Suiform Soundings

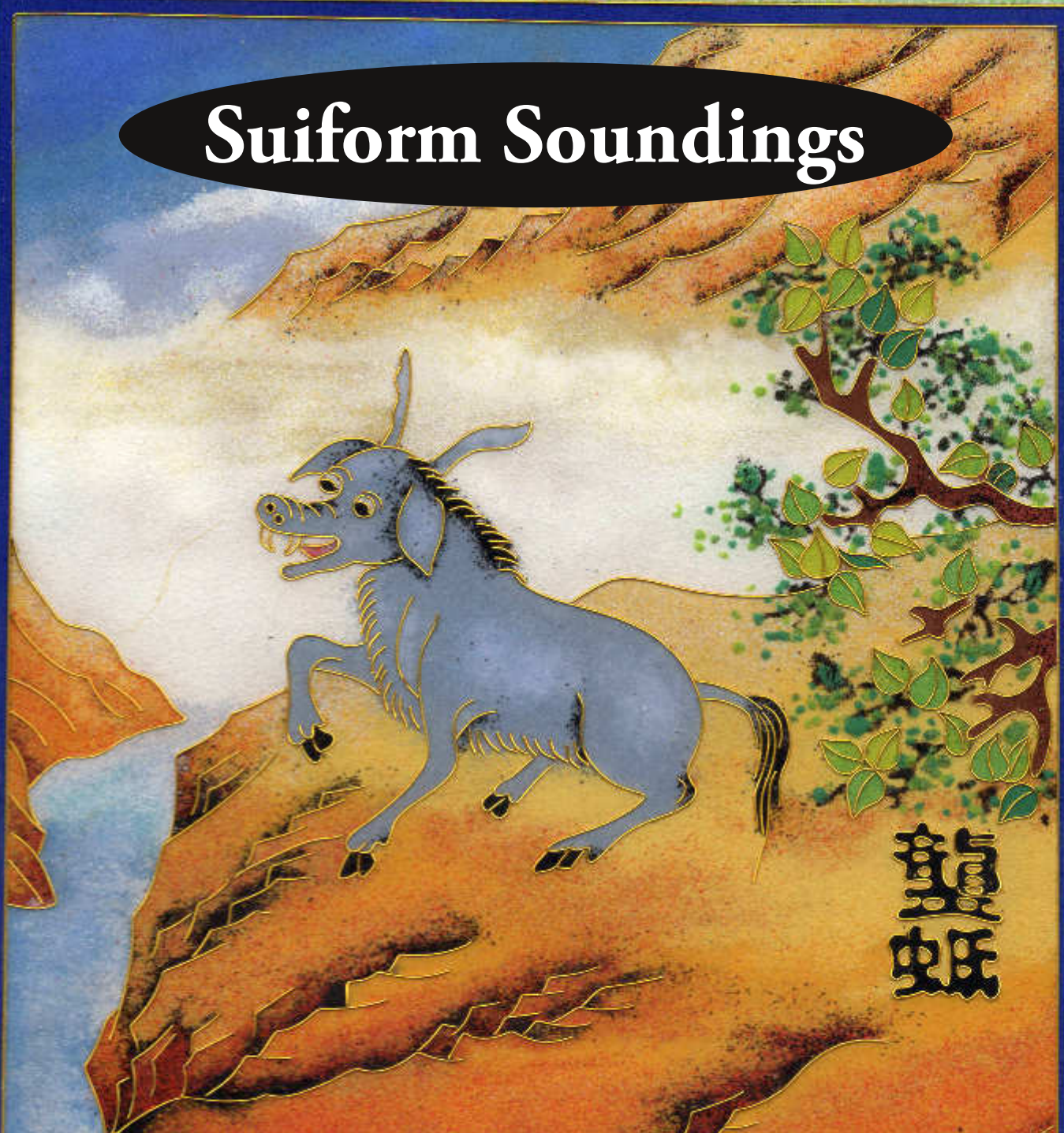

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Photo front page:

Cloisonné image made from the 1597 illustration of the horned pig, the earliest Chinese depiction. It was designed by Jiang Yinghao and originally engraved by Li Wenxiao. The original engraving is figure 6A in the first article of this issue. This enamel ware image was commissioned from the Cloisonne factory, Beijing.

Please email all contributions to future issues to Thiemo Braasch, email: salvanius@gmail.com. Articles, photos and comments are welcome and appreciated. **Please follow the guidelines for authors**, which can be found on the website listed above.

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Editorial

From the Associate Editor

Dear reader,

it is my pleasure to introduce you the new issue of Suiform Soundings!!

In this modern and everyday more degraded world we are living, conservationist have few reasons to be optimistic. In this issue we are presenting good news: a large hippo population in Cameroon has been stable despite the species being heavily poached in other African countries (Scholte et al.), a new population of white-lipped peccary has been recorded in Costa Rica (Esquivel-Cambronero et al.), and a dedicated group of conservationist is working hard to recover white-lipped peccary populations of Mesoamerica (Reyna-Hurtado et al.). We hope this good news turns out to be a reason to be optimistic and never lose the hope of saving our natural world!

Additionally, in this issue you will find articles by Alastair Macdonald who has explored the interesting perception in early Chinese descriptions of the *Babyrousa* spp, called “horned pig” and what was known about its distribution in the 1920’s. In America, due to the recently interest raised about the Chacoan peccary conservation, Dennis Merrit Jr. has compiled a list of published reports and grey literature about the species. In Uruguay several institutions are working coordinately to manage feral populations of wild pigs that are damaging the environment of this South American country.

We, the editorial team and the IUCN group of specialist, hope that Suiform Soundings is informing and spreading the good or bad news, the status, the relevant studies, and the problems the wild pigs, peccaries and hippos are experimenting around the world. We hope this will help to inspire more people to care about them. For me, watching a group of powerful, angry and focused white-lipped peccaries marching in a Mexican rainforest 18 years ago marked my life, and then I decided to dedicated entirely to studied and save this interesting group of species. This decision was one of the best I have ever taken as I have found a whole field of species, topics and actions needed to raise awareness to conserve these species that highly need the human help to survive as we have impacted almost all populations of wild pigs, peccaries and hippos on earth!

With thanks to all collaborators we hope you enjoy this issue of Suiform Soundings and the newsletter fulfill its role it was created once again!

With warm regards,

Rafael Reyna

Early Chinese awareness of the 'horned' pig (genus *Babyrousa*)

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Introduction

The adult male Babirusa (*Babyrousa* spp.) is recognised as a very unusual wild pig (Macdonald 2008) (Fig. 1). It is endemic to the Indonesian island of Sulawesi and some neighbouring islands. The extent of its range has been decreasing for many years (Leus et al. 2016; Macdonald 2017; Macdonald & Johansson 2017). We are very fortunate that there are Pleistocene depictions of this animal (Fig. 2), the female one of which has been dated to c. 33,400 BCE (Aubert et al. 2014). These were found on cave walls in the South-west peninsula of Sulawesi, and highlight the historical local interest in this animal, in a region from which they subsequently have been exterminated (van Heekeren 1952, 1972). Outside its home range, however, early knowledge of the Babirusa appears to have been quite fragmentary. The somewhat 'hidden' geographical location of the Sulawesi, Togian, Sula and Buru islands (Sulawesi first began to appear on European maps in 1535 or 1537 (Thomaz 1995), together with an apparent lack of

Fig. 1. An adult male Sulawesi Babirusa.Photo: A.A. Macdonald

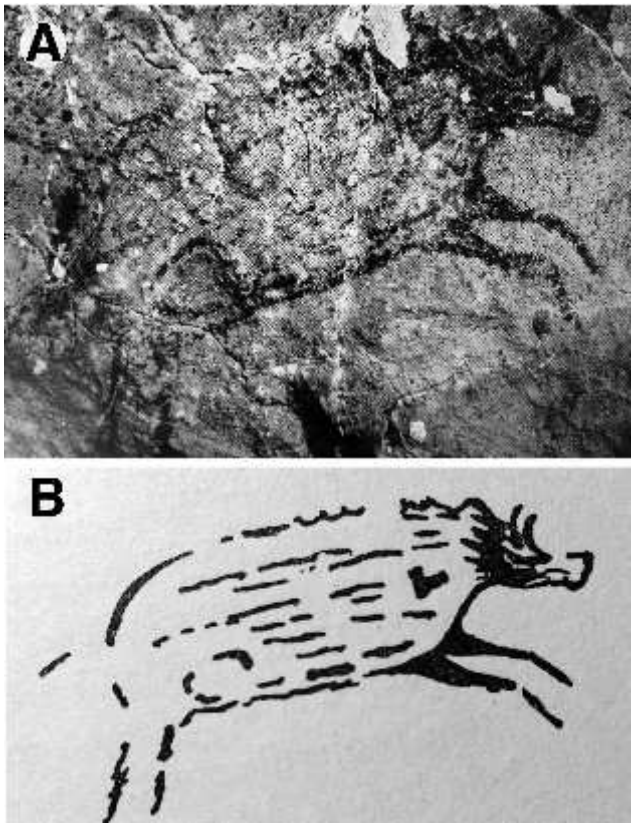

Fig. 2 A. The cave-painting, in red striped-line technique, of a charging [*Babyrousa*] boar; from South Sulawesi. (Heekeren 1972: plate 59).

Fig. 2 B. Drawing of the charging [*Babyrousa*] boar in A. (Heekeren 1972: p. 117).

any commercial attractiveness at that time, partially explains why early seafarers from other countries (e.g. Portugal, China) were rarely drawn there. Although pieces of relevant information have undoubtedly been lost (see below), or are unrecognised as such, among the scattered remaining bits and pieces, elements of a larger 'jigsaw' can be traced back through time. In addition, the results of recent excavations have begun to reveal new and unexpectedly suggestive clues for future studies (van den Bergh 2016).

Early European knowledge

Several accounts have been published describing the development of European awareness of the Babirusa (Deninger 1909; Mohr 1958; Tjiu & Macdonald 2016). Although the first Europeans to arrive in Indonesia were the Polo brothers, in c. 1292, and Odorico Mattiussi (Odoric of Pordenone), the Italian Franciscan friar and missionary explorer, came in the early fourteenth century, they did not go to the 'Babirusa' islands (Lach 1965). The Italian traveller, Ludovico di Varthema did reached Buru and the 'Spice Islands' in 1505 (di Varthema 1510), and the first Europeans to reach Sulawesi were the Portuguese sailors Simão de Abreu, in 1523, and Gomes de Sequeira (among others) in 1525 (Thomas 1995; Galvão 1563). The Portuguese remained unaware that the various peninsulas of Sulawesi represented component parts of one island until about 1560 (Thomaz 1995), whereas evidence from the Nagara-Kertagama (1365) indicated the merchantmen of the Javanese Majapahit knew the general outline of South and East Sulawesi at least since then, and were aware that it was one island (Gelpke 1992).

The earliest known European reference to a 'horned' pig from that region can be found in a manuscript written by the Portuguese soldier António Galvão, dated c. 1544; it was probably the preliminary version of his lost Historia das Molucas (Jacobs 1972). He wrote:
'A muitos porcos momtezes e grandes, e deles com cornos'
[There are many large swine, some of them with horns].

Some years later Galvão (Galvano 1555) published the following (Fig. 3):

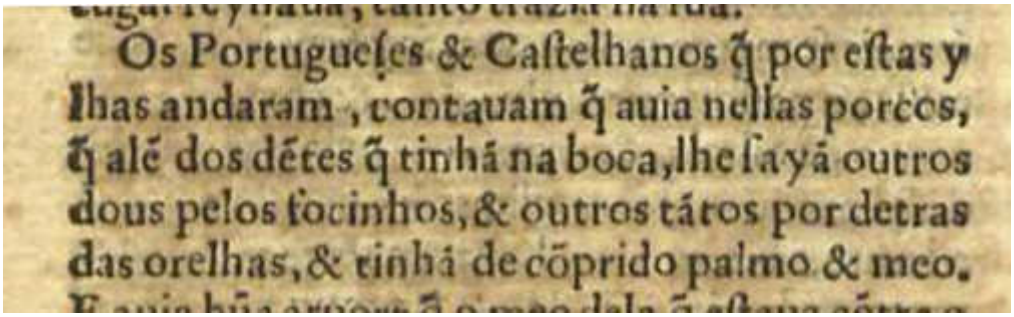
Os Portugueſes & Caſtelhanos q̃ por eſtas y
lhas andaram, contauam q̃ auia nellas porcos,
q̃ alẽ dos dẽtes q̃ tinhá na boca, lhe ſayá outros
dous pelos focinhos, & outros táros por detras
das orelhas, & tinhá de cõprido palmo & meo.

Fig. 3. Portuguese text by Galvão 1555 reporting the long canine teeth of the 'horned pigs' in the Moluccan islands (see Galvano 1555 in the references).

The Portugals and Spaniards which haue beene in these islands affirme, that there be certaine hogs in them, which besides the teeth which they haue in their mouthes, haue other two growing out of their snouts, and as many behind their eares, of a large span and an halfe in length' (Galvano 1555). It was not until some years later, on the 21st March, 1582, that Fr. Bernardino Ferrari sent to his superior, Fr Everard Mercurian, a description of the Babirusa that he had seen on Buru (Tijiu & Macdonal 2016; Jacobs 1980).

The frequency of shipping from Europe to Ambon and the spice islands of the Moluccas increased through the sixteenth and seventeenth centuries, with the Portuguese predominance being replaced by that of the Dutch (Lach & Van Kley 1993; Subrahmanyam 2012). Sailors and traders brought back to Europe the extraordinary skulls of adult male Babirusa as well as some knowledge of this animal's biology. John Evelyn wrote in his diary (Evelyn 1955) on the 3-4th February 1644, in Paris, that on the north bank of the Seine running westward from the Pont au Change, part of the modern Quai de la Megisserie, … 'here is a shop cal'd Noahs-Arke, where are to be had for mony all the Curiosities naturall or artificial imaginable, Indian or European, for luxury or Use, as Cabinets, Shells, Ivorys, Purselan, Dried fishes, rare Insects, Birds, Pictures, & a thousand exotic extravagances'. Six weeks later he reports in his diary that in Dieppe 'whatever the East Indys afford of Cabinets, Purcelan, natural & exotic rarities are here to be had with abundant choyce'. Borel, in 1649, mentions a Magasin des Indes in Lisbon where artefacts and curiosities from the East Indies could be purchased (Borel 1649).

The early Chinese perspective

However, almost nothing has been reported from the Chinese perspective, the neighbouring country most likely to have archives of its early awareness of the 'horned' pig. An early European reference to that knowledge could have been Nieuhof's 1682 account, derived from Chinese sources, of the Sukotyro, a large ox-like pig-animal with teeth coming out of its face between the eyes and the ears (Fig. 4) that was said to have come from Indonesia (Nieuhof 1682). However, Nieuhof, like Piso before him, published illustrations that corresponded more closely to the anatomy of the Babirusa (Tjiu & Macdonald 2016; Nieuhof 1682; Piso 1658).

Fig. 4. Illustration of the Sukotyro from the title page of Nieuhof, 1682 (see Nieuhof 1682 in the references).

To what extent were there Chinese sailors and traders in that region of Indonesia who might have likewise seen the Babirusa? In 1544 Galvão wrote (Jacobs 1971) that the Chinese 'were the first to buy cloves wholesale in the islands'. During the Yuan period (1279-1368), the available evidence points to Chinese vessels navigating from the South China Sea to the Sula Islands and through the Celebes Sea to Eastern Indonesia to carry out trade there (Ptak 1992, 1993). A number of Chinese junks sailed to the Moluccas each year, presumably to purchase cloves (Wang Ta-Yuan ca. 1349). There is also information that refers to knowledge of the Klabat region in Northeast Sulawesi (Wang Ta-Yuan ca. 1349). In the early Ming period (1368 to c. 1400) Chinese maritime trade was put under strict government control;

private shipping was largely discouraged through the enforcement of strict laws (Cao Yonghe 1984). Nevertheless, it would seem likely that private traders continued to travel from China to the Moluccas throughout the fourteenth and fifteenth centuries (Ptak 1992).

It was to the huge, 10,000 volume 'Imperial Encyclopaedia', Gujin Tushu Jicheng (Complete collection of illustrations and writings from the earliest to current times) that the author first searched for an early reference in Chinese to the horned pig. The renowned scholar, Chen Menglei, began this compilation of knowledge in 1701 during the Qing Emperor Kangxi's reign; it was not published until after the Qing Emperor Qianlong had ordered its revision, which was undertaken from 1723-1725 by another scholar and official, Jiang Tingxi. It was printed in 1726 (Jiang Tingxi 1726). The Gujin Tushu Jicheng provided a comprehensive survey of all that was best in the literature of the past, including accounts of many different mammals, reptiles, amphibians, birds, fish and insects, together with additional 'miscellaneous' and 'strange' members of each class. Several pig-like animals were recorded, including the Jie Zu, the Shang Gao and the yellow-bodied white-headed Wen Lin. An extraordinary black-headed pig is also depicted, the Jing Feng, and it was described as looking like a deer (the Indonesian words babi = pig and rusa = deer). However, tellingly, both the text and the illustration indicate clearly that this strange (mythical) animal had two heads.

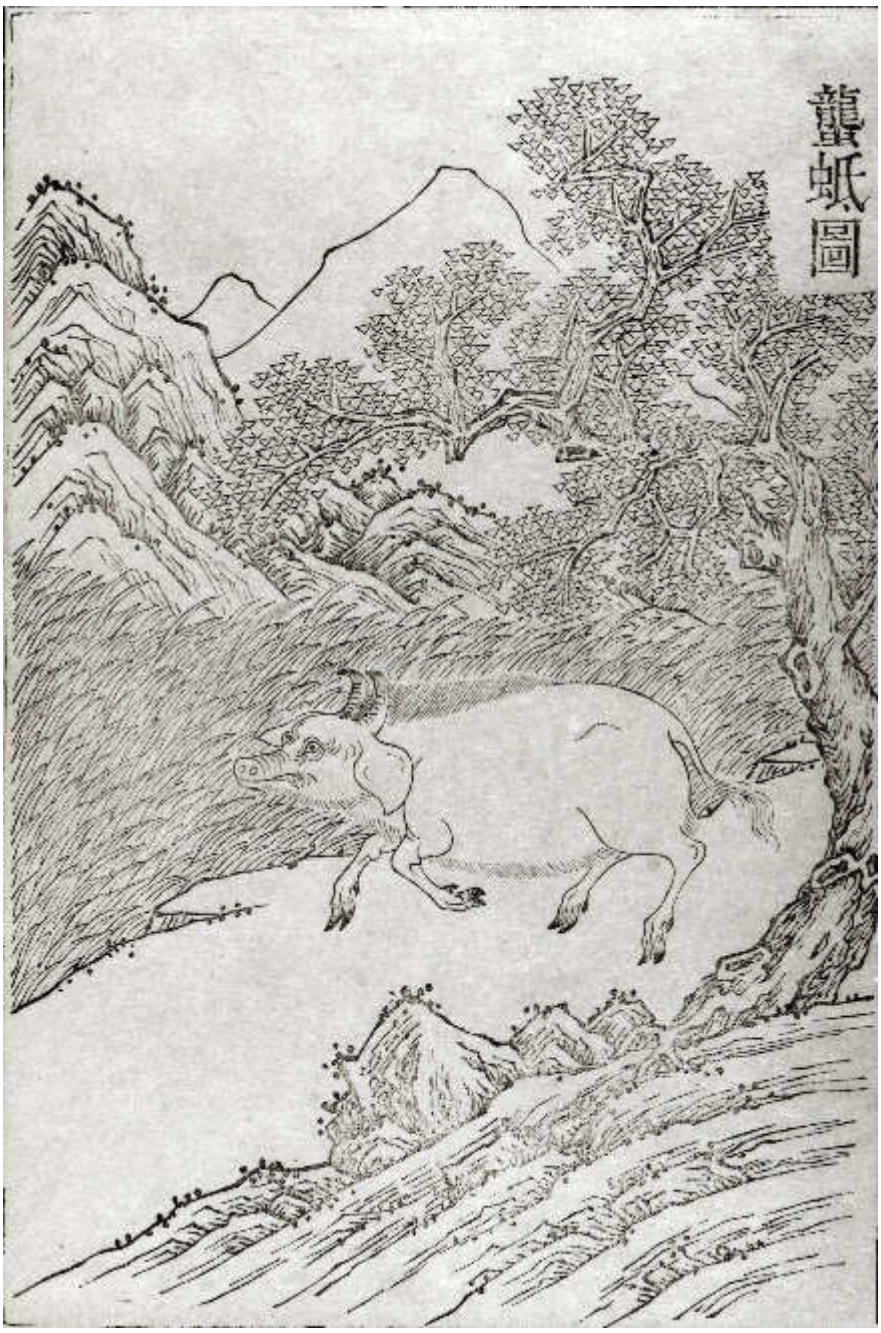

Fig. 5. The Longzhi illustration from Gujin Tushu Jicheng published in 1726 (see Jiang Tingxi 1726 in the references).

Of perhaps somewhat more direct relevance to the Babirusa, in section 126 Birds and Insects, subheading 'Exotic Animals 4/4, of the Gujin Tushu Jicheng, the following text was found:

'Wu Sun [Everlasting] Animal. In the south, [there is] an animal that looks like a deer, but is a pig. [It has] two teeth coming out of its head like deer horns. [This animal] is friendly towards humans and begs for grain. [The animal] is called ‘everlasting / unwoundable / invulnerable’ beast. People cut its flesh for food.’

However, it is the additional piece of information, included in section 124, Birds and insects, subheading Exotic Animals 2/21, of the Gujin Tushu Jicheng, which is perhaps most interesting: 'in mount Kun Wu, there is an animal, it looks like a pig, with horn(s). Its sound is like loud crying, [and] it is called Long Zhi. [People] eat the animal, [in order] not to have nightmares.’ And this 'Long Zhi' animal was illustrated (Fig. 5). It is clearly porcine, set in mountainous countryside, and has hair on its ventral surfaces and at the end of its tail. Two horns emerge from the occipital or caudal surface of its head and curl to point rostrally. Interestingly, they do so in a manner similar to that painted onto the cave walls of south Sulawesi (Fig. 2).

The earlier, and richly illustrated, Sancai Tuhui (Pictorial Encyclopedia of the Three Powers), which was published in 1609, contains many descriptions and representations of animals (Wang Chi & Wang Si Yi 1609.). Unfortunately, perhaps due to an editorial confusion with an identically named mythical fox (that had nine tails and nine heads), in the London copy the illustration beside the descriptions of the 'horned' pig - Long Zhi – was that of the nine-tailed fox, and not the horned pig itself. Four descriptions of other pigs are appropriately illustrated in the Sancai Tuhui.

The earliest illustration of the Long Zhi that is still extant can be found in the edition of the Shan Hai Jing (Guideways through Mountains and Seas) with commentary by Wang Chongqing, published in 1597 and again in 1619 (Shan Hai Jing 1597). It is interleaved with the reprint of the (text only) 1537 edition by the same editor (Strassberg 2002). The image (Fig. 6A) from Plate XXXIII, was designed by Jiang Yinghao, courtesy name Wulin, from Guangling (modern Yangzhou, Jiangsu) and was engraved by Li Wenxiao (Strassberg 2002). The accompanying text states:

The first guideway through the Central Mountains begins at the Bo Mountains, the first of which is Sweet-Jujube Mountain [the precise location of all these mountains is uncertain]. The Combined River emanates from here and flows westward into the Yellow River. ... Eight hundred li (during the Tang dynasty [618 – 907 C.E.] one li = 323m) southwest along the second guideway through the Central Mountains stands Fresh Mountain. Three hundred li farther west stands Bright Mountain ...
LONGZHI. Two hundred li farther west stands Mount Kunwu. On its heights is much copper. There is a beast here whose form resembles a pig but with horns. It makes a sound like a baby crying and is called Longzhi. Eating it will prevent blindness.’
Three other pig-like creatures are illustrated; the Lili, the Dongdong and the Dangkang.

Jiang's designs were included in a later again edition of the Shan Hai Jing, published during the Chongzhen era (1628-1644), in which the Long Zhi (Fig. 6B) was engraved by Liu Suming from Jianyang, Fujian (Shan Hai Jing c. 1628-1644).

The information about the Long Zhi in these encyclopaedias can be traced back to a much earlier edition of the Shan Hai Jing. The many pieces of early writing that comprise this book were first compiled between c. 4th to c. 1st century BCE, from the Warring States period to the Western Han dynasty (Strassberg 2002; Knechtges & Chang 2014; Guo Fu zhu 2004). The Shan Hai Jing is China's earliest surviving cosmography and typically blends empirical fact, hearsay and fantasy within a geographical framework (Shan Hai Jing c. 1628-1644). Sometime between 310 and 324 CE its foremost commentator, Guo Pu, courtesy name Jingchun, effectively established the final version that has since then been repeatedly copied, re-edited and reprinted through the centuries (Shan Hai Jing c. 1628-1644; Guo Fu zhu. 2004). He wrote; 'there is an animal with the shape like pig. It has tusks stretching forward like horns, as well as a wailing sound. The name of this animal is Long Zhi'(Guo Fu zhu 2004). Guo Pu also drew attention to a nine-headed fox that was suspected to have the same name, Long Zhi. The text describing the Long Zhi subsequently appeared in the encyclopaedic 987 C.E. Taiping Yulan (Imperial Digest) edited by Wu Shu, Lü Wenzhong, Wang Kezhen and Tang Yue (Wu Shu et al. 987). The creation of this encyclopaedia has been described in detail (Kurz 2007).

These Chinese images and texts raise a number of questions. Might there be records of the receipt of diplomatic gifts of the Babirusa or 'horned' pigs by the Court in early China? Are there additional records of paintings or other illustrations of 'horned' pigs in early China? To what extent might these illustrations reflect the observations and related accounts of Chinese sailors and merchant who visited Indonesia?

The artists of the illustrations reproduced here had clearly not seen the animal. Indeed, it might be suggested that there is something of a parallel in the pattern of their depiction when they are compared with the early European illustrations of 'hairy' Babirusa from Buru by artists who had never encountered those animals; from strangely wild to more closely resembling the familiar domestic pig (Tjiu & Macdonald 2016). However, it is of interest that the earlier depiction was of a pig with dorsal body hair (Figure 6A), and that the slightly later version was portrayed as having no hair, except on its neck and tail (Figure 6B). Guo Pu wrote short, somewhat playful, poems about the odd appearance of the creatures depicted in the illustrations of the Shan Hai Jing to which he had access at that time (310 to 324 C.E.)(Guo Fu zhu 2004; Guo Pu 1958). The poet Tao Yuanming (365-427 C.E.) is also said to have been looking at illustrations of the Shan Hai Jing when composing poetry about this work (Strassberg 2002; Knechtges & Chang 2014). The sixth century artist, Zhang Sengyou, is attributed with painting 247 illustrations of the Shan Hai Jing; however, these, like others of that time, are no longer extant (Knechtges & Chang 2014). Could these early images have borne a closer resemblance to something observed?

