (King Cobra) kâk ri niin an sawi thîn a, an inrinsiak mai mai thîn.

Heng rannung hrâm ri hi favâng tâwp dawn lam aţangin nipui inţan dawn thlengin an hre thei thîn a. Ram vâk mi thenkhatte'n an fiahngam meuh

loh laiin, a fiah tumtu thenkhatin fiah tuma an zawn chiam lahin eng rannung nge a nih tih hriat hleih theih lohina hrâmna bâwr vêlah chuan hmuh tûr a lo awm ngai lo va. Chu mai bâkah a hrâm ri a zawh veleh hian thehmeh ang thiapin a reh leh vawng vawng mai thîn a. Hetianga rannung hrâm hriat chian hleih theih loh hi zir chiang tûrin research work neih pahin kum 6 chhung (2003-2009) thlithlai a ni ta a. An hrâm ţan hun hi tlai dar 5:30 vêl aţanga inţanin zing khawvâr dawn dâr 4:30 vêl thlengin hriat tûr a awm thîn.

Materials and Methods

An hrâm ri hriatna lui thenkhat, Tlawng



Fig. 1. *Leptobrachium smithi* hrâm ri record tûrin Tuitun lui-ah riahbûk kan khuar.

(23°48'06.78"-55.04" N; 92°37'38.23"-39°08.67" E; 50-80 m asl) leh Durlui (23°53'55.42" N; 92°39'07.94" E; 103 m asl), Aizawl district, Herhse lui (23° 58' 15.5" N; 92° 41' 30.9" E; 310 m asl) leh Tuitun (23° 58' 21.27"-40.19" N; 92° 41' 05.51"-10.35" E; 300-325 m asl), Kolasib district te chu Acoustic Encounter Surveys (AES) hmangin ngun lehzuala vil an ni a. Zân lama hrâm an nih ðhin avângin luikamah puan in (tent) kaihinh riahchilh ðhin a ni (Fig. 1). An hrâm ri hi hriat a nih veleh digital voice recorder (Samsung FM frequency range 87.5-108 MHz) hmangin lo lâk (record) a nih mai bâkah a hrâm laia uchang lo awmna hmun tak (latitude/longitude) leh tuipui zâwl aþanga a hmunhma sân zâwng (elevation) chu Garmin (etrex) Global Positioning System (GPS) hmanga chhinchhiah zêl a ni bawk a. Chu mai bâkah an

hrâm duh hun laia boruak lum/vawh zâwng hi Jennson deluxe thermometer rod (accurate to 1°C)-a tehin, boruak hnâwn zâwng (relative humidity) pawh Barigo hygrometer (accurate to 1%) hmangin teh leh ðhin a ni bawk. Fimkhur takin torch light leh meichher hmangin heng rannungte hi chân an ni ta ðhin a ni.

He hrâm ri lâk (record) tawh (signal) hi sampling rate 8 KHz leh 16-bit precision hmangin digital format-ah chantir leh a nia. Heta þanghian, software tool 'SoundRuler Version (0.9.6.0) 2007.03.10 (acoustic analysis)' hmangin oscillogram duan chhuah a ni leh a. An vawikhat hrâm (single call)-a thlûk/ri mal (note) khatte hi ri (sound) a inkhak ri (pulse) a rawn inþan aþanga a tâwp thlenga lâk a ni zêl a, thlûk mal tin inkâr (note interval) te hi note hmasaa pulse hnunnung ber leh note hnunnung zâwka pulse hmasa ber

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inkâr lâk a ni zêl bawk. Note repetition rate hi second khat chhûnga pulse awm zât anga lâk a ni zêl bawk.

Results

Ngunthlûk taka zân khawvawt hnuai luikawr hnawk leh hnimpik kâra vangvat leh thosi zingah thâwm dim taka kan chhân hnuah he rannung hrâm hi uchang chi khat a ni tih finfiah a ni ta. A hrâm aţanga chhuiin leh a tak ngei (Fig. 2) leh a ulâwng (Fig. 3-6) te pawh chiang taka hmuhchhuah a ni. Zau zâwka a pianhmang leh hrilhfiarna zir hnuah, Pelobatidae family hnuai species pakhat, *Leptobrachium smithi* a ni tih kan hre chhuak ta a ni.

