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Importance of genetic data in resolving cryptic species: A century old problem of understanding the distribution of *Minervarya syhadrensis* Annandale 1919, (Anura: Dicroglossidae)

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Abstract

Frogs of the genus *Minervarya* are cryptic and widely distributed in South Asia. However, many of them lack information about the precise type locality, genetic data, and distribution range. The present study aimed to examine the genetic affinities of a widely distributed species *Minervarya syhadrensis* around its type locality in the northern Western Ghats (Pune, Maharashtra). We studied the type specimen of *M. syhadrensis* and collected similar sized *Minervarya* frogs from Pune district. In the field, we observed two different calls from morphologically similar (*M. syhadrensis* like) males suggesting the sympatric occurrence of two cryptic species (that we initially named *Minervarya* species A and *Minervarya* species B). We analyzed morphology, call pattern, and mitochondrial 16S rRNA gene sequence of both species. *Minervarya* species A has a long call with a low pulse repetition rate and higher dominant frequency compared to that of the *Minervarya* species B. These species cannot be differentiated based on morphometric data. However, they can be sorted out using morphological characters such as the presence of longitudinal skin folds on the dorsal side (*Minervarya* species A) and differences in foot webbing. DNA sequences of *Minervarya* species A and *Minervarya* species B are matching with those of *M. caperata* and *M. agricola* respectively. After studying the type specimens of *M. syhadrensis* and *M. caperata*, we found morphological similarities (longitudinal skin folds) with the samples of *Minervarya* species A collected during the present study. Based on the results of our study (morphology and genetic) and available literature, we propose to redefine *M. syhadrensis* as applying to the lineage initially named *Minervarya* species A, and to treat the species *M. caperata* as a junior synonym of *M. syhadrensis*. Our study will be helpful in further taxonomic revision of the genus, and provides natural history information for *M. syhadrensis* and *M. agricola*.

Key words: Advertisement call, cryptic species, *Minervarya syhadrensis*, *Minervarya caperata*, integrative taxonomy

Introduction

In the process of resolving ambiguities in amphibian taxonomy, many species are being newly described, resurrected, and synonymized worldwide (Frost 2019). One of the major difficulties in the identification and description of the frog species is that they are morphologically cryptic (Bickford *et al*. 2007). Cryptic species are deceptive, sometimes having polymorphic morphological characters, which could lead to underestimation or overestimation of species diversity and distribution (Vieites *et al*. 2009; Funk *et al*. 2012; Dufresnes *et al*. 2018). Also, the loss or dis-

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tortion of type specimens, incomplete descriptions, and lack of (or vague) precise type locality information are some of the major impediments in species identification (Biju *et al.* 2011; Garg *et al*. 2018). In the recent past, integrated taxonomic approaches have been applied successfully to resolve the problems associated with the identification of cryptic species (Vieites *et al*. 2009; Padial *et al*. 2010; Vijayakumar *et al*. 2014; Dinesh *et al*. 2015; Garg & Biju 2017; Garg *et al*. 2017; Dufresnes *et al*. 2018; Vijayakumar *et al*. 2019). In addition to morphological and genetic information, acoustic, behavioral, and reproductive studies can be useful for the identification of cryptic species (Funk *et al*. 2012; Abraham *et al*. 2013; Wang *et al*. 2017). Call properties of sympatric species are generally different, and their detailed analysis can help to distinguish cryptic species (Köhler *et al*. 2017).

The Indian sub-continent hosts several biodiversity hot spots, including the Western Ghats, which has a highly endemic amphibian fauna (Gunawardene *et al*. 2007; Amphibiaweb 2019; Frost 2019). Recently, many amphibian species, including species belonging to the genus *Minervarya* (Dubois *et al*. 2001) have been discovered (Dinesh *et al*. 2015, 2017; Garg & Biju 2017; Raj *et al*. 2018; Phuge *et al*. 2019). The genera *Minervarya and Fejervarya* belong to the family Dicroglossidae (Anderson 1871), and they are characterized by the presence of Fejervaryan lines on both the sides of belly (Bolkay 1915). The systematic status of many frogs belonging to both these genera are doubtful due to unclear information about their types and localities (for detailed accounts see Dinesh *et al*. 2015; Garg & Biju 2017; Dinesh *et al*. 2017; Raj *et al*. 2018; Chandramouli *et al*. 2019; Phuge *et al*. 2019). Moreover, the names of many species and even genus names have been changed several times (often without proper description of morphological characters and assessment of distributions) making taxonomic studies more complicated (Dubois *et al*. 2001; Hawaldar 2011; Dinesh *et al*. 2015; Sanchez *et al*. 2018; Frost 2019; Phuge *et al*. 2019). *Minervarya* frogs are widely distributed and morphologically cryptic with considerable intra-specific variation in appearance, making accurate species identification very difficult (Kuramoto *et al*. 2007; Dinesh *et al*. 2015, 2017; Garg & Biju 2017; Raj *et al*. 2018). In addition, due to the increasing number of new species discoveries, morphological characters proposed for classifying species groups of *Minervarya* and *Fejervarya* frogs are limited for identification in the field (Ohler *et al*. 2014; Dinesh *et al*. 2015; Sanchez *et al*. 2018; Phuge *et al*. 2019). Considering the complexity in the taxonomic status of the genera *Fejervarya* and *Minervarya*, we are following the taxonomic scheme suggested by Sanchez *et al*. (2018) tentatively.

The Bombay wart frog *M. syhadrensis* was described by Annandale (1919) as *Rana limnocharis syhadrensis* from Poona (now Pune), Satara, and Nashik district in the northern Western Ghats (Fig. 1). Since then, this species is considered to be widespread in India, Pakistan, Bangladesh, Sri Lanka, and Nepal (Frost 2019). In recent years, several new species of the genus *Minervarya* have been described from the Western Ghats (Dubois *et al*. 2001; Kuramoto *et al*. 2007; Dinesh *et al*. 2015, 2017; Garg & Biju 2017; Raj *et al*. 2018; Phuge *et al*. 2019), but none of the studies included the genetic data for *M. syhadrensis* from its type locality. In 2007, Kuramoto *et al*. described four species of *Minervarya* from the central Western Ghats with phylogenetic data (without genetic data for *M. syhadrensis* from the type locality) and limited geographical sampling. In the subsequent phylogenetic studies by Kotaki *et al*. (2010), the authors suggested two populations of *M. syhadrensis*, one from the central Western Ghats (Karnool) and another from Sri Lanka (Matale). Later, during the new species descriptions, the nomen *M. syhadrensis* was shown in the phylogenetic studies by Dinesh *et al*. (2015, 2017), Garg and Biju (2017), Raj *et al*. (2018), Phuge *et al*. (2019) based on GenBank data sets submitted by Kotaki *et al*. (2010).

In the present study, we attempted to generate genetic data for *M. syhadrensis* from its type locality (Pune district of Maharashtra state, India). We first studied the type specimen of *M. syhadrensis* and then collected *Minervarya* frogs from the type locality (Fig. 1). During field explorations, we observed two *Minervarya* species (*Minervarya* species A and *Minervarya* species B) with distinct call pattern, but having morphology similar to *M. syhadrensis*. Our observations revealed that both the types of males amplect with any (similar sized congeneric) gravid female around. We analyzed morphological and acoustic characters along with the genetic data and identified as different species. Based on the morphological characters (such as the presence of longitudinal skin folds on the dorsal side), we identified one of the species studied in the present study (*Minervarya* species A) as *M. syhadrensis*. Genetic analysis revealed that DNA sequences (the 16S rRNA gene) of *M. syhadrensis* matches those of *M. caperata*. Based on the results of the present study, available literature, and museum specimen study (of *M. caperata and M. syhadrensis*), we propose to consider *M. caperata* as a junior synonym of *M. syhadrensis*.

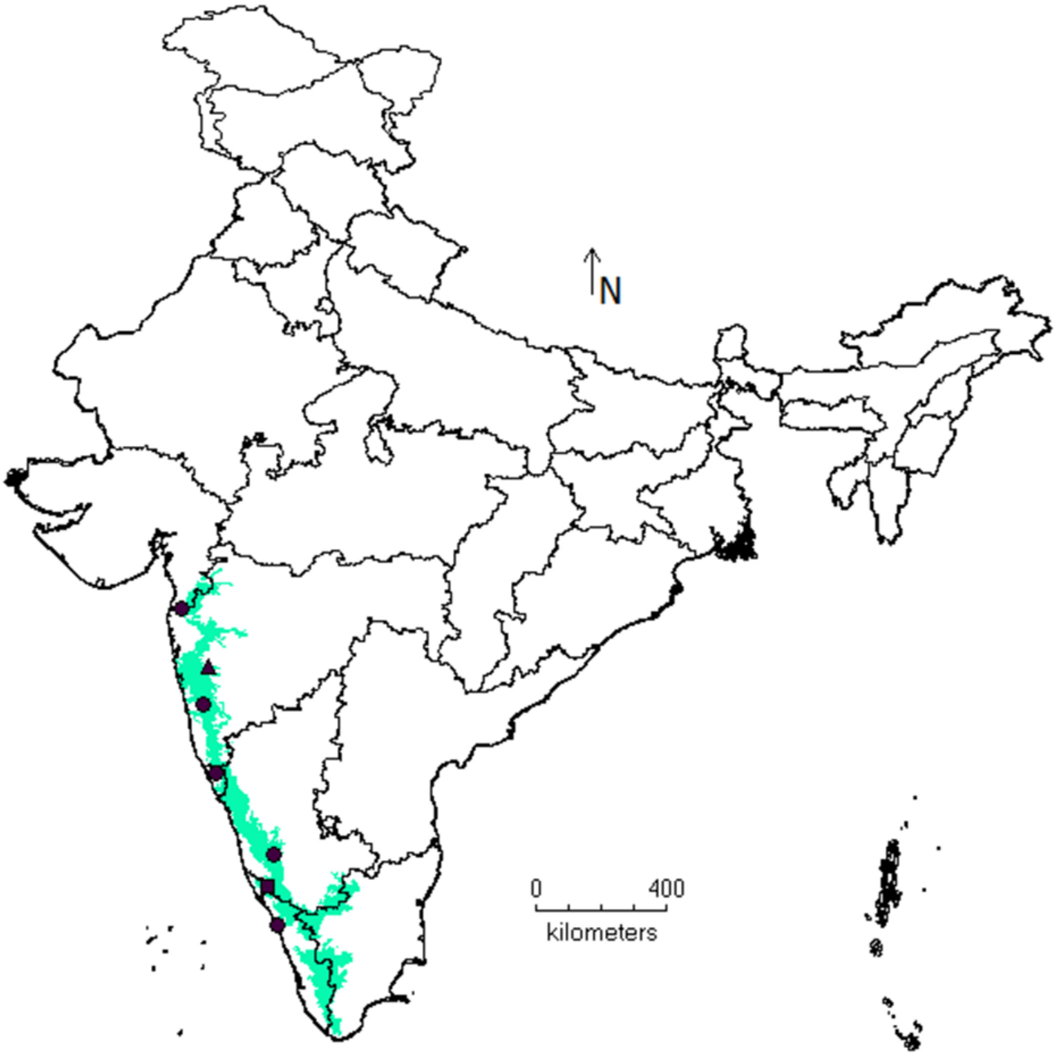

FIGURE 1. Map showing type localities of *Minervarya syhadrensis* (▲), *M. caperata* (■) and collection localities (●) in the present study.

Material and methods

Abbreviations. BNHS—Bombay Natural History Society, Mumbai; ZSI—Zoological Survey of India, Kolkata; ZSI/WRC/A-Zoological Survey of India, Western Regional Centre, Pune

Type specimens examined. We studied the type specimens of *Minervarya syhadrensis* (ZSI 19764) and *M. caperata* (BNHS4657 to BNHS4660) for morphological assessment.

Field survey, call recording and analysis. Field visits were carried out during the monsoon months (July to August) of 2016 and 2017 in and around Savitribai Phule Pune University Campus, Pune, and other regions of Pune district in the northern Western Ghats (Fig. 1). We collected and observed frogs of all *Minervarya* species. We recorded calls of two species having size and morphology similar to *M. syhadrensis*. Calling males were located using low-intensity torches, and advertisement calls were recorded during 19:00 to 23:00 hours. Initially, we termed males of different species as *Minervarya* species A and *Minervarya* species B. Advertisement calls were recorded using digital audio recorder (Tascam DR-05) connected to the microphone (Polsen SCL-1075) with a foam windscreen (sampling rate 16 bits, 44.1 kHz). The microphone was directed towards vocal sacs of the calling males and the distance between calling males and microphone was kept ~30 cm. Each individual was recorded for at least 1 min to record a minimum of 3 to 5 call bouts. A total of 37 individuals of both the species (*Minervarya* species A—22 and *Minervarya* species B—15) were recorded. Air temperature at the calling site was 24–25 °C.

The recordings were checked for noise and overlapping calls of other individuals. Clean recordings of 26 males (13 of each species) were considered for call analysis. A total of 556 calls (*Minervarya* species A—275 and *Minervarya* species B—281) of both the species were analyzed, with 21–24 calls per individual. We used terminologies prescribed by Köhler *et al*. (2017) to describe the calls. Six temporal and two spectral properties (Table 1) of each call were analyzed using Raven Pro v1.5 (Charif *et al*. 2010). Temporal parameters were measured using Raven's waveform window function, and spectral parameters were measured using the Raven's spectrogram window function. Dominant and fundamental frequencies were identified by selecting the highest energy bands and using maximum frequency function in the spectrogram view (FFT window—512, contrast—90, and brightness—45). We calculated the coefficient of variation [CV= $(SD/\overline{X})$ x 100] to determine the static and dynamic call properties (Gerhardt 1991). After call recording, five males of each species were captured and brought to the laboratory where they were photographed under laboratory conditions. Then they were euthanized using 1% Tricaine methanesulfonate (MS 222), thigh muscle tissue was extracted for genetic analysis (stored in molecular grade ethanol), and animals were fixed in 4% neutral formalin for 48 h and later preserved in 70% ethanol.

TABLE 1. Description of call properties analyzed for *Minervarya* species A and *Minervarya* species A.

Call Parameter	Description
Call Duration (CD)	Time duration between onsets of first pulse to the offset of last pulse of a call.
Call Repetition Rate (CRR)	Rate of recurrence of a call in the call group. i.e.[CRR=(n-1)/T] , Where, n=No of calls in a call group-1 and T=time duration from onset of first call to the onset of last call in a call group.
Inter-call Interval (ICI)	Time duration of silent period between two consecutive calls.
Number of Pulses/Call (P/C)	Total number of pulses in a call. (K)
Pulse Repetition Rate (PRR)	Rate of Recurrence of pulse in the call. i.e. PRR=(K-1)/t .
Fundamental Frequency(FF)	Maximum frequency of the first high energy band in the spectrogram view of a call.
Dominant Frequency (DF)	Maximum frequency of the second high energy band in the spectrogram view of a call.

Morphometric analysis. We carried out a total of 31 measurements for each specimen using Mitutoyo digital caliper (to the nearest 0.1 mm) and stereomicroscope (Leica MZ75); the following are the morphological measurements taken for each specimen. AG—axilla to groin distance; EL—eye length, i.e. the horizontal distance between the bony orbital borders of the eye; FL1—first finger length (tip of finger to proximal palmar tubercle); FL2—second finger length (tip of finger to proximal palmar tubercle); FLL—forelimb length, measured from the elbow to the base of the outer palmar tubercle; FOL—foot length, measured from the base of the inner metatarsal tubercle to the tip of the fourth toe; FTL—fourth toe length, measured from base of proximal sub articular tubercle to toe tip; HAL— hand length, measured from the base of the outer palmar tubercle to the tip of the third finger; HL—head length, from the rear of the mandible to the tip of the snout; HW—head width, at the angle of the jaws; IBE—distance between posterior corner of eyes; IFE—distance between anterior corner of eyes; IMT—length of inner metatarsal tubercle; IN—internarial distance; ITL-inner toe length; IUE—inter upper eyelid width, i.e., the shortest distance between the upper eyelids; MBE—distance from the rear of the mandible to the posterior most orbital border; MFE—distance from the rear of the mandible to the anterior most orbital border; MN—distance from the rear of the mandible to the centre of the nostril; NE—nostril to eye distance; ShL/FL— thigh length; SL—snout length, measured from the tip of the snout to the anterior most orbital border; SVL—snout to vent length; Tal—tarsus length; TE—tympanum to posterior corner of eye distance; TFL—third finger length (tip of finger to proximal palmar tubercle); TiL—tibia length; TYD—tympanum diameter; UEW—maximum upper eyelid width; WBS—body width behind shoulders; WFG—body width in front of groin.