There was a lot of shipping between China and Indonesia during the 5th to 7th centuries C.E. (Wolters 1967). Animal transfer occurred too; for example, in 647 a salmon-crested Moluccan cockatoo was brought to the Chinese court as a gift from an 'island nation' (Schafer 1963; Ptak 2012). Were mammals also transported from the Indonesian islands to China? During the first five hundred years of the millennium early Chinese records make it clear that Malayo-Austronesian seamen (K'un-lun) and ships (kunlunpo) based in Southeast Asia, sailed the routes between Southeast Asia and China (Wolters 1967; Manguin, 1994). They were the nomads of the Southern Ocean. Exactly when this far-reaching inter-island maritime activity began is unknown.

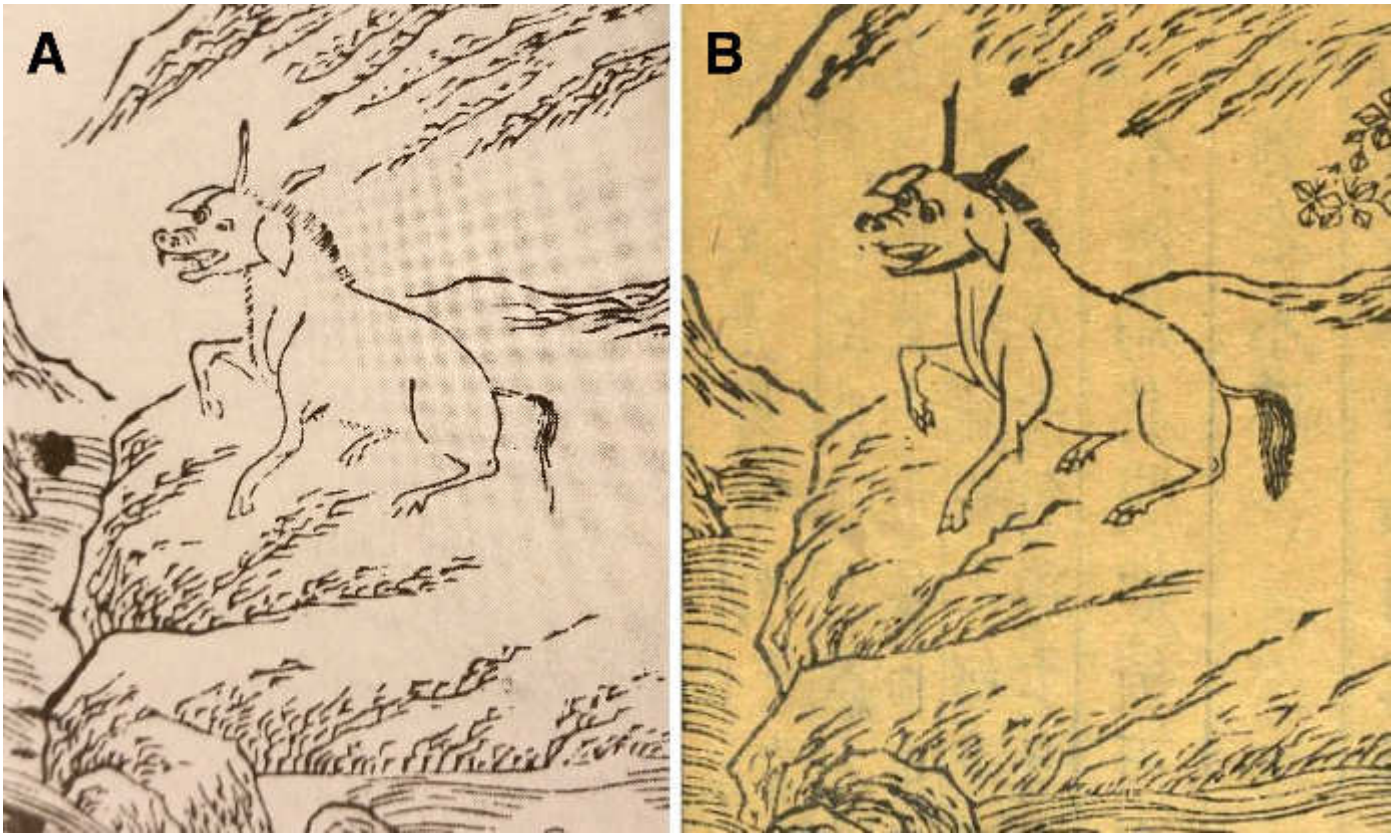

Fig. 6 A. The Longzhi illustration from the Shan Hai Jing published in 1597 and 1619 (see Shan Hai Jing 1597 and Strassberg 2002 in the references).

Fig. 6 B. The Longzhi illustration from the Shan Hai Jing published during the Chongzhen era (1628-1644) (Harvard-Yenching Library of the Harvard College Library, Harvard University, see Shan Hai Jing (c. 1628-1644) in references).

Considerable care must be taken with the interpretation of early sources. A good example is perhaps the report of a 'pig-like horned' animal (among the very many other wild mammals) in the vast imperial wildlife park of Han Wu Ti (140-187 BCE), which extended from the capital, Hsien-yang, across the countryside south of the Wei river (Schafer 1968). The animal's name was reported as Chüeh tuan. However, a detailed language analysis has shown that this animal was not a pig, but a rhinoceros (Yen 1969).

Conclusions

This article has sought to open the door to a very large area of possible study, the early Chinese knowledge of the 'horned pig'. Helpful guides to additional resources now exist (Bocci 2010). No more than a very small start has been made here. However, an excellent example of what might be possible, with knowledgeable access to the archives, paintings, poetry and other writings of China, has been ably demonstrated recently by the scholarly analysis of early Chinese knowledge of the cassowary (Lai Yu-chih 2013). Time will tell what other information is available about the 'horned pig', and indeed other wild pigs, in ancient China.

Acknowledgements

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Walter Kaudern's geographical distribution of Babirusa, 1920

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Introduction

This extract (pp. 53-61) of a typed manuscript held at Göteborgs Naturhistoriska Museum (GNM Arkiv-nr 608) has been translated from German into English; editorial insertions to the text have been indicated by square brackets e.g. [Fig. 1]. The modernisation of village, island or species spelling occurs after the first correction, and these are also within square brackets. Where Kaudern had left gaps in the text, e.g. with respect to reference details, these have been retained as found. Where possible reference materials have been traced and these have been indicated by superscript numbers, and are listed sequentially at the end.

Walter Kaudern was born near Stockholm on March 24, 1881, and obtained his PhD at Stockholm University in 1910 (Wassén 1942; Lindberg 2006). In December 1916, together with his wife, Teres, and their two young boys, Sven and Walter, he set off for North Sulawesi, Indonesia. Part of their aim was to carry out a zoo-geographical study of the island, but increasingly he came to focus on anthropology. In March 1917 they established their first home base at Gurupahi in North Sulawesi. Their second home base was in Kulawi one year later. In January 1920 they sailed to the Banggai islands and then made their way by sea to Buton island. The family left Sulawesi in July 1920.

Kaudern's studies enabled him to make contact with many hunters in villages on Sulawesi. Having his wife and young children with him perhaps enabled the family group to make very close contact with the people and the way that they lived on the islands. He travelled extensively, and published the results of his various studies (Kaudern 1921a; Kaudern 1921b; Kaudern 1925a; Kaudern 1925b; Kaudern 1927; Kaudern 1929; Kaudern 1938; Kaudern 1944).

The translated text of his German language manuscript

Although the Babirusa of both Celebes [Sulawesi] and Buru are well enough known, their geographical spread is not known exactly. On my map I have indicated its entire distribution, in as much as I have have found it in the literature and from own observations [Fig. 1]. I also have indicated the places where the different races may be found.

The Babirusa is a genuine jungle animal, and consequently it has disappeared from those large areas where the local people have cleared the land to build, and the jungle has thereby been ruined.

In order to make a reliable map of the distribution of the Babirusa, a detailed knowledge of the jungle and open country is necessary. Therefore I have only made the map detailed where my personal knowledge of the countryside allowed it.

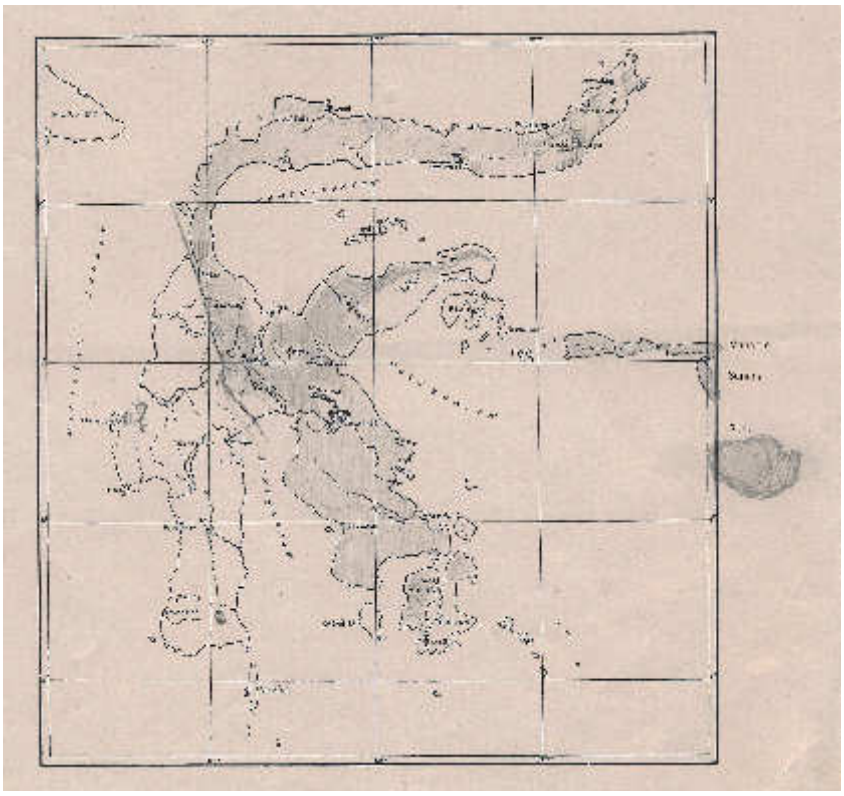

Fig. 1. Map of Sulawesi and neighbouring islands. The shaded areas denote where there is evidence that the Babirusa live; the question mark suggests an area of some doubt. The diagonal line indicates the likely boundary of Babirusa-inhabited territory. Artist credit: W. Kaudern.

The Babirusa needs more than just jungle in order to live. The terrain must not be too steep or stony. The Babirusa prefers to live where the terrain is largely flat and attractive, where it can be comfortable. In particular, swampy areas seem to be less often frequented than less swampy areas. However, in addition, in particular areas of the island, where all the appropriate conditions seem to be present, nevertheless the Babirusa is absent. For example, this seems to be the case in the southern part of the island, where large areas appear to be suitable for this animal.

According to the statements of the local people, the Babirusa is not to be seen west of a line, drawn from the river Palu with the nearby river Miu, and the river Koro between Gimpu and Belanta and its tributary the Mewe towards the north and Rampi towards the south [Fig. 1]. How far the animal goes south is not known to me. Perhaps the likely border is formed by the large riverine area of Rampi and Leboni towards the southeast where they flow towards the Bone bay.

There are no trustworthy reports that the Babirusa are still to be found in the areas which lie to the west of this line, indeed anywhere in the whole of the Makassar peninsula. Nevertheless, a sergeant who had been stationed for some time in Mamudju [Mamuju] told me that a Babirusa had once been killed there. However, this statement did not seem to be completely trustworthy, since the local people said that it did not live there. A mistake of identity with the other wild pig [*Sus celebensis*] is not impossible; indeed in areas where the Babirusa occurs rarely or not at all, it can happen that even the local people will confuse wild [*Sus*] pigs, which have very large canines, for Babirusa.

Even if the Babirusa no longer occurs in the western and southwestern parts of Sulawesi, this has not always been the case. The researchers P. and F. Sarasin, who carried out studies in the Tjakondu cave in south Sulawesi, found a number of Babirusa remains in the Paleolithic deposits there, which indicated that the Babirusa once lived in these areas (Sarasin and Sarasin 1905). These gentlemen wrote more about this in their work *Reisen in Celebes* [Journeys in Sulawesi], volume X, page Y " -- nevertheless two things are remarkable; first of all the occurrence of the

Babirusa, which in as much as anyone today knows is absent from south Sulawesi and you start finding it in Central Sulawesi."

Therefore, the Babirusa on Sulawesi now seems to be present only in the eastern part of Central Sulawesi, and in the north, northeast and southeast peninsulas. In north Sulawesi it occurs overall, wherever the natural surroundings permit it. Of course the Babirusa have disappeared from the larger built-up areas of Minahassa, as well as from the large plateau in the interior of Bolaang-Mongondou around the city of Kota Mobagu, the open low country near Gorontalo and from the large areas of coastal land which have been planted with coco palms. "Above about 1500M the vegetation has increasingly the character of Panda forest ---, at this height the Babirusa is said to be missing ", write the Sarasins. (*Reisen in Celebes*, volume X, page, Y) (Sarasin and Sarasin 1905).

In the mountains around lake Danau the inhabitants had caught a male Babirusa in a snare trap at a height of approximately 1300 M [Fig. 2]. In Minahassa it seems that the Babirusa can currently be found in the most easterly corner of the Sudara volcano and in the western part of the province. The middle parts of Minahassa are built-up too much to offer the Babirusa a suitable place to stay. It is also missing from the most northerly corner, according to the statements of the inhabitants.

Fig. 2. Photograph of an adult male Babirusa from near lake Danau, North Sulawesi (Kaudern 1921a). Photo credit: W. Kaudern, GNM 185-3.

Whether it occurs on other islands close to the Minahassa coast is unknown to me. It seems not to live on Menadu Tuwa [Menado Tua island] and the small ring of islands around it.

We find some small islands along the coast of the north peninsula, for example in the Kwandang and Dondo bays. Whether the Babirusa live here or not, I do not know. Outside Sumalata lies the small island of Motu, and during a visit there the inhabitants maintained that the Babirusa were present, and at home there. However this could not be confirmed by me, and on various grounds it did not seem likely.

If it is difficult to obtain a completely trustworthy idea of the distribution of Babirusa in north Sulawesi, this applies even more so in central, northeast - and Southeast Sulawesi. The Sarasins maintained that the Babirusa live in Central Sulawesi without giving any details other than a single mention, and that is to Lindu (Kaudern 1938).

With reference to the eastern parts of Central Sulawesi the opinions are divided. Ten Kate (1910) writes in his "De weg van Bada naar Napu" , page 292 (Ten Kate 1910): "The Babirusa are not found in the inland forests." Kruyt (1912) on the other hand, in his large work " De Bare'e-sprekende Toradjas" says the following "The large hunt takes wild pigs, and under this heading,

Babirusa (mol. Mal. babi roesa; Bare'e ` e: rari, marari or tamrari, Par. - Kaili'sch: dolodo. or dolodoki; in the hunter's language: marakoro, ' meaning its body can be seen (hairless), or boeja koro, 'white body'. ... The Babirusa can be found throughout the whole area where the Bare'e-sprekende Toradjas live and also beyond there."

Thus it is indicated that the Babirusa really does occur in different places of East Central Sulawesi. However, in my experience, not very frequently restricted to particular areas only, for example the forest areas west of lake Posso [Poso] and in its extensions to the south, which means the forest areas on the ridge of hills which bends towards the southeast in the direction of southeast Sulawesi.

Also in the forested areas in the Mori landscape, on both sides of the Kolonodale bay, the Babirusa is said to occur rather abundantly, according to the reports of the inhabitants. Moreover they are present around south Bungku and towards to the north-east in north Bungku and Todjo.

During my journey from Poso through Lage, Ondae and Pada up to Mori, I heard that in these three provinces, the Babirusa should not occur there any longer. Overall it was said to me by the local people that they should be present in Takalekadjoin in the forests to the west of lake Poso and in Mori. In Ondae I received however a decoration, in the form of a necklace or collar, that a leader of headhunters once owned, in which, among other things was fastened the strong lower canine of a Babirusa. This could be interpreted that the Babirusa occured in this province. However, the owner of the chain volunteered the information that the tooth came from the south. Generally speaking, the people certainly knew of the Babirusa, which indicated that not so long ago it had indeed lived in these parts of central Sulawesi.

Whether the Babirusa are to be found in the areas between Lage and Pada in the south and in the north-east peninsula in the east is not known to me. I would say 'perhaps, if the necessary jungle is available'.

With regard to northeast Sulawesi there are very few reports of whether the Babirusa occurs or not. Weiner (untraced) who travelled across the peninsula near Lojnang, said that in the central mountains, the uppermost parts of which form an approximately 1150 M high and approximately 1 km wide densely forested plateau, both Anoa and Babirusa are to be found in abundance.

This latter statement did not seem to me to be completely reliable, even if the description of the terrain appeared to be suitable for the Babirusa. During my stay in Lojnang [Loinang] in December 1919, I received completely different set of information with respect to the Babirusa. The local people, not only from Pinapuan and Lingketting but also from Tambunan, said that the Babirusa were only to be found in the coastal forests along the northern edge of the peninsula, particularly in the area of Bunta. According to the local people, they are completely absent from the mountains not only from the steep slopes, but also above, on the central plateau in the middle of the peninsula.

The information from the local people appeared to be completely trustworthy. They collected resin from forests mentioned and hunted Anoa there also which they said were plentifull in the

mountains. The Babirusa was a well known animal to them and was particularly highly valued and very much desired, because the canine teeth of the Babirusa male were used by head hunters as decoration of the headdress of the leader. Such teeth could not be obtained in the mountains, but had to be bought on the coast.

How is it possible that the Babirusa does not live in the jungle of the central mountains? The question is not easy to answer with certainty. The slopes of these mountains are so steep and stony that it is not possible for the animal to have penetrated the interior from the coast up through the forest. The only one possibility seems to be that it penetrated from the interior of the southwest. But the further one travels into the southwest, the higher the mountains, and if it is the case that the Sarasins are correct in their statement that the Babirusa do not occur higher than 1500 M, it is possible that the mountains have prevented the spread towards the east as far as the central plateau.

It is not known to me how far along the coast to the east of Bunta the Babirusa are present. They are said to be present in the northern section of the eastern part the peninsula south of Bualemo. Whether the forest here is directly connected to the forest of Bunta; seems uncertain to me. If this is not the case, then this is, so to say, an island. However, one could also think that this forest is linked with the forest in the west via the forest filling the central part of the peninsula, where it is narrowest between Biak and Poh.

If one continues from there along the central mountains in a westerly direction, the forest soon disappears from the low altitudes in the south, where at about 300 to 400 M above sea level we found a broad strip of flat land. Since one does not find the Babirusa here, the Balantak Babirusa must be thought of either as a remnant of a earlier wider distribution, or it is to be found along the whole of the north coast of the north-eastern peninsula.

The Babirusa has been exterminated [by hunting] from the landscape of Lamala south of Balantak some generations ago, according to the statements of the local people.

No Babirusa were seen along the south side of the northeast peninsula from Lamala in the east past Luwuk, Kintom, Batui and up to Ondolean in the west. This was decidedly so at least with respect to Luwuk, Kintom and Batui.

The Babirusa do not seem to occur on the Togian islands which lay in the Tomini bay.

According to various criteria one might expect to find the Babirusa on the larger islands in the Banggaai [Banggai] archipelago southeast of Luwuk. During my visit there in the February 1920, however, I found out that they were unknown on these islands. The terrain is unsuitable for it. Truly continuous forest is nearly completely absent, and in addition the soil is very stony. If it ever lived here, it must not have been difficult for the inhabitants to exterminate it. The possible disappearance [of the Babirusa], for example from Peling [Peleng] island must have happened a long time ago, as evidenced by the local people not having any word for this animal. I searched in vain for any remains of the Babrusa remains on the islands. Only in one village on west Peleng did I find a pair Babirusa of teeth as jewelry in the headdress of a headman. This jewelry

consisted of a lower and an upper canine, both of which were split and polished thin. They had been placed on the top of the headdress [Fig. 3]. This artifact had been passed from father to son for several generations, such that no-one knew any longer, out of what material they had been made. It cannot be excluded that these fragments stem from a time, when the Babirusa really did live at least on the island Peleng.

An investigation of the many caves, that can be found on Peleng, might perhaps answer question about whether the Babirusa had lived here or not.

With reference to the presence of the Babirusa on the southeast peninsula I have only very few reports resulting from a journey along the east coast. Consequently I cannot be certain where it occurs or is missing on this peninsula, however, it is clear that it can be found in various places.

Strangely, Elbert (1912) does not mention the Babirusa in his descriptions of his journeys in the southern most part of the peninsula. In contrast he states that the Anoa does occur there. The Sarasins also say nothing about the presence of the Babirusa in this part of Sulawesi.

Fig. 3. Painting of Tomai Lagongga from Pinapuan, Peleng, North-east Sulawesi; note the Babirusa canine teeth decoration in the headdress (Kaudern 1921b). Artist credit: W. Kaudern. Göteborgs Museum of World Culture, Kaudern No. 3.

As a result I have shaded in the whole of the southeast peninsula on my map [Fig. 1], except those places where there are maps that indicated open terrain. In this way I just want to indicate that the Babirusa also occurs on this peninsula.

The extension of this peninsula is represented by the islands of Muna, Buton, Kabaena, Wowoni and Tukangbesi [Tukang Besi]. It is not clear from the literature whether the Babirusa are also present on these islands. For example, Elbert (1912) says nothing about this. I have not excluded the possibility that [the Babirusa] may be found on the forest-covered Wowoni island, but have no proof of this, however. Nevertheless, they do occur on Muna and Buton, although restricted to small, somewhat restricted districts. This applies particularly to the island of Buton, where they are only to be found in the northern most part.

With regard to the island of Muna, someone in Raha said that the Babirusa can be found in the central and northerly parts of the island where large areas of forest are present. In the southern most part, just as in various other places, the forest has been cut down, and for this reason, naturally, the Babirusa have disappeared.

On the same submarine shelf on which the Banggai archipelago are situated, but lying somewhat further to the east, lie the Sula islands which have been little studied zoologically. Whether the Babirusa occur on these islands is not known. Koningsberger & In Van Hustijn 1918) writes about this in Van Hustijn's work 'Memorie over de Soela-eilanden [Recollections of the Sula islands]'.

The mammal fauna of the Sula islands is not much richer than that of most other islands from that part of our archipelago. Therefore it is possible, although not always with certainty to say that some types of animals are not by nature but by human intervention brought there. Among these, according to the collector Tarip (untraced), human introductions include, amongs others … the Babirusa (*Babirusa babirusa*) [*Babyrousa babyrussa*] and the moluccan deer (*Rusa moluccensis*) [*Rusa timorensis*] as possibilities, although both by earlier opportunities still remain to be found here."

From the above-mentioned it does not follow that the Babirusa are to be found on all three Sula islands, and so it cannot be excluded that it lives or has lived on all three islands. The information from van Hulstijn's map (van Hulstijn 1918) and description over the nature of these islands, it must be entirely possible for them to live there.

In museums I found only Sanana noted as a place of collection. This does not mean that the specimens in question really originate from the Sula island of Sanana, but that it is possible that they were bought in the harbour of Sanana. Whether they came from the island with the same name, or from the other Sula islands, of Mangoli [Mangole] or Taliabu, naturally nobody knows.

I have not found any evidence to support the acceptance of the idea that the Babirusa were brought here by humans, and just as little concerning the islands Muna and Buton, that they probably originated from the time period when these islands were connected to the island of Sulawesi.

To the southeast of the Sula island Sanana lies the island of Buru where the Babirusa still lives, as has been well known for a long time. It has not been possible for me to obtain more accurate descriptions of the origins [of Babirusa] on this island.

Post scriptum

It is clear from the above account that lots of pieces of local information were added to Kaudern's personal experience of the distribution of Babirusa on Sulawesi and its neighbouring islands. Valentyn (1726) had reported the presence of Babirusa on Banggai island, part of the Peleng group of islands, and here Kaudern is suggesting, by the evidence of the headdress (Fig. 3) that Babirusa may have survived somewhere in that small archipelago until the 1800s. His report that they were still present on Muna and Buton a century ago is bourne out by folk memory of them in recent years (Day & Macdonald 2016). The name for babirusa in north Buton, reported by a 94 year old gentleman, was Wewi Kanseulu Ogeno. He remembered seeing them a long time ago, and recounted that he recalled seeing two walking together; they did not walk as a group. He said that the Babirusa on Buton just ate some fruit in the forest; they never came into the farmland area (Day & Macdonald 2016).

Fragments of important historical accounts, such as these ones, may to be expected to lie almost forgotten in the memories of elderly hunters and in the archives and basements of the libraries and museums of the world. Sometimes there is a clue indicating their quiet repose; the recognition of something in a photo; a footnote in an old published paper; a comment that missionaries visited here or worked there; a set of old photographs with somebody's name attached. Treasures such as these await discovery (Macdonald & Johansson 2013).

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I Jornadas Regionales del Jabalí del Cono Sur de América

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Abstract

The wild boar is widely distributed and is considered one of the 100th more damaging exotic species. It was introduced in Uruguay in the 1920 in the Department of Colonia and expanded through the country and neighboring Brazil. It was declared as a national pest in 1982. The wild boar impact negatively in a) ovine production, b) porcine production, c) food security and d) agriculture. The complexity of controlling this species must be attended by an inter-institutional, international and multidisciplinary approach. Within this framework it was proposed to conduct the 1st Regional Meetings of the Wild Boar of the Southern Cone of South America in Artigas, Uruguay in December 2016. The goal of the meeting was to generate a dialogue among stakeholders and institutions to search for ways of managing and controlling the species. The meeting was organized by MGAP (Spanish initial of the Ministerio de Ganadería, Agricultura y Pesca), the Veterinary School and the porcine productive group UDELAR and financial and logistic help of several institutions from Uruguay and Brazil. The first day the meeting consisted of several talks and the second day a necropsy and body tissues sampling protocol procedure was conducted. As a preliminary conclusion it was considered the creation of an inter-institutional and multidisciplinary group to study the problem generated by this species and design possible solutions.

