

# Gibbons - the singing apes

Gibbons are apes in the family Hylobatidae or also called “lesser apes”. In comparison to their sister taxon the great apes, little research has been invested. Still today, 'media and scientists consistently portray great apes as having the highest conservation priority among apes, consistently ignoring gibbons.' Thus even the most endangered species of the great apes can count more than 10.000 individuals - while at least three gibbon species (*Nomascus concolor*, *nasutus*, *H. moloch*) consist of less than 3000 individuals.

Javan silvery gibbons have already lost 96% of their original habitat. 'Chinese gibbons, which used to live on an area as big as 2.000.000 km<sup>2</sup> in ancient times, today have experienced an area loss of 99%.' ((3) 5 p.39)  
In 2008 the Chinese Lar Gibbon was extincted and many others are severely endangered.



1: Hainan gibbon  
most endangered species

The family consists of 4 genera and 16 species based on the chromosome number :

Lar (*Hylobates*) (44), Hoolock (*Bunopithecus*) (38),  
Crested Gibbon (*Nomascus*) (52) and Siamang (*Symphalangus*) (50)



2: Lar gibbon

video: brachiating lar gibbon

Their habitat are the treetops of the evergreen tropical rain forest of South-east Asia. Gibbons live in small groups made up by an adult pair and their juvenile offspring. The monogamous lifestyle is rather uncommon since only 3% of all mammal species share it. The territory size ranges between 20 and 45 hectares and is aggressively defended.

The biggest representatives, the Siamangs, can reach a size of 90 cm.

Gibbons have developed two extreme specialized forms of locomotion. They are:

**'aerialists par excellence'** (Fleagle 1999)

- The ability to walk on upright (bipedalism)
- As the only true 'brachiators' gibbons virtually 'fly' through the jungle at speeds up to 55km/h. One swing can cover a distance up to 8 meters. It also gives them a resource benefit towards other species since they are able to reach the smallest branches of the trees.

The most distinct skill of the lesser apes which separates them from other species is the ability to 'sing'. This ability is not some recent found feature - it has been noted in the back of minds since centuries.

A Chinese song from the fourth century states:

“Sad the calls of the gibbons at the three gorges of Pa-tung;  
After three calls in the night, tears wet the [traveler's] dress.”

*Yüan Sung wrote (Van Gulik, 1967, p. 46)*

3 : *Nomascus nasuti* 'cao vit gibbon',



eastern black crested gibbon  
2<sup>nd</sup> rarest ape in the world

Still it was only until 1976 when scientists, Marshall and Marshall first examined the sounds. They referred to it as 'the finest music uttered by a wild land animal'.


Their studies revealed that the vocals are not just some random uttered noise to claim their territory. In fact they are made up of relatively strict patterns of phrases and notes. The mean frequency varies between 0.2 and 5 kHz.

Further studies of the last thirty years, revealed more about song patterns and the existence of species- and sex-specificity. More recent studies dealt with the terms why gibbons 'sing' and the similarities to human music.

The sounds can be referred to as 'songs' because they fulfill all criteria of a song by definition - In 1961 Thorpe defined a song as: “a series of notes, generally of more than one type, uttered in succession and so related as to form a recognizable sequence or pattern in time“ and by Tembrock in 1977 as a “succession of phrases with non-random succession probability“.

Practically the gibbon songs can be differentiated into three groups : solo-male, solo-female and duet songs.

Those can be composed in four ways: ((3) 2., p.3, (1) 2,3 p.66) 

1. duet songs only (7 species, e.g. Siamang)
2. duets and male songs only (3 species e.g. H.agilis)
3. female and male solo songs (H.klossii)
4. female songs only  (H.moloch)

Usually one duet sequel lasts for up to 30 minutes. In comparison mated males often engage in uninterrupted solo songs often lasting more than 2 hours.

The duet songs show a typical pattern:

- First the male starts with singing short phrases which might be accompanied by female short songs.

The short phrases of the songs are rarely identical. The male gibbon starts with a easy pattern becoming more complex as it goes on, reaching its most diverse pattern just minutes after it began.

Most studies ignore female short songs because they are less stereotyped and quieter than the great calls.

- Then while the female starts its 'great call' the male falls silent.