Phylogenetic analyses and genetic identification. We extracted DNA from thigh muscle tissue using DNeasy blood and tissue kit (Qiagen, Valencia, CA, USA) following the manufacturers protocol. From the purified eluted DNA, we amplified the mitochondrial (mt) 16S rRNA gene using previously described primers (Simon *et al*. 1994). The amplified PCR products were purified using QIAquick® PCR Purification Kit and Sanger sequencing was done using ABI 3500 XL platform (Applied Biosystems).

For the construction of Maximum Likelihood tree, data was considered only for the *'Minervarya* clade having predominant distribution in Sri Lanka, India, Bangladesh and Nepal (Fig 2, Phuge *et al.*, 2019). With the sequences generated in the present study (Table 4) and the mt 16s r RNA sequences downloaded from the GenBank, sequences were aligned using Mega 5.2 (Tamura *et al.* 2013) (Table 4). Maximum Likelihood (ML) tree was run using RaxML (Silvestro & Michalak, 2012) under GTR+GAMMA+I model by running 1000 thorough bootstraps and the final tree was visualized using Figtree v1.4.3.

Statistical analyses. Data for call properties of both the species were checked for normal distribution and homogeneity using the Shapiro-Wilk test and Levene's test, respectively. Data were not normally distributed. There was a negligible variation (low standard variation value) in the call recorded from each individual. Therefore, we calculated the mean of call properties from individual males (Wang *et al.* 2017). The sample size for each call property corresponds to the number of males recorded for each species (13 males of each species). Differences in the individual call properties were analyzed using the Mann-Whitney U test. For morphometric analysis, a total 13 morphological measurements were transformed to their ratio to SVL (Supplementary file Table 1). Differences in the morphological characters of the two species were analyzed by principal component analysis (PCA) using PAST software (Hammer *et al*. 2001).

FIGURE 2. Type specimen of *Minervarya syhadrensis* (ZSI 19764). Note the presence of longitudinal skin folds on dorsal side. Scale bar = 1cm.

Results

Type specimen of *Minervarya syhadrensis*. Morphological data available from the original descriptions of *M. syhadrensis* (Annandale 1919) is very limited and the type specimen is in a damaged condition for measuring morphometric details (Fig. 2). Due to these limitations we could not take the morphometric data from the type specimen. However, longitudinal skin folds could be seen on the dorsal side of the type specimen of *M. syhadrensis* (Fig. 2), and these are also clearly mentioned in the original description.

Field identification of *Minervarya* species. Our field work during two consecutive years revealed the occurrence of four *Minervarya* species in Pune district. Based on the morphological and acoustic characteristics, we identified two species as *M. cepfi* (presence of prominent shovel-shaped inner metatarsal tubercle, small webbing between toes) and *M. marathi* (large body, medium webbing between toes and barred upper lips; Garg and Biju 2017; Phuge *et al*. 2019). The remaining two species have great similarity in size and appearance (Fig. 3). Their sizes and morphological characters are matching with those of *M. syhadrensis* (Annandale 1919). Similar to original descriptions of *M. syhadrensis* (Annandale 1919), both the unidentified species are commonly distributed throughout Pune district. Calls of both these species are distinct and the difference in their call pattern is detectable to the human ear.

Considering the possibility of occurrence of two cryptic species, we analyzed advertisement call, morphology and 16S rRNA sequence of both the species. Males of one of the species have longitudinal skin folds on the dorsal side (henceforth *Minervarya* species A; Fig. 3A).

Call Description. Males of both species were observed calling in chorus with other sympatric species *Microhyla nilphamariensis* and *Euphlyctis cyanophlyctis*. Males of both species (*Minervarya* species A and *Minervarya* species B) were seen calling from the moist substratum next to stagnant water. We followed a call centered approach to describe the calls (Köhler *et al*. 2017). The calls of both the species were separated by equal or unequal time intervals (Table 2).

***Minervarya* species A.** The call of *Minervarya* species A typically lasts for 0.114 to 0.233 s and composed of a series of distinguishable pulses depicting a pulsed nature (Fig. 4A and C; Table 2). Each call contains 12-25 pulses with 100% amplitude modulation (Fig. 4C). The call spectrogram shows two high energy frequency bands, fundamental frequency range (1722.7 to 2067.2 Hz) and dominant frequency (3273 to 4134.4 Hz; Table 2; Fig. 4B).

***Minervarya* species B.** The call of *Minervarya* species B is short, ranging from 0.056 to 0.451 s and composed of an uninterrupted chain of pulses depicting its pulsatile nature (Fig. 5A and C). The call is composed of 11 to 20 pulses with moderate amplitude modulation (Fig. 5B and C; Table 2). The calls are emitted at fundamental frequency 1550.4 to 1808.8 Hz and dominant frequency 3186.9 to 3617.6 Hz (Fig. 5B; Table 2).

Among the call properties, we considered call duration (CD), number of pulses per call, pulse repetition rate (PRR), fundamental frequency (FF) and dominant frequency (DF) as static properties (CV% range—2.6 to 14.39) while inter-call-interval (ICI) and Call repetition rate (CRR) as a dynamic properties (CV% range—26.7 to 47.5; Table 2). All the static properties were analyzed for the difference between the two species. Mann-Whitney U test showed that call duration, number of pulses, the fundamental and dominant frequency of *Minervarya* species A are significantly higher as compared to *Minervarya* species B ($P < 0.03$; Fig. 6A, B, D, and E), while pulse repetition rate of *Minervarya* species B is high as compared to that of the *Minervarya* species A ($P < 0.001$; Fig. 6C).

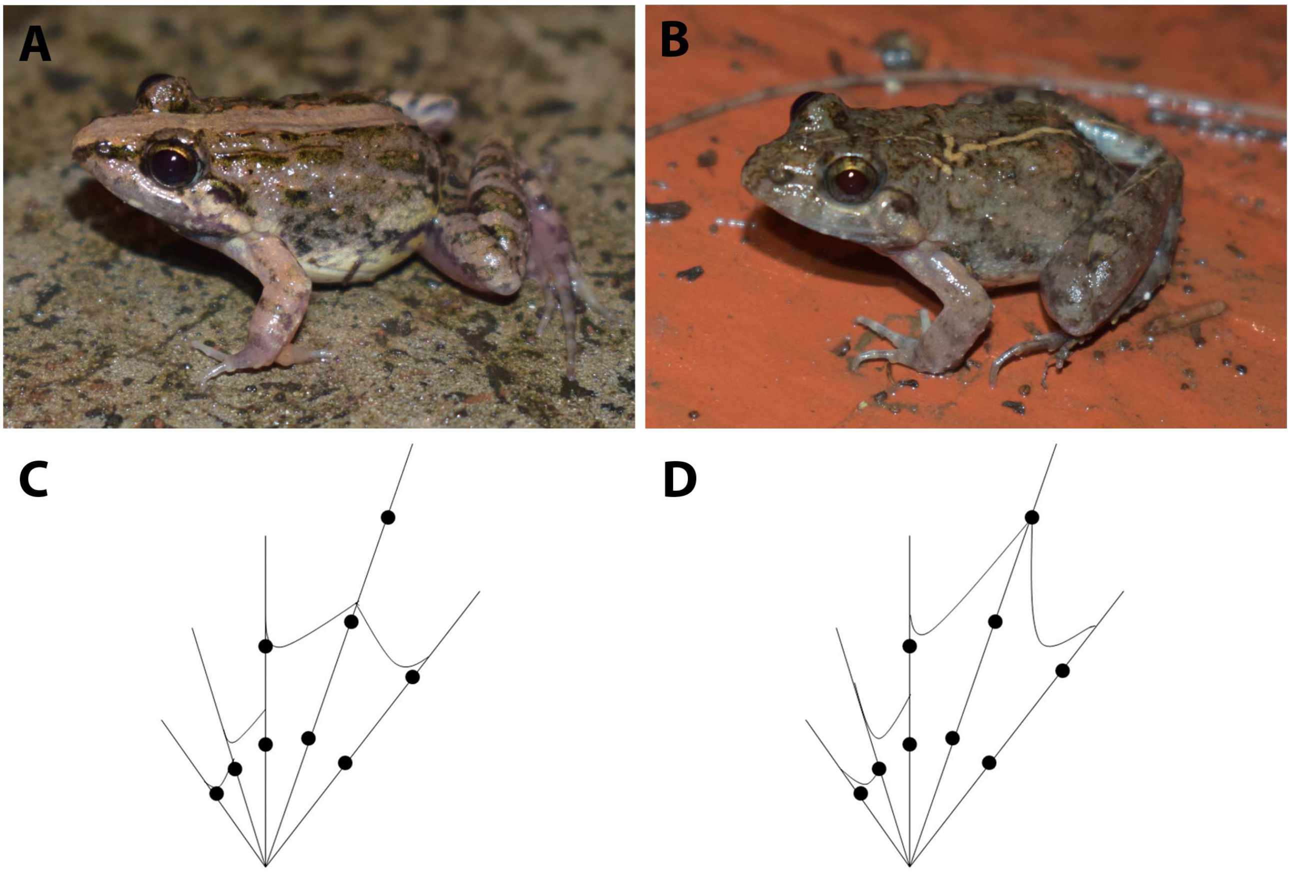

FIGURE 3. Morphological characters of *Minervarya* species A and *Minervarya* species B. *Minervarya* species A (A) and *Minervarya* species B (B) in life. Note the longitudinal skin folds on dorsal side of *Minervarya* species A and granular blotches on *Minervarya* species B. Difference in the webbing pattern on the foot of *Minervarya* species A (C) and *Minervarya* species B (D).

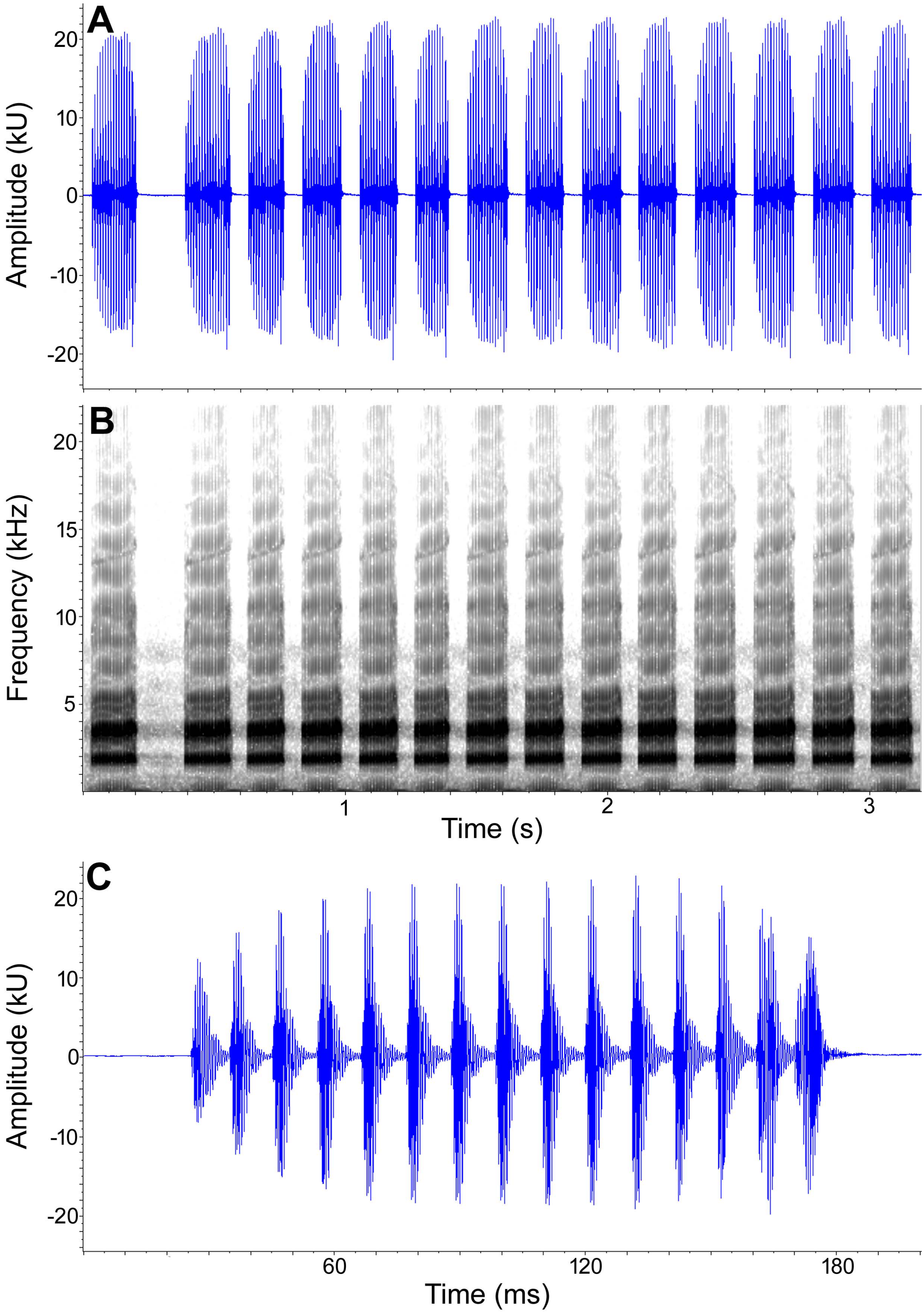

FIGURE 4. Advertisement call of *Minervarya* species A. Microtemporal structure (A) and spectrogram (B) of a call group. (C) Microtemporal structure of a single call. Note the pulsed nature of call.

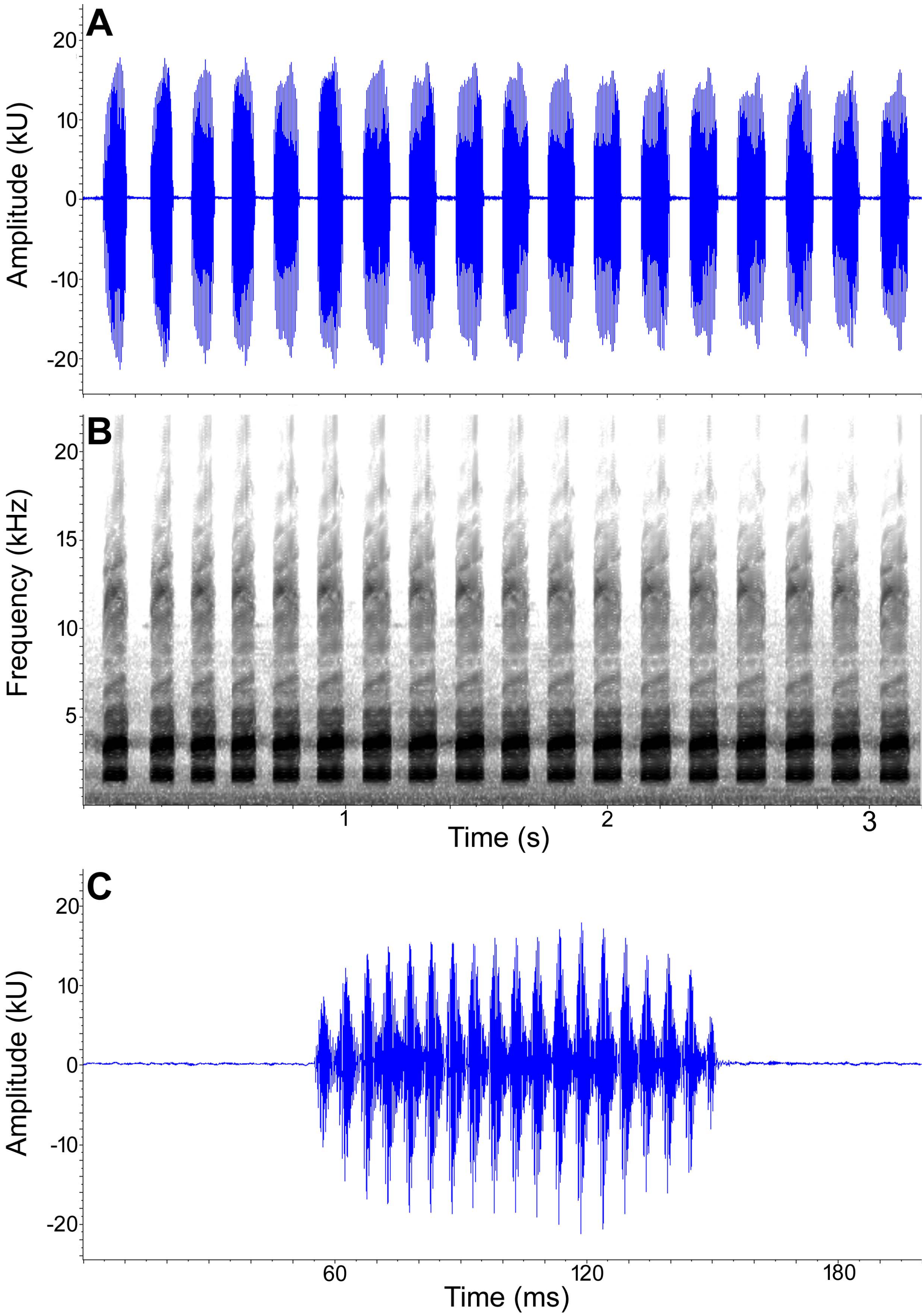

FIGURE 5. Advertisement call of *Minervarya* species B. Microtemporal structure (A) and spectrogram (B) of a call group. (C) Microtemporal structure of a call depicting its pulsatile nature.

