

THE SPAETH GIBBON COLLECTION

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ABSTRACT

A little known collection of 18 hylobatids labelled as pileated gibbons (mainly skulls and preserved fetuses) is housed at the Anthropological Institute of Zürich University, Switzerland. The exact origin of the specimens was not recorded on the labels. In order to identify these gibbons, the author scanned correspondence and unpublished documents in the A.H. Schultz Archives (Zürich), at the Yerkes Primate Center (Atlanta, U.S.A.), and at the Yale University Library (New Haven, U.S.A.). These documents revealed that all specimens belong to one homogenous collection and can be reliably identified as pileated gibbons (*Hylobates pileatus*). The collection was traced back to the original collector, the late Dr. R.A. Spaeth. The exact origin of the gibbons was established as Sriracha in southeastern Thailand.

INTRODUCTION

The pileated gibbon (*Hylobates pileatus*) is distributed in southeastern Thailand and Cambodia and is in danger of extinction because of habitat destruction (e.g. EUDEY, 1987). Geographical variability of this species has apparently not been investigated and only relatively few specimens are available for study in museum collections (see e.g. list in GROVES, 1972, p. 68).

Recently, I found a barely known collection of alleged pileated gibbons (mainly skulls and preserved fetuses) in the Schultz Collection (Anthropological Institute, Zürich University, Switzerland). Although these specimens had been used in some older studies (mainly during the 1930s), the exact origin of the specimens was apparently unknown. For many years, the only available information had been recorded directly on the skulls by the late A.H. Schultz: identification numbers, sex, and "*Hylobates pileatus*, Siam". Only this information was to be found in the catalogue and in the inventory cards at the Anthropological Institute. Moreover, it was unknown whether these specimens had lived in captivity or whether they were wild-shot animals.

Because of the lack of skins and information on the origin of the specimens, their identification as "*H. pileatus*" had never been confirmed. Schultz apparently had at various times identified many gibbons in his and other collections (and in his publications) as "*H. leuciscus*," as "*H. cinereus*," or as "*H. moloch*," irrespective of whether they came from northern Borneo (*H. muelleri*) or Java (*H. moloch*). A photograph of a dark gibbon in the Schultz Archives (as well as its skeleton in the Schultz Collection) was identified as "*H. leucogenys*" by Schultz, but the specimen can easily be recognized as *H. agilis* on the basis of this photograph. Even more unfortunate was Schultz's continued identification of some grey gibbons from Borneo (mainly *H. muelleri muelleri*, but also *H. m. funereus* and *H. agilis albibarbis*) as "*H. concolor*" (e.g. SCHULTZ, 1930, 1933, 1944, 1973), even

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though he must have known that the name was pre-occupied by black gibbons from Indochina (see GROVES, 1972, p. 12f for a brief summary of the history of the name "*H. concolor*"). Uncritical citation of Schultz's data on "*H. concolor*" (or of other articles which use his data) continues, thus further spreading the confusion. For example, MARSHALL & SUGARDJITO (1986, p. 138) wrote "We cannot find where Schultz [1933] obtained the weights of 21 concolors, mean 5.7 kg which seems too slight."

Because of the rarity of museum specimens of *H. pileatus*, it is important to reliably identify and reconstruct the exact origin and history of this unusually large collection. Such knowledge would not only considerably increase its value for future studies, but would also—in retrospect—permit a reassessment of earlier studies using these specimens. In the hope of finding relevant information on these gibbons, I scanned large quantities of unpublished documents of the late A.H. Schultz at the Anthropological Institute of the Zürich University Switzerland, where he worked from 1951 until his death in 1976, as well as some additional unpublished documents kept at the Yerkes Primate Center in Atlanta and at the Yale University Library in New Haven, U.S.A. The results are presented in this article. In anticipation of one of these results, the collection of alleged pileated gibbons will be referred to below as the "Spaeth Collection."

M A T E R I A L S

All gibbon specimens in the Spaeth Collection are presently part of the A.H. Schultz Collection stored at the Anthropological Institute of Zürich University. Only one skull (not seen by me) is on permanent loan to the Department of Anthropology, University of Kentucky, U.S.A.

Large quantities of correspondence, data sheets, old inventory cards, notes, photographs, and other unpublished documents of Schultz were examined in order to reconstruct the origin of the gibbon specimens. The majority of these documents are stored in the Schultz Archives at the Anthropological Institute, but some more were found in the Schultz Collection (also at the Anthropological Institute). Additional correspondence and unpublished documents kept both at the Yerkes Primate Center in Atlanta and at the Yale University Library in New Haven, U.S.A. were kindly made available to the author by Ms Evelyne Jones and Ms Nancy F. Lyon, respectively.

Although the gibbon specimens in question were mentioned in many of the documents examined, only a few of these threw light on the origin and identification of the gibbons:

- Unpublished notes of the late Dr. R.A. Spaeth (3 pages), dating from 1925. Three virtually identical copies of this text were found, one each in the Schultz Archives, the Yerkes Primate Center, and the Yale University Library (see also Appendix of this article). These notes will be referred to as SPAETH (1925b).
- Unpublished manuscript by Mrs. E.E. Spaeth-Taussig, also dating from 1925. Some excerpts of Mrs. Spaeth's manuscript were quoted by YERKES & YERKES (1929), and by GEISSMANN (1991). A copy of this manuscript is kept both at the Yerkes Primate Center and the Yale University Library. This

manuscript will be referred to as SPAETH-TAUSSIG (1925).

