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## Description of a New Species of *Hylarana* from Sumatra (Amphibia, Anura)

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**Abstract:** A ranid frog of the genus *Hylarana* from eastern Sumatra is sufficiently divergent morphologically from other congeners as to be recognized as a distinct species. In addition, the frog is also much divergent from the other members of the species group genetically, we hereby describe it as a new species, *H. rawa*. It is closest to *H. baramica*, *H. laterimaculata*, and *H. glandulosa* among members of *Hylarana*.

Key words: New species, MtDNA phylogeny, *Hylarana baramica*, Sumatra, Taxonomy

### INTRODUCTION

The Indonesian island of Sumatra, with an area of 473,606 km<sup>2</sup> (Barber et al., 2005), is the sixth largest island in the world and is the westernmost of the Sunda Islands. The island is narrowly separated from Malay Peninsula by the Strait of Malacca on the northeast side, and from Java by the Sunda Strait on the southeast. From such notable size (length of ca., 1700 km, widths of 200 km in the north and 350 km in the south: Page et al., 1979) and geographic position, the amphibian fauna of Sumatra is expected to be very rich. However, amphibian inventory has been rather poorly documented for Sumatra (Inger, 1999), compared with the similarly large island

of Borneo (Inger, 1966; Inger et al., 1996). Even so, more than 80 species of anurans and five species of caecilians have been recorded from the entire island of Sumatra (Inger and Voris, 2001; Frost, 2011), in contrast to 59 species of anurans and two species of caecilians listed in Van Kampen (1923). Furthermore, the amphibian fauna of Sumatra actually includes many endemic taxa (Inger and Voris, 2001), and discovery of new amphibian taxa has continuously been made in these years (e.g., Harvey et al., 2002; Inger and Iskandar, 2005).

Recently, a specimen of unidentified ranid frog was collected from Giam-Siak Kecil Wildlife Reserve in Riau, eastern part of Sumatra (Fig. 1). Morphologically, it can be assigned to the genus *Hylarana* Tschudi, 1838 and largely resembles sympatric *H. baramica* (Boettger, 1900), but is clearly differentiated from it in a number of characteristics.

In order to clarify the taxonomic identity of

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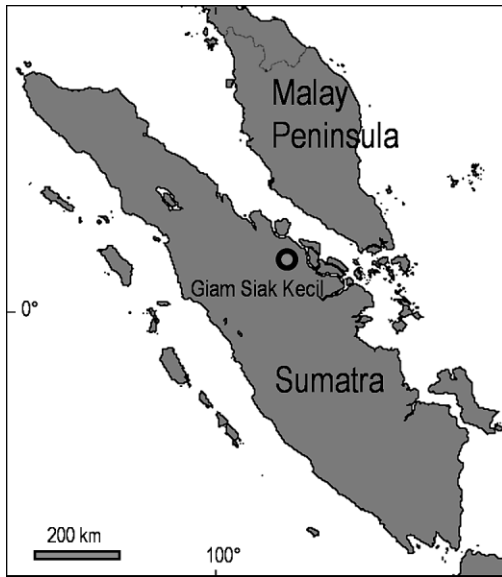


FIG. 1. Map of Sumatra, showing the type locality of *Hylarana rawa* sp. nov.

the specimen, we compared it phylogenetically with several other *Hylarana* species from Southeast Asia using morphological data and sequence data of mtDNA genes. The result yielded convincing evidence that the specimen from Sumatra is distinct from any known congeneric species. We, therefore, describe it as a new species.

#### MATERIALS AND METHODS

For specimens stored in 70% ethanol, we took body measurements following Matsui (1984). Preserved specimens of *Hylarana* examined for morphological comparisons (see Appendix 1) are stored at Museum Zoologicum Bogoriense, Research Center for Biology, Indonesian Institute of Sciences (MZB) and Graduate School of Human and Environmental Studies, Kyoto University (KUHE). DNA sequence data were obtained from

TABLE 1. Sample of *Hylarana* and outgroup species used for DNA analysis in this study together with the information on voucher, collection locality and GenBank accession numbers. See text for voucher abbreviations.