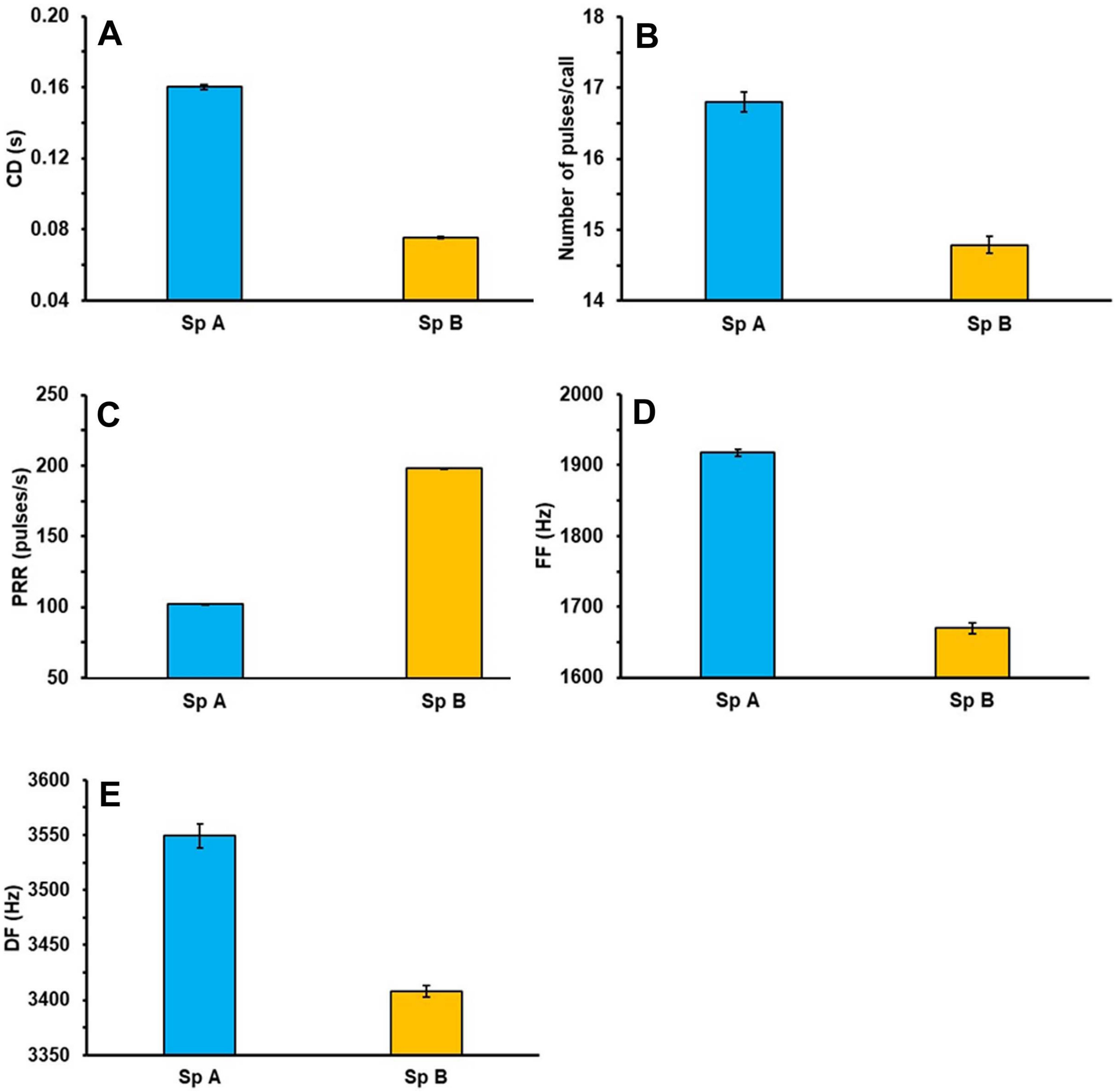

FIGURE 6. Comparison of five call properties between *Minervarya* species A and *Minervarya* species B. Bar graphs represent mean±SE ($P < 0.05$). CD = call duration, PRR = pulse repetition rate, FF = fundamental frequency, and DF = dominant frequency.

Morphometric analyses. Morphometric differences in *Minervarya* species A and *Minervarya* species B were analyzed using a total of 13 measurements (marked as * in Supplementary file Table 1). PCA analysis revealed that both the species could not be separated on the scatter plot (Fig. 7). The first two axes explain 58.7% variation, while the first four axes explain more than 83% variation (Table 3). On the PCA morphological characters like TYD and FOL seems to be differentiating. However, due to small differences in measurements (Supplementary file Table 1), these characters seem to be unrealistic for identification in the field. Besides these measurements, longitudinal skin folds were seen on the dorsal side of *Minervarya* species A (Fig. 2; Fig. 9A) while they were absent in *Minervarya* species B (with glandular blotches) (Fig. 3A and B). Further, both the species have different webbing pattern on their hind leg toes; in *Minervarya* species A, webbing on the fourth toe extends up to the second last tubercle (Fig. 3C) while in *Minervarya* species B, webbing on the fourth toe extends up to the last tubercle (Fig. 3D).

TABLE 2. Descriptive statistics of the calls of *Minervarya* species A and *Minervarya* species B. N = number of call analyzed per species.

	Mean	**SD**	**Range(min–max)**	**CV%**
***M. species A* (N=281)**				
Call Repetition Rate(calls/sec)	4.263	0.512	2.244–5.740	12.002
Call Duration(sec)	0.160	0.022	0.114–0.233	13.810
****Intercall Interval(sec)**	0.079	0.037	0.051–0.273	46.706
Number of pulses/call	16.302	2.277	12–25	13.965
Pulse Repetition Rate(pulses/sec)	102.078	4.160	94.340–114.286	4.075
Fundamental Frequency(Hz)	1917.921	81.232	1722.7–2067.2	4.235
Dominant Frequency(Hz)	3549.225	186.881	3273–4134.4	5.265
***M. species B* (N=275)**				
Call Repetition Rate(calls/sec)	4.485	1.199	2.588–6.961	26.737
Call Duration(sec)	0.076	0.011	0.05–0.107	14.399
*** Intercall Interval(sec)**	0.162	0.077	0.056–0.451	47.555
Number of pulses/call	14.287	2.029	11–20	14.203
Pulse Repetition Rate(pulses/sec)	197.881	6.246	171.875–235.294	3.157
Fundamental Frequency(Hz)	1669.724	132.376	1550.4–1808.8	7.928
Dominant Frequency(Hz)	3408.031	89.141	3186.9–3617.6	2.616

***N=244, **N=249**

TABLE 3. Factor loadings of Principal Component Analysis for *Minervarya* species A and *Minervarya* species B using ratios to SVL of a total of 13 morphometric characters marked as * in Supplementary file Table 1.

	PC 1	**PC 2**	**PC 3**	**PC 4**	**PC 5**	**PC 6**	**PC 7**	**PC 8**	**PC 9**
HW	0.35086	-0.20075	0.010674	0.259	-0.36704	-0.23632	0.35491	-0.0639	-0.20536
HL	0.3482	0.28637	-0.1775	-0.12419	-0.32909	0.11994	0.048703	-0.16075	-0.11028
IN	0.23674	-0.026604	-0.53122	-0.21628	0.046793	-0.24252	0.33594	0.069262	0.43863
NE	0.2893	-0.35624	-0.11251	0.016053	0.39563	-0.19602	-0.12079	0.51057	-0.36283
MN	0.32009	0.31455	0.036208	0.21677	0.092464	-0.3039	-0.50524	0.17801	0.4907
SL	0.28032	-0.17719	0.043652	-0.51104	0.39597	0.083957	-0.04328	-0.21933	-0.13632
EL	0.2428	-0.23006	-0.23879	0.49852	-0.16737	0.35319	-0.12134	0.14407	-0.09217
IUE	-0.053241	-0.34881	0.554	0.063025	-0.02921	0.078594	0.24267	0.27894	0.41085
TYD	0.40092	-0.050063	0.22218	0.037817	0.16628	0.12762	0.36522	-0.2179	0.24956
FLL	0.19427	0.21167	0.35685	-0.38573	-0.4234	-0.26402	-0.01719	0.37216	-0.21549
HAL	0.1843	0.31952	0.31406	0.37032	0.35487	-0.26288	0.090122	-0.31881	-0.2563
ShL/FL	0.36632	-0.15163	0.17596	-0.14907	-0.14111	0.42123	-0.42098	-0.17514	0.084007
FOL	0.080337	0.52225	-0.00893	0.015452	0.2265	0.51929	0.3073	0.456	-0.05916
Explained variance	38.071	19.399	15.41	11.103	6.4692	4.1041	2.7443	2.1735	0.52547
Eigenvalue	4.94921	2.52192	2.00335	1.44336	8.41E-01	5.34E-01	3.57E-01	2.83E-01	6.83E-02

Morphological characters (longitudinal skin folds on the dorsal side) present in *Minervarya* species A are also present in the type specimen of *M. syhadrensis*, therefore, we identified *Minervarya* species A as *M. syhadrensis*. Morphological measurements reported for *M. syhadrensis* in the original descriptions (Annandale 1919) are within the range of the measurements taken for *Minervarya* species A in the present study (Supplementary file).

Molecular diagnosis of *M. syhadrensis*. Pairwise genetic distance between *Minervarya* species A (*M. syhadrensis*) and *Minervarya* species B was around 10 %. Gene sequences of *M. syhadrensis* were matching with the sequences for *M. caperata* (Kuramoto *et al*. 2007) while the sequences of *Minervarya* species B were matching with those for *M. agricola* (Chandramouli *et al*. 2019; Fig. 8). In the Maximum Likelihood tree based on 574 bp of mitochondrial (16s) gene for the members of the *Minervarya* clade having predominant distribution in India, Sri Lanka and Bangladesh, separate monophyletic clades could be discerned for the species under study (*M. syhadrensis* and *M. agricola*), *M. sahyadris, M. gomantaki, M. krishnan, M. dhaka,* and *M. asmati* (Fig. 8). Since our sequences of *M. syhadrensis* was forming monophyletic clade with the sequences of *M. caperata*, we treated the entire clade having samples matching with the sequences of *M. caperata* / *M. syhadrensis* from different locations in the Western Ghats / India as *M. syhadrensis*. In the current study, we used genetic data for *M. syhadrensis* from Silvasa in the northern Western Ghats till Calicut in the central Western Ghats through Pune (type locality of *M. syhadrensis*), Koyna, Goa, Aldur (surroundings of the type locality of *M. caperata*; Fig. 1; Table 4). The other clade (with 27 sequences) of *M. agricola* / *M. pierrei* complex needs taxonomic revision.

Museum specimen study. We measured all the specimens deposited at BNHS for the species *M. caperata* (Supplementary file Table 1). Since there is only one male specimen included in the types of *M. caperata* (Kuramoto *et al*. 2007), we did not compare it with our collections for *M. syhadrensis* from Pune. The morphometric measurements of *M. syhadrensis* were within the range of the measurements reported for *M. caperata* (Supplementary file Table 1 and Table 2; Kuramoto *et al*. 2007). We also observed the presence of longitudinal skin folds on the dorsal side of the type specimen of *M. caperata* (Fig. 9B; Kuramoto *et al*. 2007). The authors reported that the longitudinal skin folds on the dorsal side is a diagnostic character for *M. caperata* (Kuramoto *et al*. 2007). The measurements reported for *M. syhadrensis* by Annandale, (1919) are within the range of the measurements of the specimens collected for *M. syhadrensis* in the present study (Supplementary file Table 1) and *M. caperata* in the previous study by Kuramoto *et al*. (2007). However, the webbing pattern of *M. syhadrensis* and the webbing pattern reported for *M. caperata* (Kuramoto *et al*. 2007) are slightly different. Based on the morphological characters of *M. syhadrensis* collected in the present study match with those from original descriptions (Annandale 1919) and *M. caperata* (Kuramoto, Joshy, Kurabayashi and Sumida 2007), we propose to consider *M. caperata* as a junior synonym of *M. syhadrensis*.

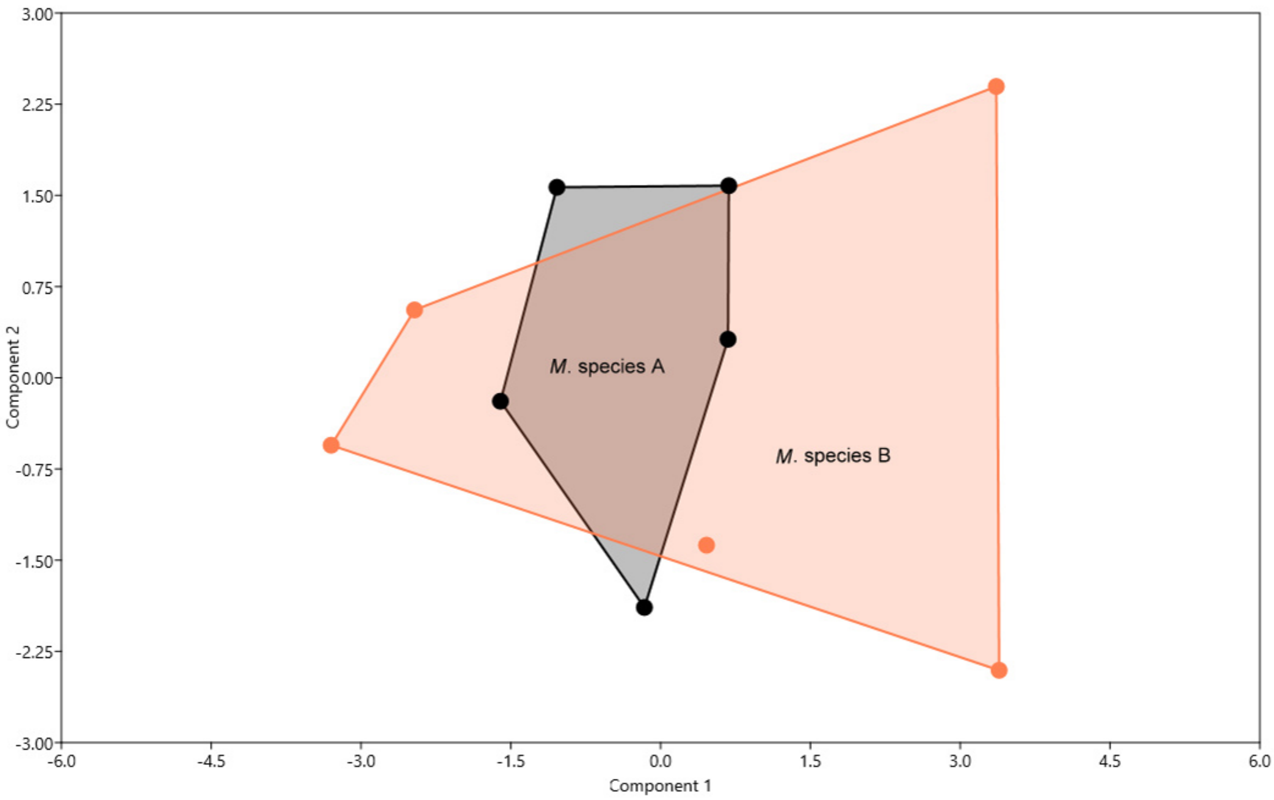

FIGURE 7. Scatter plot of Multivariate Principal Component Analysis (PCA) for male individuals using 13 morphometric characters marked as * Supplementary file Table 1 transformed to their ratio to SVL for *Minervarya* species A (*M*. species A) and *Minervarya* species B (*M*. species B)

TABLE 4. GenBank data used in the construction of ML Tree for *Minervarya* using DNA sequences of the mt 16S rRNA gene. * indicate the sequences generated for the present study.