- Among a reference collection of primate photographs in the A.H. Schultz Collection, the author found photographs of 4 fetuses, one infant male, one juvenile female, one juvenile/subadult female and 4 adult female gibbons which can be identified as gibbons of the Spaeth Collection. The photographs are undated but were made by Schultz while he was at the Anatomy Department of the Johns Hopkins Medical School, Baltimore (1925–1951).
- A hand-written key of A.H. Schultz (2 pages, not dated) in the Schultz Archives, comparing the individual numbers of the original Spaeth Collection with the new numbers given to the same specimens when received by Schultz at Johns Hopkins.
- A box of inventory cards in the Schultz Archives (not dated, but first entries of Spaeth gibbons before January 4, 1927). The cards contain information on preserved primates, including the gibbons of the Spaeth Collection. The cards not only state that the gibbons had been part of the Spaeth Collection, but also mention the original inventory numbers. In addition, the specimen numbers used by Schultz during his earlier years at the Anatomy Department of the Johns Hopkins Medical School are indicated.

In the following, Spaeth's original specimen numbers will be referred to as "Spaeth numbers". In contrast, the specimen numbers used by Schultz at the Johns Hopkins Medical School will be identified as "JH"-numbers, and the (only partly identical) numbers he adopted later for the Schultz Collection carry the identification "AS".

RESULTS AND DISCUSSION

The Collector

All of the gibbon specimens concerned could be shown to originate from a relatively small area in southeastern Thailand. They were collected over a time span of 8 days during a study of gibbon reproduction begun by Dr. R.A. Spaeth. An anonymous footnote to SPAETH (1925a, p. 839) reads:

"At the end of the session of 1923–24 he resigned his position as associate professor of physiology in the School of Hygiene and Public Health of the Johns Hopkins University to take the chair of physiology in the medical department of Chulalongkorn University, Bangkok, Siam. One of the factors that influenced him in accepting the position in Siam was the belief that it would give him an excellent opportunity to study the reproductive cycle in the monkey. While in the jungle collecting material for this work he contracted an infection which caused his death."

Dr. Spaeth died on June 26, 1925, at Bangkok, shortly after having begun this study:

“Reynold A. Spaeth, who devoted some months to an intensive study of problems of reproduction in the gibbons of Siam and whose life was sacrificed to the risk of tropical research, left notes on which Mrs. Spaeth has based a most interesting description of ‘The tree-walkers of the tropics.’ ” (YERKES & YERKES, 1929, p. 59).

Unfortunately, neither his notes (SPAETH, 1925b) nor the manuscript by his widow (SPAETH-TAUSSIG, 1925) have been published; only a few excerpts of Mrs. Spaeth-Taussig’s manuscript were quoted by YERKES & YERKES (1929).

Of particular importance are Dr. Spaeth’s notes (SPAETH, 1925b), which individually list the gibbons he collected together with a native hunter from May 26 to June 2, 1925 in Thailand, and also include some observations on his encounters with wild gibbons. In addition, the original field numbers of the collected specimens are provided. The full text of these notes is printed for the first time in the Appendix to this article. It is possible that additional notes of Dr. Spaeth exist: Mrs. Spaeth (SPAETH-TAUSSIG, 1925) quotes several field observations not contained in the three pages of her husband’s notes that are known to me. A popular article on gibbons published later by Mrs. Spaeth (SPAETH-TAUSSIG, 1927) does not refer to her late husband’s study but describes her own impressions of many pet gibbons she had been familiar with in Bangkok.

The finding that the gibbons collected by Spaeth in 1925 are those at the Anthropological Institute of Zürich University is based mainly on the discovery of a handwritten key in the Schultz Archives, comparing the individual field numbers given by Spaeth with the numbers given to the same specimens by Schultz at the Johns Hopkins Medical School. A box of inventory cards installed before January 4, 1927 (today preserved at the Schultz Archives) also confirmed these identifications. Many specimens of the Spaeth Collection still carry the old JH-numbers. For those specimens without a JH-number, the identification process was more difficult (see below).

The Collection Locality

SPAETH (1925b) gives Sriracha as his collection site. Sriracha (or Si Racha) is situated in Chon Buri Province of southeastern Thailand, about 80 km southeast of Bangkok (see map in GEISSMANN, 1991,). The U.S. BOARD ON GEOGRAPHIC NAMES (1966) reports its coordinates as 13° 10’N, 100° 56’E.

Species Identification

Among a reference collection of primate photographs in the A.H. Schultz Collection, I found photographs of 4 fetuses (JH Nos. 123a, 125a, 132a, 133a), 1 infant male (JH No. 121a), 1 juvenile female (JH No. 131), 1 juvenile-subadult female (JH No. 124) and 4 adult female gibbons (JH Nos. 126, 127, 132—hand only, 133), which could be identified as specimens of the Spaeth Collection. Schultz took the photographs while he was at the Anatomy Department of Johns Hopkins; he pasted them on large sheets of cardboard, each bearing his handwritten notes indicating the specimens’ species, age-class, sex, and JH-number. Some of the cardboard sheets bear a stamp with his name and this address. The fetuses are still preserved at the Anthropological Institute in Zürich, and appear very much the same as in the photographs.

Some of the portrait photographs from this collection are shown in Figures 1 – 4. Frontal (a) and lateral (b) views of the preserved heads of 4 gibbons have been selected here, because they represent different age classes.¹ Today, only the skulls and a few postcranial bones are preserved of the specimens. The photographs of the older specimens are of particular importance, because they permit an accurate species identification. The combination of a sharply defined black cap and black cheek region with narrow pale brow band and with long pale hairs over the ears and in the occipital region (see Fig. 4) permit a reliable identification of the adult females as *Hylobates pileatus*, as described for instance by BROCKELMAN (1975), GROVES (1972), and MARSHALL & SUGARDJITO (1986). The ontogenetic changes in coloration typical of pileated gibbons can also be seen on the photographs of the immature specimens (Figs. 1–3). Infant pileated gibbons have a completely pale, buffy- grey fur (Fig. 1), which later becomes gradually replaced by black hairs on the crown (Fig. 2) and later also on the chest. The pale cheek region and a broad pale face ring persist in juveniles (Fig. 3). Adult males turn glossy black, with white hands and feet, a white genital tuft, a narrow facial ring, and a pale corona. Although no photograph was found of the adult male of the Spaeth Collection (Spaeth No. 1), this specimen was described by SPAETH (1925b, see Appendix of this article) as “black with white ring about face and white hairs on perineum.” This description also permits the identification of the male as *H. pileatus*.