L. smithi, “Smith’s litter frog” tia an koh bawk hi kum 1999 khan Masafumi Matsui, Jarujin Nabhitabhata leh Somsak Panha te’n Khao



Fig. 2. *Leptobrachium smithi*, MZU/ZOO/A-503, a pa (SVLT 38.5mm) April 3, 2008-a a hrâm kan record hnuah a thlalâk (a hmun: Tuitun lui, Kolasib district; temperature 21.5°C; relative humidity 82%; location: 23° 58’ 31.25” N and 92° 41’ 07.56” E; elevations T 315 m asl.)



Fig. 3. *L. smithi* ulâwng khawsakna hmun (benthic microhabitat), tui hnuai hnahthel zingah (fei hmawr zawn).



Fig. 4. Uchanga chang mai tûr *L. smithi* ulâwng ke nei tawh, a chenna hmun lui aţanga man a nih laia a awm dân.



Fig. 5. *L. smithi* ulâwng (Gosner stage 26)



Fig. 6. Uchang note (froglet)-a chang mêk *L. smithi* ulâwngte.

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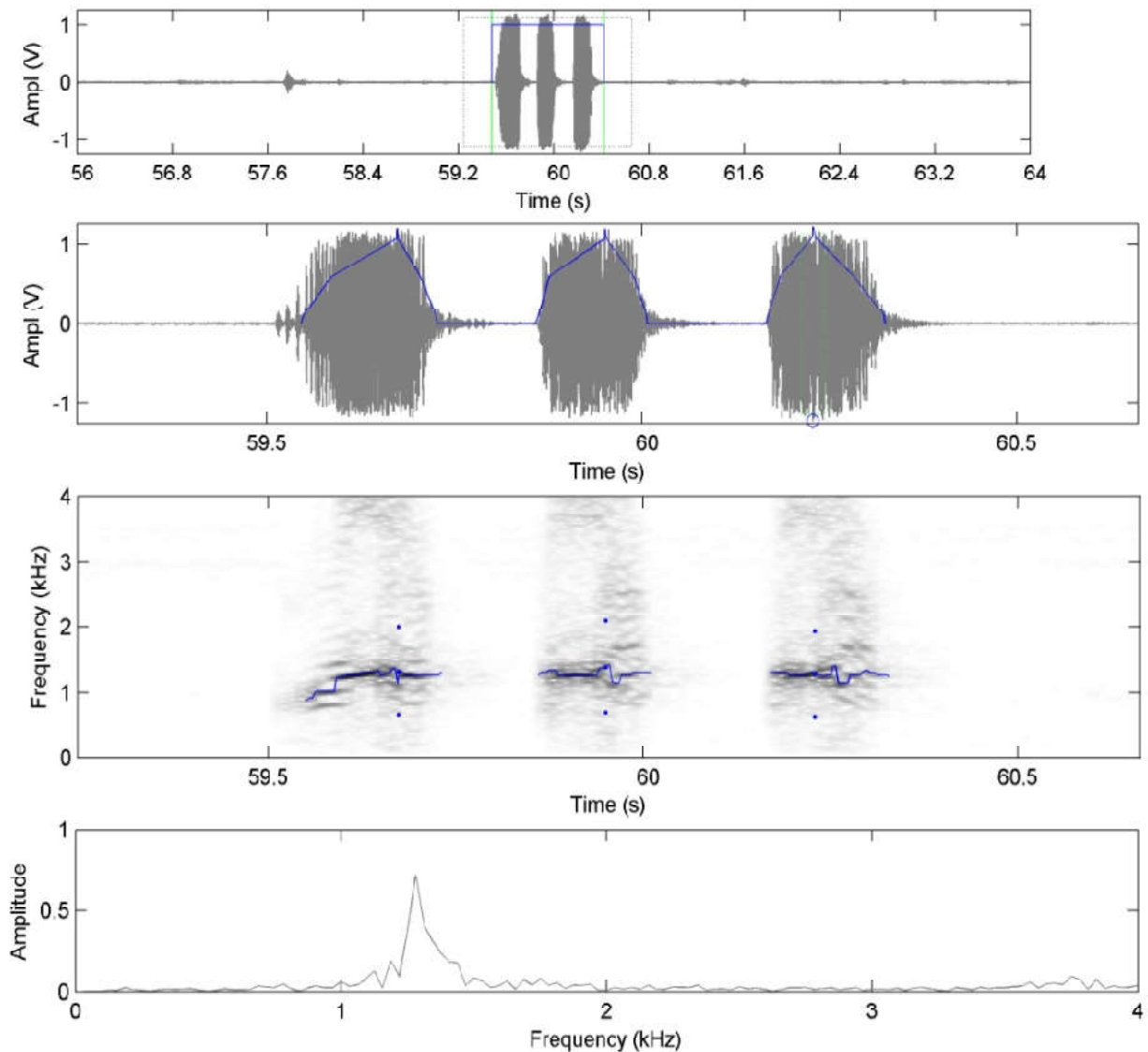