	Gene bank accession numbers	Location	Assigned species names
1	AB355845.1	Madikeri	*M. syhadrensis*
2	AY882956.1	India	*M. syhadrensis*
3	MH370481.1*	Pune	*M. syhadrensis*
4	AB488894.1	Mudigere	*M. syhadrensis*
5	AY882951.1	India	*M. syhadrensis*
6	MK713345.1*	Silvasa	*M. syhadrensis*
7	MN784504.1*	Calicut	*M. syhadrensis*
8	AB530606.1	Mudigere	*M. syhadrensis*
9	MK713344.1*	Goa	*M. syhadrensis*
10	MK713346.1*	Aldur	*M. syhadrensis*
11	AB355842.1	Karnoor	*M. syhadrensis*
12	AB355844.1	Talagini	*M. syhadrensis*
13	AY841755.1	India	*M. syhadrensis*
14	AY841753.1	India	*M. syhadrensis*
15	MK713343.1*	Koyna	*M. syhadrensis*
16	AY841752.1	India	*M. syhadrensis*
17	AY841748.1	India	*M. agricola*
18	AY841750.1	India	*M. agricola*
19	AY841751.1	India	*M. agricola*
20	MK628927.1	Pondicherry	*M. agricola*
21	AY841756.1	India	*M. agricola*
22	AY841747.1	India	*M. agricola*
23	AY882953.1	India	*M. agricola*
24	AY882952.1	India	*M. agricola*
25	AY882955.1	India	*M. agricola*
26	AY882950.1	India	*M. agricola*
27	AY882949.1	India	*M. agricola*
28	MH370482.1*	Pune	*M. agricola*
29	AB488895.1	Mudigere	*M. agricola*
30	KY820766.1	Western Ghats	*M. agricola*
31	KR995134.1	India	*M. agricola*
32	MK713347.1*	Koyna	*M. agricola*
33	GQ478321.1	India	*M. agricola*
34	AB355836.1	Madikeri	*M. agricola*
35	AB355838.1	Mudigere	*M. agricola*
36	AB355837.1	Talagini	*M. agricola*
37	AB488892.1	Sri Lanka	*M.* cf. *agricola*
38	AY141843.2	Sri Lanka	*M.* cf. *agricola*
39	AY882954.1	India	*M.* cf. *agricola*
40	AB488888.1	Nepal	*M.* cf. *pierrei*
41	MK635483.1	Bangladesh	*M.* cf. *pierrei*
42	MK635481.1	Bangladesh	*M.* cf. *pierrei*
43	KP849816.1	Bangladesh	*M.* cf. *pierrei*

......continued on the next page

TABLE 4. (Continued)

	Gene bank accession numbers	Location	Assigned species names
44	MF319215.1	Mizoram	*M. asmati*
45	MK635482.1	Bangladesh	*M. asmati*
46	MF319217.1	Mizoram	*M. asmati*
47	KP849815.1	Dhaka	*M. asmati*
48	MF319219.1	Mizoram	*M. asmati*
49	MG010390.1	Bangladesh	*M. dhaka*
50	MK635484.1	Bangladesh	*M. dhaka*
51	MK635480.1	Bangladesh	*M. dhaka*
52	MK635486.1	Bangladesh	*M. dhaka*
53	AB530604.1	Aralam	*M. sahyadris*
54	AB488893.1	Karnool	*M. sahyadris*
55	KR781087.1	Goa	*M. gomantaki*
56	KR781084.1	Goa	*M. gomantaki*
57	MG870108.1	Jog falls	*M. krishnan*
58	KY215971.1	Maharashtra	*Sphaerotheca dobsonii*
59	KY215979.1	Maharashtra	*Sphaerotheca pashchima*
60	AB290412.1	Mangalore	*Hoplobatrachus tigerinus*

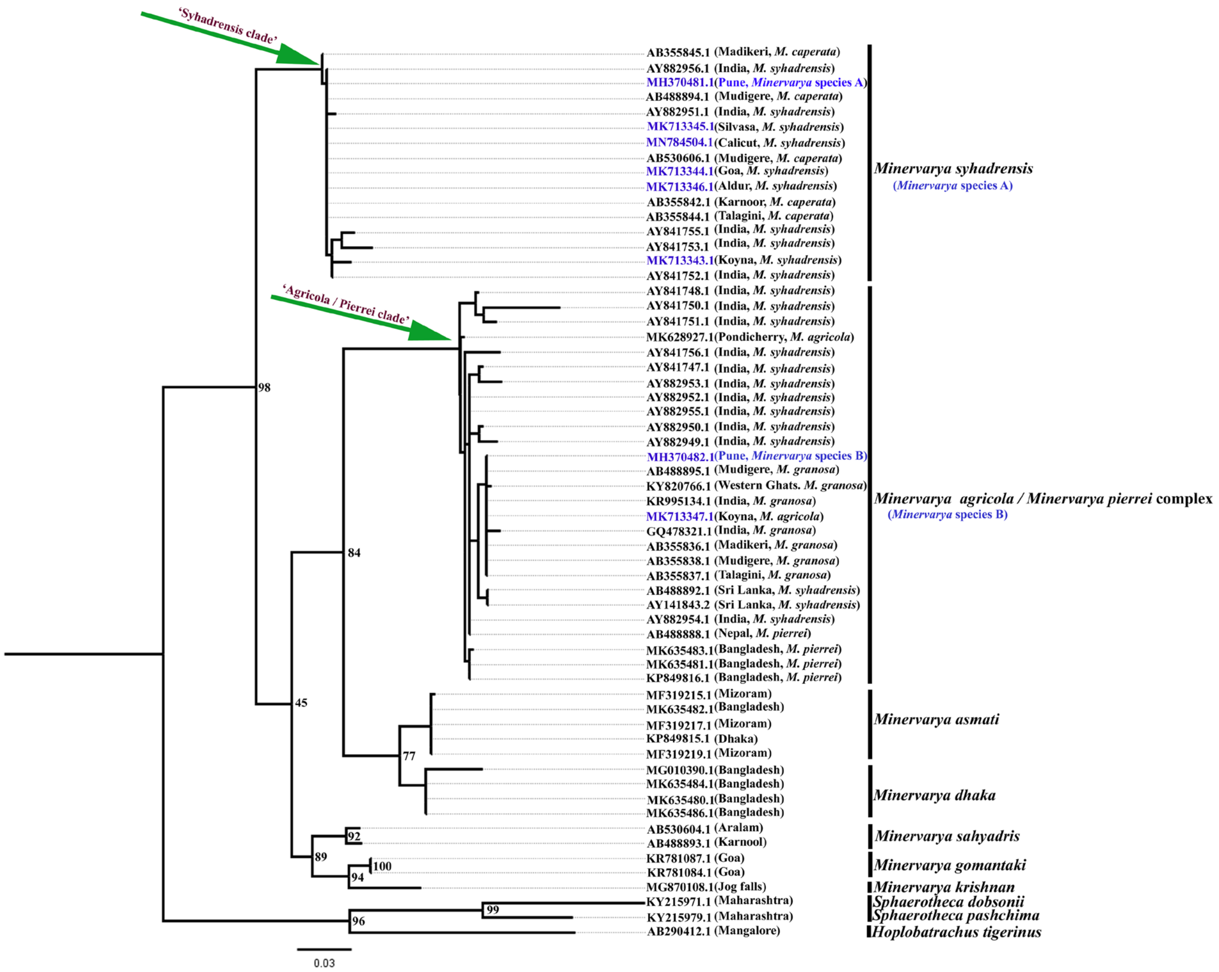

FIGURE 8. Maximum Likelihood tree based on 574 bp of mitochondrial (16S) gene for *Minervarya* clade having predominant distribution in Sri Lanka, India, Bangladesh and Nepal (Fig 2, Phuge et *al*. 2019). Locations marked as blue represents the localities from where samples were collected for the present study.

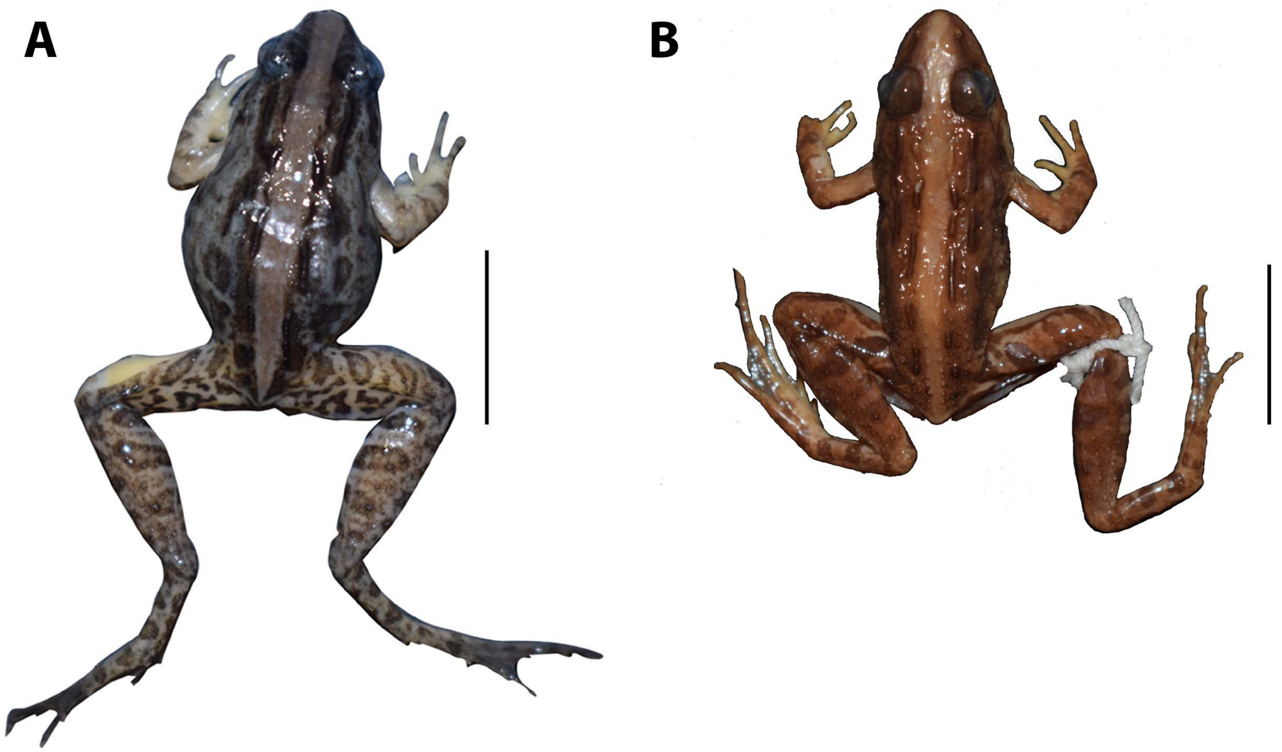

FIGURE 9. Dorsal view of *M. syhadrensis* (*Minervarya* species A collected for the present study, ZSI/WRC/A/2255) and *M. caperata* (type specimen BNHS4657). Note the presence of longitudinal skin folds on dorsal side. Scale bar = 1cm.

Discussion

In the process of generating genetic data from the type localities of *Minervarya syhadrensis*, we sampled small to medium-sized *Minervarya* frogs. We could discern two species from the phylogenetic tree, the first data set (*M. syhadrensis*) matching with the sequences of *M. caperata* (discussed here) and other (*Minervarya* species B) with sequences of *M. agricola* (see Chandramouli *et al*. 2019). Among the four species identified in the present study, *M. syhadrensis* (Annandale 1919) and *M. marathi* (Phuge *et al*. 2019) are described previously from the Pune district. The frog *M. syhadrensis* seems to be widespread and has considerable variation in its appearance (Fig. 10), morphology, and advertisement call (discussed below). Due to cryptic morphological characters, *M. syhadrensis* frogs from different localities have been identified wrongly, and their genetic data deposited in the GenBank have been mislabeled. For example, DNA sequences used for *M. syhadrensis* in different studies by Kotaki *et al*. (2008 and 2010) and Kurabayashi *et al*. (2005) belong to different species (e.g., AB488893.1and AB488892.1; see Fig. 8). In the present study, we attempted to resolve the identity and distribution (to some extent) of *M. syhadrensis* (Fig. 8; Table 4).

The use of morphometric measurements to delimit species has been widely practiced in amphibian taxonomy. But, handling errors during the measurements, especially small individuals, could lead to underestimation/overestimation of the delimiting factors (Dinesh *et al*. 2015; Garg *et al*. 2017). Therefore, in discriminating cryptic sympatric species, morphological data becomes less reliable (Lodé & Pagano 2000; Biju *et al*. 2014; Hutter & Guayasamin 2015). The results of the present study showed that morphological (metric data) data are not sufficient to distinguish *M. syhadrensis* and *M. agricola* in the overlapping range of distribution. There could be morphometric variations in a widely distributed populations of both the species. For example, webbing pattern on hind leg toes slightly differ between *M. syhadrensis* populations from Pune and Karnoor (Kuramoto *et al*. 2007). We also observed considerable differences in the morphometric measurements of *M. syhadrensis* from the sampling site of the present study and previous study (Dinesh *et al*. 2015). Such intraspecific morphometric variations have been observed in many other widely distributed anurans (Kutrup *et al*. 2006; Marcelino *et al*. 2009; Vieites *et al*. 2009; Bandeira *et al*. 2016; Hegde *et al*. 2020).

Several studies have demonstrated that advertisement call analysis provides strength to species identification. For example, two species, *Buergeria japonica*, and *B. otai* can be distinguished from each other based on their typical calls and behavioral responses of females to the calls (Wang *et al*. 2017). Females generally use static properties for conspecific mate selection, which can also be used in taxonomy studies as these are consistent in a species (Köhler *et al*. 2017). In both *M. syhadrensis* and *M. agricola*, pulse repetition rate and dominant frequency are found to be the most stable static properties having CV ≤ 5.25. Nevertheless, the call of both the species differed in static and dynamic properties as well. The difference in the call duration of both the species is detectable to the human ear, although it is a dynamic property. Differences in the static call properties of syntopic cryptic species can be viewed as prezygotic isolation (Köhler *et al*. 2017). Values of call properties of *M. syhadrensis* fall within the range of a previous study (Dubois 1975) but are different from those reported in another study (Kuramoto *et al*. 2007). The variations in the call properties of *M. syhadrensis* in the populations of the present study and previous studies could be due to the differences in the methods employed for call recording and analysis. Moreover, call properties of widely distributed conspecific individuals may vary due to various factors such as temperature, breeding season, geography, genetic divergence, and species composition at breeding site (Köhler *et al*. 2017).

FIGURE 10. Morphological variation in *Minervarya syhadrensis* frogs from different localities in the Western Ghats. (A and B) Coorg, (C) Goa, (D) Koyna, (E) Silvasa and (F) Calicut.

Inter-species breeding events during peak breeding season are common in amphibians. We also observed many interbreeding events of *M. syhadrensis* and *M. agricola* at the study site. The males of both *M. syhadrensis* and *M. agricola* are of similar sizes. During peak breeding hours, males of both the species call in chorus within the circumference of 15 cm (personal observation), which create substantial noise. The ranges of some of the call properties (Number of pulses, fundamental and dominant frequency) of both the species overlap (Table 2). Overlapping of call properties, noisy breeding ground, and morphological similarities could be the possible reasons for the interbreeding events in these species.