Sample no	Species	Voucher	Locality	GenBank	
				12 S	16 S
1	<i>Hylarana rawa</i> sp. nov.	MZB Amp 14565	Indonesia, Sumatra, Riau, Siak, Sungai Mandau, Tasik Betung	AB719205	AB719222
2	<i>Hylarana glandulosa</i>	KUHE 53618	Malaysia, Borneo, Sarawak, Mulu	AB719206	AB719223
3	<i>Hylarana glandulosa</i>	KUHE 53639	Malaysia, Borneo, Sarawak, Mulu	AB719207	AB719224
4	<i>Hylarana glandulosa</i>	KUHE 53660	Malaysia, Borneo, Sarawak, Mulu	AB719208	AB719225
5	<i>Hylarana glandulosa</i>	KUHE 54480	Malaysia, Borneo, Sarawak, Mulu	AB719209	AB719226
6	<i>Hylarana glandulosa</i>	KUHE 54495	Malaysia, Borneo, Sarawak, Mulu	AB719210	AB719227
7	<i>Hylarana laterimaculata</i>	KUHE 17593	Malaysia, Borneo, Sarawak, Samunsam	AB719211	AB719228
8	<i>Hylarana laterimaculata</i>	KUHE 17594	Malaysia, Borneo, Sarawak, Samunsam	AB719212	AB719229
9	<i>Hylarana laterimaculata</i>	KUHE 17650	Malaysia, Borneo, Sarawak, Samunsam	AB719213	AB719230
10	<i>Hylarana baramica</i>	KUHE 54478	Malaysia, Borneo, Sarawak, Mulu	AB719214	AB719231
11	<i>Hylarana baramica</i>	KUHE 53617	Malaysia, Borneo, Sarawak, Mulu	AB719215	AB719232
12	<i>Hylarana baramica</i>	KUHE 53623	Malaysia, Borneo, Sarawak, Mulu	AB719216	AB719233
13	<i>Hylarana baramica</i>	KUHE 53640	Malaysia, Borneo, Sarawak, Mulu	AB719217	AB719234
14	<i>Hylarana signata</i>	KUHE 53772	Malaysia, Borneo, Sarawak, Matang	AB719218	AB719235
15	<i>Hylarana picturata</i>	KUHE 53544	Malaysia, Borneo, Sarawak, Bario, Pa Ramapuh	AB719219	AB719236
16	<i>Hylarana erythraea</i>	MZB Amp 16274	Indonesia, Sumatra, Bengkulu, Curug	AB719220	AB719237
17	<i>Hylarana nicobariensis</i>	TNHC 59856	Indonesia, Java, West Java	AY326062	AY326062
18	<i>Hylarana nigrovittata</i>	KUHE 23726	Thailand, Doi Chiang Dao	AB719221	AB719238
19	<i>Rana ulma</i>	KUHE 10056	Japan, Okinawajima Island	AB685780	AB685780

tissues preserved in 99% ethanol (Table 1). We used the same methods for DNA extraction, and amplification and sequencing of the mtDNA fragments as those reported by Matsui et al. (2011) and Shimada et al. (2011). The resultant sequences were deposited in GenBank (Accession numbers AB719205–719221, AB719222–719238; Table 1). We reconstructed phylogenetic (maximum parsimony [MP] and maximum likelihood [ML]) trees from 1619 base pairs (bp) of partial sequences of mitochondrial 12S and 16S rRNA genes. In addition to our own data, we used a published sequence of *H. nicobariensis* (Stoliczka, 1870: Texas Natural History Collection = TNHC 59856, Darst and Cannatella, 2004) for tree construction.

#### SYSTEMATICS

The specimen of *Hylarana* from Sumatra examined here proved to be a sister species to the clade of *H. baramica*, *H. laterimaculata* (Barbour and Noble, 1916), and *H. glandulosa*

Boulenger, 1882. The clade of these four species was sister to the clade of *H. signata* (Günther, 1872) and *H. picturata* (Boulenger, 1920) (Fig. 2). From the three sister species in the sister clade, the specimen from Sumatra exhibited substantially large genetic distances (uncorrected p-distance in 16S rRNA of 13.9–15.7%: Table 2), which much exceeded values usually observed among good species of frogs (Fouquet et al., 2007). Furthermore, the specimen of *Hylarana* from Sumatra is also separated morphologically from *H. baramica*, *H. laterimaculata*, and *H. glandulosa* in congruent with genetic separation. Thus, recognition of a new species is convincing enough even on the basis of the single available specimen, and we describe it as follows:

#### *Rana rawa* n. sp.

(Figs. 3–5)

#### Etymology

The specific epithet *rawa* is an Indonesian

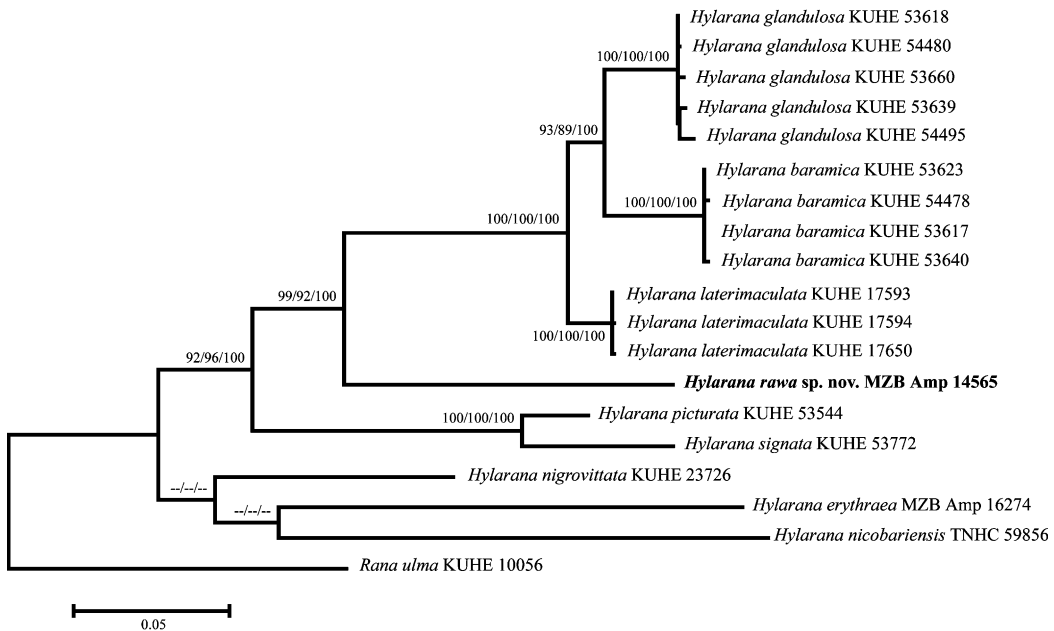


FIG. 2. Bayesian tree of a 1619 bp sequence of mitochondrial 12S rRNA and 16S rRNA genes for samples of *Hylarana* frogs from Southeast Asia. Numbers above or below branches represent bootstrap supports for maximum Parsimony (MP) inference/maximum likelihood (ML) inference/Bayesian posterior probabilities. For sample localities, refer to Table 1.