• A great call is a sequence of notes, characterized by increasing acceleration. Also there is an increase in the maximum frequency, except in B.hoolock and S.syndactylus. Compared to the short sequences, which are rarely identical, it has an evident pattern marked by a high stereotypy.

The great call is usually accompanied by outrageous behavior, pilo-erection, swinging through the trees and shaking of tree branches.

- At the climax or shortly afterwards the male adds a 'coda', except members of H.klossii and H.moloch

A coda is a special variant of the male's short phrases. The great call and coda together make up a **great call-sequence**.

- After the great call the male goes on singing its short phrased pattern, sometimes the female, too.

There is a brought spectrum of sounds among the gibbon songs, involved in a song: The genus hyoblatus song notes are composed of 'wua' notes with specific notes for each gender.

In comparison H.lar use male specific vibrato notes.


Siamang, which duets have been determined to be the most complex, use various barks and booms during the duets, shared by males and females. Long barks of the great-call are female-specific, bitonal scream is male-specific.

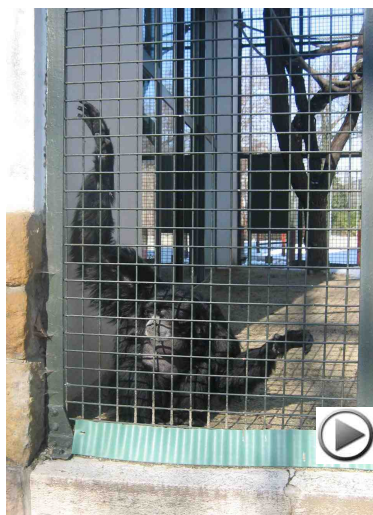
While all other gibbon species use a variety of different note types, the hoolock is unique in his behavior: Their songs do not include sex specific note types. The notes occurring during the great call of the female also appear during the short phrases of both males and females. Thus they exhibit the smallest degree of vocal sex specificity.

More recent studies found the 'other extreme of the spectrum' in Crested gibbons (Nomascus). Their songs show the highest degree of sex-specificity among all species. The songs are composed of several note types, not included in the songs of the opposite sex. Female crested gibbons contribute only great-calls to the duet song - There is neither an overlap in the note nor in the phrases repertoire among this species.

All other gibbon species (Hyoblates, Symphalangus) share certain parts of the same note repertoire, but also use sex-specific notes.

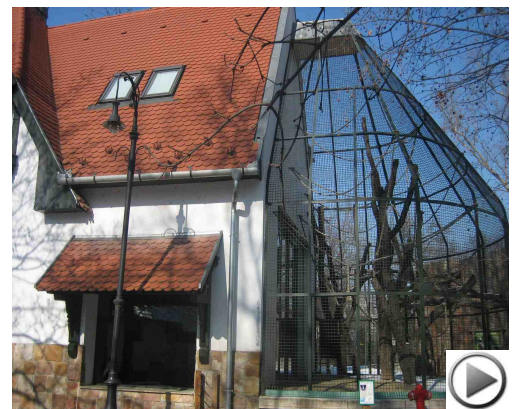


4 video: duet song 



5: Siamang couple at the Budapest zoo

The 'Siamang house' at the Budapest zoo



## Evolution

Among the primates exist four groups which are able to 'sing': Indri, Tarsius, Callicebus and Gibbons – 6% of primate genera. Since the four groups are not closely related, it is most likely that the ability evolved four times independently.



pic; videos: Gibbons and Or  
...an are kept together at the  
Philadelphia zoo

In all those primates both sexes are able to sing, and almost all sing in duets. An interesting fact is that almost all singing species have a monogamous lifestyle – this indicates that there is a correlation between the ability to sing and the evolution of monogamous behavior. This cannot just be seen among primates – most singing birds have a monogamous behavior as well.

As far as scientists know today, Gibbons have evolved from one ancestor which makes them a monophyletic group. This ancestor was capable of duet-songs even though not every kind is able to duet.

The most trusted theories today are the 'song-splitting' and 'duet-splitting' theory.

According to those, both genders of the joint ancestor used to share one song which then formed into a male-specific and female-specific part.