The initial erection of the genus *Minervarya* and *Fejervarya* were based on the clear morphological differences, but this was not congruent with the phylogenetic studies (Dinesh *et al*. 2015). Meanwhile, Hawlader (2011) proposed a new genus *Zakerana* using secondary phylogenetic inferences and superficial morphological data set without any primary data support. Recently, Sanchez *et al*. (2018) have re-established the identity of the genus *Fejervarya* and *Minervarya* purely on a large scale phylogenetic data where there are no unique morphological characters to identify/sort the members of these genera. This could be a serious impediment in the identification of the species belonging to these genera when there are problems in distinguishing the species using morphological characters, especially in the overlapping zones of distribution (Köhler *et al*. 2019). Dicroglossid frogs are hardy and adaptive to varied habitats, and hence species show a wide range of distribution across different agro-ecosystems and habitats. With this backdrop, we call for a stringent taxonomic assessment for the members of the genera *Fejervarya* and *Minervarya* across the entire distribution range (South Asia and South East Asia). In the present study, we generated the genetic data for a widespread frog, *M. syhadrensis*, from its type locality; the species could be distributed from the Western Ghats to the foothills of Himalayas to the North East Indian regions through the Eastern Ghats.

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SUPPLEMENTARY TABLE 1. Morphometric data (in mm) of *Minervarya* species A (*M. syhadrensis*) and *Minervarya* species B (*M. agricola* / *M. granosa*) from Pune.

	***F.* species A 1**	***F.* species A 2**	***F.* species A 3**	***F.* species A 4**	***F.* species A 5**	**Average ± SD (Range)**	***F.* species B 1**	***F.* species B 2**	***F.* species B 3**	***F.* species B 4**	***F.* species B 5**	**Average ± SD (Range)**
Sex	Male	Male	Male	Male	Male		Male	Male	Male	Male	Male	
SVL	29.3	27.9	29.3	28.4	26.3	28.28±1.24 (26.34–29.36)	30.4	28.8	28.7	26.7	28.4	28.65±1.31 (26.75–30.44)
HW*	9.3	9.3	9.4	9.6	9.4	9.44±0.12 (9.34–9.64)	9.3	10.3	10	9.9	9.7	9.88±0.38 (9.7–10.36)
HL*	10.8	10.6	10.5	10.2	9.8	10.43±0.4 (9.82–10.83)	10	10.8	11	9.8	10.1	10.54±0.51 (9.85–11.07)
IN*	2.5	2.5	2.6	2.5	2.3	2.52±0.1 (2.35–2.61)	2.2	2.5	2.4	2.3	2.2	2.37±0.14 (2.22–2.57)
NE*	2.4	2.3	2.5	2.7	2.2	2.46±0.18 (2.26–2.7)	2.4	2.4	2.5	2.5	2.3	2.46±0.10 (2.31–2.58)
MN*	8.7	8.5	9	8.4	8.2	8.61±0.31 (8.23–9.03)	8.9	8.5	9.4	8.2	8.5	8.75±0.44 (8.29–9.42)
MFE	7.6	6.4	6.7	6.4	6.4	6.76±0.54 (6.43–7.69)	6.6	6.7	7	6.2	6.4	6.65±0.31 (6.27–7.09)
MBE	5.4	4.2	4.1	4	4.2	4.42±0.59 (4.05–5.46)	4.4	4.3	4.5	3.7	4	4.24±0.35 (3.74–4.59)
SL*	5.2	4.8	5	5	4.3	4.90±0.34 (4.34–5.23)	5.1	5	5	4.9	4.5	4.97±0.24 (4.58–5.19)
EL*	2.8	3.4	3.3	3.5	3.4	3.31±0.28 (2.83–3.52)	3.3	3.4	3.3	3.3	3.2	3.36±0.07 (3.26–3.46)
IUE*	2.2	1.9	2.1	2.1	2	2.11±0.11 (1.98–2.23)	2.4	2.1	2.1	2.1	2.2	2.23±0.13 (2.13–2.45)
UEW	2.3	2.1	2.2	2	1.9	2.16±0.13 (1.98–2.31)	2.4	1.9	2.3	2.1	2.2	2.24±0.17 (1.98–2.42)
IFE	5.0	4.5	4.7	4.6	4.3	4.67±0.26 (4.36–5.05)	5.2	5.1	4.9	4.6	5	5.00±0.22 (4.66–5.24)
IBE	6.9	6.9	7.1	6.7	6.7	6.92±0.15 (6.76–7.14)	7.1	6.8	7.1	6.7	7	6.97±0.16 (6.76–7.12)
TYD*	2	1.9	1.8	1.9	1.8	1.89±0.07 (1.82–2)	1.9	1.9	2.1	2	1.8	1.99±0.10 (1.86–2.1

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SUPPLEMENTARY TABLE 1. (Continued)

	F. species A 1	*F.* species A 2	*F.* species A 3	*F.* species A 4	*F.* species A 5	Average ± SD (Range)	*F.* species B 1	*F.* species B 2	*F.* species B 3	*F.* species B 4	*F.* species B 5	Average ± SD (Range)
TE	1.2	1.1	1.2	1.1	1.4	1.25±0.14 (1.13–1.48)	0.9	1	1.3	1.1	1.3	1.17±0.19 (0.92–1.37)
FLL*	5.9	5.1	5.4	5.3	5	5.38±0.35 (5.01–5.91)	5.7	5.7	6	5.1	5.4	5.63±0.33 (5.15–6)
HAL*	6.6	6.4	6.4	6	5.9	6.31±0.29 (5.94–6.62)	6.6	6	6.9	6.3	6.7	6.54±0.36 (6.03–6.92)
FL1	2.3	2.4	2.4	2.1	2.5	2.39±0.15 (2.15–2.56)	2.5	2.6	3	2.5	2.7	2.70±0.20 (2.56–3.03)
FL2	2.4	2.4	2.3	2.1	2.2	2.32±0.10 (2.19–2.43)	2.2	1.9	2.5	2.5	2.4	2.34±0.25 (1.95–2.56)
TFL	3.7	3.6	3.6	3.4	3.2	3.55±0.23 (3.2–3.78)	3.8	3.1	4	3.6	3.7	3.68±0.36 (3.1–4.04)
AGL	12	11.4	13.3	10.7	10.4	11.62±1.15 (10.45–12.05)	13.4	10.7	10.9	11	10.5	11.33±1.17 (10.56–13.4)
WBS	10.9	9.2	9.3	9.7	9	9.65±0.75 (9.04–10.91)	10.4	10.4	10.2	9.9	9.7	10.16±0.33 (9.7–10.47)
WFG	7.7	8.9	8.6	7.3	7.7	8.09±0.65 (7.39–8.91)	9	8.8	8.3	7	8.3	8.31±0.79 (7–9.01)
ShL/FL*	12.8	12.7	12.7	12.8	11.8	12.62±0.43 (11.85–12.89)	13.8	13.5	13.8	13	12.1	13.28±0.72 (12.14–13.86)
TiL	14.3	14.2	14.5	13.6	13.5	14.08±0.48 (13.53–14.59)	14.7	14.4	15.3	14.1	13.3	14.42±0.77 (13.32–15.39)
Tal	7.34	7.4	7.9	7	6.5	7.27±0.52 (6.54–7.94)	7.3	7.2	7.6	7.3	7	7.33±0.21 (7.09–7.67)
FOL*	15.6	15.3	13.6	14.2	13.6	14.50±0.94 (13.66–15.67)	15	13.1	15.8	12.3	14	14.11±1.42 (12.39–15.89)
FTL	9.4	9.1	8.8	8.8	8.4	8.94±0.39 (8.44–9.49)	8.9	7.7	9.5	7.32	8.5	8.44±0.90 (7.32–9.56)
ITL	3.2	3.1	2.8	2.9	2.6	2.96±0.22 (2.68–3.23)	3.2	3.1	3.7	3	3.2	3.28±0.27 (3.03–3.72)
IMT	1.1	1.1	1	1.2	1.1	1.13±0.06 (1.07–1.22)	1.2	1.1	1.2	1.1	1.3	1.23±0.08 (1.11–1.32)

SUPPLEMENTARY TABLE 2. Morphometric data (in mm) of type specimens of *Minervarya caperata* deposited at BNHS and described by Kuramoto *et al*. (2007).

	F. caperata **BNHS 4657 (holotype)**	***F. caperata*** **BNHS 4659**	***F. caperata*** **BNHS 4660**	**Average ± SD (Range)**	***F. caperata*** **BNHS 4658**
Sex	Female	Female	Female		Male
SVL	35	34.8	31.7	33.86±1.83 (31.75–35.01	27.9
HW	11.5	11.5	10.1	11.10±0.81 (10.17–11.57)	9.6
HL	13.4	13	11.8	12.81±0.83 (11.88–13.48)	10.7
IN	3	2.9	2.6	2.87±0.23 (2.61–3.05)	2.7
NE	2.5	3	2.6	2.77±0.25 (2.58–3.05)	2.5
MN	11.1	11.3	9.8	10.79±0.80 (9.87–11.34)	9.1
MFE	8.5	8.4	7.6	8.22±0.50 (7.64–8.56)	7
MBE	5.6	5.2	5.3	5.37±0.21 (5.2–5.61)	4.8
SL	5.6	5.7	5.4	5.61±0.18 (5.42–5.77)	4.8
EL	4.1	4	3.4	3.84±0.38 (3.4–4.11)	3
IUE	2.4	2.1	2.1	2.24±0.19 (2.12–2.45)	1.8
UEW	2.6	2.9	2.4	2.66±0.27 (2.4–2.94)	2
IFE	5.7	5.4	5	5.41±0.34 (5.04–5.7)	4.5
IBE	8.5	8	7.6	8.06±.044 (7.65–8.52)	6.6
TYD	2.3	2.3	2	2.26±0.18 (2.05–2.37)	2
TE	1.2	0.8	0.9	1.02±0.16 (0.89–1.2)	0.8
FLL	7	7.2	6.4	6.93±0.39 (6.49–7.23)	5.9
HAL	7.3	7.7	6.8	7.32±0.49 (6.81–7.78)	6
FL1	3.9	3.4	2	3.17±0.98 (2.08–3.97)	2.2
FL2	3.7	3	3	3.29±0.39 (3.05–3.74)	2.5
TFL	4.1	4.6	4.1	4.31±0.26 (4.14–4.61)	3.5
AGL	15.7	15.4	15.3	15.51±0.24 (15.34–15.79)	14.4
WBS	11.2	11	10.6	10.95±0.31 (10.61–11.21)	8.5
WFG	5.3	6.7	7.1	6.40±0.92 (5.37–7.12)	5.7
ShL/FL	16.5	16.7	14.5	15.98±1.20 (14.59–16.76)	12.
TiL	17.7	18.8	16.1	17.59±1.33 (16.18–18.82)	13.6
Tal	9.9	9.4	8.7	9.36±0.61 (8.7–9.91)	7.3
FOL	17.3	19.1	16.7	17.76±1.25 (16.76–19.17)	14.6
FTL	10.3	11.6	10.4	10.81±0.72 (10.33–11.64)	8.9
ITL	5.4	5.3	4.8	5.20±0.31 (4.85–5.41)	4.5
IMT	1.4	1.4	1.4	1.44±0.04 (1.41–1.48)	1.1

SUPPLEMENTARY TABLE 3. Call properties measurements of *Minervarya* species A and *Minervarya* species B in the present study.

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A1	4.77326969	0.174	0.063	19	0.167	107.7844311	1981.1	3617.6
A	A1	4.77326969	0.149	0.066	16	0.142	105.6338028	1981.1	3617.6
A	A1	4.77326969	0.15	0.051	15	0.132	106.0606061	1981.1	3617.6
A	A1	4.77326969	0.138	0.058	15	0.132	106.0606061	1981.1	3617.6
A	A1	4.77326969	0.135	0.061	15	0.129	108.5271318	1981.1	3617.6
A	A1	4.77326969	0.141	0.058	15	0.134	104.4776119	1981.1	3617.6
A	A1	4.77326969	0.149	0.06	15	0.136	102.9411765	1981.1	3617.6
A	A1	4.77326969	0.15	0.057	15	0.136	102.9411765	1981.1	3617.6
A	A1	4.77326969	0.15	0.064	16	0.143	104.8951049	1981.1	3617.6
A	A1	4.77326969	0.155	0.066	17	0.149	107.3825503	1981.1	3617.6
A	A1	4.77326969	0.147		16	0.134	111.9402985	1981.1	3617.6
A	A1	5.011135857	0.145	0.075	16	0.137	109.4890511	1894.9	3617.6
A	A1	5.011135857	0.114	0.065	13	0.105	114.2857143	1981.1	3617.6
A	A1	5.011135857	0.129	0.063	14	0.117	111.1111111	1981.1	3617.6
A	A1	5.011135857	0.135	0.065	15	0.127	110.2362205	1981.1	3617.6
A	A1	5.011135857	0.128	0.065	14	0.119	109.2436975	1981.1	3617.6
A	A1	5.011135857	0.145	0.061	16	0.137	109.4890511	1981.1	3617.6
A	A1	5.011135857	0.135	0.061	15	0.127	110.2362205	1894.9	3617.6
A	A1	5.011135857	0.141	0.062	15	0.131	106.870229	1894.9	3617.6
A	A1	5.011135857	0.145	0.061	16	0.138	108.6956522	1981.1	3617.6
A	A1	5.011135857	0.14		15	0.129	108.5271318	1981.1	3617.6
A	A2	4.398826979	0.179	0.069	19	0.168	107.1428571	1894.9	3531.4
A	A2	4.398826979	0.154	0.064	16	0.141	106.3829787	1894.9	3531.4
A	A2	4.398826979	0.152	0.068	16	0.142	105.6338028	1894.9	3531.4
A	A2	4.398826979	0.157	0.066	16	0.144	104.1666667	1894.9	3531.4
A	A2	4.398826979	0.152	0.066	16	0.144	104.1666667	1894.9	3531.4
A	A2	4.398826979	0.159	0.067	16	0.145	103.4482759	1894.9	3531.4
A	A2	4.398826979	0.163	0.069	16	0.147	102.0408163	1894.9	3531.4

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A2	4.398826979	0.161	0.066	16	0.146	102.739726	1894.9	3531.4
A	A2	4.398826979	0.165	0.069	17	0.156	102.5641026	1894.9	3531.4
A	A2	4.398826979	0.161		16	0.146	102.739726	1894.9	3531.4
A	A2	4.24403183	0.191	0.095	21	0.18	111.1111111	1894.9	3531.4
A	A2	4.24403183	0.176	0.062	19	0.167	107.7844311	1894.9	3531.4
A	A2	4.24403183	0.163	0.07	17	0.152	105.2631579	1894.9	3531.4
A	A2	4.24403183	0.158	0.063	16	0.143	104.8951049	1894.9	3531.4
A	A2	4.24403183	0.159	0.067	16	0.144	104.1666667	1894.9	3531.4
A	A2	4.24403183	0.16	0.066	16	0.145	103.4482759	1894.9	3531.4
A	A2	4.24403183	0.163	0.066	17	0.154	103.8961039	1894.9	3531.4
A	A2	4.24403183	0.159	0.067	17	0.152	105.2631579	1894.9	3531.4
A	A2	4.24403183	0.166		17	0.166	96.38554217	1894.9	3531.4
A	A2	4.258943782	0.195	0.071	21	0.195	102.5641026	1981.1	3531.4
A	A2	4.258943782	0.155	0.075	17	0.155	103.2258065	1981.1	3531.4
A	A2	4.258943782	0.164	0.068	17	0.164	97.56097561	1981.1	3531.4
A	A2	4.258943782	0.155	0.06	16	0.155	96.77419355	1981.1	3531.4
A	A2	4.258943782	0.149	0.08	16	0.149	100.6711409	1981.1	3531.4
A	A2	4.258943782	0.174		18	0.174	97.70114943	1981.1	3531.4
A	A3	4.314994606	0.19	0.078	19	0.179	100.5586592	1894.9	3617.6
A	A3	4.314994606	0.137	0.071	14	0.127	102.3622047	1894.9	3617.6
A	A3	4.314994606	0.148	0.072	15	0.139	100.7194245	1894.9	3617.6
A	A3	4.314994606	0.158	0.073	15	0.142	98.5915493	1894.9	3617.6
A	A3	4.314994606	0.155	0.072	15	0.142	98.5915493	1894.9	3617.6
A	A3	4.314994606	0.159	0.073	15	0.144	97.22222222	1894.9	3617.6
A	A3	4.314994606	0.154	0.073	15	0.142	98.5915493	1894.9	3617.6
A	A3	4.314994606	0.165	0.076	16	0.153	98.03921569	1894.9	3617.6
A	A3	4.314994606	0.154		15	0.141	99.29078014	1894.9	3617.6