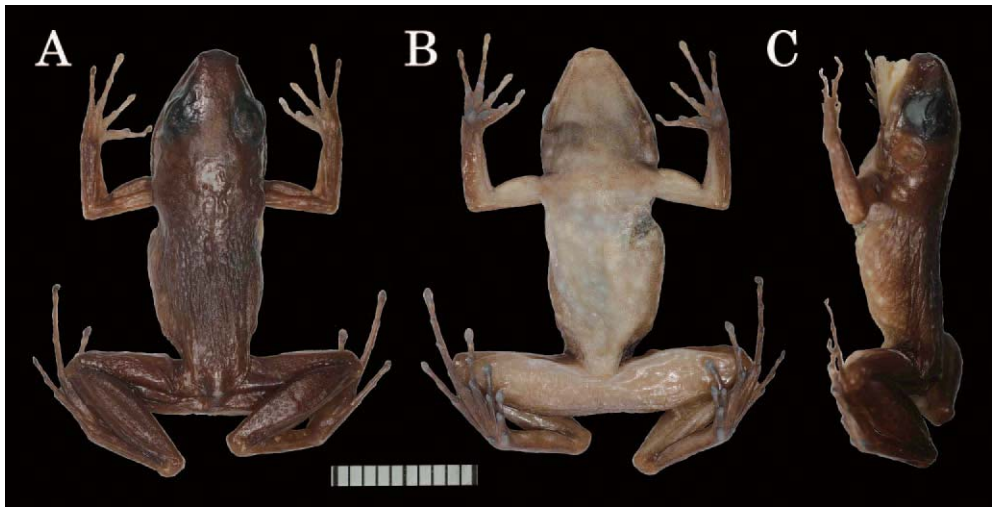


FIG. 3. Dorsal (A), ventral (B), and lateral (C) views of male holotype of *Hylarana rawa* sp. nov. (MZB Amp 14565). Scale bar = 10 mm.

TABLE 2. Uncorrected p-distances (in %) for fragment of 16S rRNA among 10 ranine taxa compared.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1 <i>Hylarana</i> sp. MZB14565																			
2 <i>H. glandulosa</i> KUHE53618	15.3																		
3 <i>H. glandulosa</i> KUHE53639	15.5	0.3																	
4 <i>H. glandulosa</i> KUHE53660	15.4	0.1	0.4																
5 <i>H. glandulosa</i> KUHE54480	15.3	0.0	0.3	0.1															
6 <i>H. glandulosa</i> KUHE54495	15.5	0.5	0.6	0.6	0.5														
7 <i>H. laterimaculata</i> KUHE17593	13.9	4.8	5.1	4.9	4.8	5.4													
8 <i>H. laterimaculata</i> KUHE17594	14.0	4.9	5.2	5.0	4.9	5.5	0.1												
9 <i>H. laterimaculata</i> KUHE17650	14.0	4.9	5.2	5.0	4.9	5.5	0.1	0.2											
10 <i>H. baramica</i> KUHE54478	15.7	5.8	6.1	5.9	5.8	6.4	5.9	6.0	6.0										
11 <i>H. baramica</i> KUHE53617	15.7	5.8	6.1	5.9	5.8	6.4	5.9	6.0	6.0	0.0									
12 <i>H. baramica</i> KUHE53623	15.7	5.8	6.1	5.9	5.8	6.4	5.9	6.0	6.0	0.0	0.0								
13 <i>H. baramica</i> KUHE53640	15.7	5.9	6.2	6.0	5.9	6.5	6.1	6.2	6.2	0.2	0.2	0.2							
14 <i>H. signata</i> KUHE53772	19.9	17.9	18.2	18.0	17.9	18.2	17.5	17.5	17.6	17.3	17.3	17.3	17.4						
15 <i>H. picturata</i> KUHE53544	17.4	16.7	17.0	16.8	16.7	17.0	15.6	15.6	15.7	15.7	15.7	15.7	15.8	7.0					
16 <i>H. erythraea</i> MZB16274	21.2	21.1	21.4	21.3	21.1	21.4	21.0	21.2	21.2	21.7	21.7	21.7	21.9	22.3	21.7				
17 <i>H. nicobariensis</i> TNHC59856	22.2	24.2	24.2	24.4	24.2	24.5	23.2	23.3	23.3	23.3	23.3	23.3	23.5	22.0	20.3	22.1			
18 <i>H. nigrovittata</i> KUHE23726	16.0	18.4	18.6	18.5	18.4	18.5	16.4	16.5	16.5	17.2	17.2	17.2	17.3	16.4	14.5	18.4	18.6		
19 <i>Rana ulma</i> KUHE10056	18.7	19.6	20.0	19.8	19.6	20.0	19.4	19.5	19.5	19.4	19.4	19.4	19.4	21.5	19.1	18.3	23.9	18.5	

word denoting marsh, alluding to the habitat of the new species.

#### Holotype

MZB Amp 14565, an adult male with large humeral glands from peat swamp in Giam-

Siak Kecil Wildlife Reserve, Tasik Betung Village, Sungai Mandau Sub-district, Siak District, Riau Province, Sumatra, Indonesia (01°15'N, 101°30'E, 5–15 m asl), collected on 29 October 2007 by Mulyadi.