Fig. 7. *Leptobrachium smithi* vavikhat hrâm rik chhûnga oscillogram, sonogram leh power spectrum te lan dân.

Chong, Thailand chhim lam ram aṅga uchang chi dangte nên an vai khâwm hnuah leh *Leptobrachium* species dangte nen uluk taka an khaikhin hnuah *Japanese Journal of Herpetology*-ah (Matsui *et al.* en rawh)¹ species thar a nih thu an lo tlângzarh tawh a.

An hrâm ri hi ram varak hrâm ang deuh takin, “Quack quack quack...,” tiin a ri ṭhin a, hriat lâwk sa loh pheichuan hnai tea an rawn hrâm thut chuan a phût ve zawk theih a ni. A bul hnai taka thâwm neih erawh chuan, dârkâr 1 dân thaw te a reh leh vawngvawng ṭhin a, chumi hnuah awmhmun

pawh sawn chuang lêm lovin a awmna ngai a tângin a rawn hrâm leh mai ðin. A huhova hrâm (chorus) chi ni chiah lo mah se eng emaw châng chuan lui kawi khat dan vêlah 2-3 te hi chu an inchhawn ve ðin bawk.

L. smithi hrâm rik dân uluk taka chhinchhiah chu Fig. 7-ah hian entir a ni. An vawikhat hrâm (single call) te hi thlûk mal (note) 1-7 in a siam a ni tângpui a, note pakhtah pulse thliar hran har tak tak 40-49 a awmzêl bawk. A vawikhat hrâm hi 180 ms -2300 ms vel a rei a ni a (mean \pm SD = 829 ± 94.2 ; $n = 24$); note 1 rei zawng chu 120-200 ms (mean \pm SD = 12.9 ± 2.3 ; $n = 10$); note leh note inkar 224-386 ms; note repetition rate = 3.1-3.8/s; frequency hi 890 KHz a tâng a 1421 KHz inkar niin, dominant frequency hi 1296 KHz-ah hmuh a ni bawk. Amplitude hi $1/4^{\text{th}}$ ah langsâr teh chiam lo mah se, $2/4^{\text{th}}$ ah erawh hi chuan ding takin a sân lai ber (peak) rawn thlengin a zuih ral leh tan a, $3/4^{\text{th}}$ a tâng hi chuan a ral têt hnuah $4/4^{\text{th}}$ tâwp lamah chuan langsâr lo takin hmuh tûr a rawn awm leh a ni.

