Korean J. Syst. Zool. Vol. 25, No. 3: 269-273, November 2009

First Record of the Himalayan Swiftlet *Aerodramus brevirostris* (Aves: Apodiformes) from Korea

Chang-Yong Choi[1,*], Jong-Gil Park[1], Yun-Sun Lee[2], Mi-Sook Min[2], Gi-Chang Bing[1], Gil-Pyo Hong[1] and Hang Lee[2]

[1]Migratory Birds Center (NPMBC), National Park Research Institute, Hongdo-ri, Shinan-gun, Jeollanam-do 535-916, Korea
[2]Conservation Genome Resource Bank for Korean Wildlife (CGRB), BK21 Program for Veterinary Science and College of Veterinary Medicine, Seoul National University, Seoul 151-742, Korea

ABSTRACT

On 28 April 2008, a male Himalayan Swiftlet (*Aerodramus brevirostris*) was captured and examined at a night roost of swallows on Hongdo Island, Jeollanam-do, Korea. This is the first record of this species from Korea confirmed by specimen examination. We describe morphological features and some phylogenetic notes of the Himalayan Swiftlet found.

Key words: first record, Himalayan Swiftlet (*Aerodramus brevirostris*), Korea, phylogenetic notes

INTRODUCTION

Swifts and swiftlets belonging to the family Apodidae (Aves: Apodiformes) are small to medium-sized aerial birds with long, narrow wings, and short, thin legs, but strong toes with sharp claws (del Hoyo et al., 1999). Due to highly specialized structures for aerial habits and high speed flight, they require open foraging areas near water with adequate concentration of aerial plankton which consists of a wide variety of insects and arachnids (Chantler and Driessens, 1995; del Hoyo et al., 1999). Currently 92 species of 19 genera are known in the family Apodidae, and six of them are threatened (Chantler and Driessens, 1995; del Hoyo et al., 1999).

In Korea, two swifts from the genus *Apus* and one needletail from the genus *Hirundoapus* are reported (Lee et al., 2000). The Pacific Swift *Apus pacificus* is the most common and abundant summer visitor along coastal areas of the Korean peninsula while the House Swift *Apus affinis* is a vagrant species collected once at Jeju Island in 1989 (Park, 1998; Lee et al., 2000). White-throated Needletails *Hirundoapus caudacutus* are uncommon migrants passing through mountainous areas of Korea (Lee et al., 2000). However, the occasional occurrence of some swiftlets in the genus *Aerodramus*, particularly the Himalayan Swiftlet *Aerodramus brevirostris* or Edible-nest Swiftlet *A. fuciphagus*, was recently suggested based on field observations on remote islands of western Korea. Therefore, the Himalayan Swiftlet *Aerodramus brevirostris* was put in the list of Korean birds by some authors (e.g., Park and Seo, 2008) referencing several observation reports, poor photographic evidences, and possible distribution of swiftlets in Asia. Nevertheless, there was no confirmed evidence or available information to identify the *Aerodramus* swiftlets' occurrence in Korea, because their aerobatic flight in open sky, roosting habits at precipitous cliffs, and rare occurrence allowed limited accessibility to the species.

This study describes the first confirmed identification of a Himalayan Swiftlet captured at a roosting site of swallows (*Hirundo* spp.) in Korea with some phylogenetic notes.

MATERIALS AND METHODS

During a survey on a night roost of swallows (*Hirundo rustica* and *H. daurica*) at 00:50 h on 28 April 2008, one *Aerodramus* swiftlet was captured on Hongdo Island, Shinan-gun, Jeollanam-do, Korea. The swiftlet was clinging to vertical surfaces of a fishing buoy, which was hanging from the eaves of a building. The bird was sleeping alone away from other roosting colonies of swallows on horizontal electronic wires under the same building (Fig. 1). The morphological features and biometric variables (wing, tail, tarsus, bill, head, and total lengths) were examined in the National Park Migratory Birds Center (NPMBC), and the bird was cared for and released the next morning. However, because the swift-

*To whom correspondence should be addressed
Tel: 82-61-246-3115, Fax: 82-61-246-4115
E-mail: subbuteo@hanmail.net

Fig. 1. A sleeping Himalayan Swiftlet (*Aerodramus brevirostris*) clinging to vertical surfaces of a fishing buoy on Hongdo Island, Korea on 28 April 2008.

let was dehydrated and had reduced fat deposits for fuel of migration, its carcass was soon recovered in a nearby town.