### Diagnosis

A small-sized species (SVL 26 mm in an adult male) of the genus *Hylarana*; tympanum one-half of eye length; no dorsolateral fold; hindlimb short, tibiotarsal articulation of adpressed limb reaching posterior border of eye; tips of digits dilated, with horizontal grooves; toe webs poorly developed; vomerine teeth or ridges absent; vocal sac absent; a conspicuous humeral gland on entire anterior surface of upper arm; no distinct marking on brown dorsal body and limbs.

### Description of holotype (measurements in mm)

Snout-vent length 26.1; body slender; head elongate, longer (9.8) than wide (8.1); snout tip blunt in dorsal outline; slightly projecting beyond lower jaw, rounded in lateral profile; canthus rostralis distinct; lore very weakly oblique, concave; nostril below canthus, much nearer to tip of snout (1.3) than to anterior margin of upper eyelid (2.4); internarial distance (2.7) slightly longer than distance from nostril to eye; eye large, length (3.9) less than twice eye-nostril distance, larger than snout



FIG. 4. Ventral view of right hand (A) and foot (B) of male holotype of *Hylarana rawa* sp. nov. (MZB Amp 14565). Scale bar=5 mm.

length (3.7); interorbital flat, wider (2.4) than width of upper eyelid (1.9) but smaller than internarial distance; tympanum conspicuous, nearly circular, about one-half of eye length (2.15), separated from eye by one-third of tympanic diameter (0.7); vomerine teeth or ridges absent; tongue moderately notched, without papilla; no vocal sac or vocal opening.

Forelimb (17.9) rather slender (Fig. 4); fingers slender, unwebbed; relative length of fingers: II=I<IV<III, first finger subequal to second; finger tips dilated forming small disk with interrupted circummarginal grooves; very narrow fringes of skin along distal phalanges; three large palmar tubercles, and one distinct supernumerary tubercle on all metacarpals; subarticular tubercles prominent, oval; no nuptial pads; a single conspicuous humeral gland occupying entire anterior surface of upper arm (Fig. 5).

Hindlimb not long (38.1), slightly more than twice length of forelimb; tibia (11.5) shorter than foot (12.6); heels touching when limbs held at right angles to body; tibiotarsal articulation of adpressed limb reaching posterior border of eye; toe tips similar to finger tips; relative length of toes: I<II<V<III<IV, third toe longer than fifth; toes poorly webbed, formula I 2–2<sup>1</sup>/<sub>2</sub> II 2–3<sup>1</sup>/<sub>2</sub> III 3–4 IV 4<sup>1</sup>/<sub>4</sub>–2<sup>3</sup>/<sub>4</sub> V; webs not crenulate; subarticular tubercles prominent, oval; inner metatarsal tubercle distinct, oval (1.25), two-fifths length of first toe (3.1); outer metatarsal tubercle distinct rather large (0.9), round and raised; no tarsal fold.



FIG. 5. Anterodorsal view of left upper arm of male holotype of *Hylarana rawa* sp. nov. (MZB Amp 14565) showing humeral gland.

Dorsal skin weakly rugose, scattered with small, low glands; supratympanic fold or dorsolateral fold absent; sides scattered with oval glands; throat and chest smooth; abdomen smooth throughout.

*Color in alcohol (after formalin fixation)*

Dark brown dorsally on head and body, densely dotted with dirty cream; no interorbital bar, chevron marking, or vertebral line; small white marking scattered from labial through arm insertion and lateral side of body to groin; dorsal surfaces of limbs and rear of thigh without marking; ventral side whitish scattered with small dark gray markings, especially dark on throat and chest; hand and foot ventrally dark gray.

*Comparisons*

Among members of *Hylarana* from Southeast Asia, *H. rawa* sp. nov. superficially most resembles *H. baramica* from peninsular Thailand and Malaysia, Singapore, Java, Borneo, Sumatra (sympatric with the new species), and Bangka Island, and *H. laterimaculata* from peninsular Thailand and Malaysia, Singapore, Borneo, and Natuna Besar Island, but differ from them in many morphological characteristics, such as distinctly smaller body (male SVL 26.1 mm vs. >35 mm in *H. baramica* and *H. laterimaculata*), and a relatively short hindlimb (tibiotarsal joint only reaching the posterior border of eye vs. reaching at least the middle, and mostly the anterior corner of eye in *H. baramica* and *H. laterimaculata*, when the hindlimb is bent forward along the body). *Hylarana rawa* sp. nov. has a humeral gland covering entire anterior surface of upper arm, but in *H. baramica* and *H. laterimaculata*, the gland is more elevated and limited to proximal half of upper arm. Most conspicuous difference is the absence in *H. rawa* sp. nov. of vomerine teeth or ridges and vocal sac opening that are present in *H. baramica* and *H. laterimaculata*. In addition, *H. rawa* sp. nov. lacks clear dorsal marking, which is conspicuous in *H. baramica* and *H. laterimaculata*.

