

= Aerodramus =

Aerodramus is a genus of small , dark , cave @-@ nesting birds in the Collocaliini tribe of the swift family . Its members are confined to tropical and subtropical regions in southern Asia , Oceania and northeastern Australia . Many of its members were formerly classified in Collocalia , but were first placed in a separate genus by American ornithologist Harry Church Oberholser in 1906 .

This is a taxonomically difficult group of very similar species . Echolocation , DNA sequencing and parasitic lice have all been used to establish relationships , but some problems , such as the placement of the Papuan swiftlet are not fully resolved . These swiftlets can pose major identification problems where several species occur .

What distinguishes Aerodramus swiftlets from other swifts , and indeed almost all other birds , is their ability to use a simple but effective form of echolocation . This enables them to navigate within the breeding and roosting caves .

The nests of Aerodramus swiftlets are constructed with saliva as a major component . In two species , saliva is the only material used , and the nests are collected for the famous Chinese delicacy ' bird 's nest soup ' , the over @-@ collection of which puts pressure on the swiftlet populations .

= = Distribution = =

The range of these swiftlets is confined to tropical southern Asia , Oceania , northeastern Australia and the Indian Ocean , with the greatest diversity in Southeast Asia , Indonesia and Papua New Guinea . Several of the species are restricted to small islands , and their limited range can make them vulnerable , like the Seychelles , Whitehead 's and Guam swiftlets . The Mangaia swiftlet is a recently extinct species known only from fossils .

= = Description = =

Aerodramus swiftlets are in many respects typical swifts , having narrow wings for fast flight , and a wide gape and small reduced beak surrounded by bristles for catching insects in flight . They have dull plumage which is mainly in shades of black , brown , and grey . Members of this genus typically have dark brown upper wings and upper body , sometimes with a paler rump , light brown underparts , a paler throat , and brownish @-@ white under @-@ wings with dark brown " armpits " . Males and female plumages are similar in appearance , as is that of the juvenile , for those species for which it has been described ; in some species the juvenile shows pale fringes to the flight feathers .

The legs , as with many swifts , are very short , preventing the birds from perching , but allowing them to cling to vertical surfaces . The flight is mainly gliding due to very long primary feathers and small breast muscles . Aerodramus swiftlets , depending on species , weigh 8 ? 35 grammes (0 @.@ 28 ? 1 @.@ 23 oz) and are 9 ? 16 centimetres (0 @.@ 28 ? 1 @.@ 23 in) long . These swiftlets are very similar , and where several species occur , such as Borneo , New Guinea and the Philippines , may not be separable in the field .

= = Behaviour = =

Aerodramus swiftlets are aerial insectivores , which take prey like flies on the wing . They roost and breed in caves ; during the day they leave the caves to forage for food , and return to roost at night . They are monogamous and both partners take part in caring for the nestlings . Males perform aerial displays to attract females and mating occurs at the nest . The breeding season overlaps the wet season , which corresponds to an increased insect population .

Clutch size depends on the location and the food source , but generally Aerodramus swiftlets lay one or two eggs . The eggs are a dull white , and are laid every other day . Many , if not all , species are colonial nesters ; some build their nests in high , dark corners on cave walls .

Most *Aerodramus* swiftlets live in the tropical Indo @-@ Pacific region and do not migrate . These birds usually remain in one cave or other roosting / nesting site . Examples of cave sites include the Niah Caves and Gunung Mulu National Park , which are both located in Sarawak , Malaysian Borneo .

Characteristics of behaviour , such as what materials apart from saliva the nests contain , can be used to differentiate between certain species of *Aerodramus* .

= = Echolocation = =

The genus *Aerodramus* is of special interest due to its use of echolocation . The swiftlets use this technique to navigate in darkness through the chasms and shafts of the caves where they breed and roost at night . Apart from swiftlets , the only other avian species to use echolocation is the unrelated oilbird .

The *Aerodramus* swiftlets ' echolocating double clicks are within the normal human hearing range and up to 3 milliseconds apart , with the interval becoming shorter in darker locations . Unlike the rest of the genus (for those species which have been studied) , the Atiu swiftlet , *Aerodramus sawtelli* , and the black @-@ nest swiftlet , *A. maximus* , emit only single clicks . Interestingly , the former species also uses echolocation outside its caves .

The use of echolocation was once used to separate *Aerodramus* from the other non @-@ echolocating cave swiftlet genera *Collocalia* and *Hydrochous* (virtually nothing is known about *Schoutedenapus*) . However , recently , the pygmy swiftlet , *Collocalia troglodytes* , was discovered making similar clicking noises both inside and outside its roosting cave .

It has recently been determined that the echolocation vocalizations do not agree with evolutionary relationship between swiftlet species as suggested by DNA sequence comparison . This suggests that as in bats , echolocation sounds , once present , adapt rapidly and independently to the particular species ' acoustic environment .