An inthlahna hmun (breeding ground)-ah hian a nu aiin a pa hi an tam zâwk zêl ðin (a nu leh a pa ratio = 1:3). *L. smithi* te hi lui kam leh a chhehvêla hnahthel kârah hmuh ni ðin mah se, a pain a nu a kohna hmun tak erawh hi chu lui tui hnaihte, tui leh khawmual inrina a tâng a hla vak lo (< 2 m), luikam hnimhnahin a hliakhuh hnuaiyah hmuh an ni zêl. Hmêlma an lo hnaih erawh chuan hnahthel hnuaiyah rang takin a hnung zâwngin an ke hnung (hindlimb) tawi te te hmangin an mawngtawlh bo thuai ðin.

He an hrâm ri danglam tak hi, October a tâng a March thleng, ruah tui tam hma (pre-monsoon) hun laia hriat an nih ðin avangin, an inthlah hun lai (breeding season) pawh awlsam takin a hriat theih a ni. A chhan chu uchang chi chauh pawh ni lo, rannung dang tam tak hian an inthlah hun a lo her chhuah hian a pain a nu a koh nan awrawl (vocal

calls) an hmang ðin. A pa hrâm awmna kan hriatna apiang chhehvêl, hnimbuk leh hnahthel hnuai, tui chim chin, lung kâr, etc., hi ngun taka kan dap hnuin, a pa hrâmna hmun a tâng a hla vak lo (< 50 m)-ah a nu hi kan hmu ve zêl ðin a ni.

He Fig. 5-a ulâwng hi *L. smithi* ulâwng nei a ni tih kan hriat theihna chhan chu Fig. 6-a a lan anghian, laboratory-ah uluk taka ulâwng engemaw zât kan khawi hnuah *L. smithi* uchang note-ah an rawn chan tâk ðin vâng a ni. Gosner² stage 25 a tâng an than len chak dân leh khawmuala khawsa tawh tûra uchang notea an inthlâk chhoh dân (growth rate and metamorphosis) leh ulâwng an nih laia an chaw ei duh zâwngte nêl tûnah chuan felfai taka zir chian vek an ni tawh a (Lalremsanga, unpublished data).

L. smithi te ulâwng hi chhûnah chuan tuihnuai lung, pât-êk leh hnah kârah te tawm boin zânah erawh chuan thisen vawt nei chi (poikilotherm) an nih avângin chhûn khaw lum lo vawngtu lungpher chungah te, tui chung lam hnaih pawnlâng tak takah chaw zawngin an rawn chhuak ðin. Chuvâng chuan chhûnah chuan tui mawnga khawsa chi (benthos) an ni tihna a nih chu (Fig. 3). Hmun tam takah chuan ulâwng nei chi kan hriat than, *Clitotarsus alticola* te nêl hre hrang lovin lên den leh lênsuah nêna man pawlh an ni ðin a, chawhmeh tui tak atân an lo hmang ðin a ni.

Discussion

Leptobrachium genus (*sensu stricto* [Dubois, 1980 ni lo³] = subgenus Dubois leh Ohler, 1998⁴) hi Pelobatidae chhungkaw hnuaiyah awm niin, an taksa khuangrual lo taka bawp tawi te nei chi an ni a. China chhim lam a tâng a Philippines, Indonesia, Sunda thliarkâr leh Bali ah te chauh awma ngaih an ni ðin.⁵ *L. smithi* bik hi Matsui leh a thiante'n kum 1999-a Thailand a tâng a an hmuhchhuah hnu lawkah, India hmârchhak,

Assam⁶ leh Mizoram,⁷ leh Myanmar-ah⁸ te pawh an awm ve a ni tih hmuhchhuah a ni ta zêl a.