Further support for the identification presented above can be found in SPAETH-TAUSSIG (1925, p. 3):

“To the siamese the gibbons ‘cry may sound like ‘Pua, Pua’ but to the European it is more like ‘Wup, wup, wu-u-u’ going up in the scale and gathering in volume and shrillness until it ends in a very high trill. Dr. Spaeth described the initial ‘wup, wup’ as ‘pumping sounds,’ as tho the animals were gathering steam for the final trill. The males, he said, made more of the pumping sounds and ended with a shorter trill than the females. As he wished particularly to collect females, he found it very convenient to be able to distinguish the sexes by the call.”

¹ The editor of this journal and one reviewer of this article have expressed concern about whether the photographs of the specimens’ heads (Fig. 1–4), probably dating from about 1925 or 1926, are suitable for publication, because readers would find them revolting. I share this concern and I have seriously considered dropping the figures. On the other hand, the following reasons make it worthwhile to publish these unique photographs: 1) They are the only preserved documents of these rare animals’ fur colouration. 2) Subspeciation in pileated gibbons remains unstudied. This reference material is all the more important, as few gibbons still survive in that region (see also BROCKELMAN, 1975). 3) There are apparently no previous publications showing photographs of the age changes in fur patterns occurring in pileated gibbons.

The shooting of primates for any purpose is now illegal in Thailand, as in most countries, and is no longer condoned by scientists. I have covered the eye region of the heads with grey bars to reduce the hideous expressions on the faces to some degree, without covering the specific fur patterns. My sincere apologies to those readers who may still feel offended by the photographs.

Gibbons are known to produce long bouts of species-specific vocalizations (e.g. HAIMOFF, 1984; MARSHALL & MARSHALL, 1976; MARSHALL & SUGARDJITO, 1986). The description of the vocalizations of the gibbons in Sriracha quite closely fits the song of pileated gibbons: In this species, females are known to produce accelerated series of notes ending in a long trill and occasionally biphasic hoots, whereas males usually utter series of biphasic hoots with occasional short trills (e.g. GEISSMANN, 1984; MARSHALL & SUGARDJITO; 1986).

Finally, all gibbons observed, heard or collected in the region of Sriracha by other authors have also been identified as *H. pileatus* (see review in GEISSMANN, 1991). Put together, this evidence strongly suggests that all gibbons included in the Spaeth Collection belong to this species. Only one male gibbon (which was not collected) had been identified as a white-handed gibbon (*H. lar*) by Spaeth (see his notes concerning female No. 11 in the Appendix to this article). The importance of this observation is considered in GEISSMANN (1991).

History of the Spaeth Collection

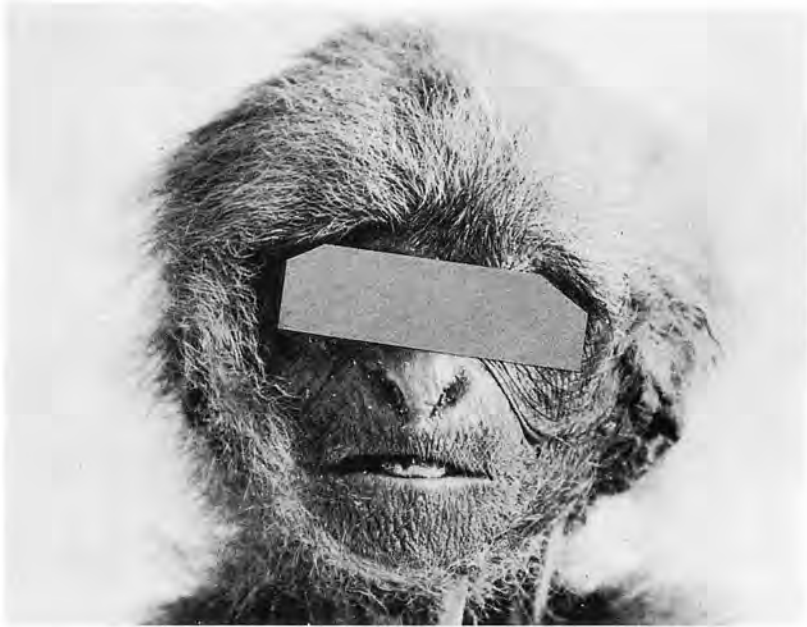
In the Schultz Archives, some data sheets with body measurements of the Spaeth gibbons are dated as early as March 5, 1926. Thus, Schultz had probably received the Spaeth Collection soon after Spaeth's death in 1925. Several of Schultz's unpublished notes dating from his early years at the Johns Hopkins Medical School document that most specimens at that time still included preserved heads and complete sets of four preserved limbs (see also Table VI in SCHULTZ, 1933). Table 1 lists some of the measurements Schultz took of the specimens; they were extracted from Schultz's data sheets dating from the years 1926 and 1931.

Schultz repeatedly lent preserved parts of specimens to colleagues for dissection and further study (see below). Later, all specimens were incorporated into the Schultz Collection, and the "JH" identification numbers were simply recoded as "AS" numbers. Eventually, most specimens were turned into skeletal parts. Unfortunately, Schultz usually gave new inventory numbers to the skulls he prepared from the heads, but not to the bones he prepared from the extremities. Thus, the same specimen could come to be labelled with more than one number. This made it difficult to recognize all the parts of some of the specimens.

When Schultz moved to Zürich in 1951 (BIEGERT, 1962, 1976; ERIKSON, 1981; HOWELLS, 1977; STEWART, 1976), he took his extensive and famous material and all the correspondence with him, including what was left of the Spaeth Collection. Unfortunately, many long bones or limbs of the Spaeth gibbons went astray or were perhaps given away by Schultz; their fate is unknown. Apparently, they are not at the Johns Hopkins Medical School, which was left with no osteological or wet specimens of primates and only a few human specimens after Schultz's departure (Dr. A. Walker, personal communication).