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A3	4.291845494	0.183	0.082	18	0.171	99.41520468	1894.9	3617.6
A	A3	4.291845494	0.144	0.071	14	0.13	100	1894.9	3617.6
A	A3	4.291845494	0.149	0.072	15	0.14	100	1894.9	3617.6
A	A3	4.291845494	0.152	0.072	15	0.142	98.5915493	1894.9	3617.6
A	A3	4.291845494	0.154	0.071	15	0.142	98.5915493	1894.9	3617.6
A	A3	4.291845494	0.164	0.072	16	0.154	97.4025974	1894.9	3617.6
A	A3	4.291845494	0.157	0.07	15	0.144	97.22222222	1894.9	3617.6
A	A3	4.291845494	0.171	0.076	16	0.154	97.4025974	1894.9	3617.6
A	A3	4.291845494	0.162	0.076	16	0.156	96.15384615	1894.9	3617.6
A	A3	4.291845494	0.177		17	0.166	96.38554217	1894.9	3617.6
A	A3	3.787878788	0.188	0.076	18	0.172	98.8372093	1894.9	3531.4
A	A3	3.787878788	0.152		15	0.142	98.5915493	1894.9	3617.6
A	A4	4.65509945	0.177	0.074	19	0.171	105.2631579	1894.9	3617.6
A	A4	4.65509945	0.12	0.068	13	0.113	106.1946903	1894.9	3617.6
A	A4	4.65509945	0.139	0.073	15	0.124	112.9032258	1894.9	3617.6
A	A4	4.65509945	0.122	0.065	13	0.105	114.2857143	1894.9	3617.6
A	A4	4.65509945	0.136	0.07	14	0.124	104.8387097	1894.9	3617.6
A	A4	4.65509945	0.155	0.064	16	0.134	111.9402985	1981.1	3531.4
A	A4	4.65509945	0.149	0.062	15	0.133	105.2631579	1894.9	3617.6
A	A4	4.65509945	0.154	0.066	16	0.135	111.1111111	1981.1	3617.6
A	A4	4.65509945	0.152	0.062	16	0.135	111.1111111	1981.1	3703.7
A	A4	4.65509945	0.159	0.068	16	0.144	104.1666667	1981.1	3617.6
A	A4	4.65509945	0.164	0.065	17	0.145	110.3448276	1981.1	3617.6
A	A4	4.65509945	0.157		16	0.146	102.739726	1894.9	3617.6
A	A4	4.635482512	0.203	0.075	21	0.191	104.7120419	1894.9	3617.6
A	A4	4.635482512	0.126	0.07	13	0.115	104.3478261	1894.9	3617.6
A	A4	4.635482512	0.134	0.071	14	0.124	104.8387097	1894.9	3617.6

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A4	4.635482512	0.146	0.066	15	0.135	103.7037037	1894.9	3703.7
A	A4	4.635482512	0.141	0.069	15	0.133	105.2631579	1894.9	3617.6
A	A4	4.635482512	0.141	0.06	14	0.126	103.1746032	1981.1	3617.6
A	A4	4.635482512	0.143	0.063	14	0.126	103.1746032	1894.9	3617.6
A	A4	4.635482512	0.154	0.063	16	0.144	104.1666667	1894.9	3617.6
A	A4	4.635482512	0.143	0.066	15	0.134	104.4776119	1894.9	3617.6
A	A4	4.635482512	0.154	0.063	16	0.144	104.1666667	1981.1	3617.6
A	A4	4.635482512	0.152	0.07	16	0.145	103.4482759	1981.1	3617.6
A	A4	4.635482512	0.154		16	0.145	103.4482759	1894.9	3617.6
A	A5	4.621606008	0.233	0.072	25	0.221	108.5972851	1722.7	3273
A	A5	4.621606008	0.172	0.06	18	0.159	106.918239	1808.8	3273
A	A5	4.621606008	0.171	0.063	17	0.156	102.5641026	1722.7	3359.2
A	A5	4.621606008	0.178	0.063	18	0.166	102.4096386	1808.8	3445.3
A	A5	4.621606008	0.168	0.064	17	0.155	103.2258065	1808.8	3359.2
A	A5	4.621606008	0.173	0.065	17	0.158	101.2658228	1808.8	3359.2
A	A5	4.621606008	0.178	0.071	18	0.165	103.030303	1722.7	3359.2
A	A5	4.621606008	0.185		19	0.174	103.4482759	1808.8	3359.2
A	A5	3.603603604	0.228	0.067	25	0.217	110.5990783	1722.7	3273
A	A5	3.603603604	0.165	0.135	17	0.15	106.6666667	1722.7	3359.2
A	A5	3.603603604	0.219	0.061	23	0.206	106.7961165	1808.8	3359.2
A	A5	3.603603604	0.171	0.064	17	0.156	102.5641026	1808.8	3359.2
A	A5	3.603603604	0.181		18	0.167	101.7964072	1722.7	3359.2
A	A5	2.243829469	0.202	0.223	21	0.189	105.8201058	1808.8	3273
A	A5	2.243829469	0.224	0.202	23	0.21	104.7619048	1808.8	3359.2
A	A5	2.243829469	0.215	0.271	22	0.203	103.4482759	1808.8	3359.2
A	A5	2.243829469	0.216		22	0.198	106.0606061	1722.7	3359.2
A	A5	3.640776699	0.23	0.074	24	0.221	104.0723982	1808.8	3359.2

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A5	3.640776699	0.188	0.064	20	0.179	106.1452514	1722.7	3273
A	A5	3.640776699	0.191	0.077	19	0.178	101.1235955	1722.7	3359.2
A	A5	3.640776699	0.197		20	0.185	102.7027027	1808.8	3359.2
A	A6	4.385964912	0.214	0.07	21	0.204	98.03921569	1808.8	3359.2
A	A6	4.385964912	0.142	0.069	14	0.131	99.23664122	1894.9	3359.2
A	A6	4.385964912	0.147	0.07	15	0.139	100.7194245	1808.8	3359.2
A	A6	4.385964912	0.149	0.068	15	0.142	98.5915493	1808.8	3359.2
A	A6	4.385964912	0.14	0.076	14	0.129	100.7751938	1894.9	3445.3
A	A6	4.385964912	0.155	0.07	15	0.143	97.9020979	1808.8	3445.3
A	A6	4.385964912	0.151	0.076	15	0.144	97.22222222	1894.9	3359.2
A	A6	4.385964912	0.17		17	0.164	97.56097561	1894.9	3359.2
A	A6	3.896103896	0.17	0.192	17	0.157	101.910828	1808.8	3359.2
A	A6	3.896103896	0.196	0.072	19	0.182	98.9010989	1808.8	3273
A	A6	3.896103896	0.155	0.072	15	0.14	100	1894.9	3359.2
A	A6	3.896103896	0.155	0.069	15	0.14	100	1808.8	3359.2
A	A6	3.896103896	0.153	0.071	15	0.141	99.29078014	1894.9	3359.2
A	A6	3.896103896	0.164	0.069	16	0.154	97.4025974	1808.8	3359.2
A	A6	3.896103896	0.158		16	0.152	98.68421053	1894.9	3359.2
A	A6	4.329004329	0.208	0.066	20	0.194	97.93814433	1894.9	3359.2
A	A6	4.329004329	0.148	0.071	15	0.141	99.29078014	1894.9	3359.2
A	A6	4.329004329	0.15	0.069	15	0.141	99.29078014	1894.9	3359.2
A	A6	4.329004329	0.15	0.072	15	0.142	98.5915493	1894.9	3359.2
A	A6	4.329004329	0.155	0.067	15	0.142	98.5915493	1894.9	3359.2
A	A6	4.329004329	0.157	0.071	15	0.144	97.22222222	1894.9	3445.3
A	A6	4.329004329	0.144		14	0.132	98.48484848	1894.9	3359.2
A	A7	3.925967471	0.182	0.205	18	0.169	100.591716	1808.8	3359.2
A	A7	3.925967471	0.207	0.065	20	0.194	97.93814433	1808.8	3359.2

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A7	3.925967471	0.155	0.069	15	0.139	100.7194245	1894.9	3359.2
A	A7	3.925967471	0.162	0.066	16	0.151	99.33774834	1894.9	3359.2
A	A7	3.925967471	0.154	0.069	15	0.141	99.29078014	1808.8	3445.3
A	A7	3.925967471	0.155	0.067	15	0.143	97.9020979	1894.9	3359.2
A	A7	3.925967471	0.155	0.073	15	0.142	98.5915493	1808.8	3359.2
A	A7	3.925967471	0.162		16	0.155	96.77419355	1808.8	3359.2
A	A7	4.085801839	0.195	0.184	19	0.179	100.5586592	1808.8	3359.2
A	A7	4.085801839	0.2	0.068	20	0.192	98.95833333	1808.8	3359.2
A	A7	4.085801839	0.148	0.069	15	0.139	100.7194245	1808.8	3359.2
A	A7	4.085801839	0.16	0.068	16	0.152	98.68421053	1894.9	3359.2
A	A7	4.085801839	0.153	0.07	15	0.141	99.29078014	1808.8	3445.3
A	A7	4.085801839	0.159	0.072	16	0.153	98.03921569	1808.8	3359.2
A	A7	4.085801839	0.165	0.066	16	0.154	97.4025974	1808.8	3359.2
A	A7	4.085801839	0.166	0.069	16	0.154	97.4025974	1808.8	3359.2
A	A7	4.085801839	0.168	0.071	16	0.154	97.4025974	1808.8	3359.2
A	A7	4.085801839	0.157	0.064	15	0.144	97.22222222	1894.9	3359.2
A	A7	4.085801839	0.162	0.072	16	0.154	97.4025974	1894.9	3359.2
A	A7	4.085801839	0.164	0.069	16	0.159	94.33962264	1808.8	3359.2
A	A7	4.085801839	0.166		16	0.155	96.77419355	1808.8	3359.2
A	A8	3.977724741	0.193	0.227	19	0.182	98.9010989	1808.8	3359.2
A	A8	3.977724741	0.206	0.072	20	0.195	97.43589744	1894.9	3359.2
A	A8	3.977724741	0.143	0.069	14	0.131	99.23664122	1894.9	3445.3
A	A8	3.977724741	0.16	0.07	16	0.153	98.03921569	1894.9	3445.3
A	A8	3.977724741	0.156	0.066	15	0.144	97.22222222	1894.9	3445.3
A	A8	3.977724741	0.155	0.07	15	0.144	97.22222222	1894.9	3445.3
A	A8	3.977724741	0.165	0.068	16	0.155	96.77419355	1894.9	3445.3
A	A8	3.977724741	0.163	0.069	16	0.156	96.15384615	1808.8	3445.3

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A8	3.977724741	0.156	0.072	15	0.146	95.89041096	1894.9	3445.3
A	A8	3.977724741	0.162	0.072	15	0.145	96.55172414	1894.9	3445.3
A	A8	3.977724741	0.168		16	0.156	96.15384615	1894.9	3445.3
A	A8	3.872633391	0.205	0.196	20	0.19	100	1808.8	3359.2
A	A8	3.872633391	0.208	0.067	20	0.197	96.44670051	1894.9	3359.2
A	A8	3.872633391	0.156	0.073	15	0.144	97.22222222	1808.8	3445.3
A	A8	3.872633391	0.165	0.073	16	0.155	96.77419355	1894.9	3445.3
A	A8	3.872633391	0.159	0.073	16	0.156	96.15384615	1894.9	3445.3
A	A8	3.872633391	0.169	0.067	16	0.158	94.93670886	1808.8	3445.3
A	A8	3.872633391	0.164	0.074	16	0.158	94.93670886	1894.9	3445.3
A	A8	3.872633391	0.163	0.072	16	0.159	94.33962264	1894.9	3445.3
A	A8	3.872633391	0.169	0.073	16	0.158	94.93670886	1808.8	3445.3
A	A8	3.872633391	0.174		17	0.169	94.67455621	1894.9	3445.3
A	A9	4.567814476	0.203	0.071	20	0.194	97.93814433	1894.9	3445.3
A	A9	4.567814476	0.133	0.066	13	0.12	100	1808.8	3445.3
A	A9	4.567814476	0.133	0.066	13	0.119	100.8403361	1894.9	3445.3
A	A9	4.567814476	0.142	0.065	14	0.13	100	1894.9	3445.3
A	A9	4.567814476	0.137	0.071	14	0.129	100.7751938	1894.9	3445.3
A	A9	4.567814476	0.136	0.069	14	0.13	100	1808.8	3445.3
A	A9	4.567814476	0.149	0.063	14	0.133	97.7443609	1894.9	3445.3
A	A9	4.567814476	0.149	0.068	15	0.142	98.5915493	1894.9	3445.3
A	A9	4.567814476	0.144	0.068	14	0.131	99.23664122	1894.9	3445.3
A	A9	4.567814476	0.145	0.071	14	0.132	98.48484848	1894.9	3445.3
A	A9	4.567814476	0.15	0.078	15	0.141	99.29078014	1894.9	3445.3
A	A9	4.567814476	0.147	0.077	14	0.134	97.01492537	1808.8	3445.3
A	A9	4.567814476	0.17	0.072	17	0.167	95.80838323	1894.9	3445.3
A	A9	4.567814476	0.164		16	0.154	97.4025974	1894.9	3445.3

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A9	4.059539919	0.182	0.198	18	0.17	100	1808.8	3359.2
A	A9	4.059539919	0.189	0.066	18	0.174	97.70114943	1808.8	3359.2
A	A9	4.059539919	0.139	0.067	14	0.131	99.23664122	1894.9	3445.3
A	A9	4.059539919	0.137	0.067	14	0.131	99.23664122	1894.9	3445.3
A	A9	4.059539919	0.15	0.068	15	0.142	98.5915493	1894.9	3445.3
A	A9	4.059539919	0.146	0.07	15	0.142	98.5915493	1894.9	3445.3
A	A9	4.059539919	0.149		15	0.142	98.5915493	1894.9	3445.3
A	A10	3.872966692	0.167	0.077	18	0.159	106.918239	1981.1	3445.3
A	A10	3.872966692	0.126	0.069	14	0.116	112.0689655	1981.1	3531.4
A	A10	3.872966692	0.128	0.068	14	0.119	109.2436975	1981.1	3531.4
A	A10	3.872966692	0.143	0.07	16	0.138	108.6956522	1981.1	3531.4
A	A10	3.872966692	0.146	0.074	16	0.14	107.1428571	1981.1	3531.4
A	A10	3.872966692	0.144	0.068	16	0.14	107.1428571	1981.1	3531.4
A	A10	3.872966692	0.129	0.065	14	0.124	104.8387097	1981.1	3531.4
A	A10	3.872966692	0.137	0.067	14	0.125	104	2067.2	3617.6
A	A10	3.872966692	0.145	0.081	15	0.136	102.9411765	2067.2	3531.4
A	A10	3.872966692	0.18	0.071	19	0.174	103.4482759	1981.1	3531.4
A	A10	3.872966692	0.147		15	0.135	103.7037037	1981.1	3531.4
A	A10	5.739795918	0.143	0.069	15	0.134	104.4776119	1981.1	3531.4
A	A10	5.739795918	0.147	0.067	15	0.135	103.7037037	1981.1	3531.4
A	A10	5.739795918	0.208	0.072	22	0.201	104.4776119	1981.1	3531.4
A	A10	5.739795918	0.137	0.065	15	0.131	106.870229	1981.1	3531.4
A	A10	5.739795918	0.148	0.069	16	0.141	106.3829787	1981.1	3531.4
A	A10	5.739795918	0.141	0.071	15	0.132	106.0606061	1981.1	3531.4
A	A10	5.739795918	0.147	0.065	16	0.143	104.8951049	1981.1	3531.4
A	A10	5.739795918	0.139	0.078	15	0.133	105.2631579	1981.1	3531.4
A	A10	5.739795918	0.157	0.068	16	0.148	101.3513514	1981.1	3531.4