Das leh Chanda te'n Myanmar aṅanga an report, *L. smithi* hi Zoological Survey of India, Kolkata-a catalogue number, ZSI 10439-40 *L. hasselti* anga an lo ngaih ṭhin an ni a.⁸ Heng specimen 3 te hi kum 1877 daih tawha Swedish journalist, novelist, poet leh lawng captain ni bawk Gustaf Arthur Ossian Limborg (1849-1908) chuan Ahsoon tia an koh Tenasserim huam chhông, Myanmar, aṅanga a man hnua a lo dah ṭhat an ni hlawm a. Tûn hnai maia a lan dân chuan *L. smithi* hi Bangladesh, India, Lao People's Democratic Republic, Malaysia, Myanmar leh Thailand aṅang tein report a awm tawh a ni.⁹ IUCN (Redlist) status-ah chuan Least Concern (LC) an ni a, an mang (extinct) mai chu a la hlauhawm rih lo deuh tihna a ni.

Hetianga *L. smithi* te uchang dang ang lo taka an hrâm rin bikna em em chhan hi kan hmuh dân chuan an inthlahna hmunah pawh uchang dangte ang lo takin tlêmte chauh an awm ṭhin a, a pa leh a nu awmna hi ramhnua ngaw pik leh kawr ruam inkâr hlat tak tak a nih ṭhin vâng niin kan hria. Hetianga a pain hla taka awm a nu hriat theih tûa ring taka a hrâm ṭhin ang hi Bornean microhylid, *Metaphrynella sundana* (tree-hole frog)-ah pawh Lardner leh Lakim te pawhin an lo zir Chiang tawh a ni.¹⁰

Mizoram chhônga survey kan neih tawhna aṅang chuan *L. smithi* te hi hmun hniam tak 50 m asl aṅanga 310 m asl-ah an awm tlângpui, 1350 m asl laia sângah pawh an awm tih hriat a ni bawk (e.g., Thailand rama Ban Khun Klang, Chiang Mai Province¹). Heng mai bakah hian *L. smithi* te hi tui luang thuk lo te teah an inthlahin an tui ṭhin a ni tih a rin hriat theih. Hetiang tui luanga inthlaha tui ṭhin te hi ‘stream breeder’ tiin an vuah nghe nghe a ni. Ruahtui awm loh lai leh thlasik tui tlêm laia inthlah pung ṭhin stream breeder te hi ‘winter

breeder’ tiin an ko bawk. Thlasik tui tlêm lai chauha an inthlah ṭhinna chhan chu heng winter breeder-te hian lui chhawrdawh uchang (cascade frog), entirnan, *Amolops marmoratus*, *A. formosus*, *A. gerbillus*, *Odorana chloronota*, *O. livida*, etc. te ang lo takin an tui hlâwm (egg clutch) te hi tui lian khauhin a len bo loh nan lung leh thlaihate inham tâng ve thei lo chi an ni a (a nu pum chhônga a tui awm dân aṅangin a hriat theih). Chuvâng chuan an inthlah hun lai hi, luitui khauh takin an tui hlawm (egg clutch) a len bo a hlauhawm loh hun lai, tui tlem leh khauh loh lai (slow water current) leh an tui hlâwm (egg clutch) an hnutchhiahna hmun remchông lui tui chiahpiah ṭiau lung (pebbles), thing ṭang leh hnimhnawk a tam thei ang ber an inpho lan hun lai a nih vâng a ni. An inlâr hun lai hian an chênna hmuna uchang leh uṭawk (anuran) dang an khawsakpui (sympatric species) inthlah ve ṭhin te chu *C. alticola*, *Hylarana cf. nicobariensis*, *Microhyla berdmorei*, *Duttaphrynus melanostictus* leh *Fejervarya limnocharis* te an ni.

L. smithi te hi ngaw hnua lui ah an ulâwng (tadpole) hmuh tûr a tam ang huin an tui (eggs) hi kan la hmu thei tlat lo a ni. Tin, an inthlah dân, an tui awm dân, an ulâwng ṭhan len chhoh dân, etc., (breeding behaviour, complete life cycle) hi tumahin an la zir Chiang hlei thei lo a ni. Zân lama chaw zawng chi (nocturnal) an nih avângin chhôn lamah chuan hmuh tûr an vâng ṭhin hle. Kan survey hun chhông hian a nu leh a pa terarium-a inthlaha tuitir kan tum pawhin, han inbawh (amplect) ve uaih uaih ṭhin mah se kan duh ang an la tihlawhtling rih lo tlat.