Present State of the Spaeth Collection

All known gibbon material of the Spaeth Collection, present and past, is listed in Table 2.



A



B

Figure 1. Infant male, shortly after birth (Spaeth No. 6a = JH 121a = AS 1663). Frontal (A) and lateral (B) views of the preserved head. This specimen has no permanent teeth; di^1 , di_1 and di_2 have erupted, di^2 and dc are erupting. Note completely pale fur without any dark hairs on top of the head.

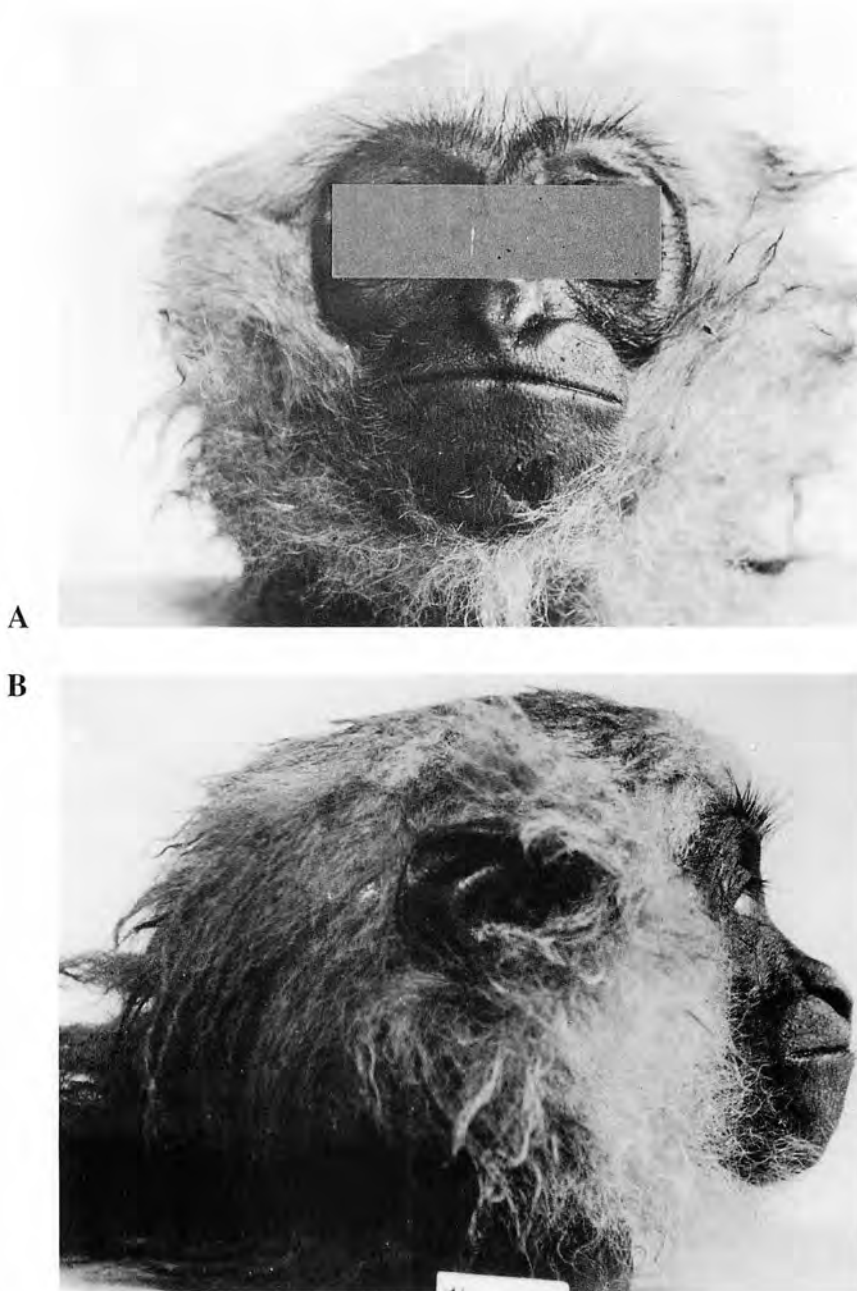


Figure 2. Juvenile female (Spaeth No. 11 = JH 131 = AS 1076). Frontal (A) and lateral (B) views of the preserved head. In this specimen, the only permanent teeth are the incisors (the lateral incisors erupted only in upper jaw), and the first molars. Note completely pale fur. The dark cap is only beginning to form: a few dark hairs on top of the head can only be seen in lateral view.