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A10	5.739795918	0.145		15	0.137	102.189781	1981.1	3531.4
A	A11	3.686635945	0.188	0.192	20	0.178	106.741573	1981.1	3617.6
A	A11	3.686635945	0.198	0.072	21	0.191	104.7120419	2067.2	3617.6
A	A11	3.686635945	0.148	0.065	16	0.144	104.1666667	2067.2	3617.6
A	A11	3.686635945	0.142	0.081	15	0.137	102.189781	2067.2	3617.6
A	A11	3.686635945	0.2		20	0.191	99.47643979	2067.2	3617.6
A	A11	3.717472119	0.181	0.273	20	0.175	108.5714286	1981.1	3617.6
A	A11	3.717472119	0.196	0.086	21	0.188	106.3829787	1981.1	3617.6
A	A11	3.717472119	0.164	0.072	18	0.159	106.918239	2067.2	3617.6
A	A11	3.717472119	0.155	0.072	16	0.145	103.4482759	1981.1	3617.6
A	A11	3.717472119	0.151	0.068	16	0.144	104.1666667	2067.2	3617.6
A	A11	3.717472119	0.154	0.072	16	0.146	102.739726	2067.2	3617.6
A	A11	3.717472119	0.164	0.073	17	0.155	103.2258065	2067.2	3617.6
A	A11	3.717472119	0.166		17	0.156	102.5641026	1981.1	3617.6
A	A11	4.013761468	0.169	0.167	19	0.162	111.1111111	1981.1	3531.4
A	A11	4.013761468	0.172	0.072	18	0.161	105.5900621	2067.2	3531.4
A	A11	4.013761468	0.154	0.074	16	0.144	104.1666667	1981.1	3617.6
A	A11	4.013761468	0.16	0.073	17	0.154	103.8961039	1981.1	3531.4
A	A11	4.013761468	0.159	0.072	16	0.147	102.0408163	2067.2	3531.4
A	A11	4.013761468	0.166	0.072	17	0.158	101.2658228	1981.1	3531.4
A	A11	4.013761468	0.159	0.076	17	0.155	103.2258065	2067.2	3531.4
A	A11	4.013761468	0.171		18	0.165	103.030303	2067.2	3531.4
A	A12	3.790750569	0.189	0.245	20	0.181	104.9723757	1981.1	3876
A	A12	3.790750569	0.197	0.214	21	0.191	104.7120419	1981.1	3789.8
A	A12	3.790750569	0.182	0.07	19	0.174	103.4482759	2067.2	4134.4
A	A12	3.790750569	0.127	0.067	14	0.121	107.4380165	1981.1	3876
A	A12	3.790750569	0.12	0.063	13	0.113	106.1946903	1981.1	4134.4

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A12	3.790750569	0.12	0.067	12	0.108	101.8518519	1981.1	4134.4
A	A12	3.790750569	0.132	0.062	14	0.125	104	1981.1	4134.4
A	A12	3.790750569	0.127	0.065	13	0.116	103.4482759	1981.1	4048.2
A	A12	3.790750569	0.126	0.062	13	0.118	101.6949153	1981.1	4134.4
A	A12	3.790750569	0.134	0.064	13	0.121	99.17355372	1981.1	4134.4
A	A12	3.790750569	0.13		13	0.118	101.6949153	1981.1	4134.4
A	A12	4.739336493	0.152	0.075	15	0.139	100.7194245	1981.1	4134.4
A	A12	4.739336493	0.189	0.081	20	0.18	105.5555556	1981.1	4134.4
A	A12	4.739336493	0.139	0.064	15	0.132	106.0606061	1981.1	4134.4
A	A12	4.739336493	0.129	0.066	14	0.123	105.6910569	1981.1	4048.2
A	A12	4.739336493	0.127	0.064	13	0.117	102.5641026	1981.1	4134.4
A	A12	4.739336493	0.127	0.067	13	0.117	102.5641026	1981.1	4134.4
A	A12	4.739336493	0.127	0.058	13	0.117	102.5641026	2067.2	4134.4
A	A12	4.739336493	0.133	0.064	13	0.119	100.8403361	1894.9	4134.4
A	A12	4.739336493	0.13	0.271	13	0.119	100.8403361	1981.1	4134.4
A	A12	4.739336493	0.193		20	0.183	103.8251366	1981.1	4134.4
A	A13	4.210526316	0.208	0.074	21	0.196	102.0408163	1981.1	3617.6
A	A13	4.210526316	0.168	0.071	17	0.157	101.910828	1981.1	3617.6
A	A13	4.210526316	0.157	0.074	16	0.148	101.3513514	1981.1	3617.6
A	A13	4.210526316	0.163	0.078	16	0.149	100.6711409	1981.1	3617.6
A	A13	4.210526316	0.158	0.073	16	0.149	100.6711409	2067.2	3617.6
A	A13	4.210526316	0.15	0.071	15	0.139	100.7194245	2067.2	3617.6
A	A13	4.210526316	0.153	0.071	15	0.14	100	1981.1	3617.6
A	A13	4.210526316	0.158	0.072	16	0.15	100	2067.2	3531.4
A	A13	4.210526316	0.148	0.082	15	0.14	100	1981.1	3617.6
A	A13	4.210526316	0.162	0.083	16	0.153	98.03921569	2067.2	3617.6
A	A13	4.210526316	0.184		18	0.172	98.8372093	2067.2	3617.6

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
A	A13	4.059539919	0.204	0.077	21	0.197	101.5228426	1981.1	3617.6
A	A13	4.059539919	0.157	0.08	16	0.147	102.0408163	1981.1	3617.6
A	A13	4.059539919	0.161	0.08	16	0.15	100	1981.1	3617.6
A	A13	4.059539919	0.151	0.082	15	0.142	98.5915493	1981.1	3617.6
A	A13	4.059539919	0.155	0.07	16	0.151	99.33774834	1981.1	3617.6
A	A13	4.059539919	0.161	0.076	16	0.151	99.33774834	2067.2	3617.6
A	A13	4.059539919	0.152	0.086	15	0.141	99.29078014	1981.1	3617.6
A	A13	4.059539919	0.161	0.096	16	0.152	98.68421053	1981.1	3617.6
A	A13	4.059539919	0.194	0.073	19	0.181	99.44751381	2067.2	3617.6
A	A13	4.059539919	0.155		15	0.146	95.89041096	2067.2	3531.4
B	B1	2.735978112	0.064	0.348	12	0.055	200	1636.5	3359.2
B	B1	2.735978112	0.074	0.451	14	0.067	194.0298507	1808.8	3359.2
B	B1	2.735978112	0.068	0.2	12	0.056	196.4285714	1636.5	3359.2
B	B1	2.735978112	0.069	0.209	13	0.06	200	1636.5	3359.2
B	B1	2.735978112	0.068	0.295	13	0.06	200	1636.5	3445.3
B	B1	2.735978112	0.067	0.284	12	0.056	196.4285714	1636.5	3359.2
B	B1	2.735978112	0.067	0.267	13	0.059	203.3898305	1636.5	3445.3
B	B1	2.735978112	0.069	0.258	13	0.06	200	1636.5	3359.2
B	B1	2.735978112	0.069		13	0.06	200	1636.5	3359.2
B	B1	2.587991718	0.064	0.297	13	0.057	210.5263158	1636.5	3445.3
B	B1	2.587991718	0.068	0.265	13	0.059	203.3898305	1636.5	3359.2
B	B1	2.587991718	0.073	0.204	14	0.06	216.6666667	1636.5	3445.3
B	B1	2.587991718	0.075	0.366	14	0.059	220.3389831	1636.5	3445.3
B	B1	2.587991718	0.074	0.377	14	0.065	200	1636.5	3445.3
B	B1	2.587991718	0.069		13	0.065	184.6153846	1636.5	3359.2
B	B1	3.382949932	0.067	0.172	12	0.064	171.875	1636.5	3273
B	B1	3.382949932	0.07	0.226	13	0.059	203.3898305	1636.5	3273

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B1	3.382949932	0.073	0.252	14	0.069	188.4057971	1636.5	3359.2
B	B1	3.382949932	0.07	0.153	13	0.055	218.1818182	1636.5	3359.2
B	B1	3.382949932	0.073	0.251	14	0.07	185.7142857	1636.5	3445.3
B	B1	3.382949932	0.071		13	0.051	235.2941176	1636.5	3273
B	B2	3.21888412	0.067	0.22	12	0.057	192.9824561	1636.5	3445.3
B	B2	3.21888412	0.067	0.221	13	0.06	200	1636.5	3445.3
B	B2	3.21888412	0.068	0.224	12	0.056	196.4285714	1636.5	3445.3
B	B2	3.21888412	0.069	0.317	13	0.06	200	1636.5	3445.3
B	B2	3.21888412	0.069	0.214	13	0.06	200	1636.5	3445.3
B	B2	3.21888412	0.067	0.296	12	0.055	200	1636.5	3445.3
B	B2	3.21888412	0.067	0.244	13	0.059	203.3898305	1636.5	3445.3
B	B2	3.21888412	0.072	0.226	14	0.064	203.125	1636.5	3445.3
B	B2	3.21888412	0.071	0.216	14	0.064	203.125	1636.5	3445.3
B	B2	3.21888412	0.068		13	0.059	203.3898305	1636.5	3445.3
B	B2	3.787878788	0.067	0.15	13	0.06	200	1636.5	3445.3
B	B2	3.787878788	0.079	0.215	15	0.07	200	1636.5	3445.3
B	B2	3.787878788	0.073	0.175	14	0.065	200	1636.5	3445.3
B	B2	3.787878788	0.078	0.22	15	0.07	200	1636.5	3445.3
B	B2	3.787878788	0.074		14	0.065	200	1636.5	3445.3
B	B2	3.50140056	0.067	0.174	12	0.057	192.9824561	1636.5	3359.2
B	B2	3.50140056	0.07	0.225	13	0.06	200	1636.5	3359.2
B	B2	3.50140056	0.069	0.179	13	0.06	200	1636.5	3359.2
B	B2	3.50140056	0.07	0.223	13	0.06	200	1636.5	3359.2
B	B2	3.50140056	0.074	0.278	14	0.066	196.969697	1636.5	3359.2
B	B2	3.50140056	0.067		13	0.059	203.3898305	1636.5	3359.2
B	B3	3.100775194	0.066	0.295	13	0.058	206.8965517	1636.5	3445.3
B	B3	3.100775194	0.071	0.213	13	0.059	203.3898305	1636.5	3445.3

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B3	3.100775194	0.078		15	0.07	200	1636.5	3445.3
B	B3	3.640776699	0.067	0.335	13	0.059	203.3898305	1636.5	3359.2
B	B3	3.640776699	0.079	0.188	15	0.07	200	1636.5	3359.2
B	B3	3.640776699	0.074	0.151	13	0.061	196.7213115	1636.5	3359.2
B	B3	3.640776699	0.075	0.206	14	0.065	200	1636.5	3359.2
B	B3	3.640776699	0.083	0.175	15	0.072	194.4444444	1636.5	3359.2
B	B3	3.640776699	0.083	0.158	16	0.076	197.3684211	1636.5	3359.2
B	B3	3.640776699	0.079	0.145	15	0.071	197.1830986	1636.5	3359.2
B	B3	3.640776699	0.078	0.263	14	0.066	196.969697	1636.5	3359.2
B	B3	3.640776699	0.067	0.167	12	0.056	196.4285714	1636.5	3359.2
B	B3	3.640776699	0.067		12	0.056	196.4285714	1636.5	3359.2
B	B3	3.476749239	0.065	0.357	12	0.054	203.7037037	1636.5	3359.2
B	B3	3.476749239	0.074	0.215	14	0.065	200	1636.5	3359.2
B	B3	3.476749239	0.071	0.173	13	0.061	196.7213115	1636.5	3359.2
B	B3	3.476749239	0.076	0.168	14	0.065	200	1636.5	3359.2
B	B3	3.476749239	0.078	0.194	15	0.07	200	1636.5	3359.2
B	B3	3.476749239	0.086	0.154	16	0.076	197.3684211	1636.5	3359.2
B	B3	3.476749239	0.089	0.213	17	0.081	197.5308642	1636.5	3359.2
B	B3	3.476749239	0.088	0.2	17	0.08	200	1636.5	3359.2
B	B3	3.476749239	0.086		16	0.076	197.3684211	1636.5	3359.2
B	B4	4.343779088	0.066	0.186	13	0.057	210.5263158	1636.5	3359.2
B	B4	4.343779088	0.07	0.238	13	0.06	200	1636.5	3445.3
B	B4	4.343779088	0.076	0.167	15	0.069	202.8985507	1636.5	3445.3
B	B4	4.343779088	0.081	0.176	15	0.071	197.1830986	1636.5	3359.2
B	B4	4.343779088	0.082	0.158	15	0.07	200	1636.5	3359.2
B	B4	4.343779088	0.086	0.155	16	0.076	197.3684211	1808.8	3359.2
B	B4	4.343779088	0.085	0.087	16	0.076	197.3684211	1550.4	3531.4

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B4	4.343779088	0.085	0.156	16	0.076	197.3684211	1808.8	3359.2
B	B4	4.343779088	0.092	0.078	17	0.085	188.2352941	1722.7	3445.3
B	B4	4.343779088	0.086	0.124	16	0.077	194.8051948	1550.4	3445.3
B	B4	4.343779088	0.102	0.083	19	0.094	191.4893617	1550.4	3445.3
B	B4	4.343779088	0.096	0.148	18	0.088	193.1818182	1550.4	3445.3
B	B4	4.343779088	0.107	0.084	20	0.099	191.9191919	1550.4	3445.3
B	B4	4.343779088	0.096	0.174	18	0.088	193.1818182	1550.4	3445.3
B	B4	4.343779088	0.075		14	0.066	196.969697	1722.7	3359.2
B	B4	4.557885141	0.067	0.177	13	0.059	203.3898305	1636.5	3359.2
B	B4	4.557885141	0.062	0.172	12	0.054	203.7037037	1636.5	3273
B	B4	4.557885141	0.078	0.162	15	0.07	200	1636.5	3359.2
B	B4	4.557885141	0.079	0.071	14	0.065	200	1636.5	3359.2
B	B4	4.557885141	0.072	0.158	14	0.065	200	1636.5	3359.2
B	B4	4.557885141	0.095		18	0.087	195.4022989	1550.4	3445.3
B	B5	3.179650238	0.067	0.304	13	0.057	210.5263158	1636.5	3445.3
B	B5	3.179650238	0.079	0.257	15	0.069	202.8985507	1636.5	3359.2
B	B5	3.179650238	0.076	0.184	14	0.064	203.125	1636.5	3445.3
B	B5	3.179650238	0.087	0.204	16	0.074	202.7027027	1636.5	3617.6
B	B5	3.179650238	0.088		17	0.08	200	1636.5	3359.2
B	B5	3.611738149	0.072	0.193	14	0.062	209.6774194	1722.7	3273
B	B5	3.611738149	0.071	0.195	14	0.063	206.3492063	1636.5	3445.3
B	B5	3.611738149	0.081	0.192	16	0.074	202.7027027	1636.5	3445.3
B	B5	3.611738149	0.09	0.182	17	0.08	200	1636.5	3445.3
B	B5	3.611738149	0.099	0.147	18	0.087	195.4022989	1722.7	3359.2
B	B5	3.611738149	0.102	0.188	19	0.093	193.5483871	1808.8	3445.3
B	B5	3.611738149	0.099	0.172	19	0.091	197.8021978	1722.7	3359.2
B	B5	3.611738149	0.107	0.224	20	0.098	193.877551	1550.4	3359.2