Amaherawhchu an inthlah dân hi a pain a nu kâwngah a ke hma lama vuanin (inguinal amplecting) zawi zawiin a zak hnuaiah a vuan chho (axillary amplecting) ṭhin tih erawh chu a hmuh theih a ni. Hei mai bâkah hian an nih phung thununtu DNA pawh hi zir chian a la ni lo bawk.

Zir Chiang tûrin tûnah hian theih ang tawkin hma kan la mêk a ni.

Uchang leh uṭawk (anuran) chi rêng rêngah chuan a pa hian an inthlah hun lain a nu hi an hrâm ri (advertisement call) hmangin an ko ṭhin a. Amaherawhchu a species azirin an hrâm rik dân a dang zêl. Species inang apiang an hrâm dân a inan ṭhin avângin an nihphung, chi inang lo leh chi thuhmun inkungkaihna (characters, interspecific, intraspecific relationships) zir chian nan a pawimawh hle.¹¹ Uchang chi rêngrêng inlaichin hnai tak (closely relative) hmun khata khawsa dûn (sympatric species) an nih chuan an hrâm hi a inang lo ṭhin hle a ni.¹² Species thuhmun rau rau pawh hi an chênna hmun leh sik leh sa a inan loh chuan an hrâm rik dân a dang ve hret hret ṭhin bawk.

L. smithi chungchâng bika Matsui leh a thiante'n kum 1999¹ chhova Khao Chong (23-24.4°C) hmuna an zir chianna a lan dânin 1-7 notes/call; 2087 msec/call; 103-230 msec/ pulse; note inkâr 297-477 msec; note repetition 2.87-3.92 msec; dominant frequency 750-1600 Hz tih a ni a, hei hi kan zir chian dân nên tlêmin a danglam deuh hlek a. A chhan ni thei âwma langte chu, hmun inhlak tak, sik leh sa inang lo tak bawk sia khawsa uchangte hi species thuhmun ni mah se an hrâm dân a danglam ve deuh ṭhin.¹³⁻¹⁶ Species thuhmun pawh, chênna ram inhlak taka mite hi an hrâm dân thununtu, inthlahchhâwnna atân a pawimawh tak kengtu (DNA sequence) pawh a danglam ve zêl ṭhin.^{14,15,17} Rannungtam tak hrâm dân hi an taksa lum leh vawh dân leh len zâwngin a thunun ṭhin bawk.¹⁸⁻²¹

India hmârchhak bikah hian, French herpetologist, Olivier Grosselet leh a hote'n kum 2004²² a Assam state aṭanga dâwnghlek chi khat, *Microhyla heymonsi*, hrâm dân an zir chian bâk kha uchang dang hrâm dân zir chian mumal a la awm leh meuh lo. India ram pum huapah hian rannung hrâm dân zir chian tlênte zingah hian

Pelobatidae family zinga mi phei chu engmah zir mumal a la awm lo a ni. Kan hmangaih Zoram nuamah hian nungcha hlu tak tak, ramdanga hmuh tûr awm ve zen zen lo tam tak kan neihte leh kan pi leh pute'n thawnthu maksak tak (myths) anga an lo ngaih ṭhin hi thilsiam ropui tak an lo nihzia belhchian tlâk taka zir chianga, hrilhfiah leh humhalh tûr chuan, hnam dang kuta dah mai lovin keini Mizo thalaite hian mawh kan phur tak meuh meuh a ni.

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Corrigendum

C. Lalrinchhana *et al.* “Collections on the saurian (Reptilia: Squamata) fauna around Aizawl City area with notes on their ecology” in *Science Vision*, 9(2), 57-72 (April-June 2009) contained Fig. 16. labeled as *Varanus bengalensis* (p. 69). The figure should have been *Lygosoma punctata*. The figure below is *V. bengalensis* (from the authors):