Then some species lost the ability to sing in duets and instead developed solo-songs such as the silver gibbon (*H.moloch*) and the kloss-gibbon (*H.klossii*).

The return to exclusive solo singing may be related to the isolated island distribution of the non-duetting species.

The great call seems an inherited feature as well. Some difference can be seen here among the acceleration speed and the use of two-phase sounds, characterized by a change of ex- and inhaled sounds (e.g. *B.hoolock*, *S.syndactylus*).

Recent analysis of hybrid vocalizations supports the idea of a genetically determined origin of gibbon songs: females of the *lar* group were mated with other species. Scientists were able to predict the hybrid female song characteristics up to at least the second generation. ((7) vocal communication)

Another study on a hybrid from *H.lar* (father) and *H.muelleri* (mother) revealed that the offspring did not inherit the species-specific vocalization of the male *H.lar* and female *H.muelleri* as expected – it was rather able to produce the great calls of this specific hybrid kind – which is a mixture of both species. ((2), 2.3 p.23)

Compared to great apes gibbons show a lot more variety in their vocal possibilities.

Great Apes are capable of making 'loud calls'. Among great apes distinct lutes are mostly used by males to keep distance between groups and mark the territory. It is usually accompanied by raising one's hackles and shaking of tree branches. Similarities can also be seen among the intensity, the long-haul function (all), the rhythm increase (chimpanzee, gorilla), rhythm decrease at the end (chimpanzee) and a louder mean part (all, esp orangutan).

The most similar behavior show chimpanzees. They use 'pant-hoots' in both genders, among all ages – most often adult males. The calls can be distinguished in four phases with increasing and decreasing elements and two-phase sounds. ((2) p.26)

## comparison to human music:

Some scientists suggest that there is a link between the 'great calls' of apes and the evolution of human music. The question is whereas the similarities are just incidence or if human music evolved from a shared 'song'.

When the African apes and humans separated from a common ancestor, several characteristics of human music evolved that are not found in loud calls of modern monkeys and apes.

Such characteristics are : the beat or rhythm, the reduction of stereotypy, the increase of improvisation and the ability to repeat improvised units as well as learned ones. ((3) p.26f, Ewens 1995)

If the interpretation of the same heritage is correct, early hominid music might have served a similar function as the loud calls of apes.

They are believed to have a variety of function: support territorial boundaries, show locality of food supply, individuals etc and strengthen a group's unity. The last aspect is the one most similar to the use of human music today. People define themselves and members of their religious, political, youth etc groups through it as is shown by National anthems, battle songs etc. This indicates a phenomenon leading way back to origin of man kind.

## The function of gibbon songs

Gibbons appear to recognize, and may respond to great-calls of other species. In zoos keeping several gibbon cages in hearing distance, neighboring pairs of different species may engage in synchronous call bouts with great-calls of several species uttered in concert. The songs do not just indicate the species but also the relationship among individuals.

- The most obvious aim of gibbon songs is the territorial factor. Gibbons try to threaten intruders by the noise and keep distance.
- Members of the same group communicate through sounds and show others where they can find available food and drinking supply.
- The catchiest is the 'strengthening of the pair-bond' thesis.

In 1980 Wickler presented the 'pair-bond hypothesis' ((3)p.10).

According to Wickler a major use of the gibbon songs was the strengthening of the pair bond. He believed in a correlation between the monogamous lifestyle and their special way to communicate since a duet requires effort on both sides and differs among pairs.

In 1999, Geissmann made an approach during a study: In the study the changes in duet structure in two pairs of captive Siamangs during a forced partner exchange was analyzed. Before the exchange both pairs had a stable strong pattern song with pair-specific traits. After the partners were switched the duet song was disturbed for a while but after some time passed, changes could be seen among the duets. Individualistic traits of the new partner were adapted into the songs. New pair-specific traits occurred during the duets. This indicates a learning effort of at least one partner.

This furthermore supports the idea of a correlation between duet singing and monogamy. The partner switch would indicate a learning effort by changing the duet sequence each time.

## Door slamming

As previously mentioned, gibbons often emphasize the climax of their great calls by shaking branches of trees, swing through trees, etc.