A study skin of the swiftlet was preserved in the NPMBC, and muscle samples from the carcass were deposited at the Conservation Genomic Resource Bank for Korean Wildlife (CGRB), Seoul National University. To understand phylogenetic relationship between the specimen and other closely-related species, genomic DNA (CGRB 6022) was extracted from the samples using a DNeasy Tissue and Blood kit (Qiagen), and partial cytochrome *b* gene (426-976 bp: 550 bp) of mtDNA were amplified by PCR with avian universal primers (Sérgio and Allan, 2004). Contiguous sequences were constructed, edited, and aligned using Clustal X software (Thompson et al., 1997). The neighbor-joining trees was constructed using MEGA 4 program (Tamura et al., 2007), based on the Kimura-2 parameter method. Bootstrap values were estimated through 1,000 replications. Sex was also determined by molecular methods (Ito et al., 2003).

SYSTEMATIC ACCOUNTS

Phylum Chordata Bateson, 1885
Class Aves Linnaeus, 1758
Order Apodiformes Peters, 1940
Family Apodidae Hartert, 1897
[1]*Genus *Aerodramus* Oberholser, 1906
[2]***Aerodramus brevirostris* (Horsfield, 1840)**
Hirundo brevirostris Horsfield, 1840, p. 155, Assam.

Material examined. One young male in first summer plumages captured at Hondgdo-ri (N 34°41′, E 125°11′) on 28 April 2008 (C.Y. Choi).

Diagnosis. The Himalayan Swiftlet (*Aerodramus brevirostris*) is very similar to the Black-nest Swiftlet (*A. maxima*), Edible-nest Swiftlet (*A. fuciphagus*), and Mossy-nest Swiftlet (*A. salangana*). *A. salangana* has no white tip on the basal barbs (rami) of back feathers (Chantler and Driessens, 1995). Although *A. maxima* and *A. fuciphagus* may have small white tips on rami, white on rami are smaller in size or absent in comparison to that of *A. brevirostris* (Chantler and Driessens, 1995). *A. maxima* also differ from *A. brevirostris* by heavy tarsal feathering, less deeply forked tail, and its sedentary habits in south-east Asia (Chantler and Driessens, 1995; del Hoyo et al., 1999). A medium-sized and sedentary *A. fuciphagus* has lightly feathered or naked tarsi (Chantler and Driessens, 1995).

Description. Relatively large species in the genus *Aerodramus*. Tail is obviously forked and has ten rectrices. Long and narrow wing is composed of ten primary feathers. Wing and tail feathers are blackish with metallic-glossy blue tinge. Upperparts are dark gray-brown with a grayish rump. The feathers on rump, which are distinctively paler than body feathers and uppertail coverts, form a narrow band with brown shaft streaks. Upperpart feathers have white basal barbs, but white rami are normally invisible as they are well concealed by arranged contour feathers (Fig. 2). Underparts are uniform brownish-gray with dark shaft streakings. Pale eye patches are shown on lores. The bill is small and slightly curved downward, while the gape is very large and wide. Whole tarsi are sparsely covered by short and soft feathers (Fig. 3). Anisodactyl feet are small, but claws are relatively long, curved, and sharp to grip onto vertical

[1]*작은칼새속(신칭), [2]*작은칼새(신칭)

Table 1. Measurements of Himalayan Swiftlets *A. brevirostris* from this study and other literatures.

Species (Subspecies)	Total length (mm)	Wing (mm)	Central tail (mm)	Outer tail (mm)	Tail fork (mm)	Tarsus (mm)	Bill: exposed culmen (mm)	Total head (mm)	Weight (g)	Source
CGRB 6022	126.0	126.3	44.0	51.7	7.3	10.0	5.3	24.0	10.9	This study
A. brevirostris brevirostris	108-112	125-132	–	54-57	7-11	–	–	–	–	Rasmussen and Anderton, 2005
	–	120-133	45-48	54-59	8-10	–	–	–	12.5-13	Ali and Ripley, 1970
	–	128-137	46-52	56-62	–	–	–	–	–	Robson, 2005
	–	123-132	–	–	–	–	–	–	–	Deignan, 1955
	–	122-135	–	–	–	–	–	–	–	Vaurie, 1965
A. brevirostris innominata	118	130	–	58	11	–	–	–	–	Rasmussen and Anderton, 2005
	–	125-132	–	52-55	8-10	–	–	–	–	Ali and Ripley, 1970
	–	132-141	–	–	–	–	–	–	–	Deignan, 1955
	–	134-140	–	–	–	–	–	–	–	Vaurie, 1965