A study suggested that the echolocation subunits were mainly located in the central nervous system , while the subunits in the vocal apparatus were already present and capable of use before echolocation even evolved . This study supports the hypothesis of independent evolution of echolocation in *Aerodramus* and *Collocalia* , with the subsequent evolution of complex behaviour needed to complement the physical echolocation system , or just possibly that the vocal apparatus @-@ parts of the echolocation system might even be inherited from some prehistoric nocturnal ancestor .

It has been suggested that the giant or waterfall swiftlet , *Hydrochous gigas* , which cannot echolocate , may be descended from an echolocating ancestor .

= = Saliva nests = =

The intricately constructed saliva nests of this swiftlet genus , which in some species contain no other material , are collected to make the delicacy bird 's nest soup . They therefore command extremely high prices .

Authentic bird 's nest soup is made from the nests of the edible @-@ nest swiftlet (or white @-@ nest swiftlet) , *Aerodramus fuciphagus* , and the black @-@ nest swiftlet , *Aerodramus maximus* . Instead of incorporating twigs , feathers and straw like others in the genus , these two swiftlets make their nest only from strands of their gummy saliva , which harden when exposed to air . Once the nests are harvested , they are cleaned and sold to restaurants . Over the past twenty years , the high demand for the nests of these *Aerodramus* species has had an adverse effect on their populations . The Niah caves population of black @-@ nest swiftlets plunged from around 1 @. @ 5 million pairs in 1959 to 150 @, @ 000 ? 298 @, @ 000 pairs in the early 1990s through over @-@ harvesting .

Early authors had doubts about the material used to make the nest , with whale and fish sperm and sea foam being proposed as the basis for construction . Even in the 1830s , when the use of saliva had been fairly well established , it was believed that it was only a cement to bind a sea plant which

provided the bulk of the gelatinous material of the nest .

= = Lice = =

As with other taxonomically difficult groups , ectoparasites can give information on relationships . A study of swiftlet parasites in northern Borneo involved transferring lice between closely related swiftlet species . The survival of lice in most of these transfers was significantly reduced in proportion to the mean difference in feather barb size between the donor and recipient species of hosts . Thus , adaptation to a particular resource on the body of the host appears to govern the specificity of swiftlet lice . In transfers where lice survived , the lice moved to different areas on the body of the host where the mean barb diameter of the feathers on which the lice occurred had the required value .

= = Papuan swiftlet = =

The Papuan swiftlet , *Aerodramus papuensis* , has three toes instead of the usual four in this group . It has the ability to echolocate , but whereas other previously studied species use echolocation primarily while flying in their caves , the Papuan swiftlet appears to be nocturnal or crepuscular and uses echolocation while active outside at night . It uses single , not double , clicks . DNA sequence data provides strong support for a basal relationship between *A. papuensis* and other *Aerodramus* taxa and suggest that this species and the waterfall swift *Hydrochous gigas* , are sister taxa , a relationship that would indicate paraphyly of the genus *Aerodramus* .

= = Species in taxonomic order = =

Seychelles swiftlet , *Aerodramus elaphrus*

Mascarene swiftlet , *Aerodramus francicus*

Indian swiftlet , *Aerodramus unicolor*

Philippine swiftlet , *Aerodramus mearnsi*

Moluccan swiftlet group

Halmahera swiftlet , *Aerodramus infuscatus*

Sulawesi swiftlet , *Aerodramus sororum*

Seram swiftlet , *Aerodramus ceramensis*

Mountain swiftlet , *Aerodramus hirundinaceus*

White @-@ rumped swiftlet , *Aerodramus spodiopygius*

Australian swiftlet , *Aerodramus terraereginae*

Himalayan swiftlet , *Aerodramus brevirostris*

Indochinese swiftlet , *Aerodramus rogersi* (sometimes included in *A. brevirostris*)

Volcano swiftlet , *Aerodramus vulcanorum*

Whitehead 's swiftlet , *Aerodramus whiteheadi*

Bare @-@ legged swiftlet , *Aerodramus nuditarsus*

Mayr 's swiftlet , *Aerodramus orientalis*

Palawan swiftlet , *Aerodramus palawanensis*

Mossy @-@ nest swiftlet , *Aerodramus salangana* (sometimes included in *A. vanikorensis*)

Uniform swiftlet , *Aerodramus vanikorensis*

Ameline swiftlet , *Aerodramus* (*vanikorensis*) *amelis*

Palau swiftlet , *Aerodramus pelewensis*

Mariana swiftlet , *Aerodramus bartschi*

Island swiftlet , *Aerodramus inquietus*

Mangaia swiftlet , *Aerodramus manuoi* (prehistoric extinction)

Atiu swiftlet , *Aerodramus sawtelli*

Tahiti swiftlet , *Aerodramus leucophaeus*

Marquesan swiftlet , *Aerodramus ocistus*

Black @-@ nest swiftlet , *Aerodramus maximus*
Edible @-@ nest swiftlet , *Aerodramus fuciphagus*
Brown @-@ rumped swiftlet , *Aerodramus (fuciphagus) vestitus*
Germain 's swiftlet , *Aerodramus germani*
Three @-@ toed swiftlet , *Aerodramus papuensis*