*Range*

So far known only from Giam-Siak Kecil Wildlife Reserve, Sungai Mandau Sub-district, Siak District, Riau Province, Sumatra, Indonesia (Fig. 1).

*Natural History*

The single male holotype was obtained from a peat land in low elevations. Other species found in this locality were: *Ingerophrynus quadriporcatus* (Boulenger, 18817), *Pseudobufo subasper* Tschudi, 1838, *Fejervarya cancrivora* (Gravenhorst, 1829), *H. parvacola* (Inger, Stuart, and Iskandar, 2009), *H. erythraea* (Schlegel, 1837), *H. baramica*, *H. glandulosa*, *Polypedates leucomystax* (Gravenhorst, 1829), and *P. macrotis* (Boulenger, 1891). Females, eggs and larvae are presently unknown.

DISCUSSION

Of about 86 species of *Hylarana* (Frost, 2011), the new species, *H. rawa* sp. nov. is closer to the members of Dubois' (1992) *Pulchrana*, which was elected as a subgenus of the genus *Rana* (sensu lato). Dubois (1992) placed the following 10 species in *Pulchrana*, with the type species *Polypedates signatus* Günther, 1872: *R. baramica*; *R. debussyi* Van Kampen, 1910 from Deli, Sumatra; *R. glandulosa* from southern Vietnam, Malay Peninsula from southern Thailand, Singapore, Sumatra (sympatric with the new species), Natuna Island, and Borneo; *R. grandocula* Taylor, 1920 from Mindanao, Philippines; *R. luctuosa* (Peters, 1871) from Malay Peninsula from Thailand and Borneo; *R. melanomenta* Taylor, 1920 from Papahag Island, Philippines; *R. mollandorffi* Boettger, 1893 from Palawan Islands, Philippines; *R. siberu* Dring, McCarthy, and Whitten, 1990 from Siberut Island and Peninsular Malaysia; *R. signata* (including *R. picturata*) from Malay Peninsula from southern Thailand, Sumatra, and Borneo; and *R. similis* (Günther, 1873) from Luzon, Polillo, Catañuanes, and Marinduque Islands, Philippines.

Of these, *R. baramica* and *R. glandulosa* are

phenotypically related (Inger, 1966), while *R. grandocula*, *R. melanomenta*, *R. mollendorffi*, *R. siberu*, and *R. similis* are related to *R. signata* (Inger, 1954; Dring et al., 1990; Brown and Guttman, 2002). The remaining species *R. luctuosa* is morphologically distinct from them. Relationships of *R. debussyi* and other species are unknown, but Van Kampen (1923: 199) suggested *R. laterimaculata* to be identical with this species. *Rana laterimaculata* was once synonymized with *R. baramica* (Inger, 1966), but was resurrected as a distinct species from morphological and acoustic evidence (Leong et al., 2003). Actually, *R. debussyi* and *R. laterimaculata* are clearly different (see below). As we have compared in this paper, *H. rawa* sp. nov. is morphologically closer to *R. baramica* and *R. laterimaculata* than to the other species of Dubois' *Pulchrana*. Therefore, if indeed *R. debussyi* and *R. laterimaculata* are related, possibilities remained that *H. rawa* sp. nov. could be a synonym of *R. debussyi*, especially because both the species are endemic to Sumatra as far as we know. Unfortunately, we could not access to samples of *R. debussyi*, but from the description of the species (Van Kampen, 1910, 1923) and photographs of live specimens (kindly offered by Mistar, an autodidact Sumatran herpetologist), the two species are distinctly different; *Rana debussyi* phenotypically resembles *R. siberu*, in having a light-colored stripe from snout-tip through upper eyelid to groin, and thigh and tibia marked with light-colored bars, etc. Habitat of the two species also seems to differ; *R. debussyi* was recorded from Bander Baru in the Battak Mountains, 1000 m asl, while *H. rawa* sp. nov. was obtained from the marshy area in Riau, situated near the sea level.