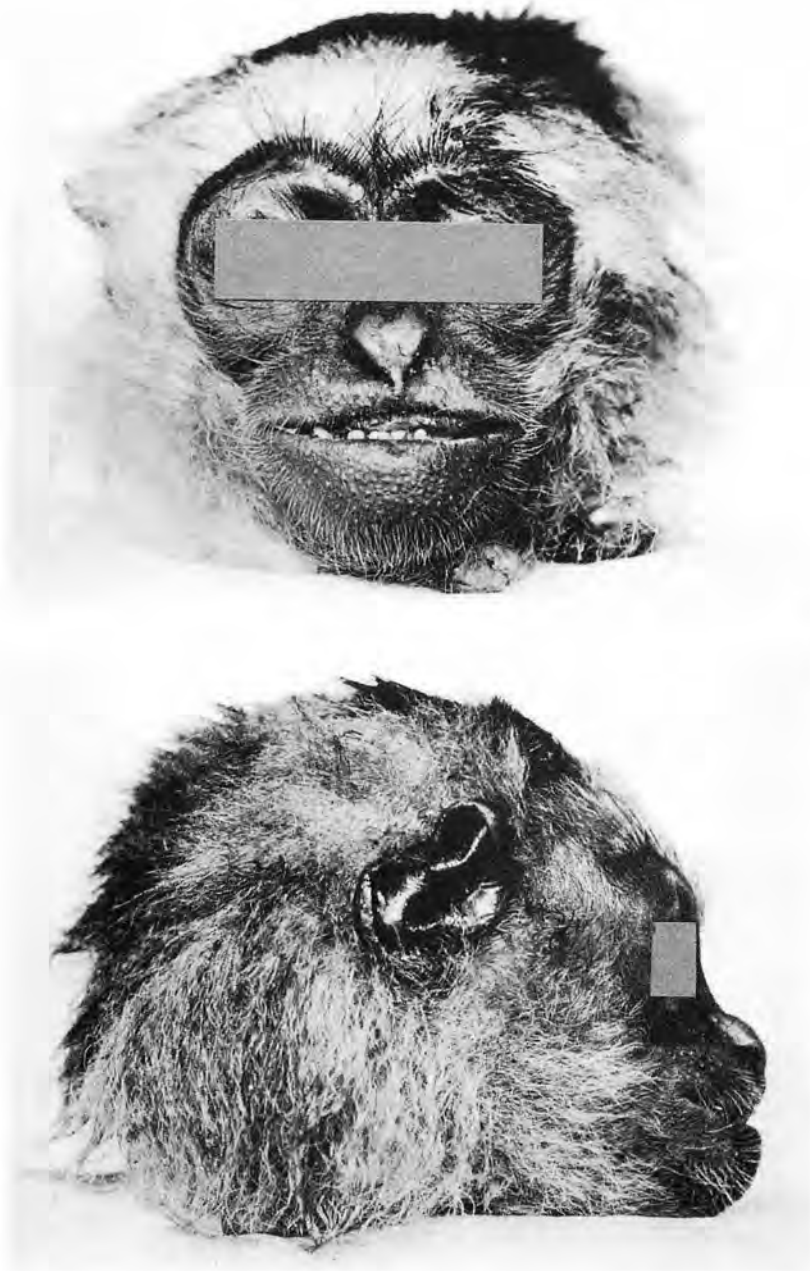


Figure 3. Juvenile-subadult female (Spaeth No. 4 = JH 124 = AS 124 = AS 1673). Frontal (A) and lateral (B) views of the preserved head. In this specimen, the upper permanent incisors are just beginning to erupt. Note black cap together with broad pale face ring and pale cheeks.

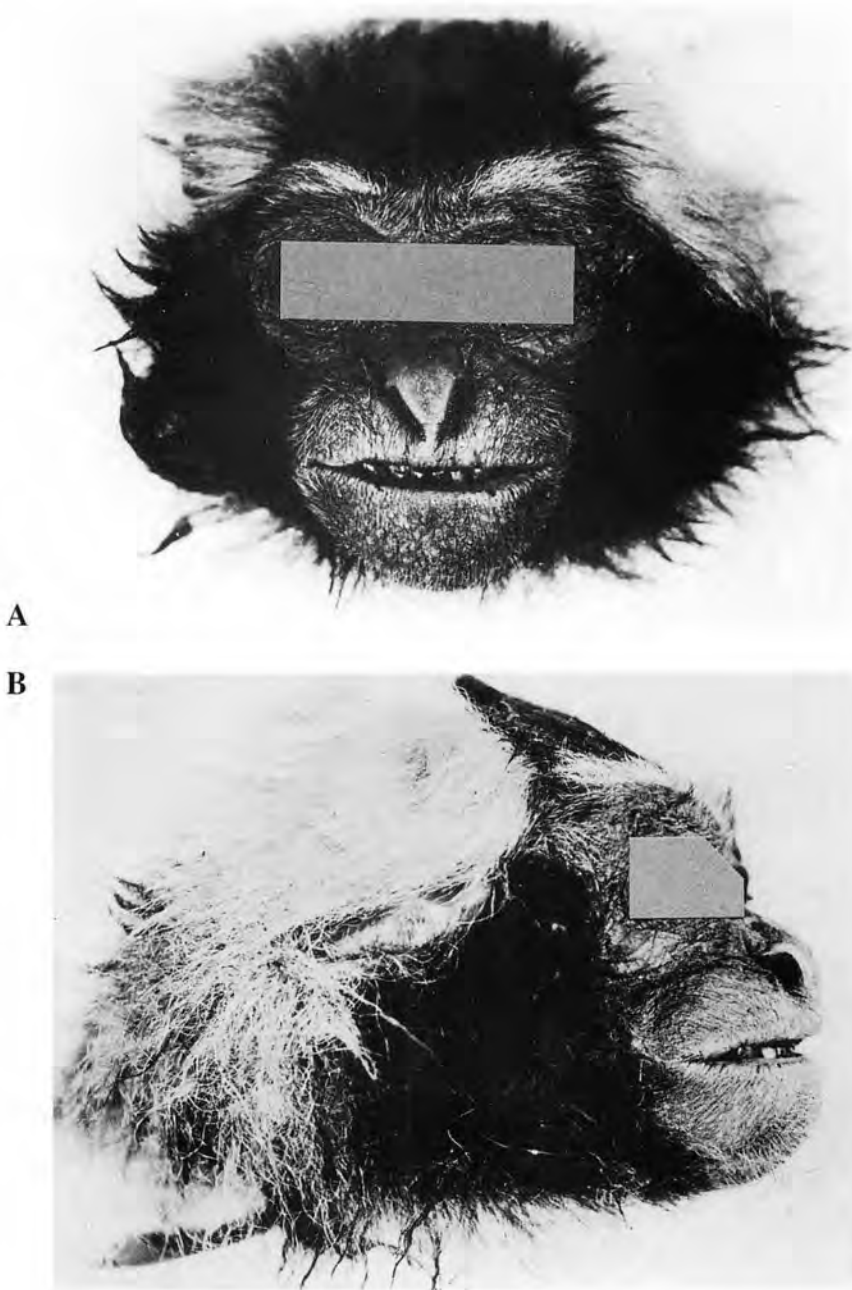


Figure 4. Adult female (Spaeth No. 6 = JH 126 = AS 126 = AS 522). Frontal (A) and lateral (B) views of the preserved head. Photograph of lateral side inverted for comparison. Worn permanent dentition. Note black cap and black cheeks, with only a thin pale browband and pale occipital region.