Resumen

El jabalí está ampliamente distribuido a nivel mundial y es una de las 100 especies exóticas invasoras más dañinas. Fue introducido en Uruguay en la década de 1920 en el departamento de Colonia y se difundió al resto del país, llegando a Brasil. Por los perjuicios que ocasiona fue declarado plaga nacional en 1982. El jabalí tiene impactos negativos en a) la producción ovina, b) la producción porcina, c) la seguridad alimentaria y d) la producción agrícola. La complejidad y antigüedad de esta problemática hace que deba abordarse en forma interinstitucional, interdisciplinaria y transfronteriza, si quiere avanzarse en el control de la especie. En este marco de situación es que se propuso la realización de las I Jornadas Regionales del Jabalí del Cono Sur de América. Estas se realizaron en Artigas (Uruguay) en diciembre de 2016. Su objetivo fue generar un intercambio a nivel nacional e internacional entre los diversos actores e instituciones para la búsqueda de propuestas de control y aprovechamiento productivo del jabalí. Fueron organizadas por el MGAP, la Facultad de Veterinaria y el Grupo Porcino de UDELAR, con el apoyo logístico y/o financiero de varias instituciones de Brasil y Uruguay. El 1º día se realizaron ponencias y el 2º día una práctica sobre necropsia y remisión de muestras al laboratorio. Como conclusión primaria se consideró prioritaria la creación de un Grupo de Trabajo interinstitucional e interdisciplinario para el estudio de los problemas generados por el jabalí y sus posibles soluciones.

Introducción

El jabalí (*Sus scrofa*) es un animal mamífero artiodáctilo perteneciente a la familia Suidae, que está ampliamente distribuido a nivel mundial. Figura en la lista de las 100 especies exóticas invasoras más dañinas del mundo (ISSG, 2016). Se considera el origen, desde el punto de vista genético, de los cerdos domésticos actuales (Lombardi et al., 2015).

Fue introducido en Uruguay a mediados de la década de 1920 por el productor agropecuario argentino Aarón de Anchorena en su establecimiento del departamento de Colonia (suroeste del país). Esos animales eran originarios del Cáucaso. A consecuencia de sueltas o escapes los jabalíes se difundieron al resto del país y llegaron a Brasil a fines de la década de 1980, favorecidos por las condiciones ambientales, la ausencia de depredadores naturales y su capacidad de adaptación (García et al., 2011; Lombardi et al., 2015). Respecto a su distribución actual, se estima una densidad mínima real de 0,33-0,75 jabalíes/km^2 (Lombardi et al., 2015). La hibridación con ejemplares de cerdos domésticos (generalmente machos jabalíes con hembras porcinas domésticas) hace que a nivel poblacional convivan estas cruzas, las variedades puras del jabalí y ejemplares de cerdos domésticos asilvestrados (García et al., 2011; Lombardi et al., 2015).

Por los perjuicios que ocasiona la especie fue declarada plaga nacional mediante el Decreto 463 de 1982 y se autorizó su libre caza, transporte, comercialización e industrialización en todo el territorio nacional. Complementariamente, mediante el Decreto 47 de 2001 se permitió su cría en cautividad y mediante el Decreto 096 de 2004 fue incluido en las plagas de la agricultura, facultando al MGAP (a través de las Direcciones Generales de Servicios Agrícolas y Recursos Naturales Renovables) a organizar, supervisar y fiscalizar las medidas de contralor.

El jabalí tiene impactos negativos en:

a) la producción ovina, al ser uno de los principales predadores de corderos.

b) la producción porcina, como transmisor y/o reservorio de enfermedades de importancia económica (por ej.: fiebre aftosa y Peste Porcina Clásica) y zoonótica (por ej.: brucelosis y triquinelosis).

c) la seguridad alimentaria, puesto que su carne es consumida sin controles sanitarios.

d) la producción agrícola, por los daños que ocasiona en los cultivos de los que se alimenta.

La complejidad y antigüedad de esta problemática hace que deba abordarse en forma interinstitucional, interdisciplinaria y transfronteriza, si quiere avanzarse en el control de la especie. En este marco de situación es que se propuso la realización de las I Jornadas Regionales del Jabalí del Cono Sur de América.

Fig. 1. Ubicación geográfica de la ciudad de Artigas (Uruguay) (fuente: www.mapadeuruguay.org).

Metodología

Las Jornadas se realizaron en la ciudad de Artigas, Uruguay (Fig. 1), los días 9 y 10 de diciembre de 2016.

Su objetivo fue generar un intercambio a nivel nacional e internacional entre los diversos actores e instituciones vinculados a la temática, para la búsqueda de propuestas de control y aprovechamiento productivo del jabalí.

Fueron organizadas por la Dirección General de Servicios Ganaderos (DGSG) del Ministerio de Ganadería, Agricultura y Pesca (MGAP); la Facultad de Veterinaria de Montevideo y el Grupo Porcino de la Universidad de la República (UDELAR). Recibieron apoyo logístico y/o financiero de las siguientes instituciones:

• de Brasil: el Departamento de Defesa Agropecuária de Rio Grande do Sul, la Divisão de Sanidade dos Suídeos del Ministério da Agricultura, Pecuária e Abastecimento (MAPA), la Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA) Suinos e Aves, el Equipe Javali no Pampa, el Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) y el Sindicato Rural de Quarai.

• de Uruguay: la Academia Nacional de Veterinaria, la Asociación Agropecuaria de Artigas, la Asociación de Cultivadores de Arroz, Central Lanera Uruguaya, la División Fauna de la Dirección Nacional de Medio Ambiente (DINAMA), el Grupo Marfrig, el Instituto Nacional de Carnes (INAC), el Instituto Nacional de Investigación Agropecuaria (INIA), la Intendencia (Gobierno local) de Artigas, el Plan Agropecuario, el Regimiento “Guayabos” de Caballería Mecanizada Nº 10 de Artigas (Ejército Nacional), el Secretariado Uruguayo de la Lana (SUL), la Sociedad Criadores de Corriedale, la Sociedad Criadores Merino Australiano y la Sociedad de Criadores Texel.

Participaron cerca de 100 personas de 3 países (Argentina, Brasil y Uruguay).

Fig. 2. Poster de las Jornadas.

Durante el primer día de las Jornadas se realizaron las exposiciones orales que se detallan en el cuadro 1. Finalizadas las mismas se realizó una mesa redonda para responder preguntas y elaborar las conclusiones.

Cuadro 1. Expositores y ponencias del primer día de las Jornadas.

Expositor	Institución y país	Ponencia (*)
Ing. Agr. Javier Frade	SUL, Uruguay	El jabalí como predador - Alternativas para su control
Ing. Agr. Raul Paixao	ICMBio, Brasil	Jabalíes en el Área de Protección ambiental do Ibirapuitã (ICMBio, Brasil) - Experiencias de control en área protegida del bioma Pampa
Dr. La Hire Mendina Filho	Equipe Javalí no Pampa, Brasil	Jabalí: problemas y posibles soluciones para el productor rural
Ing. Agr. Andrés Ganzábal	INIA, Uruguay	Utilización de perros pastores para el control del jabalí en rebaños ovinos
Dr. Jorge Cravino	División Fauna, Uruguay.	Propuesta de control a nivel local del jabalí
Lic. Marina Winter	Universidad Nacional de Rio Negro, Argentina	Enfermedades infecciosas y parasitarias en jabalíes del nordeste de la Patagonia Argentina
Dra. Adriana Cavalcanti de Souza	Divisão de Sanidade dos Suídeos, Brasil	Sistema de vigilancia para Peste Porcina Clásica en suidos asilvestrados de Brasil
Dr. Gustavo Castro	DGSG y Grupo Porcino, Uruguay	Vigilancia sanitaria de jabalíes y cerdos asilvestrados en Uruguay
Dr. Luis Días	Academia Nacional de Veterinaria, Uruguay	Importancia de la vigilancia sanitaria de la fauna silvestre para las enfermedades vesiculares

(*): Todas las ponencias estarán disponibles en breve en los sitios web de las instituciones organizadoras.

Fig. 3. Apertura de las Jornadas a cargo del Dr. Federico Fernández (Director de la División Sanidad Animal del MGAP, Uruguay), la Dra. Adriana Cavalcanti (Coordinadora de la Divisão de Sanidade dos Suídeos del MAPA, Brasil) y el Sr. Pablo Caram (Jefe de Gobierno de Artigas) (foto: DGSG).

Durante el segundo día de las Jornadas se realizó una actividad teórico-práctica sobre necropsia de jabalíes y la remisión de muestras al laboratorio para el diagnóstico de enfermedades.
En primera instancia la Dra. Virginia Santiago (de EMBRAPA Suinos e Aves, Brasil) realizó una breve ponencia sobre aspectos sanitarios del control poblacional de los jabalíes y cerdos asilvestrados. Luego, junto a su colega la Dra. Iara Trevisol realizaron una necropsia de 2 jabalíes capturados la noche anterior e hicieron hincapié en la forma de colectar y enviar muestras biológicas para monitoreo sanitario.

Fig. 4. Actividad de necropsia y toma de muestras para laboratorio (foto: DGSG).

Conclusiones

Para el trabajo a futuro se consideró prioritaria la creación de un Grupo para el estudio de la problemática generada por el jabalí y sus posibles soluciones. Este debe ser necesariamente interinstitucional e interdisciplinario y coordinado por el MGAP y/o la DINAMA.
Sus objetivos serán:

• Actualizar información sobre las actividades relacionadas con el jabalí que realizan las diferentes instituciones.
• Actualizar los conocimientos sobre la especie.
• Establecer los contactos internacionales para el abordaje en común de la problemática a nivel de frontera.
• Generar proyectos y/o planes de trabajo en los diferentes aspectos de la temática.
• Fomentar la organización con cierta periodicidad de las Jornadas en países de la región, por la importancia de la temática y la receptividad y avidez por el tema.
• Crear instancias de capacitación y sensibilización en la temática.

Agradecimientos

Al Gobierno local de Artigas por su permanente presencia, a las instituciones que apoyaron el evento, a los colegas que trabajaron antes, durante y después de las Jornadas y a las personas que participaron e hicieron sus aportes al tema.

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First records of *Tayassu pecari* (Artiodactyla: Tayassuidae) in the Barbilla National Park, Costa Rica

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The White-lipped Peccary (*Tayassu pecari* Link, 1795) is one of the two species of the suborder Suiformes that are distributed in Costa Rica (Carrillo et al., 2002, Rodríguez-Herrera et al., 2014). The species is categorized as "Vulnerable" according to the IUCN Red List of Threatened Species on the IUCN (Keuroghlian et al., 2013) and appears within Appendix II listing of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2016). Also, *T. pecari* is considered as a species specialist because of their preference for habitats free of anthropogenic disturbances (Mayer & Wetzel, 1987; March, 1990), a feature that makes the White-lipped Peccaries (WLP) an indicator of habitat quality (Briceño-Mendez et al., 2014); deforestation and hunting are their main threats (Naranjo, 2002; Altrichter & Almeida, 2002; Reyna-Hurtado & Tanner, 2007; Reyna-Hurtado et al., 2010).

Previous studies carried out in Mexico and Costa Rica have shown that during the past 50 years the species' abundance has decreased dramatically such that today it is a rare species with a low probability of long-term persistence (Reyna-Hurtado et al., 2009, Altrichter et al., 2012). In Costa Rica, the remaining populations of *T. pecari* occur in only 11% of their historical range (Altrichter et al., 2012), mostly in protected areas within the national parks of Corcovado, Guanacaste, Tortuguero, International La Amistad and Rincón de la Vieja (Altrichter et al., 2001; Mora et al., 2003; Wainwright, 2007; Leonardi et al., 2010) and, more recently, within the Refugio Nacional de Vida Silvestre Mixto Caño Negro (Guerrero Ortiz & Morazán Fernández, 2016).

Barbilla National Park (BNP) is located in the extreme northwest of the Cordillera de Talamanca (9°56'31,61"N/ 83°25'12.47"W), between the provinces of Limón and Cartago. The altitudinal range of 110 to 1617 m.a.s.l (Moreno Hernandez, 2012) include four life zones: tropical wet forest, premontane tropical wet forest, premontane rainforest and lower montane rainforest (Holdridge 1967). The BNP is surrounded almost entirely by indigenous territories of Cabecar ethnicity that to some extent work as buffer areas and also have the potential to act as a connectivity zone between the Cordillera de Talamanca and the Cordillera Volcánica Central (Moreno Hernandez, 2012).

In BNP White-lipped Peccaries had been known from personal communication with local indigenous people. However, since 2009 when studies with camera traps began, the species had not been reported photographically or by tracks and has been considered virtually extinct locally. More recently, our team has recorded videos of these animals at one camera stations. The

records were obtained on 30th August 2015 at 06h52, and on 27th May 2016 at 06h39, all in an area of primary forest to the north of BNP (9°59'51,30"N / 83°25'48,23"W) at an altitude of 291 m (Fig. 1). In the first video four adult individuals are seen going down a slope; the second shows one adult and three young peccaries foraging.

Fig. 1. Photo-capture of White-lipped Peccaries (*Tayassu pecari*) registered inside the Barbilla National Park, Limón, Costa Rica.

The record of this species in the BNP emphasizes the conservation importance of protecting tropical forests in a connected state. Also, although there are currently no records of white-lipped peccaries in other regions near the BNP, it cannot be ruled out that our photographed animals are part of a larger population that has not been detected. We plan to continue monitoring wildlife, and this species, in the Barbilla sector, and hope to create initiatives to promote connectivity between protected areas and other areas with different categories of management, and to encourage documentation of peccaries wherever they occur in the country.

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White-lipped Peccary in Mesoamerica: Status, Threats and Conservation Actions

Short Report of:
1st Symposium on White-lipped Peccary in Mesoamerica
August 25, 2016
Belize City, Belize

February 2017

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White-lipped peccary (*Tayassu pecari*) is one of the three extant species of peccaries. Peccaries are pig-like animals from the Tayassuidae family, a family of ungulates from the Neotropics. White-lipped peccary distribution range extends from northern Argentina to southern Mexico with the largest continuous population within the Amazon forest, and smaller and isolated populations scattered from Panama to Mexico (Altrichter et al. 2012).

Group size can vary from less than 10 to over 300 individuals (Sowls 1997, Moreira-Ramirez et al. 2015, Reyna-Hurtado et al. 2016). Historically there were reports of hundreds of white-lipped peccaries roaming together through the Neotropical understory, however, habitat destruction and hunting have dramatically affected their group size. In addition, white-lipped peccaries are a highly prized prey for subsistence and market hunters. Currently the species is listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and classified as Vulnerable on the IUCN Red List (Keuroghlian et al. 2013). The white-lipped peccary is presently considered endangered, or critically endangered, for some areas of Brazil and for all of Mexico, Belize, Costa Rica and Panama by the environmental institutions of these countries (Brazil: Keuroghlian et al. 2012, Mexico: Secretaría de Medio Ambiente y Recursos Naturales-SEMARNAT, NOM-059, 2010, Costa Rica: Regulations to the Wildlife Conservation Law n°32633; Panama: Ministerio de Ambiente, 2016).

According to an analysis by Altrichter et al. (2012) using data from 2005, the range of white-lipped peccary had been reduced by 20.5 % from its historic distribution over the previous 100 years (http://maps.iucnredlist.org/map.html?id=41778) including extirpations from entire countries (i.e. El Salvador and Uruguay). In another 48% of its current range, white-lipped peccary remains but with reduced abundance and a low to medium probability of long-term survival. There have been major range declines in Argentina, Paraguay, southern Brazil, Colombia, Venezuela, northeast Brazil, Guatemala, Mexico, Costa Rica, Honduras y Panama (Altrichter et al. 2012; Keuroghlian et al. 2013; Moreno & Meyer, 2014, Portillo & Elvir 2016; Meyer et al. 2016).

Long term monitoring projects in strategic sites in Mesoamerica (Maya forest in Guatemala and Mexico; Darien forest, Panama; Bosawas, Nicaragua) carried out by academic or conservationist organizations (Wildlife Conservation Society, El Colegio de la Frontera Sur; Fundación Yaguara Panamá) have suggested that the species situation across Mexico and Central America (Mesoamerica) is quite different than the situation in the Amazon forest. In that context, the current global status of Vulnerable on the IUCN Red List, which includes vast secure areas in South America, does not represent the status of the species in Mesoamerica, which is in contrast, highly jeopardized mainly because of the current rate of deforestation and forest fragmentation.
Seeing the need for a regionally-focused review, a group of more than 30 scientists, conservationists and professionals convened to discuss the status of the species from Panama to Mexico and compile the most accurate available information on current range, status of the

populations, main threats, and conservation actions needed for white-lipped peccaries in each of the 7 countries of the Mesoamerican region where the species survive (Mexico, Guatemala, Belize, Honduras, Nicaragua, Costa Rica and Panama; the species is extinct in El Salvador). We assigned national coordinators to aggregate expert opinion from each of 7 represented countries through a formal questionnaire about estimates of population and group size, through a presentation and a mapping exercise, which was then coordinated at the symposium by a spatial analysis expert. This provided the first regional scientific assessment of white-lipped peccary range, status and trends.

More than 40 participants delivered responses to a questionnaire sent in advance of the meeting that took place on August 25th 2016 in Belize City, within the framework of the XX Congress of the Mesoamerican Society for Biology and Conservation. Objectives of the review event were described in an opening presentation led by Rafael Reyna and Jeremy Radachowsky followed by presentations for each country, summarizing the existing knowledge of the species. The symposium ended with a mapping exercise in which the current range of the species from Mexico to Panama was plotted on a single map. This exercise was led by Daniel Thornton from Washington State University, who used polygons and shapefiles as well as drawings to elaborate the maps according to best available knowledge of the species in each country, and across the whole region.

Respondents were able to identify at least 29 populations scattered across 7 countries of Mesoamerica. However, information on these 29 populations revealed rapid negative trends. Of the 29 populations, 20 were classified as showing a decreasing trend (69%), 4 were classified as unknown (14%), 4 as stable (14%) and only 1 population was categorized as apparently increasing (3%). The majority of populations were estimated as lower than 1000 animals and in most of the cases current group sizes were estimated at fewer than 50 animals, which compared to remote sites and historic records, are small for this species (Altrichter et al. 2012; Bustamante et al. 2013; Reyna-Hurtado et al. 2016).

Large, stable populations exist only in the tri-national Maya forest (Calakmul in Mexico, Maya Biosphere Reserve in Guatemala and Rio Bravo in Belize) and the Darien National Park in Panama. Smaller but stable or increasing populations were identified only in the Maya Mountains (Belize) and Corcovado National Park (Costa Rica). All other populations are experiencing a rapid decrease. Most experts consider hunting pressure and habitat loss as the main threats to all populations, with only one population that seems affected by water unavailability (Calakmul forest, Mexico). The relevance of diseases as threat is unknown, and lack of connectivity is affecting the smaller populations.

White-lipped peccary status and future scenarios are not optimistic in Mesoamerica. Seventy percent of the remnant isolated populations were classified with a decreasing trend with only few of them (17%) located in large protected areas, showing a stable or increasing trend. The major threats identified across all countries were unregulated and illegal hunting pressure and habitat loss. Although it is difficult to define which one is paramount, there is evidence that severe hunting pressure may eliminate whole populations from major areas of otherwise healthy forest (large communal forest of southern Mexico, ejidos; Reyna-Hurtado pers. obs.).

Hunting in combination with habitat loss is the worst scenario for the conservation of large and healthy populations of white-lipped peccaries in Mesoamerica. This current and growing reality is calling for the need of implementing conservation actions such as in-country hunting regulations. The status of white-lipped peccaries in Mesoamerica is more critical than its current range-wide IUCN Red List status of "vulnerable". The current strongholds are remnants and the precipitous declines in range and group size justify a regionally accurate classification in the IUCN Red List to help provide a mechanism to ensure better protection of the species.

In summary, in Mesoamerica white-lipped peccaries range has been reduced from 87% of its historical distribution to a few populations that may be stable, whilst the remaining 70% are decreasing. Therefore, we consider that the IUCN Red List status of the species as a whole (Vulnerable, Keuroghlian et al. 2013) does not accurately represent the situation of the Mesoamerican populations. We recommend that the status of white-lipped peccaries be raised to Endangered in the Mesoamerican region (from Mexico to Panama) given its likely status as the rarest and most jeopardized large terrestrial mammal in the region.

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Appendix

Participants in the Symposium:

Wildlife Conservation Society: Jeremy Radachowsky.
Washington State University: Daniel Thornton.
Mexico: Rafael Reyna-Hurtado, Khiavett Sanchez Pinzón, Edwin Hernández Pérez.
Belize: Maarten Hofman, Omar Figueroa, Bart Harmsen, Lee Mcloughlin, Wilber Martínez, Reynold Cal, Stevan Renau, Boris Arevalo, Elma Kay, Yahaira Urbina, Rebecca Wooldridge, Celso Poot, Yamira Novelo.
Guatemala: José F. Moreira-Ramírez, Roan McNab, Rony García-Anleu, Gabriela Ponce-Santizo.
Honduras: Fausto Elvir, Hector Orlando Portillo Reyes.
Nicaragua: Fabricio Diaz-Santos, John Polisar.
Costa Rica: Adolfo Artavia, Ronit Amit, Lizeth Corella-Esquivel.
Panama: Ricardo Moreno, Ninon Meyer, Adolfo Artavia

White-lipped peccaries. Photo: R. Reyna-Hurtado

Bibliography of the Chacoan Peccary *Catagonus wagneri* (Rusconi, 1930)

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With the renewed interest in a conservation action plan and IUCN action for the Chacoan peccary or Tagua, *Catagonus wagneri* (see Suiform Soundings 15:1) it would seem appropriate and necessary to assemble the literature related to this species re-discovery, natural history, as well as its captive management and conservation activities. Recent publications may have missed important and significant publications available in the literature. This bibliography provides an opportunity to assist in clarifying any existing species misconceptions by providing as complete a bibliography as is currently available to the author. The literature on this species is rich and multifaceted.

This bibliography was assembled from available on-line resources including Google and Google Scholar, an early bibliography produced by the Zoological Society of San Diego, and that of the AZA Librarians Group. Additional citations are included from hard copy reprints held in the files of the author, accumulated during more than three decades of work with and commitment to this species.

This bibliography while no doubt incomplete is a starting place for those with an academic or research interest in the Tagua. I encourage corrections and additional citation information to be forwarded to the author of this list so that we might produce as complete a bibliography as possible for this endangered species. All contributions will be acknowledged. Apologies in advance for any oversights.

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Dry season counts (1976 – 2016) in the Faro - Bénoué protected area complex (North Cameroon) highlight the continued importance of West – Central Africa's largest population of common hippopotamus

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Abstract

We reviewed the surveys on the status of hippopotamus, hereafter hippo, in the c. 1.3 million ha protected area complex of Faro – Bénoué, North Cameroon. Initiated in 1976, counts were conducted in the second part of the dry season, when the Bénoué and Faro rivers were the parks' only remaining source of water and observers followed for several days the dry river bed, counting each individual hippo. Bénoué National Park (NP) has been surveyed between 1976 and 2013, showing a reduction of hippo numbers from 400 to 180, negatively correlated with the presence of gold diggers. However in the vicinity of the hunting camps and park headquarters, with an all-year round protection presence, numbers have remained with 3.7 individuals km^{-1} relatively constant. Contrastingly, numbers of hippo along 97 km of the Faro River have remained stable with 647, 525 and 685 between 2000 – 2014 showing the efficiency of the private sector (i.e. safari hunting) compensating a decline in state protection efforts. Results of the most comprehensive survey to date, implemented in Faro NP in March and Bénoué NP in May 2016, showed only 136 individuals along the Bénoué River, with 92 individuals found in nearby tributary Mayo Oldiri. Numbers along the 2000-2014 Faro River trajectory showed a continued stable number of 665. An additional 206 hippo were observed further upstream in hunting zones 16 and 15. The observed total of 1093 individuals in the Faro-Bénoué ecosystem in 2016 largely surpasses estimates from other populations in the wider region. This signifies that the Faro-Bénoué hippo population is not only the largest in North-Central Africa but of the entire West-Central Africa region from Senegal in the West to Chad in the East, and given their possible genetic specificity the population is of global conservation concern.

Introduction

North Cameroon used to be among the richest biodiversity areas in Sahelo-Sudanian Africa with some of the last remaining populations of large mammals (Brugière & Scholte 2013). Until 2000, large mammal populations in protected areas were stable, possibly due to relatively low human population pressure and a recovery in rainfall after the 1970-80s Sahelian droughts (Scholte 2011). A shift in the political-economic climate triggered erosion of state control and insecurity resulting in marked declines in large mammal populations over the last decade (Scholte, Nguimkeng & Iyah 2016). The Vulnerable common hippopotamus (*Hippopotamus amphibius* L.), hereafter hippo (Photo 1), is under pressure due to habitat conversion and hunting for bushmeat and increasingly ivory (Klingel 2013). Threats from influxes of transhumant cattle and gold diggers are rapidly increasing in North Cameroon, where the protected areas are confronted with declined governmental protection (Scholte & Iyah, 2015; Scholte, Nguimkeng & Iyah 2016).

Photo 1. Hippopotamus (Faro River, January 2015)

Genetic analyses have supported the presence of hippo subspecies, or unique genetic groupings (Okello et al 2005) across Eastern, Southeastern and Southern African countries. Although West-Central Africa samples were not included in this analysis, the finding of subspecies across Eastern and Southern African countries suggests that hippos in West Africa may also contribute unique genetic material and, as such, represent an important target for conservation and management activity. However the status of hippos in North Cameroon has till recently remained poorly known, as illustrated by the lack of inclusion in the latest continent-wide references (Klingel 2013). The lack of clarity on trends of the hippo populations has led CITES and the European Union to suspend trade in hippo trophies from Cameroon since 2012. We, a team under the umbrella of the Garoua Wildlife College based in North Cameroon, initiated in 2013 subsequent surveys to clarify the status of hippopotamus and identify threats to their populations.

Here we review the surveys on the status of hippo populations in the protected area complex of North Cameroon over the last 40 years. In addition results of the most comprehensive survey to date, implemented in 2016, will be presented. This paper builds heavily on earlier analysis, most notably of Bénoué National Park (Ngog Nje 1988; Scholte & Iyah 2016) and Faro National Park (Scholte, Nguimkeng & Iyah 2016) to which the reader is referred for more details on hippo population structure and how its distribution correlates with the distribution of other species, human disturbance as well as management issues.