As noted before, survey of anuran diversity has not been adequately made in Sumatra, and many new species have been described recently (e.g., Doria et al., 1999; Inger et al., 2008; Teynié et al., 2010). Thus, it is not surprising that a species like *H. rawa* sp. nov. was discovered in the area of Biosphere Reserve, which is relatively easy to access. On

the other hand, Sumatra is reported to have lost nearly half of natural forest cover in these 30 years, and extinction of several large mammals is in concern. Because biodiversity of the Giam Siak Kecil Wildlife Reserve, where the present new species was found, is also influenced by logging (Sutrisno, 2009), immediate attention from the viewpoint of conservation is required.

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#### LITERATURE CITED

- BARBER, A. J., CROW, M. J., AND MILSOM, J. S. 2005. Introduction and previous research. p. 1–6. In: A. J. Barber, M. J. Crow, and J. S. Milsom (eds.) *Sumatra: Geology, Resources and Tectonic Evolution*. Geological Society, London.
- BROWN, R. M. AND GUTTMAN, S. L. 2002. Phylogenetic systematics of the *Rana signata* complex of Philippine and Bornean stream frogs: reconsideration of Huxley's modification of Wallace's Line at the Oriental–Australian faunal zone interface. *Biological Journal of the Linnean Society* 76: 393–461.
- DARST, C. R. AND CANNATELLA, D. C. 2004. Novel relationships among hyloid frogs inferred from 12S and 16S mitochondrial DNA sequences.