Table 1. Selected measurements (mm) recorded by A.H. Schultz on the preserved specimens of the Spaeth Collection, before they were made into skeletons. ¹

Age& Sex	JH No.	Sitting Height	Chest Circumference	Upper Arm Length	Forearm Length	Hand Length	Thigh Length	Lower Leg Length	Foot Length	Ear Height
ad. m	121	-	-	-	264	146	-	-	-	-
ad. f	122	-	-	231	255	146	206	186	150	-
ad. f	123	-	-	232	255	153	208	180	144	-
ad. f	125	-	-	225.5	247	150	196	175	136	31
ad. f	126	-	-	232	264	141	212	190	136	33
ad. f	127	-	-	238	267	159	214	192	144	32
ad. f	129	-	-	227	246	146	203	182	135	34
ad. f	132	-	-	230	253	147	205	175	141	-
ad. f	133	-	-	222	249	140	204	179	140	32.5
juv.- sad. f	124	-	-	221	250	149	203	181	138	32.5
juv. m	128	-	-	156	159.5	114	141	127	111	32
juv. f	131	-	-	170	182	119	158	141	116	28
inf. m	121a	198	158	80.5	81	62	74	64	64.5	25
inf. f	130	-	-	116	119	85	106	89	85	-
fet. m	123a	83	-	-	-	-	-	-	-	-
fet. m	125a	169	160	67	66	59	62	53	56	23
fet. m	132a	158	150	59	57.5	51.5	57	46	49.5	21
fet. m	133a	102	-	-	-	-	-	-	-	-

¹ Specimens sorted by age class. Measurements of left side only, where available. The technique of measurement used here has been described by SCHULTZ (1929). Abbreviations: JH—Johns Hopkins University; ad.—adult; sad.—subadult; juv.—juvenile; inf.—infant; fet.—fetus; m—male; f—female.

Table 2. Specimens of the original Spaeth Collection and their history¹

Age & Sex	Spaeth No.	JH No.	AS No.	Material collected by Spaeth ⁴	Material currently at the Anthropol. Institute, Zürich University
ad. m	1	121	780	Skull, 2 hands and forearms (black)	Skull
ad. f	"2" ²	122	781	Skull, 4 limbs	Skull
ad. f	3	123	783	Skull, 4 limbs, fetus (see following specimen), placenta, uterus	Skull (teeth worn)
fet. m	3	123a	123a	Entire fetus preserved	Very small fetus. Photos
juv. - sad. f	4	124	124, +skull 1673	Head, 4 limbs, ischial callosities and entire sexual apparatus	Skull, partial skeleton: left leg (femur damaged). Photos: head (broad face ring, cheeks pale, see Fig. 3)
ad. f	5	125	?	Ovaries and ducts, fetus (see following specimen), placenta, uterus, breasts, head, and 4 limbs preserved	Skull; either AS 1264 (worn) or AS 1860 (young adult, only 2 lower incisors)
fet. m	5	125a	125a	Entire fetus preserved	Near term fetus. Photos
ad. f	6	126	126, +skull 522	Head, arms and legs, single nipple, stomach contents	Skull, partial skeleton: left leg. Photos: head (thin browband, see Fig. 4)
inf. m	6a "1a" ³	121a	1663	Entire animal preserved	Entire skeleton. Left femur broken. Photos: pale infant (see Fig. 1)
ad. f	7	127	912	Head, 4 limbs, entire perineal region, smears	Skull. Photos: head (thin browband)
juv. m	8	128	172	Head, 4 limbs, testes	Skull
ad. f	9	129	?	Entire animal preserved, smears	Skull; either AS 1264 (worn) or AS 1860 (young adult, only 2 lower incisors)

Age & Sex	Spaeth No.	JH No.	AS No.	Material collected by Spaeth ⁴	Material currently at the Anthropol. Institute, Zurich University
inf. f	10	130	?	4 limbs, perineum, ovaries and uterus, smears, head destroyed	-
juv. f	11	131	1076	Head, 4 limbs, ovaries and uterus, smears	Skull. Photos: pale head, cap only beginning to form (see Fig. 2)
ad. f	12	132	782	Skull, 4 limbs, ovaries, (uterus and placenta with following specimen)	Skull. Photo: right hand (published in SCHULTZ, 1933)
fet. m	12a	132a	132a	Entire fetus preserved with uterus and placenta	Fairly old fetus. Photos
ad. f	13	133	133 +Skull 1656 ⁵	Head, 4 limbs, ovaries, (uterus and placenta with following specimen)	Skull ⁵ , partial skeleton: right arm, left femur and foot. Photos: head (thin browband), right foot (but published as JH No. 132 in SCHULTZ, 1933)
fet. m	13	133a	133a	Entire fetus preserved with uterus and placenta	Small fetus. Photos

¹ Abbreviations: JH - Johns Hopkins University; AS - Adolph Schultz Collection (at the Anthropological Institute of Zürich University); ad. - adult; sad. - subadult; juv. - juvenile; inf. - infant; fet. - fetus.

² For unknown reasons, this specimen number was only found in Schultz's notes, not in Spaeth's.

³ The specimen designation "Spaeth #1a" was as probably created by A.H. Schultz; it is not listed in Spaeth's notes (see also footnote ²). It is listed in Schultz's key for the cross-reference of the Spaeth- and JH-numbers (and in other notes of A.H. Schultz), and is almost certainly identical with Spaeth #6a: The latter is the only number from Spaeth's list which A.H. Schultz did not mention in his key. Both numbers refer to the only male infant of the series. In addition, specimen #1a has the left femur broken, as in Spaeth's description of his specimen #6a.