Study area

The protected area complex in the North Region of Cameroon (Fig.1) has a Guinea-Sudanian climate characterized by a single rainy season from April till October with average rainfall of c.1200 mm in the north up to c.1500 mm in the south. Towards the end of the dry season, temperatures soar well above 40°C. The mostly undulating area, with few isolated mountains, is covered by wooded savanna dominated by the trees genera Isoberlinia and Terminalia and a diversified grass layer with Andropogon and Hyparrhenia species.

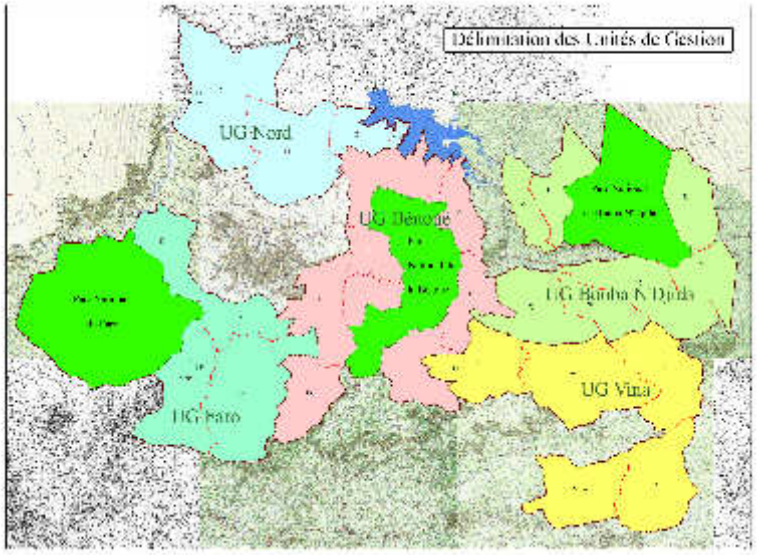

Fig. 1. Map of the North Region, Cameroon, with Faro – Bénoué - Bouba Ndjida national parks and hunting zones

The five management units are depicted in five colours, including various hunting zones with their respective identity numbers (Source Regional Delegation of Forestry and Wildlife, Garoua, Cameroon)

Bénoué National Park (NP) main geographical feature, the Bénoué River, forms its Eastern border over 100 km flowing between the tributary of Mayo Alim in the South and the Grand Capitaine tourist camp in the North (Fig. 1). The Faro River flows East – West. During the dry season, the rivers flow over large stretches underground. Intermittent rivers, so-called mayos, contain water during the wet season and attract hippo and other large mammals.

Bénoué NP (180,000 ha) is surrounded by sport hunting zones, zone 9 (50,072 ha) in the North-East, zone 3 (55,328 ha) in the East and zone 2 (75,648 ha) in the South-East. Zone 9 has been abandoned by professional hunters since 2012, while zones 2 and 3 are marginally operational (Fig. 1). Faro NP (330 000 ha) is surrounded by sport hunting zones, clockwise: zone 13 (61 216 ha), Voko-Bantadje (60 000 ha), zone 18 (56 624 ha) and zone 18bis (118 976 ha). Further East and upstream the Faro River are situated hunting zones 16 (164 000 ha) and 15 (80 000 ha), (Fig. 1).

Previous hippopotamus surveys in North Cameroon

Bénoué National Park (1976-2013)

In 1976 Ngog Nje (1988) initiated hippo counts with what has become a standard methodology for total hippo counts along seasonal rivers in Central Africa. Counts were generally conducted in the second part of the dry season, when the Bénoué River is the park's only remaining source of water and the area is easily accessible. Notable exceptions are the July 2011 and May 2016 counts that were carried out during the early rainy season. Looking out for hippo, observers walked through the riverbed or along its edges, splitting up when the riverbed was too wide to be overseen. Walking speed varied between 1 to 4 km hr^{-1}, but in case of observations a halt of 15-30 minutes was taken. With each observation, the number of hippo was counted several times, till consensus on the number could be reached (Photo 2).

Photo 2. Counting Hippopotamus (Faro River, hunting zone 15, March 2016)

Total counts were repeated with the same methodology in 1987 (Ngog Nje 1988) and in 1999 (Zibrine & Gomse 1999). After another decade, in 2011 and 2013, a team of observers, with two permanent members, walked from 7:30 till 17:30 with a 1-2 hour break at midday (Maha 2015, Scholte & Iyah 2016). Nine and six days respectively were spent for the 2011 rainy season and 2013 dry season counts. Contrary to earlier surveys, GPS coordinates were taken for each hippo observation and major landmarks, allowing their subsequent mapping of individual hippo groups (even spaced) or assemblages (if concentrated in the same waterhole). In 2013, observations on other wildlife, i.e. antelopes and primates, as well as signs of human presence were also recorded.

Photo 3. Gold diggers in Bénoué River bed, cause of local extinction of hippopotamus.

Counts in the 100 km stretch of the Bénoué River in the park showed a reduction from 400 to 188 individuals from 1976 to 2013 (Scholte & Iyah 2016). Hippo distribution was negatively associated with the presence of the camps of gold diggers, which occupied the northern half of the Park (Photo 3). Supervised by the same staff, teams of 2-3 students at the Garoua Wildlife College conducted comparable partial hippo count every two years from 1976 till 2010. Counts concentrated on a stretch of 15 to 32 km of the Bénoué River centered on the Buffle Noir park headquarters, not extending beyond the hunting zone camps (Fig. 4). Counts were carried out in the dry season, during a single day generally between 9 and 12 AM (Ngog Nje 1988). Results of 2011 and 2013 total counts were reinterpreted to linear densities over the same area (Scholte & Iyah 2016). Linear densities in the 15-32 km stretch centered on the park headquarter and sport hunting camps had, with 3.7 individuals km^{-1}, remained remarkably constant between 1976 and 2013 (Scholte & Iyah 2016). These results showed the importance of year-round conservation presence.

Faro National Park (2000 – 2014)

Based on the methodology developed by Ngog Nje (1988), Zibrine (2000) was the first counting hippo along the wildlife-rich Faro River, followed in 2008 as reported by Tsi et al. (2013). In 2014, Scholte, Nguimkeng & Iyah (2016) counted hippo in neighboring Faro National Park and hunting zones. Using the same methodology as in 2000 and 2008, 685 individuals were counted over 97 km of river, compared to 647 and 525 in 2000 and 2008 respectively. The observed stability of hippo population contrasted the dramatic declines in large mammal populations across North-Central Africa, including the hippo population in Bénoué NP. This conservation success was attributed to private (safari hunting) protection compensating declined state protection (Scholte, Nguimkeng & Iyah 2016). Despite the results of these surveys to date, there are stretches of the Faro River and its tributaries which have never been surveyed. This holds especially for the c. 60 km river stretch further upstream, traversing the hunting zones 16 and 15 (Fig. 3). Information from trophy hunting enterprises suggested that this area harbors an important number of hippos that, if confirmed, would further highlight the area's importance for their conservation.

Disregarded survey results

Stark (1986) used in 1974-1975, without stratifying the Bénoué River, terrestrial transect counts and estimated a hippo population size of 235 individuals in Bénoué NP with high 95 % confidence limits of ± 212. Total aerial surveys covering the entire North Cameroon protected area system (including hunting zones) targeted elephants and did not stratify the Bénoué and Faro Rivers neither. Omondi et al. (2008) suggested unrealistically low hippo numbers, i.e. 17 in Bénoué NP, two in Faro NP and 31 hippos for all hunting zones combined in 2008. Also in 2015 an aerial survey provided unrealistically low estimates: 20 hippo in Bénoué NP and none in the surrounding hunting zone blocks, with 100 individuals at the edge of Faro National Park and hunting zone 13,

and another 34 hippo in the southeastern hunting blocks of the Faro ecosystem (Elkan et al. 2016).

Methodology comprehensive survey Faro - Bénoué (2016)

We here report the findings of a survey in 2016 that aimed to cover the entire Faro River. In addition we also conducted a count along the Bénoué River, allowing an assessment of changes in hippo numbers and distribution since 2013. The proximity of both rivers, at one point c. 20 km as the crow flies, with tributaries even closer to each other, suggests that we can consider the hippos present in Bénoué – Faro as one single population.

Following the same methodology as applied during previous surveys (Scholte & Iyah 2016; Scholte, Nguimkeng & Iyah 2016), we conducted, with two parallel teams, a five day survey in March 2016 at the end of the dry season to cover the entire Faro River system (c. 200 km). In 2016, we also conducted a count along the Bénoué River, following the same methodology (Scholte & Iyah 2016) during six days with a single team. Because of logistical constraints, an anti-poaching operation had just taken place, rendering the area temporarily less safe for the counts, the Bénoué count has taken place after the onset of the rains in early May 2016 when water levels in the Bénoué River had already risen with risk of dispersion of hippos.

Results and discussion

Results comprehensive survey Faro - Bénoué (2016)

Along the Faro River, we counted a total of 865 individuals, of which 415 downstream of the confluence (conservation camp) till the Mayo Deo, 19 further downstream (close to the village Djalingo 5 km downstream of the Faro-Deo confluence), 250 upstream of the conservation camp till Mayo Bigoué (hunting zones 18 and 18bis), 113 in hunting zone 16, and 93 in hunting zone 15 (Figs. 2, 3). The number of hippo observed along the Bénoué River totaled 136, a further decline from 180 (2011) and 188 (2013). Note that this includes a group of 9 hippo in Mayo Oldiri, expected to have been present in the Bénoué River a few weeks earlier (Fig. 4).

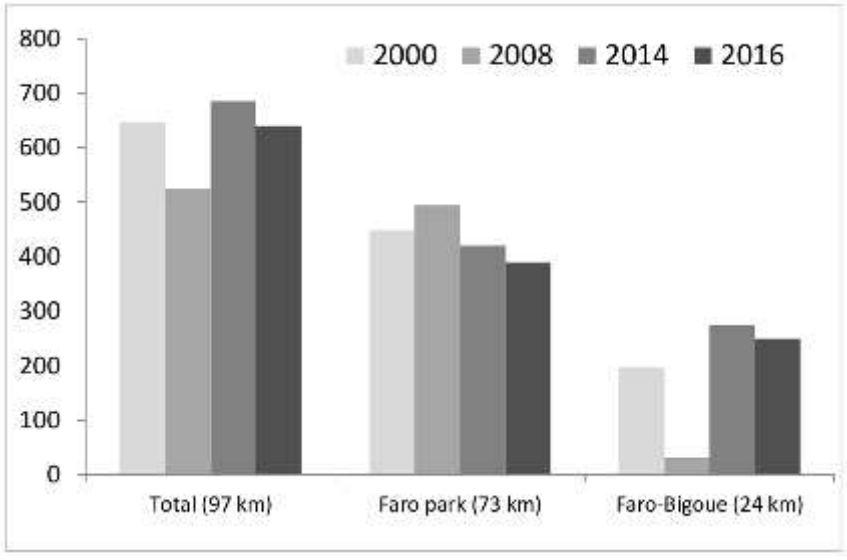

Fig. 2. Numbers of hippopotamus along Faro River (97 km stretch, 2000-2016).

We earlier concluded that linear densities in a 15-32 km stretch centered on the park headquarter and sport hunting camps with 3.7 individuals km-1, remained remarkably constant between 1976 and 2013 (Scholte, Ngumkeng & Iyah 2016). In 2016 linear density was with 2.7 individuals km1 in the lower range, hinting at increased pressure, also within the proximity of the camps. The total population of hippos counted on the Faro River stands at 865, with 136 individuals along the

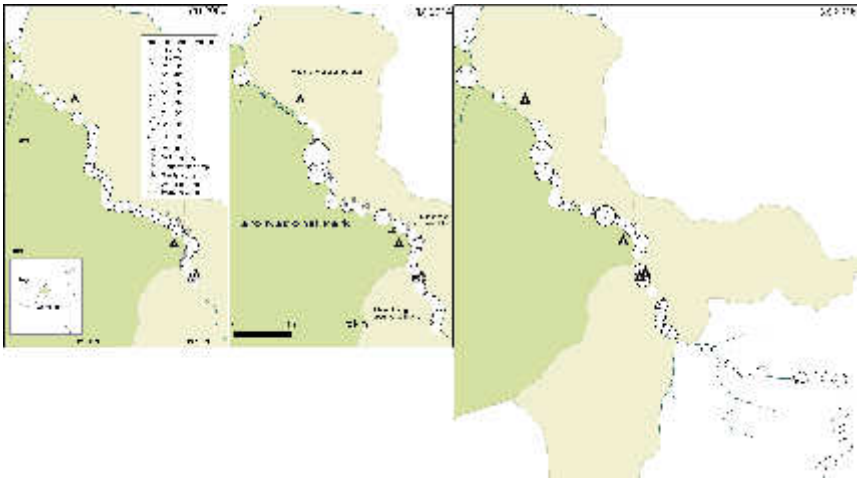

Fig. 3. Distribution of hippopotamus along Faro River (2008, '14, '16).

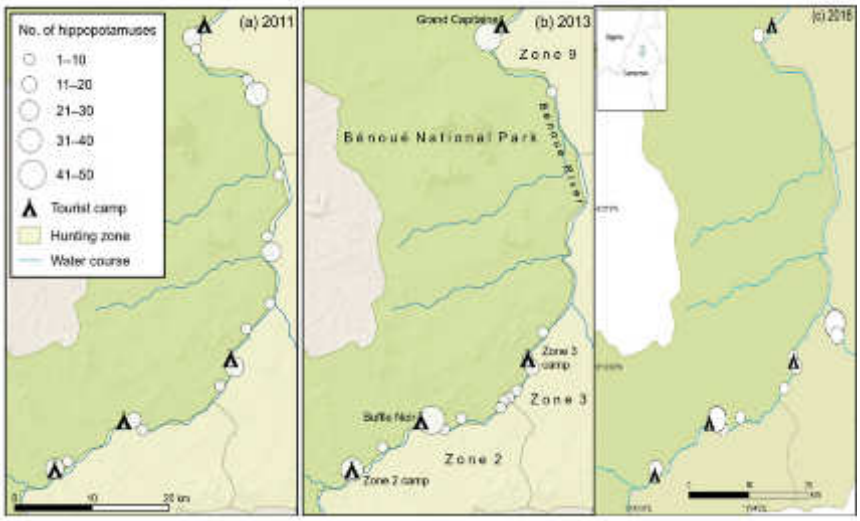

Fig. 4. Distribution of hippopotamus along Bénoué River (2010, '13, '16).

Bénoué River, in addition to 92 individuals along Mayo Oldiri a total of 1093 individuals in an area of national parks and hunting zones of c. 1.3 millions ha, with high reliability (A cf. Thouless et al. 2016).

Other hippo (sub-) populations in Cameroon

No systematic surveys of hippo in other areas in North Cameroon have been reported. Our own incidental observations suggest another 50 hippo downstream of Bénoué NP, mainly in Lagdo reservoir (observations of 36 individuals), as well as a guess-estimated 50 hippo in the hunting zones further east. This would bring the total hippo population in North Cameroon at 1120 observed + 64 guess-estimated with low reliability (E cf Thouless et al. 2016) = c.1184 individuals. The Far North Region is guess-estimated to encompass at least 200 individuals (Lake Maga 50, Fianga 50, Lower Chari and Lake Chad 100), the Adamaoua Region at least 100 (Nchanji & Fotso 2007) observed 79 in 2001),and guess estimates for the central and South West region each at 50 individuals. This would result into a country-wide number of 1120 observed (A) + 470 guess-estimated (E cf Thouless et al. 2016), i.e. c. 1600 hippos.

Comparison with other populations in West – Central Africa

The 2008 Red List assessment described hippo as not common in West Africa and the population is split into a number of small groups totaling about 7,000 spread over 19 countries (Lewisson and Oliver 2016). North Cameroon being largely neglected in assessments (see above), three other populations stand out: the one in Comoé National Park (Ivory Coast), in the Pendajari-Arli protected area complex (North Benin and Burkina Faso) in West Africa and of the northern Central African Republic (CAR) in Central Africa. According to the latest assessments, albeit non-targeted aerial surveys shown to be inaccurate (see above), hippo has become virtually extinct in the CAR (Bouché et al. 2012). In 2015 estimates from the 3.1 million ha of the Arly-Pendjari System in West Africa (Benin, Burkina Faso) provided 346 individuals (Kougnati & Narakoua), although in 2007 the hippo population was estimated at 1010 individuals (Tehou 2007), with

estimates of 696 in 2003 (Bouché 2004; Bouché et al. 2004) and 520 in 1981 (cited by Tehou 2007). Comoé NP harbored in the period 1977-1981 over a thousand hippo, reduced to c. 600 and 400 in 1988 and 1989, when the last pre-crisis systematic large mammal counts have taken place. During the 2016 aerial survey, specifically targeted hippo by flying over the entire river bed, only 129 hippo were counted (Bouché et al. 2016).

The observed 1093 individuals in the Faro- Bénoué ecosystem of c. 1.3 million ha largely surpass estimates from these other populations. This signifies that the Faro-Bénoué hippo population is not only the largest in North-Central Africa but of the entire West-Central Africa region that goes from Senegal in the West to Chad in the East and given their possible genetic specificity, of global conservation importance.

Acknowledgments
We acknowledge the support of the Faro and Bénoué National Park authorities, as well the regional wildlife authorities that participated actively in the counts. We acknowledge the logistical support and hospitality of Koen Maes (hunting zone 13) and Guy Gillet (hunting zone 15) and the hunting zone managers for access to their zones. We further thank Nouhou Njoumemi and Christian Ngongang (GIZ-Yaounde) for preparing the maps. Fieldwork of the 2016 survey was made possible through a grant of The Phoenix Zoo (USA).

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Veterinary, Genetic and Physiological Studies

Proposed Surveillance for Influenza A in Feral Pigs.
Antonia E Dalziel, Heidi A.Peck, Aeron C. Hurt, Julie Cooke, Phillip Cassey
EcoHealth. 2016 Jun; 13 (2):410-414.
Pigs carry receptors for both avian- and human-adapted influenza viruses and have previously been proposed as a mixing and amplification vessel for influenza. Until now, there has been no investigation of influenza A viruses within feral pigs in Australia. We collected samples from feral pigs in Ramsar listed wetlands of South Australia and demonstrated positive antibodies to influenza A viruses. We propose feral pigs, and their control programs, as an available resource for future surveillance for influenza A viruses.

Sparganosis in wild boar (*Sus scrofa*) - Implications for veterinarians, hunters, and consumers.
Marta Kolodziej-Sobocinska, Mariusz Miniuk, Iwona Ruczynska, Malgorzata Tokarska
Veterinary Parasitology. 2016 Aug 30; 227 115-117.
From February to March 2016 we found plerocercoids of Spirometra sp. in four wild boar hunted in Bialowieia Primeval Forest, north-eastern Poland. Plerocercoids were located subcutaneously and in muscle tissue. A sequence of a nuclear 18S rRNA gene was used for genetic specification of the samples. The analyzed gene fragment showed 100% identity with the Spirometra erinacei sequence. Thus, the emerge of human sparganosis due to consumption of undercooked or smoked wild boar meat is likely in the areas where wild boar is an approved food source, especially in the absence of routine guidelines for vets. It has become a priority to inform the public about possibilities and consequences of this zoonosis.

Molecular detection of Anaplasma spp. in pangolins (*Manis javanica*) and wild boars (*Sus scrofa*) in Peninsular Malaysia.
Fui Xian Koh, Kai Ling Kho, Chandrawathani Panchadcharam, Frankie Thomas Sitam, Sun Tee Tay
Veterinary Parasitology. 2016 Aug 30; 227 73-76.
Anaplasma spp. infects a wide variety of wildlife and domestic animals. This study describes the identification of a novel species of Anaplasma (Candidatus *Anaplasma pangolinii*) from pangolins (*Manis javanica*) and Anaplasma bovis from wild boars (*Sus scrofa*) in Malaysia. Based on 16S rRNA gene sequences, Candidatus *Anaplasma pangolinii* is identified in a distinct branch within the family Anaplasmataceae, exhibiting the closest sequence similarity with the type strains of *Anaplasma bovis* (97.7%) and Anaplasma phagocytophilum (97.6%). The sequence also aligned closely (99.9%) with that of an *Anaplasma* spp. (strain AnAj360) detected from Amblyomma javanense ticks. The nearly full length sequence of the 16S rRNA gene derived from two wild boars in this study demonstrated the highest sequence similarity (99.7%) to the *A. bovis* type strain. Partial 16S rRNA gene fragments of *A. bovis* were also detected from a small population of *Haemaphysalis bispinosa* cattle ticks in this study. Our finding suggests a possible spread of two *Anaplasma* species in the Malaysian wildlife and ticks. The zoonotic potential of the *Anaplasma* species identified in this study is yet to be determined.

Drivers of synchronized vigilance in wild boar groups.
Tomasz Podgorski, Sanne de Jong, Jakub W. Bubnicki, Dries PJ. Kuijper, Marcin Churski, Bogumila Jedrzejewska
Behavioral Ecology. 2016 Jul; 27 (4):1097-1103.
There is a growing evidence that members of animal groups synchronize their vigilance behavior to minimize predation risk. Because synchronized vigilance deviates from the classical vigilance models, which assume independent scanning, it is important to understand when and why it occurs. We explored vigilance behavior of wild boar (*Sus scrofa*) in a population subject to spatial variation in human hunting risk and seasonal variation in food availability. Group members synchronized their vigilance behavior. We hypothesized that vigilance synchronization would be context dependent and the trade-off between energy gain and safety would shape the relationship between the degree of vigilance synchronization and group size. We predicted weaker synchronization in large groups under heavy predation risk, due to benefits of numerical dilution, and stronger synchronization in large groups when food is limiting, due to intense food competition. The degree of synchronization decreased with increasing group size in the area where human hunting added another risk factor to the natural predation, pointing at the safety benefits of vigilance synchrony for members of small groups and the role of human-induced risk in shaping vigilance synchrony. We found no relation between vigilance synchrony and group size in a food scarce, winter season. However, low levels of vigilance and its synchronization observed in winter indicated that energy gain was prioritized over safety. Thus, members of wild boar groups can adjust levels of vigilance and its synchronization depending on the forage-risk trade-off set by the ecological context.

Detection of Zoonotic Protozoa Toxoplasma gondii and Sarcocystis suihominis in Wild Boars from Spain.
R. Calero-Bernal, J.E. Perez-Martin, D. Reina, F.J. Serrano, E. Frontera, I. Fuentes, J.P. Dubey
Zoonoses and Public Health. 2016 Aug; 63 (5):346-350.
Food safety regulations require the control of the presence of Protozoa in meats destined for human consumption. Wild boar (*Sus scrofa*) meat may constitute a source of zoonoses. A 23.8% (688/2881) seroprevalence of anti-*Toxoplasma gondii* antibodies and 72.2% (662/910) *Sarcocystis sarcocysts* prevalence were detected among wild boars hunted in Southwestern areas of Spain. Identity of Sarcocystis spp. was performed by RFLP-PCR and sequencing, detecting *S. miescheriana* (7/8) and the zoonotic *S. suihominis* (1/8). Risk assessment studies of these coccidian in meats destined to human consumption are needed.

Conservation priorities of Iberoamerican pig breeds and their ancestors based on microsatellite information.
O. Cortes, A.M. Martinez, J. Canon, N. Sevane, L.T. Gama, C. Ginja, V. Landi, P. Zaragoza, N. Carolino, A. Vicente, P. Sponenberg, J.V. Delgado
Heredity. 2016 Jul; 117 (1):14-24.
Criollo pig breeds are descendants from pigs brought to the American continent starting with Columbus second trip in 1493. Pigs currently play a key role in social economy and community cultural identity in Latin America. The aim of this study was to establish conservation priorities among a comprehensive group of Criollo pig breeds based on a set of 24 microsatellite markers and using different criteria. Spain and Portugal pig breeds, wild boar populations of different

European geographic origins and commercial pig breeds were included in the analysis as potential genetic influences in the development of Criollo pig breeds. Different methods, differing in the weight given to within-and between-breed genetic variability, were used in order to estimate the contribution of each breed to global genetic diversity. As expected, the partial contribution to total heterozygosity gave high priority to Criollo pig breeds, whereas Weitzman procedures prioritized Iberian Peninsula breeds. With the combined within-and between-breed approaches, different conservation priorities were achieved. The Core Set methodologies highly prioritized Criollo pig breeds (Cr. Boliviano, Cr. Pacifico, Cr. Cubano and Cr. Guadalupe). However, weighing the between-and within-breed components with FST and 1-FST, respectively, resulted in higher contributions of Iberian breeds. In spite of the different conservation priorities according to the methodology used, other factors in addition to genetic information also need to be considered in conservation programmes, such as the economic, cultural or historical value of the breeds involved.

Isolation and molecular and phylogenetic analyses of encephalomyocarditis virus from wild boar in central China.

Huimin Liu, Xiuyuan He, Xiaofeng Song, Liang Xu, Yun Zhang, Guoli Zhou, Wenjiao Zhu, Chen Chang, Zhian Yin, Yuhang Shi, ChuanqingWang, Hongtao Chang

Infection Genetics and Evolution. 2016 Jun; 40 67-72.

Encephalomyocarditis virus (EMCV) can infect many host species and cause acute myocarditis and respiratory failure in piglets, reproductive failure in pregnant sows. In this study, an EMCV strain, designated JZ1202, was isolated from semi-captive wild boars that presented with acute myocarditis and sudden death in central China. It was identified by hemagglutination inhibition (HI) assay, reverse transcription polymerase chain reaction (RT-PCR) and genome sequencing. The subsequent results showed that the virus could produce a specific cytopathic effect on BHK cells and could cause clinical symptoms and pathological changes in mice. Complete genome sequencing and multiple sequence alignment indicated that JZ1202 strain was 81.3%-99.9% identical with other isolates worldwide. Phylogenetic analysis of the whole genome, ORF, VP3/VP1 and 3D genes using neighbor-joining method revealed that JZ1202 isolate was grouped into lineage 1. The results of this study confirmed that an EMCV strain JZ 1202 isolated from wild boar in central China was fatal to mice and provided new epidemiologic data on EMCV in China.

Hunters' acceptability of the surveillance system and alternative surveillance strategies for classical swine fever in wild boar - a participatory approach.

Katja Schulz, Clementine Calba, Marisa Peyre, Christoph Staubach, Franz J. Conraths

BMC Veterinary Research. 2016 Sep 6; 12 187.