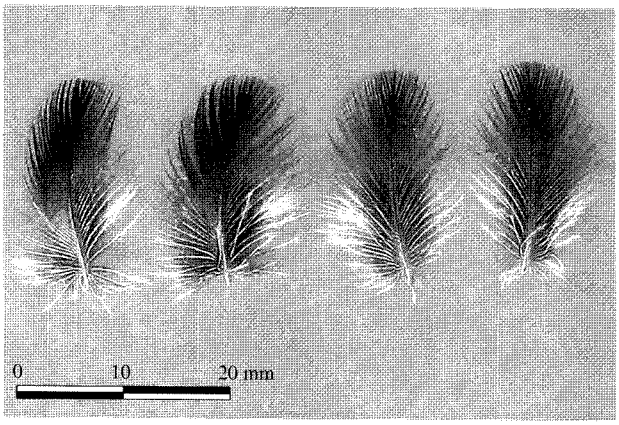

Fig. 2. White tips on the basal barbs of back feathers observed in the Himalayan Swiftlet (*Aerodramus brevirostris*).

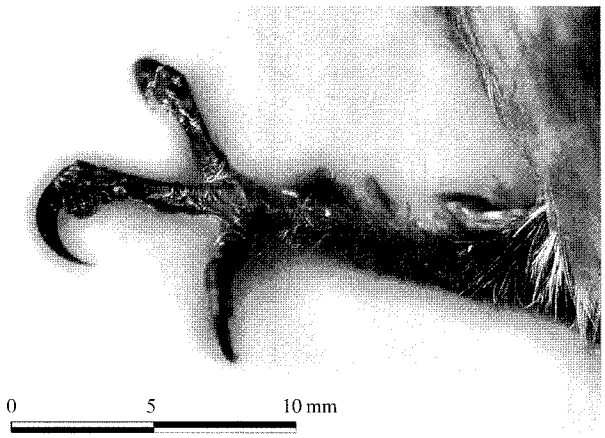

Fig. 3. A tarsus sparsely covered by short and soft feathers of the Himalayan Swiftlet (*Aerodramus brevirostris*).

surfaces. Measurements are shown in Table 1.

Distribution. Extensive south and south-eastern Asia (Chantler and Driessens, 1995) ranging from the Himalayas to western and central China, Assam (north-eastern India), and Indochinese countries (Vaurie, 1965). Mainly resident (del Hoyo et al., 1999); only small proportions of population migrate to south-western and southern Thailand, Malay Peninsula, and possibly Sumatra as partial migrants for winter (Vaurie, 1965; Chantler and Driessens, 1995; del Hoyo et al., 1999). Vagrant in Korea, but possibly rare passage migrant based on field observations (Park and Seo, 2008; first possible observation at Gageodo Island on 3 May 2001, one bird at Hongdo Island on 6 June 2003, and five records at Eocheongdo Island on 18 April 2002, 25 August 2002, 6 May 2005, 9 May 2006, and 25 April 2008).

Remarks. Sexes are identical; no difference in plumages or measurements is known between sexes, but molecular sexing indicated that the specimen was male.

Four subspecies of *A. brevirostris* are currently recognized (del Hoyo et al., 1999), two of which (*A. b. rogersi* and *A. b. vulcanurum*) may represent distinct species (Chantler and Driessens, 1995; del Hoyo et al., 1999). Although the wing length is relatively short, the specimen of this study (CGRB 6022) may belong to *A. b. innominata*, whose color of rump is relatively darker (Chantler and Driessens, 1995) and which is distributed in ranges close to Korea (Chantler and Driessens, 1995; del Hoyo et al., 1999) than nominate subspecies. Whether the specimen is *A. b. innominata* or *A. b. brevirostris*, it belonged to a different clade from *A. b. vulcanurum* (Fig. 4). Sometimes it is placed in genus *Collocalia* as *Collocalia brevirostris* (Horsfield, 1840).