- Molecular Phylogenetics and Evolution* 31: 462–475.
- DORIA, G., SALLVIDIO, S., AND TAVANO, M. L. 1999. Description of *Amolops (Huia) modiglianii*, new species from Sumatra (Amphibia, Anura, ranidae). *Doriana* 7: 1–9.
- DRING, J., MCCARTHY, C., AND WHITTEN, A. 1990. The terrestrial herpetofauna of the Mentawai Islands, Indonesia. *Indo-Malayan Zoology* 6: 119–132.
- DUBOIS, A. 1992. Notes sur la classification des Ranidae (Amphibians Anoures). *Bulletin Mensuel de la Societe Linneenne de Lyon* 61: 350–352.
- FOUQUET, A., GILLES, A., VENCES, M., MARTY, C., BLANC, M., AND GEMMELL, N. J. 2007. Underestimation of species richness in Neotropical frogs revealed by mtDNA analyses. *PLoS ONE* 2: e1109.
- FROST, D. R. 2011. *Amphibian species of the world: an online reference. Version 5.5 (31 January, 2011)*. American Museum of Natural History, New York. <http://research.amnh.org/vz/herpetology/amphibia/index.html>
- HARVEY, M. B., PEMBERTON, A. J., AND SMITH, E. N. 2002. New and poorly known parachuting frogs (Rhacophoridae: *Rhacophorus*) from Sumatra and Java. *Herpetological Monographs* 16: 46–92.
- INGER, R. F. 1954. Systematics and zoogeography of Philippine Amphibia. *Fieldiana: Zoology* 33: 183–531.
- INGER, R. F. 1966. The systematics and zoogeography of the Amphibia of Borneo. *Fieldiana: Zoology* 52: 1–402.
- INGER, R. F. 1999. Distribution of amphibians in Southern Asia and adjacent islands. p. 445–482. In: W. E. Duellman (ed.) *Patterns of Distribution of Amphibians. A Global Perspective*. Johns Hopkins University Press, Baltimore and London.
- INGER, R. F. AND ISKANDAR, D. T. 2005. A collection of amphibians from West Sumatra, with description of a new species of *Megophrys* (Amphibia: Anura). *Raffles Bulletin of Zoology* 53: 133–142.
- INGER, R. F., STUART, B. L., AND ISKANDAR, D. T. 2008. Systematics of a widespread Southeast Asian frog, *Rana chalconota* (Amphibia: Anura: Ranidae). *Zoological Journal of the Linnean Society* 155: 123–147.
- INGER, R. F. AND TAN, F.-L. 1996. Checklist of the frogs of Borneo. *Raffles Bulletin of Zoology* 44: 551–574.
- INGER, R. F. AND VORIS, H. K. 2001. The biogeographical relations of the frogs and snakes of Sundaland. *Journal of Biogeography* 28: 863–891.
- LEONG, T.-M., MATSUI, M., YONG, H.-S., AND HAMID, A. A. 2003. Revalidation of *Rana latelimaculata* Barbour et Noble, 1916 from the synonymy of *Rana baramica* Boettger, 1901. *Current Herpetology* 22: 17–27.
- MATSUI, M. 1984. Morphometric variation analyses and revision of the Japanese toads (genus *Bufo*, Bufonidae). *Contributions from the Biological Laboratory, Kyoto University* 26: 209–428.
- MATSUI, M., HAMIDY, A., BELABUT, D. M., AHMAD, N., PANHA, S., SUDIN, A., KHONSUE, W., OH, H.-S., YOUNG, H.-S., JIANG, J.-P., AND NISHIKAWA, K. 2011. Systematic relationships of oriental tiny frogs of the family Microhylidae (Amphibia, Anura) as revealed by mtDNA genealogy. *Molecular Phylogenetics and Evolution* 61: 167–176.
- PAGE, B. G. N., BENNETT, J. D., CAMERON, N. R., BRIDGE, D. MCC., JEFFERY, D. H., KEATS, W., AND THAIB, J. 1979. A review of the main structural and magmatic features of northern Sumatra. *Journal of the Geological Society of London* 136: 569–579.
- SHIMADA, T., MATSUI, M., YAMBUN, P., AND SUDIN, A. 2011. A taxonomic study of Whitehead's torrent frog, *Meristogenys whiteheadi*, with descriptions of two new species (Amphibia: Ranidae). *Zoological Journal of the Linnean Society* 161: 157–183.
- SUTRISNO, H. 2009. A comparison on biodiversity between private conservation and wildlife reserve forests in Riau by using macro-moths as an indicator. *Biodiversitas* 10: 34–39.
- TEYNIÉ, A., DAVID, P., AND OHLER, A. 2010. Note on a collection of amphibians and reptiles from western Sumatra (Indonesia), with the description of a new species of the genus *Bufo*. *Zootaxa* 2416: 1–43.

VAN KAMPEN, P. N. 1910. Eine neue *Necophryne*-Art und andere Amphibien von Deli (Sumatra). *Natuurkundige Tijdschrift voor Nederlandsch-Indie* 69: 18–24.

VAN KAMPEN, P. N. 1923. *The Amphibia of the Indo-Australian Archipelago*. E. J. Brill, Leiden. 304 pp.

#### APPENDIX I

##### *Specimens of Hylarana examined for morphological comparisons*

*H. baramica* from Sarawak, Borneo: KUHE 10537, 17017, 17030, 17031, 17068, 17119, 53616, 53617, 53623, 53638, 53640, 53939, 54478.

*H. glandulosa* from Sarawak, Borneo: KUHE 10370, 10486, 10505, 10506, 10566, 10614, 42570, 42599, 42600, 42601, 53605, 53618, 53639, 53660, 54479.

*H. laterimaculata* from Sarawak, Borneo: KUHE 17592, 17593, 17594, 17607, 17650.

*H. luctuosa* from Sarawak, Borneo: KUHE 53763, 53769; from Malay Peninsula: KUHE 54210, 54211, 54255, 54256, 54257.

*H. signata* from Sarawak, Borneo: KUHE 53526, 53527, 53544, 53587, 53659, 53661, 53737, 53738, 53739, 53792, 53844, 53917, 54497, 54548.

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## Erratum

In the article “Description of a New Species of *Hylarana* from Sumatra (Amphibia, Anura)” by Masafumi Matusi, Mumpuni, and Amir Hamidy, appearing in *Current Herpetology* 31(1), pp. 38–46, on 30 June 2012, there was an error in the right column of page 40: The word “*Rana rawa n. sp.*” should be replaced with “*Hylarana rawa n. sp.*”.