A phenomenon in gibbon behavior was witnessed at the Zoo Seeteufel, Switzerland in 2009. A white-handed gibbon pair was kept there since 1971, wild-born. Besides them three groups of Siamang were kept there, one in the enclosure nearby.

All groups could hear each other.

The white handed gibbon female 'Su' showed a special, rather untypical behavior during more than half of her great call. Just before her great call, she went into her sleeping-box while singing. She then shut the door half way from inside and at the climax of her great call she would slam the door open and jump out, showing some locomotive action.

When a tape with their own song was played, both gibbons made noises and showed some locomotive action. The female also did the door trick once.

Gibbons are listed among non-tool users together with gorillas. There has been no similar observation as the 'tool-use' of this gibbon. The most probable reason for the use of the door is, since it also used it during the play-back is, that it is a 'signal directed at neighboring groups and potential competitors' (Geissmann 2000).

Even though no evident advantage was observed – great apes in comparison only use tools in order to achieve something.

There is also less study about the intellectual capacities of gibbons.

Gibbons appear to be capable of self-recognition. The mirror-self recognition test revealed great individual differences among gibbons and their behavioral actions to it.



7: 12 hours old gibbon at the Ohio Zoo, August 2009



8: Su sitting in enclosure, male mate in front

While there could only be seen minimal responses among members from H.lar, members of the N.leucogenys strongly reacted to it. They showed a wide range of testing behavior up to self-exploratory behavior in front of the mirror.

The Siamang showed the highest level of self-recognition. They were among the four study-animals the only ones which passed it.

The test still indicates that gibbons may be need to be included among species capable of providing evidence for self-recognition – this would not separate great apes and humans form other primates anymore, but all apes from other primates. (Ujhelyi 2000)

## methods and research

An additional and very important reason for the lack of studies about gibbons and their singing behavior was the difficulty of finding matching measure methods to identify and compare collected material on a scientific basis.

In 2001 Dallmann and Geissmann, leading scientists in this field, finally found a new method : Mean pairwise difference (MPD) of scaled variables. It is a method which can compare results directly with those of other studies. ((3) p.5f)

With the new method Geissmann and Dallmann determined that species can be ordered by there degree of inter- and intra-individual variability. The inter-individual variability is relatively high – it showed that H.agilis has the highest variability among great calls, followed by H.moloch and H.klossii.

The first half of the great call in females shows the highest potential for individual recognition. Short phrases can barely be recognized because they are highly variable in structure.

Scientists were not able to recognize a difference between the singing behavior among captive and wild living gibbons yet. ((1) p.58)

Geissman has recorded gibbon calls of the known kinds in European, Asian and American zoos as well as with free-living animals in southern Vietnam and China for years.

During his studies at the Berlin zoo he recorded the calls of a gibbon female from the north-east of Vietnam. The calls showed striking differences to the known kinds. He made further studies on gibbon coats and stuffed animals at the zoo's museum and found more evidence in the coat pattern and fur coloring among the animals from the same region.

Geissmann made further studies in a small rest rain forest in the north-east of Vietnam and on the island of Hainan. There he finally discovered a group of gibbons who used the same divergent song pattern and showed the typical coat pattern of the Berlin animals.

During the past decade no gibbons were sighted in the north-east region and less than 20 animals on Hainan all together. That is why the new discovered Nomascus gibbon species is probably the rarest too, and might not survive the coming decades.

But as Geissmann said :

„Gibbons are so different to other apes that it is possible that they will surprise us in completely different areas of cognition.“

by Arlene Schmidt

## Literature:

### supply background information:

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5. took the pictures myself at the Budapest zoo
6. [http://farm4.static.flickr.com/3059/2627479346\\_a949333b26.jpg?v=0](http://farm4.static.flickr.com/3059/2627479346_a949333b26.jpg?v=0)
7. Photo: Xen Riggs, USA. Nature Honorable Mention.
8. [http://news.bbc.co.uk/earth/hi/earth\\_news/newsid\\_8150000/8150604.stm](http://news.bbc.co.uk/earth/hi/earth_news/newsid_8150000/8150604.stm)

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White handed gibbon: <http://www.arkive.org/white-handed-gibbon/hylobates-lar/video-12.html>

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Siamang: <http://www.arkive.org/siamang/symphalangus-syndactylus/video-00.html>

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