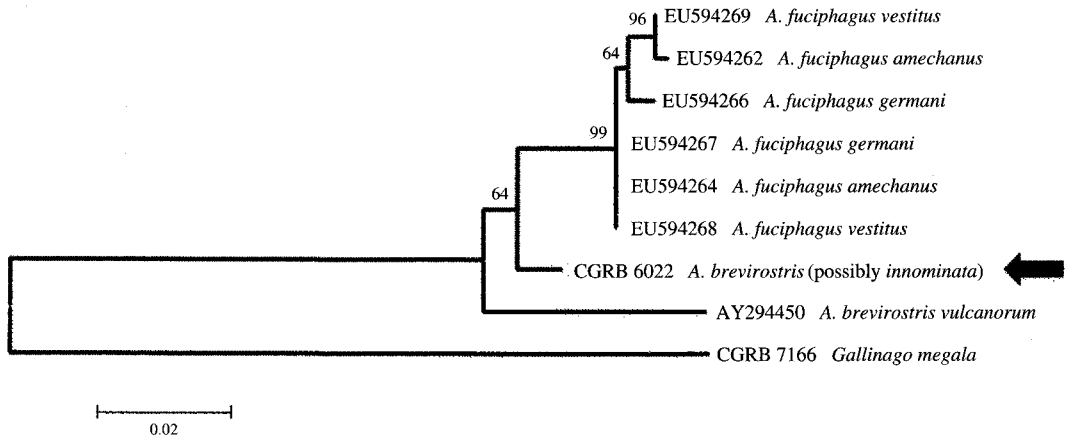

Fig. 4. Neighbor-joining tree of the *A. brevirostris* (CGRB 6022 collected at Hongdo Island) constructed using partial cytochrome *b* gene (426-976 bp: 550 bp) of mtDNA based on the Kimura-2 parameter method. Numbers above branches are for percent supports in 1,000 bootstrap replications.

DISCUSSION

After the discovery of echolocating behaviors in swiftlets (Medway, 1959), all swiftlets placed in a single genus (*Collocalia*) were split into two genus; the genus *Aerodramus* consists of all echolocating species, while the genus *Collocalia* comprises small non-echolocating species (Brooke, 1970). Because the use of echolocation has been proved in the Pygmy Swiftlet *Collocalia troglodytes* (Price et al., 2004), the validity of genus separation by echolocating ability is still in controversy, and the two genera are frequently grouped into the original single genus *Collocalia* (Chantler and Driessens, 1995). However, many literatures and phylogenetic studies separate *Aerodramus* from *Collocalia* (del Hoyo et al., 1999; Thomassen et al., 2005, 2006), and a recent phylogenetic study suggests that echolocation in *Aerodramus* and *C. troglodytes* is a result of independent convergent evolution (Thomassen et al., 2005). Following this perspective, the specimen collected in Korea is referred to *Aerodramus* in this study.

Several swiftlets, particularly Black-nest (*A. maxima*), Edible-nest (*A. fuciphagus*), and Mossy-nest Swiftlets (*A. salangana*), share similar morphological features with the Himalayan Swiftlet, and may not be easily separated in the field (Chantler and Driessens, 1995). Regarding distant distributions and more sedentary habits of the other three swiftlets (*A. maxima*, *A. fuciphagus* and *A. salangana*), possible records of Himalayan Swiftlets were suggested by some authors (Park and Seo, 2008). Distribution is also an important key for field identification, but vagrancy of migratory birds may occur in unexpected ways temporally and spatially (Remsen and Parker, 1990). Therefore, in spite of previous observations on this species in the field since 2001 (Park and Seo, 2008), there was no clear evidence or voucher specimen to confirm the occurrence of *A. brevirostris* in Korea.

Aerodramus brevirostris is included in several phylogenetic studies linked with evolution of behavioral traits, but all the molecular information were taken from *A. brevirostris vulcanurum* due to its conservative issues, not from nominate ones in subspecies level. *A. brevirostris vulcanurum* is frequently regarded as the Volcano Swiftlet (*Aerodramus vulcanurum*), because it has different morphological traits (indistinct rump patch, darker underparts and throat), small population under threat of periodic extinction by volcanic eruption, highly sedentary habits, and limited distribution to volcanic peaks and crater rims only in Java (Chantler and Driessens, 1995). Therefore, further studies are needed to construct a new phylogenetic tree including true Himalayan Swiftlets (*A. b. brevirostris* or *A. b. innominata*).