Background: Surveillance measures can only be effective if key players in the system accept them. Acceptability, which describes the willingness of persons to contribute, is often analyzed using participatory methods. Participatory epidemiology enables the active involvement of key players in the assessment of epidemiological issues. In the present study, we used a participatory method recently developed by CIRAD (Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement) to evaluate the functionality and acceptability of Classical Swine Fever (CSF) surveillance in wild boar in Germany, which is highly dependent on the participation of hunters. The acceptability of alternative surveillance strategies was also analyzed. By conducting focus group discussions, potential vulnerabilities in the system were detected and

feasible alternative surveillance strategies identified. Results: Trust in the current surveillance system is high, whereas the acceptability of the operation of the system is medium. Analysis of the acceptability of alternative surveillance strategies showed how risk-based surveillance approaches can be combined to develop strategies that have sufficient support and functionality. Furthermore, some surveillance strategies were clearly rejected by the hunters. Thus, the implementation of such strategies may be difficult. Conclusions: Participatory methods can be used to evaluate the functionality and acceptability of existing surveillance plans for CSF among hunters and to optimize plans regarding their chances of successful implementation.

Macronutritional consequences of food generalism in an invasive mammal, the wild boar.
Alistair M. Senior, Catherine E. Grueber, Gabriel Machovsky-Capuska, Stephen J. Simpson, David Raubenheimer
Mammalian Biology. 2016 Sep; 81 (5):523-526.
We apply a recently established nutritional framework for defining dietary generalism to global populations of wild boar (*Sus scrofa*). Across its range, wild boar consume a diversity of foods that vary in nutritional composition. The macronutrient (carbohydrate, protein and fat) composition of the diets composed from those foods also varies substantially between countries, particularly in terms of proportion of energy from protein. These results suggest that as a species wild boar have a wide fundamental macronutrient niche, which likely contributes to the success of the species as an invader of novel environments.

Lack of polymorphism at the MC1R wild-type allele and evidence of domestic allele introgression across European wild boar populations.
A. Canu, S.T. Vilaca, L. Iacolina, M. Apollonio, G. Bertorelle, M. Scandura
Mammalian Biology. 2016 Sep; 81 (5):477-479.
Domestication promotes the emergence of novel phenotypic and behavioural traits in domesticated animals compared to their wild ancestors. We analysed variation at the melanocortin receptor I (MC1R) and nuclear receptor subfamily 6, group A, member 1 (NR6A1) genes in European wild boar populations, two loci which have been under strong artificial selection during domestication. These loci influence coat colour and number of vertebrae, respectively. A total of 145 wild boars were sampled throughout Europe, to evaluate frequency and spatial distribution of domestic alleles and patterns of hybridization between wild and domestic forms. Most of the wild boars (94%) were homozygous for the European wild-type (E+) MC1R allele. We did not observe any synonymous substitution in the European E+ allele, confirming its monomorphism even in areas known to be hotspots of wild boar genetic diversity. The remaining wild boars (6%) showed genetic introgression of three different European domestic alleles. No Asian MC1R allele was found in our sample. Furthermore, domestic NR6A1 alleles were observed in 6% of wild boars. Considering jointly the two loci analyzed, 11% of boars, sampled all over Europe, showed signs of recent or past introgression in their genome. These data agree with previous investigations on other molecular markers, confirming that, compared to Asian conspecifics, European wild boars have a relatively low genetic diversity, which is locally increased by the introgression of allelic variants from the domestic counterpart.

Contact Zone of Asian and European Wild Boar at North West of Iran.
Parinaz Khalilzadeh, Hamid Reza Rezaei, Davoud Fadakar, Malihe Serati, Mansour Aliabadian,

James Haile, Hamid Goshtasb
PLoS ONE. 2016 Jul 21; 11 (7):e0159499.
Wild boar (*Sus scrofa*) are widely distributed throughout the Old World. Most studies have focused on Europe and East Asia with the genetic diversity of West Asia being less well studied. In particular, the genetic variability and genetic structure of the Iranian populations are not yet known; gaps which prevent scientists from resolving the genetic relationships of the Eurasian wild boar. This paper is the first attempt to provide information about genetic relationships among modern Iranian populations of the Eurasian wild boar (*S. scrofa*) by sequencing 572 bp of the mitochondrial (mt) DNA control region. As a result of this investigation, it was discovered that Iran contains not only Middle Eastern haplotypes, but also shares haplotypes with Europe and East Asia. The Italian clade, which is endemic in Italy, is not identified in Iran, while all other clades, including Asiatic, European, Near East 1, and Near East 2 are found based on the phylogenetic tree and median-joining network. The results of this study illustrate that north west of Iran (specifically Southwest Caspian Sea) is the contact zone between the Asian (Near Eastern and Far Eastern), and the European clades. In light of the fact that the domestication of pigs occurs in Anatolia, this finding is important.

Animal tuberculosis due to *Mycobacterium bovis* in Eurasian wild boar from Morocco.
Meryem El Mrini, Faouzi Kichou, Ahlam Kadiri, Jaouad Berrada, Mohammed Bouslikhane, Nathalie Cordonnier, Beatriz Romero, Christian Gortazar
European Journal of Wildlife Research. 2016 Aug; 62 (4):479-482.
Eurasian wild boar (*Sus scrofa*) is widespread in the northern third of Morocco, Northern Africa. We aimed to investigate the presence of *Mycobacterium bovis* infection in wild boar and to generate information on the possible host status in this region. *M. bovis* was isolated in six of 43 wild boars. Culture-positive samples yielded spoligotype number SB1627. Sixty percent of lung tissue specimens or tracheobronchial lymph node samples yielded positive culture. Two thirds (64 %) of the wild boar submitted for histopathology revealed tuberculosis-compatible lesions. These lesions were particularly frequent in lymph nodes (63 %) and in lung tissue samples (43 %). Ziehl-Neelsen staining did not identify acid-fast bacilli, indicating paucibacillary infections. Our results confirm the presence of Mycobacterium tuberculosis complex (MTC) infection in Moroccan wild boar. Regarding the host status of wild boar in this region, the often generalized lesion pattern suggests a possible role of wild boar as a component of the MTC maintenance host community. However, our information was limited to 43 wild boars from one specific region. Thus, further research is needed to assess the host status of wild boar in Morocco.

Evidence of Aujeszky's disease in wild boar in Serbia.
V. Milicevic, S. Radojicic, M. Valcic, V. Ivovic, V. Radosavljevic
BMC Veterinary Research. 2016 Jun 30; 12 134.
Background: Aujeszky's disease is a viral disease of suids caused by Suid Herpesvirus 1. The disease has worldwide distribution with significant economic impact. In Serbia, there is neither an Aujeszky's disease eradication nor national vaccination programme of domestic pigs. Since clinical symptoms of Aujeszky's disease are not specific, it is important to establish a link between clinical signs and presence of ADV active infection in wild boars. The aim of this study was to investigate the possibility of active infection within wild boar showing signs of ADV and also to examine relationship between isolates from domestic pigs and wild boar. Having in mind that virus

has not been previously isolated from wild boars in Serbia, we report the first isolation of Suid Herpesvirus 1 from this species in Serbia. Results: Tissue and serum samples from 40 wild boars from eastern Serbia were examined for evidence of Aujeszky's disease (AD). Suid Herpesvirus 1 (SHV1), the cause of AD was isolated on PK15 cell line from three tissue samples, inducing cytopathic effect (CPE) with syncytia forming, and viral genome was detected by polymerase chain reaction (PCR) in eight samples. Genetic analysis of us4, us9 and ul49.5 partial sequences showed high homology between ADV isolates from wild boars and between isolates from wild boars and domestic animals. Neutralizing antibodies were not detected by virus neutralisation test (VNT) in sera from four out of eight PCR positive wild boars suggesting recent infection in those animals. Conclusions: This is the first demonstration of Aujeszky's disease virus (ADV) in the wild boar population in Serbia although seroconversion has been detected previously.

Evolution and molecular epidemiology of classical swine fever virus during a multi-annual outbreak amongst European wild boar.
Katja V. Goller, Claudia Gabriel, Mireille Le Dimna, Marie-Frederique Le Potier, Sophie Rossi, Christoph Staubach, Matthias Merboth, Martin Beer, Sandra Blome
Journal of General Virology. 2016 Mar; 97 (3):639-645.
Classical swine fever is a viral disease of pigs that carries tremendous socio-economic impact. In outbreak situations, genetic typing is carried out for the purpose of molecular epidemiology in both domestic pigs and wild boar. These analyses are usually based on harmonized partial sequences. However, for high-resolution analyses towards the understanding of genetic variability and virus evolution, full-genome sequences are more appropriate. In this study, a unique set of representative virus strains was investigated that was collected during an outbreak in French free-ranging wild boar in the Vosges-du-Nord mountains between 2003 and 2007. Comparative sequence and evolutionary analyses of the nearly full-length sequences showed only slow evolution of classical swine fever virus strains over the years and no impact of vaccination on mutation rates. However, substitution rates varied amongst protein genes; furthermore, a spatial and temporal pattern could be observed whereby two separate clusters were formed that coincided with physical barriers.

Assessing performance of single-sample molecular genetic methods to estimate effective population size: empirical evidence from the endangered Gochu Asturcelta pig breed.
Juan Menendez, Isabel Alvarez, Ivan Fernandez, Nuria A. Menendez-Arias, Felix Goyache,
Ecology and Evolution. 2016 Jul; 6 (14):4971-4980.
Estimating effective population size (Ne) using linkage disequilibrium (LD) information (Ne(LD)) has the operational advantage of using a single sample. However, Ne(LD) estimates assume discrete generations and its performance are constrained by demographic issues. However, such concerns have received little empirical attention so far. The pedigree of the endangered Gochu Asturcelta pig breed includes individuals classified into discrete filial generations and individuals with generations overlap. Up to 780 individuals were typed with a set of 17 microsatellites. Performance of Ne(LD) was compared with Ne estimates obtained using genealogical information, molecular coancestry (Ne(M)) and a temporal (two-sample) method (Ne(JR)). Molecular-based estimates of Ne exceeded those obtained using pedigree data. Estimates of Ne(LD) for filial generations F3 and F4 (17.0 and 17.3, respectively) were lower and steadier than those obtained using yearly or biannual samplings. Ne(LD) estimated for samples including

generations overlap could only be compared with those obtained for the discrete filial generations when sampling span approached a generation interval and demographic correction for bias was applied. Single-sample Ne(M) estimates were lower than their Ne(LD) counterparts. Ne(M) estimates are likely to partially reflect the number of founders rather than population size. In any case, estimates of LD and molecular coancestry tend to covary and, therefore, Ne(M) and Ne(LD) can hardly be considered independent. Demographically adjusted estimates of Ne(JR) and Ne(LD) took comparable values when: (1) the two samples used for the former were separated by one equivalent to discrete generations in the pedigree and (2) sampling span used for the latter approached a generation interval. Overall, the empirical evidence given in this study suggested that the advantage of using single-sample methods to obtain molecular-based estimates of Ne is not clear in operational terms. Estimates of Ne obtained using methods based in molecular information should be interpreted with caution.

Identification of robust microsatellite markers for wild pig fecal DNA.
Elisabeth M. Kierepka, Shem D. Unger, David A. Keiter, James C. Beasley, Olin E. Jr. Rhodes, Fred L. Cunningham, Antoinette J. Piaggio
Journal of Wildlife Management. 2016 Aug; 80 (6):1120-1128.
Collection of fecal samples for use in a genetic capture-mark-recapture framework has become popular as a noninvasive method of monitoring wildlife populations. A major caveat to this process, however, is that fecal samples often yield low quality DNA that is prone to genotyping errors, potentially leading to biases in population parameter estimation. Therefore, considerable care is required to identify robust genetic markers, especially in hot or humid conditions that may accelerate DNA degradation. We identified microsatellite loci in wild pig (*Sus scrofa*) fecal samples that were robust and informative within warm, humid ecosystems. To examine how degradation affected genotyping success, we sampled pig feces across 5 days and calculated how the number of quantitative polymerase chain reaction (qPCR) cycles required to reach the fluorescent threshold (Ct) changed over time. We identified 17 microsatellite loci that had high polymorphism and amplification success and low genotyping error rates (0-0.050 per locus). In the degradation experiment, Ct increased over the 5 days, but in the absence of rain, the majority of samples produced accurate genotypes after 5 days (2,211/2,550 genotypes). Based on the high amplification success and low error rates, even after 5 days of exposure to warm, humid conditions, these loci are useful for estimating population parameters in pig fecal samples.

Genetically edited pigs lacking CD163 show no resistance following infection with the African swine fever virus isolate, Georgia 2007/1
Popescu, L., Gaudreault, N. N., Whitworth, K. M., Murgia, M. V., Nietfeld, J. C., Mileham, A., ... & Rowland, R. R. (2017)
Virology, 501, 102-106
African swine fever is a highly contagious, often fatal disease of swine for which there is no vaccine or other curative treatment. The macrophage marker, CD163, is a putative receptor for African swine fever virus (ASFV). Pigs possessing a complete knockout of CD163 on macrophages were inoculated with Georgia 2007/1, a genotype 2 isolate. Knockout and wild type pen mates became infected and showed no differences in clinical signs, mortality, pathology or viremia. There was also no difference following in vitro infection of macrophages. The results do not rule out the possibility that other ASFV strains utilize CD163, but demonstrate that CD163 is

not necessary for infection with the Georgia 2007/1 isolate. This work rules out a significant role for CD163 in ASFV infection and creates opportunities to focus on alternative receptors and entry mechanisms.

Using non-invasive faecal hormone metabolite monitoring to detect reproductive patterns, seasonality and pregnancy in red river hogs (*Potamochoerus porcus*)

Bryant, J., Wielebnowski, N., Gierhahn, D., Houchens, T., Bellem, A., Roberts, A., & Daniels, J. (2016)

Journal of Zoo and Aquarium Research, 4(1), 14-21.

Few studies have been conducted on red river hog (*Potamochoerus porcus*) reproductive biology in zoos. Furthermore, in spite of regular breeding efforts in zoos, reproductive success has been relatively poor for this species, particularly in the North American population. In this study, we used faecal hormone metabolite monitoring to analyse near daily samples from two males and three females over several years to gain insight into their patterns of reproductive hormone secretion. Both a progesterone and a testosterone enzyme immunoassay (EIA) were validated and subsequently used to monitor reproductive patterns, seasonality, ovulatory activity and a successful pregnancy. The findings indicate that female red river hogs are seasonally polyoestrous. Regular cycles were observed from approximately December through August and an annual period of anoestrous was observed from approximately September until December. Average cycle length for all females was 23 days ± 1.19, range 13–30 days. Androgen excretion patterns of the two males did not show clear seasonal patterns. Only one male experienced an increase in androgen levels (141.53 ± 45.55 ng/g) corresponding with the female seasonal oestrous period. There was, however, some evidence of possible androgen suppression between the two males, and a potential 'boar effect' on a young female upon first introduction to a male. Ultimately, this information may increase our understanding of this species' reproductive biology and serve as a baseline for more in-depth follow-up studies to identify specific patterns associated with reproductive success.

Morphology and vascularization of the corpus luteum of peccaries (*Pecari tajacu*, Linnaeus, 1758) throughout the estrous cycle

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Arq. Bras. Med. Vet. Zootec. Vol.68 no.1 Belo Horizonte Jan./Feb.2016

The current paper characterizes the changes in morphology and vascularization of the corpus luteum of collared peccaries during the estrous cycle and correlates progesterone synthesis (P4). Twenty females were subjected to a treatment for estrus synchronization; an ear implant containing 1.5 mg of norgestomet was implanted on D0, whereas on D9 the peccaries received an IM injection of eCG 200UI and 50g of PGF2a. The animals were divided into four groups (G1, G2, G3 and G4) and euthanized on post-ovulation days 3, 12, 18 and 22. The ovaries were collected and the corpora lutea were measured and processed for histological and vascular density (Dv). Blood was collected for dosage of P4 serum. The morphology of the ovaries, the corpora lutea and P4 varied significantly during the estrous cycle ($P<0.001$). There was a significant co-relationship between weight and length of the ovaries and CL ($r = 0.66$, $r = 0.52$, $P<0.05$, respectively) and between weight, length and width of the CL and P4 ($r = 0.51$, $r = 0.54$ and $r = 0.68$, $P<0.05$, respectively). The luteal Dv was highly influenced by the estrous cycle

phase (P<0.0001). The P4 and luteal Dv concentrations were higher in G2 and evidenced maximum secretory activity, with a highly significant correlation (P<0.0001). Assessed lutein parameters may estimate the phase of the estrous cycle in peccaries and the functional activity of the corpus luteum.

Estimating the binding ability of collared peccary (*Pecari tajacu* Linnaeus, 1758) sperm using heterologous substrates

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Theriogenology, Volume 92, 1 April 2017, Pages 57–62

In collared peccaries, the development of artificial insemination (AI) is scarce, requiring search for alternative methods for the evaluation of sperm fertilizing ability. Thus, the aims of this study were to estimate the binding capability of collared peccaries sperm, using swine oocytes and the egg perivitelline membrane, and to evaluate the prognostic value of sperm parameters on the in vitro interactions among sperm and heterologous substrates. Eleven ejaculates were collected by eletroejaculation and evaluated for viability and morphology by light microscopy, for functionality by hypo-osmotic swelling test, for plasma membrane integrity by epifluorescence microscopy, and for sperm motility by computerized analysis. Subsequently, for analysis of the in vitro interactions, sperm samples were cultured in an incubation medium with swine oocytes and egg perivitelline membrane for 18 h and 20 min, respectively, at 38.5°C and humidified atmosphere. The sperm-oocyte interaction rate was 100% with sperm penetrating 19.8+5.5% of oocytes. The average values of bound sperm and penetrated sperm per oocyte were 39.4+4.6 and 2.5+0.7, respectively. Already for perivitelline membrane binding assay, all samples presented sperm bound (100%) with average of 140.6±19.4 bound sperm (range 33.9–308.7). Moreover, positive correlations were observed for the number of sperm bound to swine oocytes and osmotic response (r = 68.5%; P = 0.02), membrane integrity (r = 65.1%; P = 0.03), and straightness (r = 66.5%; (P = 0.03), as weel as for the number of sperm bound to egg perivitelline membrane and sperm viability (r = 74.0%; P = 0.01), total motility (r = 63.6%; P = 0.04), and linearity (r = 70.5%; P = 0.02). Finally, a negative correlation among slow (r = −80.5%; P = 0.01) and static (r = −84.3%; P = 0.01) sperm with the egg perivitelline membrane was observed. In conclusion, swine oocytes and perivitelline membrane can be used as indicators for the functional evaluation of the binding capability of sperm derived from collared peccaries. These tests could be incorporated into the routine of semen technologies.

Sexual behavior of *Pecari tajacu* (Cetartiodactyla: Tayassuidae) during periovulatory and early gestation periods

Suleima do Socorro Bastos da Silva, Yvonnick Le Pendu, Otavio Mitio Ohashi, Eunice Oba, Natália Inagaki de Albuquerque, Alexandre Rossetto Garcia, Pedro Mayor, Diva Anelie de Araujo Guimarães

Behavioural Processes, Volume 131, October 2016, Pages 68–73

The goal of this study was to describe the sexual behavior in female and male collared peccary. Twenty females and twelve males were monitored in familiar and non-familiar units for two 60 days periods. During both phases, we recorded 2747 sexual interactions initiated by 20 different females toward males and 4461 sexual interactions initiated by 12 males toward females. The

frequency of sexual interactions initiated per female significantly increased from proestrus to estrus, and they were significantly more frequently courted. Females initiated olfactory inspections 15.42 times more and were mounted 22.6 times more during estrus than during proestrus. Nulliparous and primiparous females copulated only when exposed to non-parental males. After estrus, the frequency of sexual interactions received by females sharply decreased. One mating event was recorded during the first gestation week and 31 mountings were observed after the second week. In conclusion, the behavioral monitoring is a useful procedure for the recognition of estrus. Our results suggest that ovulation may be associated with the end of the estrus, which will support future work in assisted reproduction in this species. To promote good handling practices, females of reproductive age should be removed from their family unit of origin.

Measurement of cognitive bias and cortisol levels to evaluate the effects of space restriction on captive collared peccary (Mammalia, Tayassuidae)

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Applied Animal Behaviour Science, Volume 181, August 2016, Pages 76–82

We use the judgement-bias paradigm to evaluate whether space restriction in metabolism pens affects the emotional state of collared peccary (*Pecari tajacu*) during a nutritional experiment. We trained individual adult males to 'go' to a specific location within 30 s when a positive auditory cue (whistle; CS+) was given in order to receive cassava root pieces as a reward, and to 'no-go' when a negative cue (caxixi percussion instrument; CS−) was sounded to avoid punishment (jet of water) and no reward. An 'ambiguous' auditory cue (a drumstick hitting an aluminum plate; CSA) was presented to probe decision-making under ambiguity. Individuals were subjected to five 8-day housing conditions in the order: H1 (control-no space restriction-metabolism pen and additional area), H2 space restriction without environmental enrichment (metabolism pen only), H3 (control-no space restriction), H4 (space restriction with environmental enrichment), and H5 (control-no space restriction). On the eighth day of each housing condition, each animal was exposed to 10 judgement bias trials of each of the three cue types: CS+, CS−, and CSA. We recorded whether animals showed the 'go' or 'no-go' response after each type of cue and collected fecal samples to assess fecal glucocorticoid metabolite concentrations. Peccaries learnt to discriminate CS+ and CS− and maintained this discrimination during the five housing conditions tested. The response to the ambiguous cue (CSA) varied according to the housing condition. During H1, the peccaries made a similar proportion of 'go' responses to all three types of cue (Ps > 0.07). During H2 and H3, 'go' responses to CSA and CS− cues occurred in similar proportions (Ps > 0.70), but peccaries showed more go responses to CS+ (Ps < 0.03) indicating that they were responding to CSA as if it were more likely to predict the waterjet than food. During H4 and H5, peccaries again made a similar proportion of 'go' responses to all three types of cue, as in H1. During H2 and H3, fecal glucocorticoid metabolite concentrations were higher than during the other tests (208.0 ± 16.4 vs. 141.6 ± 25.9 ngg−1 dry feces, Ps < 0.03). Our results suggest that space restriction may induce physiological stress and influence judgement bias and affective state in peccaries, and that these effects may be offset by environmental enrichment. However, the possibility of a general habituation to the housing conditions across time cannot be ruled out.

Taxonomic, Biogeographic and Evolutionary Studies

Phenotypic characterization of the Transylvanian wild boar population '*Sus scrofa ferus*'.
Voichita Ana Maria Gavrila, Crina Elena Strugariu, Oroian Teofil
Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca Animal Science and Biotechnologies. 2016; 73 (1):53-56.
This research study was based on requirements in the field of forestry in Transylvania, where there has been a decrease in the performance of conformation and constitution of the wild boar. In the studied area, we intend to monitor the phenotypic parameters: conformation and constitution of individuals by sex and age. The surveys were conducted over the years 2013-2014. The biological material was represented by 43 female and 63 male adults, aged over 3 years, harvested from three hunting grounds in Transylvania. Conformation measurements were made for the following characteristics: body length, height at the withers, croup height, thorax perimeter, body weight, head length, forehead width between the ears. Estimates were made of average and dispersion factors for each characteristic, s and phenotypic correlations were estimated between concerned characteristics. There is a large variability in all studied characteristics in both males and females, given by individual differences and higher performance limits for each characteristic, given by both individual variability, and environmental condition as well as harvesting season.

On the evolutionary consequences of increasing litter size with multiple paternity in wild boar (*Sus scrofa scrofa*).
Thibault Gayet, Sebastien Devillard, Marlene Gamelon, Serge Brandt, Ludovic Say, Eric Baubet
Evolution. 2016 Jun; 70 (6):1386-1397.
Understanding how some species may be able to evolve quickly enough to deal with anthropogenic pressure is of prime interest in evolutionary biology, conservation, and management. Wild boar (*Sus scrofa scrofa)* populations keep growing all over Europe despite increasing hunting pressure. In wild boar populations subject to male-selective harvesting, the initially described polygynous mating system may switch to a promiscuous/polyandrous one. Such a change in the mating system, where potentially more males sire a litter at one reproductive event, may be associated with the retention of high genetic diversity and an increase of litter size. We tested these hypotheses by estimating the number of sires per litter based on a six-year long monitoring of a wild boar population subject to particularly high harvesting pressure. Our results show a high and stable genetic diversity and high rates of multiple paternity compared to other populations, thus depicting a promiscuous/polyandrous mating system in this population. We also show that litter size is positively linked to the number of sires, suggesting that multiple paternity increases fecundity. We finally discuss that multiple paternity may be one of the factors allowing rapid evolution of this population by maintaining both genetic and phenotypic diversity.

New material of *Listriodon guptai* Pilgrim, 1926 (Mammalia, Suidae) from the basal Manchar Formation, Sindh, Pakistan: biochronological and paleobiogeographic implications.
Gregoire Metais, Rafiq Ahmed Lashari, Martin Pickford, Mashoque Ali Warar
Paleontological Research. 2016 Jul; 20 (3):226-232.

New fossil material from the latest early Miocene Manchar Formation in the Ranikot area (Sindh, Pakistan) provides information about the poorly known listriodontine suid *Listriodon guptai* Pilgrim, 1926. Recognition of this taxon, initially described on the basis of a fragmentary upper molar, allows biochronologic correlations for the base of the Manchar Formation with penecontemporaneous formations of Pakistan where this taxon also occurs (Sulaiman Range and Potwar Plateau). *Listriodon guptai* may be closely related to the bunolophodont species Listriodon affinis of doubtful stratigraphic provenance and age in the Bugti Hills, as well as to the fully lophodont *Listriodon pentapotamiae* which occurs throughout the Chinji Formation in the Potwar Plateau. The early occurrence of these taxa pleads for an early diversification of the listriodonts in the Indo-Pakistan Subcontinent during the late early Miocene.