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B5	3.611738149	0.106		20	0.097	195.8762887	1550.4	3445.3
B	B5	3.63856883	0.067	0.285	13	0.059	203.3898305	1636.5	3445.3
B	B5	3.63856883	0.068	0.172	13	0.059	203.3898305	1636.5	3445.3
B	B5	3.63856883	0.08	0.245	15	0.07	200	1636.5	3445.3
B	B5	3.63856883	0.085	0.136	16	0.075	200	1550.4	3445.3
B	B5	3.63856883	0.087	0.245	16	0.076	197.3684211	1636.5	3359.2
B	B5	3.63856883	0.093	0.086	17	0.081	197.5308642	1636.5	3445.3
B	B5	3.63856883	0.079		15	0.071	197.1830986	1636.5	3445.3
B	B6	3.446295233	0.089	0.164	17	0.082	195.1219512	1550.4	3531.4
B	B6	3.446295233	0.091	0.281	17	0.081	197.5308642	1808.8	3531.4
B	B6	3.446295233	0.075	0.173	14	0.065	200	1636.5	3445.3
B	B6	3.446295233	0.079	0.258	15	0.071	197.1830986	1808.8	3531.4
B	B6	3.446295233	0.071	0.234	13	0.062	193.5483871	1636.5	3445.3
B	B6	3.446295233	0.07	0.157	13	0.061	196.7213115	1636.5	3445.3
B	B6	3.446295233	0.083		16	0.076	197.3684211	1808.8	3531.4
B	B6	4.21179302	0.065	0.262	13	0.057	210.5263158	1636.5	3359.2
B	B6	4.21179302	0.068	0.234	13	0.059	203.3898305	1636.5	3445.3
B	B6	4.21179302	0.073	0.163	14	0.065	200	1636.5	3445.3
B	B6	4.21179302	0.072	0.15	14	0.064	203.125	1636.5	3445.3
B	B6	4.21179302	0.077	0.134	15	0.07	200	1636.5	3445.3
B	B6	4.21179302	0.085	0.136	16	0.077	194.8051948	1636.5	3445.3
B	B6	4.21179302	0.084	0.072	16	0.076	197.3684211	1808.8	3531.4
B	B6	4.21179302	0.073	0.145	14	0.065	200	1808.8	3359.2
B	B6	4.21179302	0.1	0.091	19	0.093	193.5483871	1722.7	3445.3
B	B6	4.21179302	0.087	0.132	16	0.078	192.3076923	1636.5	3445.3
B	B6	4.21179302	0.098	0.085	18	0.088	193.1818182	1722.7	3445.3
B	B6	4.21179302	0.087	0.15	16	0.079	189.8734177	1722.7	3445.3

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B6	4.21179302	0.09	0.161	17	0.083	192.7710843	1722.7	3445.3
B	B6	4.21179302	0.077	0.273	14	0.067	194.0298507	1722.7	3445.3
B	B6	4.21179302	0.072		13	0.061	196.7213115	1808.8	3359.2
B	B7	3.863134658	0.076	0.209	14	0.064	203.125	1636.5	3445.3
B	B7	3.863134658	0.076	0.195	14	0.065	200	1636.5	3445.3
B	B7	3.863134658	0.079	0.16	15	0.07	200	1636.5	3359.2
B	B7	3.863134658	0.076	0.194	14	0.066	196.969697	1550.4	3359.2
B	B7	3.863134658	0.076	0.175	14	0.067	194.0298507	1550.4	3359.2
B	B7	3.863134658	0.078	0.173	15	0.07	200	1636.5	3359.2
B	B7	3.863134658	0.077	0.168	14	0.066	196.969697	1636.5	3359.2
B	B7	3.863134658	0.075		14	0.066	196.969697	1550.4	3445.3
B	B7	4.074702886	0.062	0.389	12	0.053	207.5471698	1636.5	3359.2
B	B7	4.074702886	0.067	0.177	13	0.059	203.3898305	1636.5	3445.3
B	B7	4.074702886	0.065	0.165	12	0.055	200	1636.5	3445.3
B	B7	4.074702886	0.071	0.174	13	0.06	200	1636.5	3445.3
B	B7	4.074702886	0.071	0.165	13	0.062	193.5483871	1636.5	3445.3
B	B7	4.074702886	0.072	0.076	13	0.059	203.3898305	1636.5	3445.3
B	B7	4.074702886	0.067	0.153	12	0.055	200	1636.5	3445.3
B	B7	4.074702886	0.078	0.093	15	0.07	200	1636.5	3359.2
B	B7	4.074702886	0.078	0.156	15	0.071	197.1830986	1550.4	3359.2
B	B7	4.074702886	0.085	0.17	16	0.077	194.8051948	1636.5	3359.2
B	B7	4.074702886	0.078	0.152	14	0.066	196.969697	1550.4	3359.2
B	B7	4.074702886	0.072	0.209	14	0.066	196.969697	1550.4	3359.2
B	B7	4.074702886	0.082		16	0.075	200	1550.4	3359.2
B	B8	3.053953173	0.067	0.215	12	0.056	196.4285714	1636.5	3531.4
B	B8	3.053953173	0.067	0.334	12	0.057	192.9824561	1636.5	3273
B	B8	3.053953173	0.068	0.23	13	0.058	206.8965517	1636.5	3531.4

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B8	3.053953173	0.068	0.321	12	0.055	200	1636.5	3445.3
B	B8	3.053953173	0.067	0.195	12	0.054	203.7037037	1636.5	3273
B	B8	3.053953173	0.068	0.376	12	0.056	196.4285714	1636.5	3445.3
B	B8	3.053953173	0.068	0.217	13	0.058	206.8965517	1636.5	3273
B	B8	3.053953173	0.069	0.223	12	0.056	196.4285714	1636.5	3445.3
B	B8	3.053953173	0.069	0.226	13	0.06	200	1636.5	3445.3
B	B8	3.053953173	0.069		12	0.056	196.4285714	1636.5	3445.3
B	B8	4.380201489	0.065	0.204	12	0.052	211.5384615	1550.4	3359.2
B	B8	4.380201489	0.068	0.172	12	0.055	200	1636.5	3531.4
B	B8	4.380201489	0.071	0.176	13	0.061	196.7213115	1636.5	3445.3
B	B8	4.380201489	0.071	0.143	13	0.06	200	1636.5	3445.3
B	B8	4.380201489	0.07	0.135	13	0.059	203.3898305	1636.5	3445.3
B	B8	4.380201489	0.072	0.138	13	0.059	203.3898305	1636.5	3445.3
B	B8	4.380201489	0.078	0.156	14	0.065	200	1808.8	3445.3
B	B8	4.380201489	0.081	0.139	15	0.07	200	1636.5	3445.3
B	B8	4.380201489	0.078	0.142	14	0.066	196.969697	1808.8	3445.3
B	B8	4.380201489	0.079	0.144	15	0.07	200	1636.5	3445.3
B	B8	4.380201489	0.082		15	0.07	200	1636.5	3445.3
B	B9	4.424778761	0.051	0.175	11	0.048	208.3333333	1636.5	3186.9
B	B9	4.424778761	0.054		11	0.05	200	1550.4	3186.9
B	B9	4.669779853	0.05	0.192	11	0.047	212.7659574	1722.7	3186.9
B	B9	4.669779853	0.054	0.154	11	0.05	200	1808.8	3273
B	B9	4.669779853	0.057	0.186	11	0.05	200	1550.4	3186.9
B	B9	4.669779853	0.058	0.196	11	0.051	196.0784314	1550.4	3186.9
B	B9	4.669779853	0.06	0.124	12	0.055	200	1550.4	3186.9
B	B9	4.669779853	0.06	0.138	12	0.054	203.7037037	1808.8	3273
B	B9	4.669779853	0.064	0.107	12	0.057	192.9824561	1550.4	3359.2

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B9	4.669779853	0.062		12	0.055	200	1550.4	3359.2
B	B9	4.975124378	0.055	0.191	11	0.049	204.0816327	1722.7	3273
B	B9	4.975124378	0.056	0.228	11	0.051	196.0784314	1550.4	3273
B	B9	4.975124378	0.058	0.154	12	0.054	203.7037037	1808.8	3273
B	B9	4.975124378	0.059	0.164	12	0.055	200	1550.4	3186.9
B	B9	4.975124378	0.061	0.152	12	0.056	196.4285714	1808.8	3359.2
B	B9	4.975124378	0.059	0.108	12	0.056	196.4285714	1550.4	3273
B	B9	4.975124378	0.061	0.121	12	0.055	200	1808.8	3359.2
B	B9	4.975124378	0.065	0.096	13	0.061	196.7213115	1550.4	3359.2
B	B9	4.975124378	0.068	0.109	13	0.061	196.7213115	1722.7	3273
B	B9	4.975124378	0.068	0.075	13	0.062	193.5483871	1722.7	3273
B	B9	4.975124378	0.064		13	0.06	200	1550.4	3359.2
B	B10	6.33161852	0.058	0.138	11	0.049	204.0816327	1636.5	3273
B	B10	6.33161852	0.059	0.143	11	0.051	196.0784314	1722.7	3359.2
B	B10	6.33161852	0.07	0.106	13	0.062	193.5483871	1722.7	3273
B	B10	6.33161852	0.069	0.067	13	0.06	200	1808.8	3359.2
B	B10	6.33161852	0.066	0.071	13	0.06	200	1808.8	3359.2
B	B10	6.33161852	0.075	0.087	15	0.07	200	1722.7	3359.2
B	B10	6.33161852	0.075	0.065	14	0.067	194.0298507	1722.7	3445.3
B	B10	6.33161852	0.073	0.067	14	0.067	194.0298507	1722.7	3273
B	B10	6.33161852	0.072	0.123	14	0.066	196.969697	1808.8	3359.2
B	B10	6.33161852	0.087	0.065	16	0.077	194.8051948	1722.7	3273
B	B10	6.33161852	0.074	0.068	14	0.067	194.0298507	1722.7	3359.2
B	B10	6.33161852	0.081	0.073	15	0.072	194.4444444	1722.7	3445.3
B	B10	6.33161852	0.079	0.068	15	0.073	191.7808219	1722.7	3445.3
B	B10	6.33161852	0.079	0.067	15	0.073	191.7808219	1550.4	3445.3
B	B10	6.33161852	0.08	0.069	15	0.072	194.4444444	1722.7	3445.3

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B10	6.33161852	0.082	0.072	15	0.073	191.7808219	1722.7	3445.3
B	B10	6.33161852	0.082		15	0.074	189.1891892	1722.7	3445.3
B	B10	4.846526656	0.056	0.156	11	0.051	196.0784314	1550.4	3359.2
B	B10	4.846526656	0.056	0.148	11	0.051	196.0784314	1550.4	3359.2
B	B10	4.846526656	0.065	0.138	12	0.056	196.4285714	1722.7	3359.2
B	B10	4.846526656	0.067		12	0.056	196.4285714	1550.4	3359.2
B	B11	6.512006512	0.056	0.149	11	0.05	200	1808.8	3359.2
B	B11	6.512006512	0.06	0.134	11	0.05	200	1808.8	3359.2
B	B11	6.512006512	0.067	0.131	13	0.061	196.7213115	1808.8	3273
B	B11	6.512006512	0.068	0.097	13	0.062	193.5483871	1722.7	3273
B	B11	6.512006512	0.066	0.099	13	0.061	196.7213115	1722.7	3359.2
B	B11	6.512006512	0.07	0.069	14	0.065	200	1550.4	3359.2
B	B11	6.512006512	0.068	0.069	13	0.062	193.5483871	1722.7	3359.2
B	B11	6.512006512	0.069	0.069	14	0.065	200	1808.8	3359.2
B	B11	6.512006512	0.071	0.07	14	0.067	194.0298507	1722.7	3359.2
B	B11	6.512006512	0.069	0.061	13	0.063	190.4761905	1722.7	3273
B	B11	6.512006512	0.07	0.068	14	0.066	196.969697	1808.8	3359.2
B	B11	6.512006512	0.069	0.061	13	0.063	190.4761905	1722.7	3273
B	B11	6.512006512	0.07	0.076	13	0.063	190.4761905	1722.7	3273
B	B11	6.512006512	0.072	0.068	14	0.068	191.1764706	1722.7	3273
B	B11	6.512006512	0.075	0.069	14	0.068	191.1764706	1722.7	3445.3
B	B11	6.512006512	0.073	0.076	14	0.068	191.1764706	1722.7	3273
B	B11	6.512006512	0.073		13	0.063	190.4761905	1722.7	3445.3
B	B11	6.960556845	0.076	0.07	15	0.071	197.1830986	1722.7	3359.2
B	B11	6.960556845	0.071	0.07	14	0.067	194.0298507	1722.7	3273
B	B11	6.960556845	0.075	0.07	14	0.068	191.1764706	1722.7	3273
B	B11	6.960556845	0.071		14	0.067	194.0298507	1722.7	3273

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B12	6.802721088	0.078	0.064	14	0.071	183.0985915	1636.5	3531.4
B	B12	6.802721088	0.08	0.063	15	0.075	186.6666667	1636.5	3531.4
B	B12	6.802721088	0.083	0.065	15	0.076	184.2105263	1636.5	3445.3
B	B12	6.802721088	0.082	0.064	15	0.076	184.2105263	1636.5	3531.4
B	B12	6.802721088	0.085	0.068	16	0.079	189.8734177	1636.5	3531.4
B	B12	6.802721088	0.084	0.065	15	0.076	184.2105263	1636.5	3445.3
B	B12	6.802721088	0.082		15	0.074	189.1891892	1722.7	3531.4
B	B12	5.577005577	0.072	0.151	14	0.065	200	1808.8	3531.4
B	B12	5.577005577	0.078	0.171	15	0.071	197.1830986	1722.7	3531.4
B	B12	5.577005577	0.081	0.13	15	0.073	191.7808219	1722.7	3531.4
B	B12	5.577005577	0.089	0.128	17	0.082	195.1219512	1722.7	3531.4
B	B12	5.577005577	0.081	0.056	15	0.071	197.1830986	1636.5	3531.4
B	B12	5.577005577	0.074	0.093	14	0.066	196.969697	1722.7	3531.4
B	B12	5.577005577	0.088	0.076	16	0.081	185.1851852	1636.5	3531.4
B	B12	5.577005577	0.087	0.078	16	0.081	185.1851852	1636.5	3617.6
B	B12	5.577005577	0.084	0.087	16	0.078	192.3076923	1722.7	3531.4
B	B12	5.577005577	0.095	0.084	18	0.088	193.1818182	1722.7	3531.4
B	B12	5.577005577	0.09	0.064	16	0.082	182.9268293	1636.5	3531.4
B	B12	5.577005577	0.077	0.066	15	0.072	194.4444444	1722.7	3531.4
B	B12	5.577005577	0.083	0.07	15	0.075	186.6666667	1722.7	3531.4
B	B12	5.577005577	0.086		15	0.076	184.2105263	1636.5	3617.6
B	B13	5.110732538	0.072	0.233	14	0.064	203.125	1722.7	3617.6
B	B13	5.110732538	0.075	0.147	15	0.066	212.1212121	1636.5	3531.4
B	B13	5.110732538	0.081	0.134	16	0.077	194.8051948	1722.7	3531.4
B	B13	5.110732538	0.087	0.162	17	0.081	197.5308642	1722.7	3531.4
B	B13	5.110732538	0.08	0.059	16	0.074	202.7027027	1636.5	3531.4
B	B13	5.110732538	0.075	0.127	15	0.069	202.8985507	1722.7	3531.4

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SUPPLEMENTARY TABLE 3. (Continued)

Species	Individual	Call Repetition Rate	Call Duration	Inter-call Interval	No. of pulses/Call	pulse period	Pulse Repetition Rate	Fundamental frequency	Dominant frequency
B	B13	5.110732538	0.094	0.098	18	0.087	195.4022989	1722.7	3445.3
B	B13	5.110732538	0.087	0.073	17	0.082	195.1219512	1636.5	3531.4
B	B13	5.110732538	0.09	0.072	18	0.086	197.6744186	1636.5	3531.4
B	B13	5.110732538	0.091	0.064	18	0.086	197.6744186	1722.7	3617.6
B	B13	5.110732538	0.091	0.081	18	0.087	195.4022989	1636.5	3531.4
B	B13	5.110732538	0.097	0.077	19	0.092	195.6521739	1722.7	3531.4
B	B13	5.110732538	0.098		19	0.092	195.6521739	1722.7	3531.4
B	B13	6.097560976	0.093	0.077	18	0.087	195.4022989	1636.5	3617.6
B	B13	6.097560976	0.09	0.068	17	0.083	192.7710843	1722.7	3531.4
B	B13	6.097560976	0.094	0.071	18	0.088	193.1818182	1722.7	3445.3
B	B13	6.097560976	0.095	0.07	18	0.088	193.1818182	1722.7	3531.4
B	B13	6.097560976	0.097	0.073	19	0.093	193.5483871	1722.7	3531.4
B	B13	6.097560976	0.098	0.063	19	0.092	195.6521739	1722.7	3531.4
B	B13	6.097560976	0.094	0.066	18	0.087	195.4022989	1722.7	3531.4
B	B13	6.097560976	0.096		19	0.091	197.8021978	1722.7	3617.6