⁴ List on the basis of Spaeth's notes, SCHULTZ's (1933) list, and various unpublished notes of A.H. Schultz.

⁵ Skull AS 1656 (not seen) on permanent loan to Department of Anthropology, University of Kentucky, U.S.A.

Some confusion arose because Schultz had listed two Spaeth numbers (Nos. 1a and 2) that had not been mentioned by Spaeth himself (SPAETH, 1925b). By exclusion and with the help of SPAETH's (1925) original description of the specimens, it could be shown that the individual with the questionable Spaeth No. "1a" is, in fact, Spaeth No. 6a. On the other hand, No. 2 in Schultz's list appears to be an additional specimen which Spaeth may simply have forgotten to mention in his notes (SPAETH, 1925b).

For three female skulls in the Schultz Collection, no written document was found to serve as cross-reference to a specimen of the Spaeth Collection. Likewise, for three adult females of the Spaeth Collection, no such cross-reference was found to the skulls in the Schultz Collection. One of these females is Spaeth No. 6 (=JH 126). The preserved head of this specimen appears on one of the photographs made by Schultz. Fortunately, the lower jaw can be seen in the photograph (Fig. 4) to carry the full set of four incisors, and so the specimen cannot be identical with skull AS 1860, which has only 2 lower incisors. The front teeth of the specimen on the photograph can be shown to be identical with those of skull AS 522, but not skull AS 1264.

Thus, there still remain two Spaeth specimens (adult females No. 5 and No. 9) without a cross-reference to one of the skulls in the Schultz Collection, and likewise, no reliable cross-reference to particular individuals of the Spaeth Collection could be established for the following two *pileatus* skulls (both adult females) in the Schultz Collection: AS 1264 (teeth worn), and AS 1860 (only 2 incisors in lower jaw, teeth not much worn). Both skulls carry Schultz's inscription "*Hylobates pileatus*, Siam", like the known Spaeth skulls (AS 1860 also carries the supplement: "Ban Sadet"). It is almost certain that Spaeth specimens Nos. 5 and 9 are Schultz specimens AS 1264 and AS 1860, but I was unable to determine exactly which is which.

In any event, all skulls of the original Spaeth Collection can now be shown to be still present at the Anthropological Institute of Zürich University (except one skull on permanent loan to Department of Anthropology, University of Kentucky, U.S.A.). In addition, it was possible to re-unite all available postcranial material with their respective skulls, in spite of different inventory numbers of postcrania and skulls (see Table 2, column 4). Many limb bones of the Spaeth Collection are missing, however, and their whereabouts remain a mystery.

Previous Research on the Spaeth Collection

Schultz used the specimens of the Spaeth Collection for several of his publications; individual specimens were mentioned in SCHULTZ (1930, 1931, 1933), and unpublished notes at the Schultz Archives document that the *pileatus* gibbons used in SCHULTZ (1942) were also specimens of the Spaeth Collection. Probably, this is also the case for most pileated gibbons mentioned in Schultz's other publications (e.g. SCHULTZ, 1941, 1944, 1949).

Schultz lent three left legs (JH No. 124, 126, and 133) to Dr. Straus for dissection (inventory cards in the Schultz Archives), but only JH 133 is mentioned in STRAUS (1930). An additional specimen was lent to Dr. Straus for dissection of the hands on Jan. 28, 1936. According to Schultz's old inventory cards, this was specimen JH 132, but in a later publication, STRAUS (1941) again mentioned specimen JH 133 instead. Specimen JH 127 was lent to Dr. Huber (Jan. 4, 1927) for dissection of neck, shoulder, and chest; and the

head of JH 131 was also lent to Dr. Huber (Jan. 31, 1928) for dissection of the facial musculature (HUBER, 1930, 1931). The nasal cartilages of specimens JH 126 and 133a were dissected by Dr. WEN (1930).

Some uteri, placentas and external genitalia collected by Spaeth were later studied by WISLOCKI (1929, 1932, 1936), but he mentioned the JH-number (JH 132A) only for the specimen examined for the last publication. SAGLIK (1938) described the ovaries of one (probably pregnant) pileated gibbon of the Spaeth Collection, and of a second (non-pregnant) specimen he received from Wislocki. The latter specimen probably also stemmed from the Spaeth Collection, because most of the genital tracts and placentas of gibbons described previously by WISLOCKI (1929, 1932) were said to come from that collection. The identification numbers of Saglik's individuals are not known. The hands of 14 pileated gibbons (8 adult females, 1 juvenile male, 1 juvenile female, and 4 male fetuses) described by MIDLO (1934) most certainly were from specimens of the Spaeth Collection.

A C K N O W L E D G E M E N T S

I am grateful Prof. Dr. R.D. Martin for giving me full access to the collection and the archives of the late Prof. A.H. Schultz. Ms Evelyn Jones (Library, Yerkes Regional Primate Research Center, Atlanta) and Ms Nancy F. Lyon (Department of Manuscripts and Archives, Yale University Library, New Haven) kindly provided helpful information on, and photocopied correspondence and other documents of, Dr. R.A. Spaeth, Mrs E.E. Spaeth-Taussig, and Dr. R.M. Yerkes. For information on the Johns Hopkins Collection I am grateful to Dr. Alan Walker (Johns Hopkins University, Baltimore). Mrs Gerda Greuter and Ms Eva Schnyder made copies of the gibbon photographs housed at the Schultz Collection. I thank Prof. Dr. R.D. Martin and Dr. Peter Schmid for reading the manuscript and for giving helpful comments.