What is in a 'Common' Name? A Call for Consistent Terminology for Nonnative *Sus scrofa*.
David A. Keiter, John J. Mayer, James C. Beasley
Wildlife Society Bulletin. 2016 Jun; 40 (2):384-387.
Sus scrofa is both a destructive invasive species and a popular game animal in many parts of the world, but there is a lack of consistency and accuracy in how scientists and wildlife managers refer to wild-living members of the species. The growing importance of this invasive species necessitates that scientists, managers, and policy-makers standardize use of a common name in a taxonomically accurate manner to effectively communicate to the general public and scientific community. In this commentary, we discuss the current terminology used for S. scrofa and, based upon the history of introductions of this species, propose that these animals be referred to as wild pigs within their introduced range unless it is known that the population consists of genetically pure wild boar or domestic pigs that have recently been released and become feral. Use of the term "wild pig" should reduce the potential to misclassify populations as a result of genetic introgression and evolution following release. Furthermore, we recommend that, when appropriate, the terms "nonnative" or "invasive" be included to describe wild pigs in their introduced range to emphasize their negative impacts on natural and anthropogenic environments. The effective control of wild pig populations considered to be invasive will require informed public support and sound scientific management, necessitating clear communication about this species among the research community, wildlife managers, and the general public.

The Rhinocerotidae and Suidae of the Middle Pleistocene from Petralona Cave (Macedonia, Greece).
Evangelia Tsoukala, Claude Guerin
Acta Zoologica Bulgarica. 2016 Jun; 68 (2):243-264.
The Petralona Cave, well known also for its praeneanderthalian skull, has yielded 30 remains of the Rhinocerotidae, i.e. *Dicerorhinus hemitoechus* (Falconer, 1868), and 25 remains of the Suidae, i.e. Sus scrofa priscus Goldfuss, 1823. All these fossils of the "Old Collection" housed in the Paleontological Museum of Thessaloniki Aristotle University since 1960, correspond to a minimum of two adults or subadults, four juvenile rhinos, and a minimum of four adult boars. The dimensions and proportions of the teeth and bones of rhinoceros were compared with those of Dicerorhinus hemitoechus, Dicerorhinus mercki and Coelodonta antiquitatis from Europe. They confirmed that the three species were easily distinguishable and justified our determination. The remains of *Sus scrofa priscus* were compared with three European samples, one of extant *S. scrofa*, one of the upper Middle and recent Pleistocene *S. scrofa*, and one of the early Middle

Pleistocene *S. s. priscus*. They corresponded to the latter subspecies. The degree of evolution of the rhino dated the site from the early Middle Pleistocene (MNQ zones 20-23), an age confirmed by recent dating and by the presence of *Sus scrofa priscus*. The presence of *D. hemitoechus* indicated forested prairie, more or less wooded. The finding of the boar strengthens confirmation of the woody dominance.

Holocene paleoenvironmental change in southeastern Africa (Makwe Rockshelter, Zambia): Implications for the spread of pastoralism.

Joshua R. Robinson, John Rowan

Quaternary Science Reviews. Volume 156, 15 January 2017, Pages 57–68

The paleoenvironmental conditions surrounding the origins of pastoralism and the movement of herders from eastern to southern Africa sometime between 4000 and 2000 ybp have been much debated. We lack, however, detailed paleoenvironmental data from sites sampling the hunter-to-herder transition in southeastern Africa, the likely corridor from eastern to southern Africa for early pastoralists. Here we report on new paleoenvironmental data from a site in the under-sampled area of eastern Zambia, Makwe Rockshelter, which has two aggregates of archaeological horizons representing the mid-Holocene (5700-5000 ybp) and the late Holocene (1600-800 ybp). The mid-Holocene sediments at Makwe document a foraging society, whereas the late Holocene sediments include both wild game and domestic livestock. Using stable carbon isotopes (δ13C) of herbivore enamel (n = 107), we show that the shift from mid-Holocene to late Holocene paleoenvironments was characterized by an increase in C4 vegetation. These data are complemented by paleoenvironmental records from Lake Malawi that show that C4 vegetation peaked after 2000 ybp and was coincident with the onset of cooler, more arid climates. This combined paleoenvironmental record has implications for the spread of pastoralism across southeastern Africa between 3000 and 2000 ybp and potential 'animal disease barriers' these early herders may have faced.

Fossil Suidae (Artiodactyla, Mammalia) from Aves Cave I and nearby sites in Bolt's Farm Palaeokarst System, South Africa

Martin Pickford, D. Gommery

Estudios geológicos, 72(2), 9.

Excavations carried out since 2011 at Bolt's Farm Palaeokarst System, South Africa, have led to the recovery of interesting remains of suids, notably from Aves Cave I. The taxa present are *Potamochoeroides hypsodon* and *Notochoerus capensis*, the same as those that occur at Makapansgat. The new *Notochoerus* material, which includes an upper third molar and a lower fourth premolar, strengthens the conclusion that this genus is a suine and not a tetraconodont as thought for the past half century. Potamochoeroides has thickened mandibular rami indicating that it descended from the genus *Dasychoerus* that dispersed into Africa from Eurasia about 5 million years ago. Other karst deposits at Bolt's Farm have yielded a younger suid fauna comprising *Metridiochoerus andrewsi* and *Phacochoerus modestus*, indicating that the Bolt's Farm Karst System was active for a considerable period of time (ca 4.5 Ma - 1.8 Ma). The fact that all the suid taxa from Bolt's Farm are hypsodont indicates that the palaeoenvironment contained abundant grass.

Phylogenetic Systematics of Peccaries (Tayassuidae: Artiodactyla) and a Classification of South American Tayassuids

Dutra, R. P., de Melo Casali, D., Missagia, R. V., Gasparini, G. M., Perini, F. A., & Cozzuol, M. A. . Journal of Mammalian Evolution, (2016): 1-14.

Tayassuidae is a family of pig-like Artiodactyla restricted to the New World. Despite its rich fossil history, they have received less attention from a taxonomic and phylogenetic perspective when compared to the Old World pigs, Suidae. In this study, we performed a computer assisted phylogenetic analysis using morphological and molecular data including fossil and extant Tayassuidae, using parsimony and Bayesian approaches. We recovered the monophyly of the family Tayassuidae, confirming previous proposals, as well as the monophyly of the subfamilies Hesperhyinae and Tayassuinae, and the genus Platygonus, which we placed in a new taxon of tribe level. The three living peccaries and a number of fossil species belong to a new, tribe level, monophyletic group. The genus *Catagonus* comes out as paraphyletic, leading us to propose to restrict the generic name to the type species, *C. metropolitanus*, and a new taxonomic arrangement for the remaining species previously included in it, revalidating the genera *Brasiliochoerus* and *Parachoerus*, and describing a new genus, *Protherohyus*, gen. nov..

A new fossil peccary from the Pleistocene-Holocene boundary of the eastern Yucatán Peninsula, Mexico

Sarah R. Stinnesbeck, Eberhard Frey, Wolfgang Stinnesbeck, Jeronimo Avíles Olguín, Patrick Zell, Alejandro Terrazas Mata, Martha Benavente Sanvicente, Arturo González González, Carmen Rojas Sandoval, Eugenio Acevez Nuñez

Journal of South American Earth Sciences

Available online 18 November 2016

Here we describe the left mandibular ramus of a fossil peccary from the submerged karst cave system in the southeastern Mexican state of Quintana Roo. The specimen, which was discovered in the Muknal cave northwest of Tulúm, is a new genus and species of peccary termed Muknalia minima. The taxon likely dates from the latest Pleistocene and differs significantly from all extant peccaries and their Pleistocene relatives by a concave notch at the caudal edge of the mandibular ramus and prominent ventrally directed angular process. These diagnostic osteological differences suggest that the masticatory apparatus differed from all other peccaries, which may hint to an ecological isolation on the late Pleistocene Yucatán Peninsula.

Fossil peccaries of Late Pleistocene/Holocene (Cetartiodactyla, Tayassuidae) from underwater caves of Serra da Bodoquena (Mato Grosso do Sul State, Brazil)

Parisi Dutra, R., Missagia, R. V., Perini, F. A., Cozzuol, M. A., Gasparini, G. M., Guedes, P. G., & Salles, L. D. O. (2017)

Historical Biology, 29(1), 85-92.

New records of *Catagonus stenocephalus* and T*ayassu pecariare* reported from the karst of Serra da Bodoquena, located at a south-western portion of Brazil near the border with Paraguay. Skull and lower jaw fragments at different stages of mineralisation were retrieved from two limestone underwater caves, Japonês and Nascente do Formoso, associated with clay and sand deposits with no retrievable stratigraphy. C14 dating of fossil mammals from these caves was attempted, but so far no success was achieved, but the inferred age for the associated paleofauna of these caves is Late Pleistocene and Holocene. The morphology of these fossil peccaries, from the most

south-western known population in Brazil, is detailed and paleoecological implications are considered.

Morphometry of *Catagonus stenocephalus* (Lund in Reinhardt 1880) (Artiodactyla: Tayassuidae) and taxonomical considerations about *Catagonus* Ameghino 1904
Missagia, R. V., Parisi-Dutra, R., & Cozzuol, M. A. (2016).
Factors such as the discordance on the choice of characters by different authors and the fragmentary condition of the majority of fossils are responsible for many issues on the taxonomy of the South American Tayassuidae. The extinct Tayassuidae species *Catagonus stenocephalus* (Lund in Reinhardt 1880) presents a confuse nomenclatural history and a questionable genus designation. The morphometric analysis performed in this study, based on craniomandibular and dental characters, allowed to distinguished three groups morphologically distant from each other within the *Catagonus* genus. This result highlights the need for more precise phylogenetic analysis for the definition of taxonomic groups in the South American Tayassuidae.

Ecological, Behavioural and Conservation Studies

Play fighting in Visayan warty pigs (*Sus cebifrons*): insights on restraint and reciprocity in the maintenance of play.
Sergio M. Pellis, Vivien C. Pellis
Behaviour. 2016; 153 (6-7):727-747.
Restraint is thought to be essential to enable the reciprocity needed for play fighting to remain playful. Descriptions of playing in pigs suggest that they do not exhibit restraint. Analysis of videotaped sequences of play fighting in captive family groups of warty pigs was used to test three hypotheses about restraint and reciprocity. Hypothesis 1 asserts that the lack of restraint arises from neither participant handicapping its actions in favour of its opponent: this was supported. Hypothesis 2 asserts that the winner of a contest will show restraint by not prosecuting further attack: this was not supported. However, the winner did refrain from attacking if the loser signalled submission. Hypothesis 3 asserts that restraint by the winner will allow reciprocal attacks by the loser - this was supported. The dissociation of restraint and reciprocity evident in the pigs offers some new insights into the evolution of play fighting.

Potential impact of wild boar (*Sus scrofa*) on pheasant (*Phasianus colchicus*) nesting success.
D. Senserini, F. Santilli
Wildlife Biology in Practice. 2016 Jun; 12 (1):15-20.
In the last decades, the wild boar population has greatly increased in Europe due to a combination of its high reproduction rate and environmental and human factors. Wild boars often cause conflicts with human activities and in particular with agriculture. In addition, the ecological impact of wild boars and in particular the ecological impact on ground nesting birds, which are generally species presenting declining abundances is not well known. For this reason, we evaluated the potential impact of wild boars on pheasant nests. Predation rates of pheasant nests were compared among areas with different wild boar abundances and among nests placed inside fenced plots (without access to wild boars although other predators were able to enter the fenced plots) or outside (thus available to wild boars). Wild boar predation rate in the area with higher

wild boar abundance was 66.7%. On the other hand, in the area with lower abundance, the wild boar predation rate was 19.2%. In the unfenced plots, wild boar predation reached 34.2%, whereas in fenced plots there was no predation by wild boars and the main nest predators were foxes (25.0%). Our findings suggest that wild boars could have a strong impact on pheasant reproductive success since wild boars were the main nest predator (total loss 22.8%).

Negative effect of the wild boar (*Sus scrofa*) on the population size of the wood mouse (*Apodemus sylvaticus*) in forest habitats of Sardinia.
Giovanni Amori, Luca Luiselli, Giuliano Milana, Paolo Casula
Mammalia. 2016 Jul; 80 (4):463-467.
The various activities of the wild boar (*Sus scrofa*), such as nesting, feeding, and rooting, may impact a wide array of taxa and ecological processes, but there is still controversial evidence about the effects of wild boars on small mammal populations. Here, we tested whether a negative effect of wild boar abundance on the wild populations of the wood mouse (*Apodemus sylvaticus*) does occur along 24 transects in Sardinia Island, Italy. We found a significantly negative linear relationship between the rooting intensity of wild boars and the density of mice in each transect. Our study, therefore, suggests that wild boars may have a negative impact on mice populations. Monitoring the populations of wild boar would be also useful for the management of free-ranging rodent populations throughout Europe.

Overabundant ungulates in French Sologne? Increasing red deer and wild boar pressure may not threaten woodland birds in mature forest stands.
Marie Baltzinger, Anders Marell, Frederic Archaux, Thomas Perot, Franck Leterme, Marc Deconchat, Marc
Basic and Applied Ecology. 2016 Sep; 17 (6):552-563.
Increasing ungulate populations have been considered to drive changes in woodland bird communities in temperate and boreal forests. Ungulates may negatively affect understory-dependent woodland birds either directly or indirectly. For instance ungulates may prey on nests, or they may reduce the availability of nesting sites, foraging resources or cover for understory-dependent bird species. We conducted ungulate pressure, vegetation and bird surveys on 95 plots, in 19 mature forest stands (9 fenced and 10 unfenced properties) located in the Sologne region (France). In such private forests, ungulate population densities are highly variable; we were therefore able to explore the effects of varying red deer (Cervus eiaphus) browsing and wild boar (Sus scrofa) rooting intensity on bird communities, Bayesian Binomial mixture models indicated that ground-nesting birds were more abundant in forests with high observed wild boar rooting intensity. Generally, increasing deer browsing pressure did not have any negative effect On woodland birds in mature forest: stands with a developed canopy, and did not result in lower shrub cover. Most previous studies documenting a negative effect of browsing On birds focused On young forest stands where overstory vegetation was scarce, Our results suggest that the impact of ungulate pressure on forest birds may decrease with forest stand age.

Influence of Matrix Habitats on the Occurrence of Terrestrial Mammals in Planted Forest Landscapes.
Kosuke Maeda, Shinsuke Koike, Mina Murao, Takuya Ishigane, Shota Harasawa, Takashi Masaki, Masashi Soga, Tomoko Naganuma, Akira Sato

Pakistan Journal of Zoology. 2016 Jun; 48 (3):907-911.
We studied the responses of terrestrial mammal community to high levels of habitat fragmentation caused by forestry plantations in central Japan. Our aim was to understand how terrestrial mammals select remnant natural forest (broad-leaved forest) patches in a fragmented forestry plantation landscape. Camera traps monitored remnant 12 broad-leaved forest patches for 7 months. These patches differed in the ratio of broad-leaved forest to the surrounding forestry plantation matrix area. In total, 144 photographs captured. A positive relationship was found between the number of photographs of mammals and the area of broad-leaved forest around the remnant broad-leaved forest. Hierarchical variation partitioning also showed that BF had a substantially greater independent explanatory power than CF. Future studies of landscapes resulting from different matrix types are needed to help land managers understand the influences of habitat configuration on patterns of species persistence and community dynamics.

Structural Classification of Wild Boar (*Sus scrofa*) Vocalizations.
Maxime Garcia, Bruno Gingras, Bruno, Daniel L. Bowling, Christian T. Herbst, Markus Boeckle, Yann Locatelli, W. Tecumseh Fitch
Ethology. 2016 Apr; 122 (4):329-342.
Determining whether a species' vocal communication system is graded or discrete requires definition of its vocal repertoire. In this context, research on domestic pig (*Sus scrofa domesticus*) vocalizations, for example, has led to significant advances in our understanding of communicative functions. Despite their close relation to domestic pigs, little is known about wild boar (*Sus scrofa*) vocalizations. The few existing studies, conducted in the 1970s, relied on visual inspections of spectrograms to quantify acoustic parameters and lacked statistical analysis. Here, we use objective signal processing techniques and advanced statistical approaches to classify 616 calls recorded from semi-free ranging animals. Based on four spectral and temporal acoustic parametersquartile Q25, duration, spectral flux, and spectral flatnessextracted from a multivariate analysis, we refine and extend the conclusions drawn from previous work and present a statistically validated classification of the wild boar vocal repertoire into four call types: grunts, grunt-squeals, squeals, and trumpets. While the majority of calls could be sorted into these categories using objective criteria, we also found evidence supporting a graded interpretation of some wild boar vocalizations as acoustically continuous, with the extremes representing discrete call types. The use of objective criteria based on modern techniques and statistics in respect to acoustic continuity advances our understanding of vocal variation. Integrating our findings with recent studies on domestic pig vocal behavior and emotions, we emphasize the importance of grunt-squeals for acoustic approaches to animal welfare and underline the need of further research investigating the role of domestication on animal vocal communication.

A wild boar dominated ungulate assemblage from an early Holocene natural pit fall trap: Cave shaft sediments in northwest England associated with the 9.3 ka BP cold event.
Tom C. Lord, John A. Thorp, Peter Wilson
Holocene. 2016 Jan; 26 (1):147-153.
A highly unusual pit fall ungulate assemblage dominated by wild boar (*Sus scrofa*) was recovered during the recent exploration of a cave shaft in the upland karstic landscape of northwest England. Both the opening of the cave shaft to the surface and its infilling by clastic sediments are attributable to accelerated landscape erosion associated with the 9.3 ka BP climatic

deterioration. Evidence that wild boar had died in winter or spring suggests that their deaths relate to the prolonged periods of annual snow cover experienced by the uplands of northwest England during the 9.3 ka BP event. The dominance of wild boar in the pit fall assemblage is explained by the snow pack concealing the open shaft and turning it into a baited trap for wild boar whenever it contained carrion. Wild boar bones splintered and chewed by wild boar demonstrate carrion cannibalism. Human presence is attested by slight butchery to an aurochs (*Bos primigenius*). How Mesolithic people adapted to climate change associated with the 9.3 ka BP event is a subject well worth pursuing.

Effects of wild boar predation on nests of wading birds in various Swedish habitats.
Antonio J. Carpio, Lars Hillstrom, Francisco S. Tortosa
European Journal of Wildlife Research. 2016 Aug; 62 (4):423-430.
The wild boar has, over the past few decades, undergone an expansion in Europe, which may have negatively affected ground-nesting bird populations and particularly those of wading birds. The aim of this study was to evaluate predation on waders' nests by wild boar in Sweden, where this species has been increasing since its reintroduction. This was done by placing artificial nests in seven different study areas. A comparison was then made of predation rates of the nests placed on control plots (areas in which no wild boar were present but other predators were) and plots containing different abundances of wild boar. Contrary to our expectations, the proportion of nests predated was significantly lower in those areas in which wild boar were present, with a predation rate of 54 %, whereas the predation rate was 87.5 % in the others. The wild boar was identified as the second most important nest predator in the plots in which it was present, accounting for 18 % of the predated nests. The main predator on both types of plots was the red fox, which was responsible for 28 and 38.5 % of the predated nests on plots with/without wild boar, respectively. Interestingly, predation by badgers occurred principally in areas in which the wild boar was absent (34.5 % of the predated nests), whereas only one nest was predated by this predator in areas containing wild boar. It is not, however, possible to state whether predation by badgers was lower because of the presence of wild boar or whether this was owing to the fact that badgers do not select those particular patches because of habitat features.

Penile Injuries in Wild and Domestic Pigs.
Ulrike Weiler, Marie Isernhagen, Volker Stefanski, Mathias Ritzmann, Kevin Kress, Charlotte Hein, Susanne Zoels
Animals. 2016 Apr; 6 (4):25.
In boars, sexually motivated mounting can not only cause problems such as lameness, but penile injuries are also reported. The relevance of penis biting in boars is discussed controversially, but reliable data is missing. In the present study, boars (n = 385) and barrows (n = 85) from experimental farms were therefore evaluated for scars, fresh wounds and severe injuries of the penis. Similarly, 321 boars from 11 farms specializing in pork production with boars, and 15 sexually mature wild boars from the hunting season of 2015/16 were included in the study. In domestic boars, a high incidence of penile injuries was obvious (76.6%-91.3% of animals with scars and/or wounds at experimental farms, 64.0%-94.9% at commercial farms). The number of boars with severe injuries was in a similar range in both groups (5.2% vs. 9.3%). At commercial farms, the number of scars but not that of fresh wounds increased per animal with age by 0.3 per week. Moreover, raising boars in mixed groups led to about a 1.5 times higher number of scars

than in single-sex groups. In wild boars, a considerable proportion of animals (40%) revealed penile injuries, which were even severe in three animals. We therefore conclude that penis biting is a highly relevant and severe welfare problem in the male pig population, but this phenomenon is not limited to intensive production systems.

Human–wildlife conflict and attitude of local people towards conservation of wildlife in Chebera Churchura National Park, Ethiopia

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African Zoology. Pages 1-8

Human–wildlife conflict is a serious challenge undermining the integrity of protected areas in developing countries. Developing effective human–wildlife conflict mitigation strategies requires an understanding of the conflict patterns, species involved and attitudes of local people living along protected area boundaries. We hypothesised that (1) there was a high level of human–wildlife conflict and (2) the local people would have less favourable attitudes towards problematic wild animals. We assessed patterns of human–wildlife conflict and attitudes of local people along the boundary of Chebera Churchura National Park, Ethiopia from 2012 to 2014. A total of 354 households were selected randomly for interview. A questionnaire survey, focus group discussions and direct field observations were carried out in the selected villages. The major types of human−wildlife conflict in the area include crop raiding, livestock predation, increased risk of livestock diseases and direct threats to human life. A majority of the respondents (68.1%) faced crop damage and domestic animal loss, 12.3% reported threat to humans and 0.3% reported that the wildlife might cause diseases. Close proximity of the villages to the park and seasons influenced livestock predation intensity with highest predation in the wet season (56.0%). To mitigate these problems, the local people utilised various traditional methods, including guarding. Most respondents had positive attitudes towards the conservation of wildlife. However, as the frequency of conflicts increased in the last five years, the attitudes of local people might change. Active measures are to be implemented to mitigate the problem and safeguard the future of the wildlife around the park. The park has enormous potential to benefit more local people by implementing a participatory management approach to conservation.

Ecological Monitoring and Health Research in Luambe National Park, Zambia: Generation of Baseline Data Layers

Neil E. Anderson, Paul R. Bessell, Joseph Mubanga, Robert Thomas,Mark C. Eisler, Eric M. Fe`vre and Susan C. Welburn

Classifying, describing and understanding the natural environment is an important element of studies of human, animal and ecosystem health, and baseline ecological data are commonly lacking in remote environments of the world. Human *African trypanosomiasis* is an important constraint on human well-being in sub-Saharan Africa, and spillover transmission occurs from the reservoir community of wild mammals. Here we use robust and repeatable methodology to generate baseline datasets on vegetation and mammal density to investigate the ecology of warthogs (*Phacochoerus africanus*) in the remote Luambe National Park in Zambia, in order to further our understanding of their interactions with tsetse (*Glossina* spp.) vectors of trypanosomiasis. Fuzzy set theory is used to produce an accurate landcover classification, and distance sampling techniques are applied to obtain species and habitat level density estimates for

the most abundant wild mammals. The density of warthog burrows is also estimated and their spatial distribution mapped. The datasets generated provide an accurate baseline to further ecological and epidemiological understanding of disease systems such as trypanosomiasis. This study provides a reliable framework for ecological monitoring of wild mammal densities and vegetation composition in remote, relatively inaccessible environments.

Citizen scientists help unravel the nature of cattle impacts on native mammals and birds visiting fruiting trees in Brazil's southern Pantanal

Donald P. Eaton, Alexine Keuroghlian, Maria do Carmo A. Santos,Arnaud L.J. Desbiez, Donald W. Sada

Biological Conservation

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We used 2 years of camera-trap surveys conducted by citizen scientists to compare native mammal and bird visits to dominant fruiting-tree species in low and high cattle-impact areas of rarely-flooded “cordilheira” forests in the Brazilian Pantanal. Monthly fruit censuses showed greater diversity of fruiting-tree species in low cattle-impact areas. Citizen scientists documented 29 native mammal and bird species among 5639 photo records obtained at fruiting trees. Analyses of 3 sets of camera-trap samples comprising: (1) only *Attalea phalerata* palms, (2) all ten dominant fruiting-tree species, and (3) all except a species with a highly-valued fruit and an unusual distribution, showed that faunal composition in low cattle-impact areas was significantly different and more diverse compared to that in high cattle-impact areas. Long-term cattle-related alterations of forest vegetation and short-term fruit depletion and interference by cattle explained faunal differences. While 5 frugivores and 1 carnivore were consistent indicators of low cattle-impact conditions, the value of 2 other frugivores (*Tayassu pecari* and *Crax fasciolata*) as indicators of cattle impact varied depending on fruit-species nutritive value, timing, and distribution. Improved cattle management is needed to prevent additional loss of forest biodiversity.

Abundance variation of ungulates in two protected areas of the Colombian Guayana estimated with occupancy models

Bibiana Gómez, Olga Montenegro, Pedro Sánchez-Palomino

Therya vol.7 no.1 La Paz ene. 2016 p 89-106 doi.org/10.12933/therya-16-342

Six ungulate species inhabit the Colombian Guiana Shield, a patchily-distributed biogeographic region characterized by poor nutrient soils and by harboring the only forest in Colombia growing on a Precambrian surface. In Colombia, two protected areas are located on the Colombian Guiana Shield, the Tuparro National Natural Park (PNNT, for its Spanish initials) and the Puinawai National Natural Reserve (RNNP, for its Spanish initials), which have a large difference in the configuration and availability of native forest. These ungulates are three deer species (*Odocoileus virginianus*, *Mazama americana* and *M. nemorivaga*), two peccary species (*Pecari tajacu* and *Tayassu pecari*) and one tapir specie (*Tapirus terrestris*). The aims of this study were to estimate and compare the abundance of those six ungulate species in two protected areas located within the Guiana Shield region in Colombia and analyze the relationship with the landscape forest amount and distance to human settlements. The study sites were in PNNT where the landscape is dominated by natural savannas mixed with riparian forests, and RNNP covered by tropical forests. We estimated the relative abundance of each ungulate species using

repeated presence-absence data with the occupancy model with heterogeneous detection of Royle and Nichols (2003). Presence detection was obtained from both direct observations and tracks. The direct sightings and tracks we sampled along six transects in PNNT and nine in RNNP (244.4 km at PNNT and 257 km at RNNP) and track plots of 0.25 m2 (211 at PNNT and 297 at RNNP). The relative abundance of tapir, collared peccary *(P. tajacu*) and brocket deer (*Mazama* spp.) were different between protected areas; we found no differences in the white-lipped peccary abundance (*T. pecari*). Relative abundance estimation was higher at RNNP for tapirs and brocket deers. In contrast, collared peccary was more abundant in the PNNT. There was positive effect of floodplain forest area abundance of white-lipped peccary. The distance to human settlements had positive effect on collared peccary abundance and negative effect on tapir and white tailed deer (*O. virginianus*). The higher abundance in the RNNP for tapirs and *Mazama* spp., brocket deer was unrelated to the forest area, so the difference may be related to local habitat conditions. The white-lipped peccary is sensitive to the forest area in the landscape, but has also been found that riparian forests act as natural corridors. Failure to find differences in abundance can be an indicator of the high habitat quality for these species. The collared peccary has been positively associated to a moderate degree of subdivision of forest at landscape (number of patchs), which could explain the higher abundance in the PNNT. The positive relationship of white-lipped peccary with the floodplain forest coincides with the patterns observed in other Amazonian areas. Finally, the negative effect of the distance from settlements for brocket deer and tapir may be related to low hunting pressure on these species, contrary to what was found for the collared peccary. The six ungulate species show low detectability, which is associated with low abundances.