Consequently, the specimen of this study is the first confirmed record of the Himalayan Swiftlet from Korea, and its molecular information supports the suggestion that the sedentary *A. b. vulcanurum* should be regarded as a separate species (Volcano Swiftlet *Aerodramus vulcanurum*) from true Himalayan Swiftlets (*Aerodramus brevirostris*).

REFERENCES

Ali, S. and S.D. Ripley, 1970. Handbook of the Birds of India and Pakistan, Vol. 4. Oxford University Press, Bombay, pp. 25-60.

Brooke, R.K., 1970. Taxonomic and evolutionary notes on the subfamilies, tribes, genera and subgenera of the swifts (Aves: Apodidae). Durban Mus. Nov., 9: 13-24.

Chantler, P. and G. Driessens, 1995. Swift: A Guide to the Swifts and Treeswifts of the World. Pica Press, Sussex, pp. 1-139.

Deignan, H.G., 1955. The races of the swiftlet, *Collocalia brevirostris* (McClelland). Bull. B. O. C., 75: 116-117.

del Hoyo, J., A. Elliott and J. Sargatal, 1999. Handbook of the Birds of the World, Vol. 5. Barn-owls to Hummingbirds. Lynx Ediction, Barcelona, pp. 388-435.

Horsfield, T., 1840. List of mammalia and birds collected in Assam by John McClelland, Esp., assistant-surgeon in the service of the East India Company, Bengal establishment, member of the late deputation which was sent into that country for the purpose of investigating the nature of the tea plant. Proceedings of the Zoological Society of London, (1839): 146-167.

Ito, H., A. Sudo-Yamaji and M. Abe, 2003. Sex identification by alternative polymerase chain reaction methods in Falconiformes. Zool. Sci., 20: 339-344.

Lee, W.S., T.H. Goo and J.Y. Park, 2000. A Field Guide to the Birds of Korea. LG Evergreen Foundation, Seoul, pp. 186-187.

Medway, L., 1959. Echo-location among *Collocalia*. Nature, 184: 1352-1353.

Park, J.G. and J.H. Seo, 2008. A Photographic Guide to the Birds of Korea: Land Birds. Shingu Publishing, Seoul, pp. 132-135 (in Korean).

Park, H.S., 1998. The Birds of Cheju Island. Cheju University Press, Jeju, pp. 67-69 (in Korean).

Price, J.J., K.P. Johnson and D.H. Clayton, 2004. The evolution of echolocation in swiftlets. J. Avian Biol., 35: 135-143.

Rasmussen, P.C. and J.C. Anderton, 2005. Birds of South Asia: The Ripley Guide, Vol. 2. Smithsonian Institution and Lynx Edicions, Washington, D.C. and Barcelona, pp. 256-257.

Remsen, J.V. and T.A. Parker, 1990. Seasonal distribution of the Azure Gallinule (*Porphyrula flavirostris*), with comments on vagrancy in rails and gallinules. Wilson Bull., 102: 380-399.

Robson, C., 2005. Birds of South-East Asia. New Holland, London, pp. 64-65.

Sérgio, L.P. and J.B. Allan, 2004. Vicariant speciation of curassows (Aves, Cracidae): a hypothesis based on mitochondrial DNA phylogeny. Auk, 121: 682-694.

Tamura, K., J. Dudley, M. Nei and S. Kumar, 2007. MEGA4: Molecular Evolutionary Genetics Analysis (MEGA) software version 4.0. Mol. Biol. Evol., 24: 1596-1599.

Thomassen, H.A. and G.D.E. Povel, 2006. Comparative and phylogenetic analysis of the echo clicks and social vocalizations of swiftlets (Aves: Apodidae). Biol. J. Linn. Soc., 88: 631-643.

Thomassen, H.A., R-J. den Tex, M.A.G. de Bakker and G.D.E. Povel, 2005. Phylogenetic relationships amongst swifts and swiftlets: a multi locus approach. Mol. Phyl. Evol., 37: 264-277.

Thompson, J.D., T.J. Gibson, F. Plewniak, F. Jeanmougin and D.G. Higgins, 1997. The Clustal X windows interface: flexible strategies for multiple sequence alignment aided by quality analysis tools. Nucleic Acids Res., 24: 4876-4882.

Vaurie, C., 1965. The Birds of the Palearctic Fauna: Non Passeriformes. H.F. & G. Witherby Limited, London, pp. 646-647.

Received August 19, 2009
Accepted November 4, 2009