R E F E R E N C E S

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A P P E N D I X

The entire text of Spaeth's notes is published here for the first time, and is referred to as SPAETH (1925b). The numbers in the left column are the original field numbers of Spaeth. I have introduced the following minor changes:

- Animals are listed in order of increasing inventory numbers (in Spaeth's original notes, animals No. 1 to No. 6 are listed with decreasing order.)
- Abbreviations for metric dimensions changed to lower case ("M" changed to "m")
- Real numbers: Zeros in front of first decimal are written out (e.g., ".46" has been changed to "0.46").
- Specimen No. 13: Heel to crown: "9.75 m" should probably read "0.75 m"

Notes on Gibbons collected by Dr. R. A. Spaeth

Sriracha, Siam, May 26 to June 2, 1925

- #1. Male gibbon. Black with white ring about face and white hairs on perineum. Penis very small but prominent and projecting out behind animal. Taken 8:30 a.m. of 26th with 32-50 rifle. Was in tree with large and smaller female but both females escaped. One female may have been #3 subsequently shot by Lajong.
- #3. Female gibbon. Shot by Lajong with #2 shot in 12 bore gun. This animal shot morning of May 26th but did not see it until 24 hours later. Pregnant with about five months foetus, counting gestation period at 7 months. Length (nose to anus): 0.48 m. Spread (nail to nail): 1.42 m. (Tape following the curve of the body). Made skull of head and saved feet and foetus with placenta and uterus in 5% formalin.
- #4. Female gibbon, taken with #2 chilled shot. Probably young of #5. See #5 history. A virgin. Full of worms. Dissected out anal callosities and entire sexual apparatus. Very long and prominent clitoris with deep urethral groove and prepuce. Bilateral injection of carotids with 5% formalin. Length 0.43 m. Spread: 1.28 m.
- #5. Female gibbon. Shot with #2 chilled shot. Lajong crept right under tree where she was feeding with #4. Probably mother of #4. Male fled when shots were fired. Foetus in normal presentation, nearly at term. Vagina very distended and dry. Ovaries and ducts to Bouin's fluid. Placenta, foetus and uterus to formalin 5%. Breasts normal and to formalin to compare with #6 (single nipple). Length 0.48 m. Spread: 1.30 m.
- #6. Female gibbon with one young, suckling male. Breasts asymmetrical, only right one developed. Animal very fat. Was feeding in tree top accompanied by running male young, another young female (own offspring?) and male in nearby tree. A family? Stomach contents kept—seeds and leaf bits (red). Length 0.46 m. Spread: 1.32 m.
- #6a. Young male, nursing on #6. Very thin - not enough to eat on account of mother's single nipple? Fell when mother was shot and broke left hind leg. Saved whole animal. Opened abdomen, formalin into both carotids (not very successful, however) and into brain thru slice in skull. Length: 0.24 m. Spread: 0.48 m.
- #7. Female gibbon taken about 10:30 a.m. 5/29/25, on the west side of railroad, 2 miles north of Ban Sudat. Again one male and one young (male #8) associated with this gibbon. Field smears made immediately after shooting. No blood to obscure smear

- as shot was clean thru upper abdomen. Vagina moist and slightly distended when first seen. Clitoris very prominent. This animal lactating and probably nursing #8 (one shot crippled both animals but I did not actually see young male attached to mother). Ovaries show no sign of recent corpus luteum but many very old scars. Preserved entire perineal region, with root of rectum, vagina, bladder, anus, uterus, both ovaries intact, also anal callosities to Bouin's. Length: 0.50 m. Spread: 1.40 m.
- #8. Male gibbon, son of #7. Taken with her on same day, same place. Probably nursing on #7. Pelage about same color as female (mistaken for young female when shot in field) but slightly more gray. Testes to Bouin's. Double carotid injection with 5% formalin forward. Length: 0.36 m. Spread: 0.92 m.
- #9. Female gibbon. Taken 5/30/25 east of railroad about one mile out and 1.5 miles east. Nursing #10. Tried to take 10 alive but as mother fell it was swept off into the branches and subsequently shot. Field smears made. Bouin and alc. one-half hour later. No corpora lutea (fresh ones) visible in fresh preparation. Injected both carotids forward. Fixed whole specimen in formalin. Length: 0.48 m. Spread: 1:30 m.
- #10. Young female, nursing on #9. Had to take it as it might have starved without mother. Head so badly shattered by 32-50 bullet that I decapitated it before bringing to camp. Took field smears and preserved ovaries and uterus in Bouin's fluid, perineum in formalin. Immature ovaries and no corpus luteum. Length: 0.30 m. Spread: 0.70 m. Length approximate only, head missing.
- #11. Female gibbon, young. 5/31/25. Associated with one older female, two males and a white handed male gibbon. The last paid little attention to #11 and to the other female. Probably mere chance that they were all feeding together on "Khadon" fruit. (Large seed, small, white, very sour flesh.) Ovaries and uterus only to Bouin's fluid. Double carotid injection with 8% formalin forward (8% of 40% : 5%) Immature ovaries and no corpus luteum. If there is blood in this vaginal smear it does not mean animal was menstruating as shot was low down in abdomen and whole ovarian region badly congested. Length: 0.36 m. Spread: 1.065 m.
- #12. Female gibbon 6/2/25. Pregnant. Shot with 32-50 rifle. Uterus on opening measured 14 x 10 mm. Corpus luteum of pregnancy on right ovary. Length: 0.48 m. Spread: 1.31 m.
- #12a. Foetus of #12, male. Nearly at term. Head low down near cervix, small amount of amniotic fluid. Eyes open, hands well developed, and nails and penis pigmented. Facial hairs present. An unsuccessful common carotid artery injection with 5% formalin. Cut umbilicus but preserved whole uterus with placenta in 5% formalin. Put in same cloth with embryo.
- #13. Female gibbon 6.2.25. Shot by Lajong with #2 shot in 12 gauge gun. This animal pregnant. Foetus lying on its right side with both hands over left shoulder. Head turned anterior. Ends of nails and tip of penis pigmented, a male foetus. To formalin without injection or removal of attachments to placenta and uterus. Corpus luteum of pregnancy on one ovary. (See specimen). Injected both carotids forward with formalin. Saved head for brain. Foetus opened only. Length: 0.45 m. Spread: 1.28 m. Heel to crown: 0.75 m.