Spatial ecology of a herd of white-lipped peccaries (*Tayassu pecari*) in Belize using GPS telemetry: challenges and preliminary results

Maarten P. G. Hofman, Johannes Signer, Matthew W. Hayward, Niko Balkenhol

Therya vol.7 no.1 La Paz ene. 2016 P 21-38

The Maya Mountains are a heavily forested mountain range in Belize and Guatemala supporting high levels of biodiversity. Due to environmental degradation around the range, it is in danger of becoming isolated from the largest contiguous forest in Central America. Forest connectivity in the area is vital for white-lipped peccaries. These social ungulates roam in herds of up to 300 individuals and need large forested areas to sustain populations. The species has not previously been studied in Belize and its distribution, population size, herd dynamics and movement patterns are unknown for the country. We aimed to estimate home range size and investigate movement patterns of the species in southern Belize. We present a preliminary 4-month data set from a herd of ca. 60 animals tracked by an individual fitted with a GPS satellite collar. We evaluated collar performance, habitat preference and movement characteristics, and estimated home range size using a semi-variogram approach, suited for sparse and irregular data. Collar performance was poor, with 38 % of the data not reaching the satellite, and a GPS fix success rate of 11.6 % for the data that did reach the satellite. The semi-variogram home range size was 55.2 km2. We observed a maximum daily movement distance of 3.8 km, and a preferential use of forest habitat over shrubland, savannah and cropland. We calculated a density of 1.09 ind/km2 and make an informed guess of close to 100 herds in the broad-leaf forests of the Maya Mountains. Our study highlights some of the challenges faced when collaring white-lipped peccaries, as well as the performance of GPS-collars in tropical forests. It also provides a first

glimpse of the home range and movement behaviour of white-lipped peccaries in Belize.

Importance of waterholes for white-lipped peccary (*Tayassu pecari*) in the Selva Maya, Guatemala

José Fernando Moreira-Ramírez, Rafael Reyna-Hurtado, Mircea Hidalgo-Mihart, Eduardo Naranjo, Milton C. Ribeiro, Rony García-Anleu, Melvin Mérida, Gabriela Ponce-Santizo

Therya vol.7 no.1 La Paz ene. 2016 P. 51-64

Water is considered an essential nutrient for wildlife and, when not in the proper proportion, can be a limiting factor to populations. Differences in water dependency among ungulate species can arise through a variety of physiological, morphological and behavioral mechanisms employed in maintaining the balance of temperature and water. The white-lipped peccary forms large and cohesive groups of 10 to over 300 individuals inhabiting dense tropical forests. Our objectives were to describe the use of waterholes by white-lipped peccaries groups in a humid site of the Selva Maya and evaluate the effect of humidity may have on the visit frequency, group size and activity patterns. From June to August 2014 and February to April 2015 seven waterholes were monitored using digital camera traps. The visit frequency was estimated by dividing the number of events between 1,000 sampling effort traps night. The minimum group size and age structure were estimated for each separate event. Activity patterns were estimated at one-hour intervals for the dry and rainy seasons. Forty-seven and 185 separate events for the rainy and dry season respectively were obtained. The sampling effort in each period was 630 traps night. For the rainy and dry season we obtained a visit frequency of 74.6 and 293.7 respectively. For the rainy and dry season an average group size of 17 (± 9.5) and 25.5 (± 12.6) were estimated respectively. The groups are mainly composed of adults. The presence of newborns was mainly in August and April. Activity patterns were mainly recorded between 10:00 h and 16:00 h. The visit frequency estimated is higher compared to other protected areas in the Selva Maya. The minimum group size estimated is similar to those reported in dry areas within the Selva Maya. The presence of newborns was reported during all months of the study, existing peaks during August, March and April. The white-lipped peccary visited the waterholes mainly during the day between 10:00 h and 16:00 h. Waterholes in the Laguna del Tigre National Park can be called "sanctuaries" for white-lipped peccaries because are extremely important in the ecology of this social ungulate.

Redescubrimiento de *Tayassu pecari* (Artiodactyla: Tayassuidae) en el Refugio Nacional de Vida Silvestre Mixto Caño Negro, Costa Rica

Sol Guerrero Ortiz & Francisco José Morazán Fernández

Research Journal of the Costa Rican Distance Education University (ISSN: 1659-4266) Vol. 8(2): 25-229, 2016

Rediscovery of *Tayassu pecari* (Artiodactyla: Tayassuidae) in the Refugio Nacional de Vida Silvestre Mixto Caño Negro, Costa Rica. The white lipped peccary (*Tayassu pecari*) is a widely distributed Neotropical species that can be found from northern Argentina to southern Mexico. According to the IUCN, the white lipped peccary is vulnerable throughout its distribution range. In Costa Rica their distribution has decreased in 89%, its populations are in danger of extinction and are restricted to a few protected areas. This document presents the details of the first records of the presence of white lipped peccary in the Mixed National Wildlife Refuge of Caño Negro, where it was previously considered to be locally extinct. During 2013, 52 in depth interviews were conducted in several communities near the refuge. Between September and December 2015,

eight camera traps were placed in farms close or within the refuge. In ten of the conducted interviews, people confirmed that there is a small population of these animals. Most people believe they live in a high and secluded sector of the refuge known as “Terrón”. Of the eight camera traps that were used, two were placed in this sector. One of these cameras registered a pack of white lipped peccary composed of at least eight individuals including adults and juveniles. Local ecological knowledge serves as a complement for technical knowledge and as a guide for planning and focusing efforts during the development of ecological research, such is the case of the present study. The confirmation of the presence of white lipped peccary is a finding of great importance since it can serve to increase the conservation measures that are applied in the refuge.

How mammalian predation contributes to tropical tree community structure
Timothy Paine, Harald Beck, and J. Terborgh
Ecology, 97(12), 2016, pp. 3326–3336
The recruitment of seedlings from seeds is the key demographic transition for rain forest trees. Though tropical forest mammals are known to consume many seeds, their effects on tree community structure remain little known. To evaluate their effects, we monitored 8,000 seeds of 24 tree species using exclosure cages that were selectively permeable to three size classes of mammals for up to 4.4 years. Small and medium-bodied mammals removed many more seeds than did large mammals, and they alone generated beta diversity and negative density dependence, whereas all mammals reduced diversity and shaped local species composition. Thus, small and medium-bodied mammals more strongly contributed to community structure and promoted species coexistence than did large mammals. Given that seedling recruitment is seed limited for most species, alterations to the composition of the community of mammalian seed predators is expected to have long-term consequences for tree community structure in tropical forests.

Implications of climatic seasonality on activity patterns and resource use by sympatric peccaries in northern Pantanal
Gabriel Selbach Hofmann, Igor Pfeifer Coelho, Vinicius Augusto Galvão Bastazini, José Luís Passos Cordeiro, Luiz Flamarion Barbosa de Oliveira
Int J Biometeorol (2016) 60: 421. doi:10.1007/s00484-015-1040-8
We evaluated the effects of climate seasonality from a thermal and water availability perspective on the activity patterns and resource use of *Pecari tajacu* and *Tayassu pecari* during wet and dry seasons in the northeastern Brazilian Pantanal. We used camera traps and temperature sensors to record species activity patterns in relation to temperature, established five habitat categories based on flooding intensity and local vegetation characteristics, assessed the activity patterns of each species in dry and wet periods and in artificial water bodies using circular statistical metrics, and calculated niche amplitude and overlap on three axes (temperature, time, and habitat) in both periods. Peccaries shared a strong resemblance in resource use and in their responses to seasonal variations in the tested gradients. The activity patterns of both species exhibited a significant correlation with air temperature on all the evaluated measures, and both species strongly reduced their activity when the air temperature exceeded 35 °C. High temperatures associated with low water availability were most likely responsible for the changes in species activity patterns, which resulted in an increased temporal overlap in habitat use throughout the

dry season. However, the peccaries avoided intensively flooded habitats; therefore, the habitat gradient overlap was greater during the wet period. Our results show that an increase in niche overlap on the environmental gradient as a result of climatic seasonality may be partially compensated by a reduction in other niche dimensions. In this case, temporal partitioning appears to be an important, viable mechanism to reduce competition by potentially competing species.

Responses of two sympatric species of peccaries (*Tayassu pecari* and *Pecari tajacu*) to hunting in Calakmul, Mexico

M. Briceño-Méndez, E.J. Naranjo, S. Mandujano, M. Altricher,R. Reyna-Hurtado

Tropical Conservation Science 2016. P. 1–11

The white-lipped peccary (*Tayassu pecari*) and the collared peccary (*Pecari tajacu*) are social ungulates of great ecological and economic importance. Both species represent important sources of animal protein in the diet of indigenous and rural communities in Neotropical forests, which has contributed to reducing their populations throughout their geographic distribution. It is still not well understood how the social ecology of peccaries is affected by hunting. This study analyzed the relationship between hunting and group size, group composition, daily activity patterns, and the relative abundance of the two peccary species. Camera-traps and direct observation were used from February 2014 through February 2015 in two sites differing in their degree of protection and hunting pressure: the first was Calakmul Biosphere Reserve (a site with no hunting) and the second was the community of Nuevo Becal (a hunting site). Our analyses suggest that hunting negatively affects group size, structure, composition and the relative abundance of both peccary species. We propose that management and conservation plans, particularly for key resources such as water, and monitoring and hunting controls in the habitats of both peccary species, might ensure their survival in the Calakmul region.

Buffer zone use by mammals in a Cerrado protected area

Roberta Montanheiro Paolino, Natalia Fraguas Versiani, Nielson Pasqualotto, Thiago Ferreira Rodrigues, Victor Gasperotto Krepschi, Adriano Garcia Chiarello

Biota Neotrop. Vol.16 no.2 Campinas 2016 Epub Apr 29, 2016

Habitat loss and degradation is threatening mammals worldwide. Therefore, Protected Areas (PA) are of utmost importance to preserve biodiversity. Their effectiveness, however, depends on some management strategies such as buffer zones, which prevent/mitigate the impact of external threats and might increase the amount of available habitat for wildlife existing within reserves. Nevertheless, how intensively terrestrial mammals use buffer zones remains little studied, particularly in the Neotropical region. Aiming to analyse the use of a buffer zone (5 km wide) by medium and large-sized mammals, we modelled the occupancy probabilities of five species of conservation concern including local (interior and buffer zone) as a site covariate, simultaneously controlling for imperfect detection. Data collection was made with camera traps from April to September 2013 in a 9000 ha Cerrado PA (“interior”) and in its surrounding area (39721.41 ha; “buffer zone”). This PA (Jataí Ecological Station) is immersed in a landscape where sugarcane plantations predominate in the northeastern of the state of São Paulo. We also conducted an inventory to compare the number and composition of species between interior and buffer zone. A total of 31 mammal species (26 natives) was recorded via camera traps and active search for sightings, vocalizations, tracks and signs. Occupancy estimates for *Myrmecophaga tridactyla*,

Leopardus pardalis and *Pecari tajacu* were numerically higher in interior. On the other hand, *Chrysocyon brachyurus* had the highest occupancy in buffer zone, while the largest predator, *Puma concolor*, used both areas similarly. However, as the confidence intervals (95%) overlapped, the differences in occupancy probabilities between interior and buffer were weak for all these species. Additionally, regarding only the species recorded by cameras, the observed and estimated richness were similar between interior and buffer zone of the PA. Our data demonstrated that the buffer zone is indeed used by medium and large-sized mammals, including conservation-dependent ones. The lack of enforcement of current legislation regarding buffer zones is therefore a real threat for mammals, even when protection is guaranteed in the interior of protected areas.

Dominance relationships between collared peccaries *Pecari tajacu* (Cetartiodactyla: Tayassuidae) in intensive breeding system

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Applied Animal Behaviour Science

Volume 184, November 2016, Pages 117–125

The collared peccary (*Pecari tajacu*) is a species with great potential for breeding in captivity since it adapts well to a variety of foods, has a high breeding capacity and there is an existing market for its meat and leather, which is of excellent quality. However, itis necessary to understand its social structure, when maintained in intensive breeding, to adequately manage groups and limit potential aggressions to the stockman. Four family units (dam, sire and descendants) were monitored (phase 1); females descendants were subsequently relocated into four new experimental social groups (phase 2). In these experimental groups, the female descendants were grouped with adult males, without the presence of the parents. Interactions were filmed three times per week, during two months, for each treatment (phase 1 = family units and phase 2 = experimental groups).A matrix of aggressive and submissive behaviors was developed and the dominance relations were evaluated with the Elo-rating method. A stability index of rank orders, the steepness and the degree of linearity were calculated to analyse the hierarchy in each family unit and experimental group. The parents remained on the highest hierarchical levels in three of the four family units and female descendants occupied the highest hierarchical levels in experimental groups. A linear hierarchy composed of adults of both genders was found in two family units and a mono-sexual linear hierarchy with females atthe highest-ranking positions was evidenced in two experimental groups. Hierarchy was stable (all stability indexes values ≥0.94), while steepness was variable among family units and experimental groups (range: 0.23–0.84). The ranking-position of a female descendant in a family unit was not a good predictor of her ranking position in experimental units. Male descendants received significantly less friendly behaviors than female descendants did ($p = 0.01$), dams ($p < 0.01$) and sires ($p < 0.05$) in the family units. There was no significant increase in the frequency of aggressive behavior after relocation of the animals. Our results indicate that collared peccaries raised in small group present stable dominance relations, form hierarchies of variable steepness and show females as the highestranking individual.

New records of the Endangered Chacoan peccary *Catagonus wagneri* suggest a broader distribution than formerly known

Parisi Dutra, R., Missagia, R. V., Perini, F. A., Cozzuol, M. A., Gasparini, G. M., Guedes, P. G., & Salles, L. D. O. (2017)

Historical Biology, 29(1), 85-92.

The Chacoan peccary *Catagonus wagneri* is the rarest and most threatened of the three extant species of peccary. Its presence has been recorded in the northern Dry Chaco ecoregion, which spans northern Argentina, western Paraguay and south-eastern Bolivia. However, distribution models based on its occurrence in Argentina have predicted that suitable habitat extends southwards into central Argentina, where the species was not previously recorded. We present several records of the species outside the currently accepted distribution, including the first two records in the west of Córdoba province, > 650 km south of the southern limit of the previously known distribution. The discovery of the Chacoan peccary in central Argentina could serve as a justification for the protection of Chacoan forests in this region, where deforestation rates are among the highest worldwide.

Hippopotamus (*H. amphibius*) diet change indicates herbaceous plant encroachment following megaherbivore population collapse

Kendra L. Chritz, Scott A. Blumenthal, Thure E. Cerling and Hans Klingel

Scientific Reports, 2016

Megaherbivores (>1000 kg) are critical for ecosystem health and function, but face population collapse and extinction globally. The future of these megaherbivore-impoverished ecosystems is difficult to predict, though many studies have demonstrated increasing representation of C3 woody plants. These studies rely on direct observational data, however, and tools for assessing decadal-scale changes in African ecology without observation are lacking. We use isotopic records of historical common hippopotamus (*Hippopotamus amphibius*) canines to quantify herbaceous vegetation change in Queen Elizabeth National Park, Uganda following a period of civil unrest and poaching. This poaching event led to population collapse of two threatened African megaherbivore species: hippopotamus and African elephants (*Loxodonta africana*). Serial carbon isotope ratios (δ13C) in canine enamel from individuals that lived between 1960–2000 indicated substantial increases in C3 herbaceous plants in their diet (<20% C3 in the 1960s to 30–45% C3 in the 80s and 90s), supported by other observational and ecological data. These data indicate megaherbivore loss results in succession of both woody and herbaceous C3vegetation and further reaching effects, such as decreased grazing capacity and herbivore biodiversity in the area. Given multiple lines of evidence, these individuals appear to accurately capture herbaceous vegetation change in Mweya.

Declining population of the Vulnerable common hippopotamus *Hippopotamus amphibius* in Bénoué National Park, Cameroon (1976–2013): the importance of conservation presence

Paul Scholte and Emmanuel Iyah

Oryx Volume 50, Issue 3, July 2016, pp. 506-513

Populations of the common hippopotamus *Hippopotamus amphibius* have undergone widespread decline as a result of habitat conversion and hunting for bushmeat and, increasingly, for ivory. North Cameroon holds important populations of large mammals, including the hippopotamus. The species' status and population trend are poorly known, and led CITES to suspend trade in

hippopotamus trophies in 2013. Using the methodology of surveys conducted during 1976–1987, we conducted counts of the hippopotamus in Bénoué National Park during the wet season of 2011 and dry season of 2013, and drew on unpublished biannual density counts conducted by the Garoua Wildlife College, Cameroon, during 1989–2010. Counts along the 100 km stretch of the Bénoué River in the Park indicated a reduction from 400 individuals in 1987 to 188 in 2013. However, linear densities along a 15–32 km stretch in proximity to the Park headquarters and two tourist camps were constant during 1976–2013 (c. 3.7 individuals km−1). Hippopotamus distribution was negatively associated with the presence of the camps of gold diggers, which occupied the northern half of the Park. Observations of antelopes suggested they had a comparable distribution, unlike primates, which were distributed relatively evenly. Our results show the importance of year-round conservation presence in the Park, which could be achieved with adequate personnel, a functional road system, and reinforcement of operations in neighbouring sport-hunting areas.

Preventing crop raiding by the Vulnerable common hippopotamus *Hippopotamus amphibius* in Guinea-Bissau

Luis M. González, Francisco G. D. Montoto, Tome Mereck, Junior Alves Jose Pererira, Pablo Fernandez de Larrinoa, Ana Maroto Luis Bolonia and Nuria El-Khadir.

Oryx, Page 1 of 8 2016, doi:10.1017/S003060531500109X

Guinea-Bissau is host to the westernmost subpopulation of the common hippopotamus *Hippopotamus amphibius*, which is one of only two known populations inhabiting coastal waters. The presence of hippopotamuses causes conflict with rice farmers as a result of crop damage and the absence of effective measures to protect crops. To develop an effective method for protecting rice fields, we studied the patterns of access to flooded and rain-fed rice fields by hippopotamuses and assessed the effect of the installation of electric fences. Hippopotamuses were detected in 54% of the flooded fields (n = 100) and in 39% of the rain-fed fields (n = 91). They were detected more frequently in fields on offshore islands than on the mainland, in unfenced than in fenced fields, and in fields closer to running water. Hippopotamuses entered fenced flooded fields less frequently than unfenced, and were detected most frequently at the end of the rainy season and the start of the dry season, and in the period of vegetative stem growth. Electric fences were an effective deterrent and facilitated increased rice production. The maintenance and cost of the electric fencing were acceptable to farmers, and therefore the use of such fencing is recommended to resolve the conflict between hippopotamuses and farmers in Guinea-Bissau and in other areas with similar conditions.

A mix of community-based conservation and protected forests is needed for the survival of the Endangered pygmy hippopotamus *Choeropsis liberiensis*.

Annika Hillers, Graeme M. Buchanan, Jerry C. Garteh, Solomon M. Tommy Mohamed, L Fofafa and Jeremy A. Lindsell

Oryx, Page 1 of 10 2016, doi:10.1017/S003060531600020X

The contribution of protected areas to biodiversity conservation is well attested but many taxa in many regions remain dependent on the unprotected wider landscape. To develop conservation plans for large mammals such as the Endangered pygmy hippopotamus *Choeropsis liberiensis* of West Africa's Upper Guinea Forests it is critical to understand the importance of unprotected land. Despite being a conservation priority, little is known about the habitat associations of this species,

or its distribution across its range. Through a combination of field surveys, species distribution models and community questionnaires we investigated the use of unprotected areas by the pygmy hippopotamus in the Sierra Leone–Liberia border region. We found signs of the species in of 128 1-km^2 cells surveyed. Our analysis suggested that the species is reasonably widespread in this region and is associated with major rivers. It occurred close to, but rarely within, large areas of intact forest, and 80.4 % of pygmy hippopotamus signs were recorded outside protected areas. The expansion of the protected area network in this area is unrealistic in Sierra Leone and to some extent in Liberia, mainly because of anthropogenic pressure and the overlap of proposed protected areas with mining and logging concessions. Thus pygmy hippopotamus conservation activities in the region need to include programmes on community lands while maintaining a robust network of protected forests. Community-based conservation of the pygmy hippopotamus may prove valuable for other threatened and endemic species that are not confined to protected areas in this region.

Alarming link between feral pigs and vampire bats

https://www.sciencedaily.com/releases/2017/02/170201141927.htm
February 1, 2017
Fundação de Amparo à Pesquisa do Estado de São Paulo

The number of vampire bats, which transmit rabies and are a concern for livestock breeders, may be increasing in Brazil and the Americas along with growth in the populations of invasive feral pigs and wild boars (*Sus scrofa*).
A group of researchers has recently reported an alarming rise in the numbers and distribution of *S. scrofa,* as well as showing that the common vampire bat *Desmodus rotundus* is now feeding on the blood of these animals.
Results of this study have been published in the journal Frontiers in Ecology and the Environment by Mauro Galetti, a professor at São Paulo State University's Bioscience Institute in Rio Claro, Brazil (IB-UNESP/RC), his PhD supervisee Felipe Pedrosa, Alexine Keuroghlian, a biologist with the Wildlife Conservation Society (WCS Brazil), and Ivan Sazima, a collaborating professor at the University of Campinas's Zoology Museum (MZ-UNICAMP) in São Paulo State.
As numbers of invasive feral pigs increase, so does the damage to crops and native fauna, among other problems. S. scrofa is also a growing source of blood for vampire bats, so the population of *D. rotundus* is also likely to increase.
Only three of the approximately 1,200 known bat species feed exclusively on blood, and all three are found only in the Americas. *D. rotundus* is the most widely distributed, inhabiting a territory that ranges from Mexico to Argentina. This species feeds mostly on livestock and poultry, but it has also been documented to prey on mammals such as tapirs and deer.
In Brazil's Atlantic Forest biome, about 1.4% of vampire bats are infected with rabies. The proportion may be as high as 10% in the Peruvian Amazon. Transmission of rabies by vampire bats is a major concern for ranchers in Brazil, even in areas where cattle are routinely vaccinated. Wild animals, including feral pigs, are not vaccinated and may therefore pose a serious threat by spreading this disease.

The researchers have used camera traps to monitor mammals in the Brazilian Pantanal and Atlantic Forest for the past 12 years. These are remotely activated infrared cameras that film at night when triggered by sensors that detect the presence of an animal.

After checking 10,529 photos and videos with several examples of vampire bats feeding on feral pigs, cattle, tapirs, and red brocket deer (*Mazama americana*), the researchers selected 158 independent events in the Pantanal (101 with feral pigs, 38 with deer, and 19 with tapirs), and 87 events in the Atlantic Forest (35 with feral pigs, 29 with deer, and 23 with tapirs). Based on these events, they estimated that the probability of vampire bat attacks on feral pigs was as high as 10% for nights in which recordings were made.

"The rabies virus is transmitted through the saliva of infected bats. *D. rotundus* is a reservoir for other viruses with epidemiological potential, including hantavirus and coronavirus," Sazima said.

"Vampire bats are fond of pigs' blood, and switching from domestic to feral pigs must have been easy for such an adaptable animal."

Invasion

Feral pigs combine the ferocity of the wild boar with the size and fertility of the domestic pig, an animal selected to supply more meat and offspring than its wild ancestor. A male boar can weigh as much as 100 kg. Feral pigs often weigh over 150 kg and reproduce constantly.

Brazil faces an unprecedented invasion of feral pigs in rural areas, with an increase of 500% in these animal populations since 2007. In 1989, feral pigs from Uruguay began crossing the border with Rio Grande do Sul, Brazil's southernmost state. This was the onset of the infestation in the South region.

"Major incentives were introduced in the Southeast region in the mid-1990s to encourage the production of boar meat," Pedrosa recalled. "Producers imported sows and bred herds. But it proved not to be a very profitable line of business, and some producers gave up and released their boars into the wild."

In an attempt to save their failing businesses, producers began crossing wild boars with domestic pigs, but they ended up also releasing the resulting crossbred pig-boars. As a result, the infestation previously confined to the South advanced through the Southeast to the Atlantic Forest region of São Paulo State. In the Pantanal, the invasion is older, dating from the colonial period, when free-range pigs raised by Portuguese settlers escaped and gave rise to the feral pig.

"Wild boars, crossbred pig-boars, and feral pigs all belong to the same species as the domestic pig, *Sus scrofa*. The wild boar's original habitat was Eurasia, but it was introduced to Australia, South America, and the United States. Wild boars and other suids in a feral state are held to be among the worst exotic species in the world," the researchers say.

The study concludes that the invasion of feral pigs in the Pantanal and Atlantic Forest areas is a serious threat and that "there is an urgent need to develop and implement effective control measures."

Feral pigs are social animals that roam in groups. They are aggressive and highly dangerous. The problem is likely to spread. "Within a few years, they'll be in the Amazon and Caatinga biomes. In the US and Europe, S. scrofa is the fastest-growing vertebrate species. Nearly 14,000 wild boars were killed in Germany near the Danish border in 2016 alone," Galetti said.

The problem may not be limited to suids. "Other viral diseases carried by boars and feral pigs may be transmitted to native animals that are bitten by vampire bats, such as tapirs, deer, and capybaras," Keuroghlian said.

Journal Reference:
Mauro Galetti, Felipe Pedrosa, Alexine Keuroghlian, Ivan Sazima. Liquid lunch - vampire bats feed on invasive feral pigs and other ungulates. Frontiers in Ecology and the Environment, 2016; 14 (9): 505 DOI: 10.1002/fee.1431

Homeowners in a town besieged by wild boar are urged to put up 5ft electric fences to stop the animals destroying their gardens after graveyard attacks

http://www.dailymail.co.uk/news/article-4145598/Town-besieged-wild-boar-told-fences.html#ixzz4Y7TDrCls
By Kelly Mclaughlin For Mailonline
PUBLISHED: 17:01 GMT, 22 January 2017

- The wild boars in the Forest of Dean have begun venturing into residential areas
- The boars desecrate graves, uproot turf and eat floral tributes at St John the Evangelist Church in Cinderford, Gloucestershire, in the process
- Forestry Commission says it is not responsible for protecting private property
- The commission has urged locals to invest in fences or even barbed wire

But locals claim they have been left to 'fend for themselves' as the forest's 1,500 free-roaming pigs stray further into the town

Homeowners in a town besieged by wild boar have been urged to erect 5ft electric fences around their homes as the beasts destroy gardens and graveyards.

The feral animals in the Forest of Dean have begun venturing into residential areas in recent years in the hunt for food.

Now they have desecrated graves, uprooted turf and eaten floral tributes at St John the Evangelist Church in Cinderford, Gloucestershire.

The Forestry Commission says it is not responsible for protecting private property from the pigs and has urged locals to invest in fences or even barbed wire.

But locals have slammed the advice, claiming they have been left to 'fend for themselves' as the forest's 1,500 free-roaming pigs stray further into the town.

Councillor Tim Gwilliam of Forest of Dean District Council has urged Defra and the Forestry Commission to take more responsibility.

He said: 'It's just not good enough. While old people are forced to watch the graves of their loved ones being dug up by the boar, they are busy setting up another workshop to talk about.

'They don't want to know because opinion is so divided. It's very difficult bringing people with such extreme views together, but that doesn't mean they can just wash their hands of it.

'They need to do something, not let people fend for themselves.'

Some 1,562 wild pigs roam free in the Forest of Dean according to the Forestry Commission, compared to 1,018 in 2015.

Earlier this month one was chased off a school field in the middle of a housing estate in Cinderford.

And ten days ago, shoppers in the High Street were stunned by the sight of large wild boar foraging in waste bins.

A combination of rising population, winter food shortages and increasing confidence is emboldening the boar towards an increasingly urban existence.
They are now regularly straying into the graveyard at St John the Evangelist Church despite the efforts of warden Chris Taylor.
He told The Forester newspaper: 'It is very distressing for families but so far nothing we have done has managed to keep them out.
'We try to keep the gates closed at all times and we ask visitors to close the gates after them, but the boar always seem to manage to get in.
'We have been told there is a group of boar living in the area between the church and Valley Road.
'We have contacted the council and the Forestry Commission, but it appears they don't want to know. We just don't know what the solution is.'
The Forestry Commission insist it is the responsibility of property owners to install boar-proof fencing.
Its advice states: 'Feral Wild Boar are classed as a wild animal, and individual property owners need to adequately defend their property if they wish to deter feral wild boar from entering.'
It states electric and barbed wire should be considered but warns: 'Boar have been seen to clear 1.2m and attempt 1.5 m when invading pig pens.
'Feral wild boar will be unfamiliar with electric fencing and may pass through it when running.
'They may also jump over or through (receiving no shock when in the air). Even 6 strand fencing may be penetrated if under pressure.'
Forestry Commission officials recently met with DEFRA, Natural England and Animal and Plant Health Agency representatives to discuss the issue.
A Forestry Commission spokesman said: 'There was no specific outcome of the meeting other than a reiteration that DEFRA's Feral Wild Boar An Action Plan dated 2008 remains relevant.
'Feral Wild Boar are classed as a wild animal, and individual property owners need to adequately defend their property if they wish to deter feral wild boar from entering.'
Last May one had to be shot by rangers after wandering into the centre of Coleford and posing a risk to the public.
The Forestry Commission carries out an annual cull and last year's killed 543.
Residents were last year asked not to feed the boar or leave their bins out overnight because the beasts come looking for food.
Wild boar became extinct in Britain more than 300 years ago but reappeared in the Forest of Dean in 2004 when they were illegally reintroduced from farms.
The forest is now the largest breeding ground in the country, though groups of wild boar are springing up across Britain including in Kent, Devon and Dorset.

Diagnostic breakthrough: 'Shaking piglets' attributed to previously unidentified virus

https://www.sciencedaily.com/releases/2017/01/170113090450.htm
January 13, 2017
Veterinärmedizinische Universität Wien

Symptoms of tremors and shaking in newborn piglets are not a sign that the animals are cold, but rather that they are suffering from a specific viral infection. Researchers at Vetmeduni Vienna

have now been able to prove this correlation for the first time using a newly developed test. The scientists detected a previously unknown virus, termed atypical porcine pestivirus (APPV), in "shaking piglets," making it possible to clearly diagnose the potentially fatal disease. The virus remains in the animals for a long time following an infection and may also be transmitted sexually. The findings were published in the journal Veterinary Research.

Cases of newborn "shaking piglets" have been reported since the 1920s both in Europe and abroad. Yet an additional cause for these congenital tremors has so far eluded researchers. A previously unknown virus had therefore been suspected for quite some time -- but without conclusive confirmation.

On the basis of new genomic sequence data, a team of researchers from the University Clinic for Swine, the Institute of Virology, and the Institute of Pathology and Forensic Veterinary Medicine at Vetmeduni Vienna has now been able to identify a new virus as the cause of this potentially life-threatening disease. The pathogen, which belongs to the so-called atypical porcine pestiviruses (APPV), was detected in diseased animals at Austrian farms using a specially developed test.

Congenital tremors may be life-threatening

"Depending on the severity of the shaking, congenital tremor presents a challenge for the piglets from the first minute of their life," says first author Lukas Schwarz, veterinary clinician at the University Clinic for Swine. The tremor can sometimes be so severe that the piglet is unable to properly suckle milk. Yet suckling is especially important for piglets in the first 24 hours after birth. Only mother's milk contains everything the animals need to survive. "Without the first drink of mother's milk, piglets have a very low chance of survival," Schwarz explains.

In piglets which survive this first phase, symptoms usually subside after three or four weeks. In rare cases, a slight tremor remains in the ears. But getting this far requires an enormous amount of attention and care on the part of the pig farmers and veterinarians. This makes it even more surprising that researchers have so far failed to identify a cause for this mysterious disease. A mortality rate of up to 30 percent is possible among affected piglets; the detection of the APPV virus therefore represents a diagnostic breakthrough.

"Shaking piglets" infected with previously unidentified virus

The pestiviruses had been considered a possible causative agent, along with other viral pathogens, but the established tests had so far remained without success. "It was the characterization of the atypical pestiviruses that first brought us on the right track," says virologist Benjamin Lamp. On the basis of the sequence data, it was possible to identify a further strain of these viruses and so develop a new test. Detection is now possible using the usual molecular methods such as polymerase chain reaction.

The detection procedure not only confirmed the presence of the virus in high numbers in the diseased piglets; the team was also able to detect the pathogen in the saliva and semen of mature pigs.

Sexual transmission possible

"The presence of the virus in the semen of a mature boar sheds new light on how the pathogen may be spread," says Schwarz. "The virus appears to persist in some animals even without symptoms. We detected the pathogen in the semen of a former shaking piglet, which shows that the disease may be transmitted sexually."

The virus is likely transmitted to the piglet at a stage of gestation when the central nervous system is developing, as indicated by changes in nerve fibres. Antibodies against the virus have been detected in sows, yet the uterine anatomy is such that it prevents transmission to the foetus.

An infection among older animals is most likely asymptomatic.
Interdisciplinary cooperation led to the findings
Schwarz credits the research findings to the efficient cooperation among the campus partners and swine practitioners. "Although this disease has been present in Austria for some time, it was the intense cooperation with the university's other institutes that allowed us to achieve a clear result so quickly. This not only enables us to make a clear diagnosis, but can also be helpful in developing a vaccine." Lamp sees more work to be one in the characterization and classification of the pestiviruses: "The discovered virus is only 90 percent identical to the new sequences of atypical pestiviruses. We should therefore reconsider the classification of this virus species."

Journal Reference:
Lukas Schwarz, Christiane Riedel, Sandra Högler, Leonie J. Sinn, Thomas Voglmayr, Bettina Wöchtl, Nora Dinhopl, Barbara Rebel-Bauder, Herbert Weissenböck, Andrea Ladinig, Till Rümenapf, Benjamin Lamp. Congenital infection with atypical porcine pestivirus (APPV) is associated with disease and viral persistence. Veterinary Research, 2017; 48 (1) DOI: 10.1186/s13567-016-0406-1

He's having a pig of a day! Wild boar storms the tarmac of Hong Kong airport before being caught by four SWAT officers

http://www.dailymail.co.uk/news/article-4054668/He-s-having-pig-day-Wild-boar-storms-tarmac-Hong-Kong-airport-caught-four-SWAT-officers.html#ixzz4Y7U5ovfn
By Sophie Williams and Julian Luk For Mailonline
PUBLISHED: 13:39 GMT, 21 December 2016

- Footage shows the boar wandering on airport apron on December 20
- The animal was pinned to the ground by four armed SWAT police officers
- The eight-stone wild pig was captured and euthanised due to its leg injury
- A second boar was discovered in the airport at 6:30pm on the same day
- It remains unclear how they managed to intrude into the restricted area

Two wild boars invaded the Hong Kong's International Airport causing chaos on December 20.
Four tactical police officers used their riot shields to capture the first intruding animal, weighing nearly eight stone (110 pounds), in early afternoon.
It's thought that the 3.3-foot-long wild pig may have swum across the water before entering the airport which is located on an

artificial island, according to Hong Kong media.
A video, posted on Youtube, shows the moment the officers pinned the animal to the ground using their shields after it entered the airport.
The Hong Kong Airport Authority told MailOnline that a boar was discovered by staff on the apron close to the north runway on Tuesday 2:15pm.
The staff informed the tactical police stationed in the airport. They chased after the boar before capturing the animal. The airport authority said the duration of the process is not known. Airport operation was not interrupted by the incident.
The wild animal was handed to Agriculture, Fisheries and Conservation Department at around 4 pm, said the authority.
The pig, with its rear legs injured, was euthanised in the evening, reported local media Apple Daily.
Another boar also was discovered in the airport on the same day 6:30pm. After a half-an-hour chase, the pig jumped into the sea.
The airport spokesman told MailOnline it was rare to see wild boar in the airport apron. Snakes and birds are more commonly seen.
According to the same spokesman, the airport staff are highly aware of the need to remove foreign objects, not just animals, but also small objects like umbrella, on the apron. These objects might get sucked into the turbines of the planes, posing threat to aviation safety.
HKFP reported that pilot and lawmaker of Hong Kong's Civic Party said: 'There have always been wild boars residing on nearby Lantau island. To prevent them from straying into the airport again, it is important to inspect whether there are loopholes in existing airport security policies.'
The authority is investigating into how the boars managed to intrude into the restricted area.

'We have waited such a long time for this': For the first time EVER, hidden cameras capture the birth of the rare babirusa pig on Secret Life of the Zoo

http://www.dailymail.co.uk/femail/article-3937762/The-Secret-Life-Zoo-hidden-cameras-capture-incredibly-moving-birth-rare-babirusa-pig-believed-time-filmed.html#ixzz4Y7WHWfi3
By Natalie Corner For Mailonline
PUBLISHED: 08:13 GMT, 17 November 2016

- Meaning 'pig-deer' in Malay language they are native to Indonesia
- Found on the island of Sulawesi babirusa can thrive in captivity
- Very few people in the world have witnessed the animal giving birth
- The series goes behind the scenes at the famous Chester Zoo

Baribusa are no ordinary pigs and for what is thought to be the first time ever, the rarest pig species in the world has been captured giving birth.
The animals, which mean 'pig-deer' in the Malay language, are native to Indonesia and can thrive in captivity which is exactly what has happened at the famous Chester Zoo.

Articles in the news

Hidden cameras set up for Channel 4's The Secret Life of the Zoo have captured remarkable footage showing the live birth of a babirusa piglet.

In the clip the female pig named Kendari can be seen in the dead of the night rustling around to get comfortable as she goes into labour.

'It's dark, it's quite, there's no one around. That's when they are the most comfortable,' the zoo keeper say.

'It's really exciting it's nervewracking, and you hope you have done everything you can for her. It'll be sad for us to see anything go wrong for her because we have waited such a long time.'

It's good news for the team as all of a sudden the mother jumps up to reveal a wriggling piglet stumbling around trying to find it's feet.

The piglet was born on July 1st this year after a five-month pregnancy but, given the sensitive nature of the species, mum had been caring for her youngster in a special behind-the-scenes breeding area.

But now, Kendari has shown off her important new charge to the public for the first time in the zoo's Islands habitat.

In the stunning images the proud mum welcomes her piglet to their enclosure in the zoo, guiding it around the lush vegetation for feeding.

The naked-looking babirusa piglet lacks the significant horns of its male counterpart which are thought to be purely for aesthetic purposes as they have no real use.

Babirusa are found on the island of Sulawesi in Indonesia where their numbers have plummeted to an estimated 5,000 individuals.

The species was once thought to be reasonably common but a history of hunting for their meat and destruction of their habitat has seen them largely disappear from some areas of Sulawesi.

The never-before-seen footage captured at the zoo has thrilled the keepers and the directors who hope that it will give an insight into the creature and help breed them for the future.

Dr Mark Pilgrim, Chester Zoo's director general, said: 'Very few people in the world, if any, will have ever witnessed a babirusa give birth. To be able to watch, for the very first time, those incredible tender first moments between mum and baby is very, very special indeed.

'The footage is truly unique and some of the information we can learn from it may be really helpful in terms of the conservation breeding of the endangered species in the future.'

Tim Rowlands, curator of mammals at the zoo, added: 'When Kendari's new piglet grows up he will sport a face full of twisted tusks, a large wet snout, warts and will be almost completely hairless, just like his dad, Sausu. But looks aren't everything! This species is incredibly special and he's such an important new arrival.

'Babirusa are under huge pressure in Sulawesi. They're vulnerable to extinction and Kendari's latest piglet is a significant addition to the world's population.

'As their survival in the wild is put at risk, zoo breeding programmes are an important way of ensuring the species does not die out altogether.

'We are one of only a handful of zoos worldwide which has successfully bred these distinctive animals – something we've achieved on several occasions in the last few years – and we're very proud to be playing a key part in the long-term conservation of these charismatic animals.

'Our work with the babirusa also doesn't stop within the boundaries of the zoo. We're working out in Indonesia where, alongside international conservationists and the government, we're supporting the conservation of the species to counteract the ever increasing threats to its survival in its homeland.'

The Secret Life Of The Zoo uses special filming techniques to capture the animals and their keepers - and shed light on the species-saving work that goes on at the pioneering institution.
Also featured in the series is a surprise litter of otter pups that the keepers name and a baby pygmy marmoset (miniature monkey) called Gus who forms an unusual bond with an emperor tamarin monkey called Ting. Ting becomes Gus' adoptive parent and allows him to ride around on his back.

A pig's life: How mood and personality affect the decisions of domestic pigs

https://www.sciencedaily.com/releases/2016/11/161116101936.htm
November 16, 2016
University of Lincoln

The judgements and decisions a pig makes are governed by their mood -- whether good or bad -- and their personality type, according to new research published today.
The new study, carried out by scientists specialising in animal behaviour and welfare at the University of Lincoln and Newcastle University, UK, demonstrates for the first time that the combined mood and personality of an animal have a significant impact on its outlook.
The findings are published today (16th November 2016) in the Royal Society's scientific journal, Biology Letters.
Previous research has revealed how, in humans, mood and personality affect our 'cognitive biases' -- deviations in judgement which form our individual characteristics and personalities, complete with errors and imperfections. However, until now, it was not known whether the same process also affects how animals think.
Funded by the Biotechnology and Biological Sciences Research Council (BBSRC), the new study was designed to explore how mood and personality affect how optimistic or pessimistic pigs are. The researchers found that just like humans, domestic pigs are more likely to have a pessimistic outlook on life if they are in a bad mood.
The personalities of pigs are deemed to be either 'proactive' or 'reactive' -- proactivity in pigs is characterised by more active conduct and a consistency of behaviour, whereas reactivity in pigs is often indicated by passive behaviour and being more changeable in their responses. In humans, proactivity and reactivity have been linked to extraversion and neuroticism, with extrovert individuals being more optimistic and people with neurotic tendencies proving more pessimistic. The scientists worked with a group of pigs which included both 'proactive' and 'reactive' individuals.
The pigs were housed in one of two environments known to influence their mood, and were trained to associate two separate feeding bowls with different outcomes. One contained sugar-coated sweets (representing a positive outcome) and the other contained coffee beans (a negative outcome). When a third 'ambiguous' bowl was introduced, the researchers observed whether or not the pigs approached the third feeding bowl expecting more sweets (another positive outcome), thus showing how optimistic or pessimistic each pig was.
Pigs with a proactive personality were more likely to respond optimistically regardless, but the optimism of the reactive pigs was significantly affected by their mood. Reactive pigs living in a more enriched environment, which is known to contribute to a 'good mood', were much more likely to be optimistic about the new feeding bowl.

Project leader Professor Lisa Collins, from the University of Lincoln's School of Life Sciences, explained: "In humans, mood and personality interact to determine cognitive bias but this was not something that had previously been investigated in any other animals. The results of our study clearly show that those pigs living in a worse environment were more pessimistic, and those in a better environment were much more optimistic. Importantly, this finding demonstrates that humans are not unique in combining longer term personality traits with shorter term mood biases when making judgements."
Dr Lucy Asher from the Institute of Neuroscience at Newcastle University was the lead author for the study. She said: "Our results suggest that judgement in pigs, and potentially in other animals, is similar to humans -- incorporating aspects of stable personality traits and more transient mood states. The study provides a fascinating insight into the minds of these intelligent animals and paves the way for even more in-depth studies in the future."

Journal Reference:
Lucy Asher, Mary Friel, Kym Griffin, Lisa M. Collins. Mood and personality interact to determine cognitive biases in pigs. Biology Letters, 2016; 12 (11): 20160402 DOI: 10.1098/rsbl.2016.0402

Peccaries of Mesoamerica now highly threatened, warn experts

https://www.sciencedaily.com/releases/2016/10/161004141520.htm
October 4, 2016
Wildlife Conservation Society

Hunting, deforestation, and cattle ranching in Mesoamerica have become a triad of trouble for the white-lipped peccary (*Tayassu pecari*), an ecologically important species now threatened with regional extinction, according WCS (Wildlife Conservation Society) and a group of experts at a recently held meeting in Belize.
WCS recently hosted a symposium at the 20th Mesoamerican Society for Conservation Biology Congress, which brought together leading scientists for an emergency assessment of the rapidly declining white-lipped peccary in Mesoamerica. The objectives of the Symposium were to document the current status of this pig-like species, to map recent reductions in its range across Mesoamerica, and to propose conservation actions to protect the species.
Hunting and deforestation for agriculture and cattle ranching have driven precipitous declines of the white-lipped peccary in most Mesoamerican countries. As the only large mammal that moves in large herds in forested environments, this species represents one of Central America's true wildlife spectacles, and plays a key role in ecosystem function of the region's forests. Peccary herds can number up to 200 individuals and range as widely as 120 square kilometers (more than 46 square miles).
However, herd sizes like this are becoming ever rarer as hunting depletes populations and disrupts their social structure. In Mexico and Guatemala, the species' distribution range has been reduced by more than 84 percent in the last 30 years. In Honduras and Nicaragua, only a few remnant populations remain. In El Salvador, the species is already locally extinct.
Dr. Omar Figueroa, the Belizean Minister of Environment, presided over the symposium, which brought together leading mammal researchers from Belize, Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, and Panama. The group outlined the threats facing white-lipped peccary

populations in each country. Collectively, the scientists mapped the current known locations of remaining white-lipped peccary populations and compared these with the past extent of their range to develop an idea of the rate of loss.
Experts led by Dr. Rafael Reyna-Hurtado of El Colegio de la Frontera Sur (ECOSUR) are calling for an increase in the official International Union for the Conservation of Nature (IUCN) extinction threat level from 'Vulnerable' to 'Endangered' in Mesoamerica. A map of the species' current range will be released in the coming weeks. The group of scientists and conservationists also signed a pledge committing themselves to jointly propose and implement conservation actions to save the species.
"The white-lipped peccary is an important ecosystem engineer for the extremely threatened forests of Mesoamerica," said Dr. Jeremy Radachowsky, Director of WCS's Mesoamerica and the Western Caribbean Program. "A coordinated regional plan is required to prevent this keystone species from disappearing from the region."
"The U.S. Fish and Wildlife Service is deeply concerned about the plight of white-lipped peccaries in Central America," said Ani Cuevas, Program Officer for the Central America program. "We are pleased to support this group of scientists in assessing the range and population status of this bellwether species for healthy forests. Collaboration from a variety of partners will be critical to achieving effective conservation of this important species."

Fiona's first steps! Cincinnati Zoo's prematurely born hippopotamus walks for the first time

http://www.dailymail.co.uk/news/article-4193870/Cincinnati-Zoos-prematurely-born-hippo-takes-steps.html#ixzz4Y7YRwVDY

By Associated Press and Kaileen Gaul For Dailymail.com
PUBLISHED: 19:13 GMT, 5 February 2017

- Fiona the hippo took her first steps at the Cincinnati Zoo on Sunday
- Zookeepers have been tending to the premature baby hippo around the clock
- The calf was born on January 24 weighing 29lbs when Nile hippos are supposed to weight 55-120lbs

Fiona the six-week-premature baby hippopotamus took her first steps Sunday morning.
The Cincinnati Zoo documented the adorable and monumental occasion of the tiny hippo walking for the first time. In the video, she waddles a bit as she explores her surroundings.
When Fiona was born, the zoo wrote on the website that she would have to be able to stand on her feet before she could reunite with her parents. She has to be able to stand in order to nurse.
The hippo calf has been with vets and zookeepers around the clock since her birth on January 24.
Zookeepers keep her close enough to her parents so they can hear and smell each other.
These steps are especially good news for Fiona considering two days ago she had low energy and struggled with suckling on a milk tube.
Little Fiona has become and internet sensation. Thousands of people have shared her photos and videos of the zookeepers nursing her to health.
Yesterday the hippo seemed tuckered out in a precious photo of Fiona napping on a zookeeper's chest.

The zoo wrote on Facebook: 'To regulate her oxygen intake and minimize the dive reflex, caregivers position her chest to chest so she can feel normal breathing.'
'Her premature lungs absorb CO2 when she holds her breath (dive reflex) and cause oxygen levels to dip.'
Zoo spokeswoman Michelle Curley said Sunday that Fiona was active during the night and consumed a good amount of formula by herself.
The baby's mother, 17-year-old Bibi, gave birth to the first Nile hippo born there in 75 years.
When she was born she weighed 29lbs when the normal range for a new calf is 55-120lbs.
The zoo is taking donations to help care for Fiona.

After a long demise due to poaching, Virunga's hippos climbing back

https://www.sciencedaily.com/releases/2016/11/161103151954.htm
November 3, 2016
Wildlife Conservation Society

Recent surveys for hippos in Virunga National Park -- the oldest protected area in Africa -- have found that the beleaguered behemoths are finally recovering from decades of poaching and habitat loss in the eastern Democratic Republic of Congo, according to researchers from the Institut Congolais pour la Conservation de la Nature (ICCN) and WCS (Wildlife Conservation Society) who conducted the research.
The published research titled "Conservation of the common hippopotamus in Virunga National Park, eastern Democratic Republic of Congo" appears in the most recent addition of Suiform Soundings, a newsletter published by the IUCN's Pigs, Peccaries, and Hippos Specialist Group. The authors of the study are: Deo Kujirakwinja, P. Shamavu, Andrew Plumptre, and E. Muhindo of WCS; and J.D. Wathaut and E. de Merode of the ICCN (Institut Congolais pour la Conservation de la Nature).
"The hippo is one of Africa's iconic species, one that is becoming increasingly threatened by hunting and other factors," said WCS Scientist Deo Kujirakwinja, the lead author of the paper. "Our findings that hippos are on the increase is encouraging and evidence that efforts to protect hippos and other species are working. "
The researchers estimate that the current population of hippos in the park represents only 11 percent of the original population and only 8.2 percent of the peak population estimate of about 30,000 individuals made in the 1970s.
The increase in hippos is likely the result of increased enforcement in Virunga National Park's portion of Lake Edward and nearby river systems and collaboration between fishermen and park authorities in both the Democratic Republic of Congo and Uganda.
Virunga National Park used to contain Africa's largest known hippo population in the 1970s, with especially large groups found in both the Rwindi and Rutshuru rivers. Later surveys revealed a steep decrease in hippo numbers as a result of hunting, human development and agriculture, as is the case with declines in other large mammals in the eastern Democratic Republic of Congo.
"This recent surveys have shown that the Ishasha River on the border with Uganda is now very important for their conservation and shows that transboundary conservation efforts are succeeding there," stated Andrew Plumptre, WCS senior scientist and co-author of the report.
Scientists noted that, while past surveys have relied partly on aerial surveys, more recent efforts

entailed more ground surveys than before (plane-based counts were avoided in many areas due to the presence of militias in many survey areas). The ground counts resulted in more hippos being recorded and improved population estimates, in part because aerial surveys often miss submerged animals in lakes and rivers.
Growing up to 13 feet in length and weighing up to 4,400 pounds, the common hippo is one of the largest mammals in Africa. It often congregates in pools, rivers, and lakes and can stay submerged for up to six minutes. They are herbivorous animals and feed almost exclusively at night. The common hippo is listed as "Vulnerable" on the IUCN's Red List.

DISCLAIMER

The IUCN/SSC Wild Pigs, Peccaries and Hippos Specialist Groups (WPSG, PSG and HSG) are three of several Specialist Groups of the Species Survival Commission (SSC) developed by the IUCN to foster conservation, research and dissemination of information for species of conservation concern.
These groups consist of technical experts focusing on the conservation and management of wild pigs, peccaries and hippos.
The broad aim of the these groups is to promote the longterm conservation of wild pigs, peccaries and hippos and, where possible, the recovery of their populations to viable levels.

Pigs, peccaries and hippopotamuses are nonruminant ungulates belonging to the Suborder Suiformes of the Order Artiodactyla (the eventoed ungulates).Within the Suborder Suiformes, pigs belong to the Family Suidae, peccaries to the Family Dicotylidae and hippopotamuses to the Family Hippopotamidae.