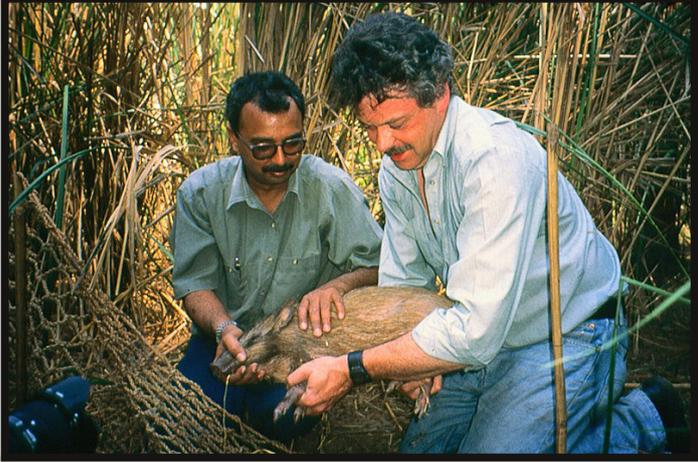


Suiform Soundings



Newsletter of the IUCN / SSC Wild Pig, Peccary and Hippo Specialist Groups

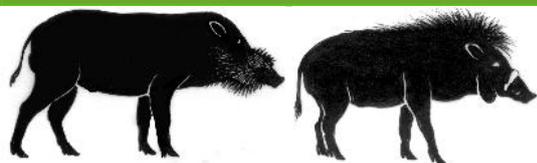


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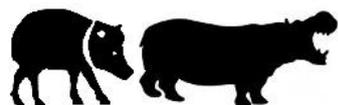
Photo front page:

William Oliver (right) and Goutam Narayan with a Pygmy hog (*Porcula salania*) in Assam, India in 1996. Photo taken by Roland Seitre.

Paintings front page:

These paintings are some of William Oliver's art heritage. They were part of a WWF post stamp series. Groth AG, Unterägeri, Switzerland, is the worldwide licensee for the WWF Conservation Stamp Collection. The painting of Visayan spotted deers on page 6 also belongs to this licensee. Special thanks to Anita Groth and Jean-Pierre d'Huart, Belgium.

Please email all contributions to future issues to emeijaard@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.



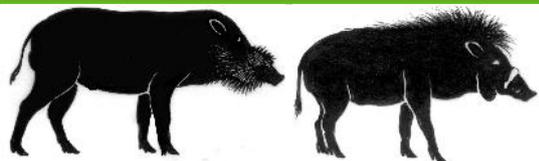
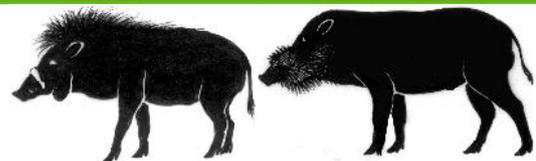
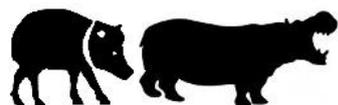
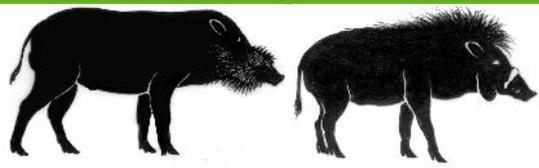


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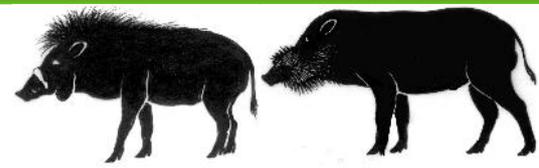


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Editorial



It gives me great pleasure to present to you another excellent and informative issue of Suiform Soundings, the newsletter for the IUCN/SSC Peccaries, Hippos and Wild Pigs Specialist Groups, now in its 13th year of publication. My pleasure is however tainted with considerable sadness as we commemorate the passing of William Oliver, the long time Chair of the former Pigs, Peccaries and Hippos Specialist Group. Thiemo Braasch and Rafael Reyna, our Managing and Production editors, have pulled together various stories from around the world that remember William as the passionate, eccentric, no-nonsense Chair he was of the respective specialist groups for nearly 30 years. The conservation of the species in our groups will never quite be the same without William,



but we have no choice but to move on and build on the legacy that William left us – his conservation projects, his strategies, and his art work that celebrates the beauty of the animals and places that he saw. I hope that this issue and its commemoration of William Oliver can serve all he knew him and all who didn't as a source of inspiration for further dedicating our time and minds to the improved conservation of all species of peccary, hippo and wild pigs.

The present issue additionally contains various interesting contributions that inform better species management. Among others, we present the first insights in the ecology and distribution of *Sus oliveri*, a Philippine pig species named after William about which almost nothing is known. Jo Rode-Margono and Mark Rademaker report their preliminary findings from a survey of the Bawean pig, another poorly known pig

species from a small island in the Java Sea that may yet turn out to be a distinct species in its own right. A while ago, we didn't even know whether this taxon still existed, but the evidence now suggest of a significant population of these animals remaining.

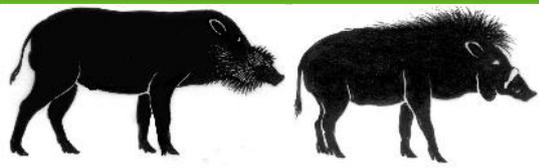
We have further contributions about *Sus scrofa* in Turkey, captive breeding of White-lipped Peccary, sex identification of White-lipped Peccary through new genetics techniques, and a paper on the spread of porcine endogenous retroviruses in Russia. Also, make sure to have a look at the Peccary and Babirusa art pages, which shows how a range of different artists have been inspired by these species.

I hope you enjoy reading this latest issue of Suiform Soundings. Please pass this on to colleagues and others who might be interested.

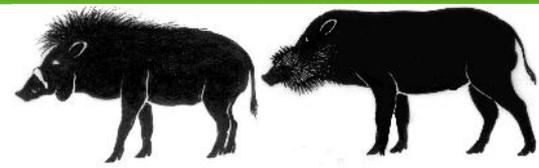
With warm regards

Erik Meijaard, Editor in Chief





Ecology and Conservation

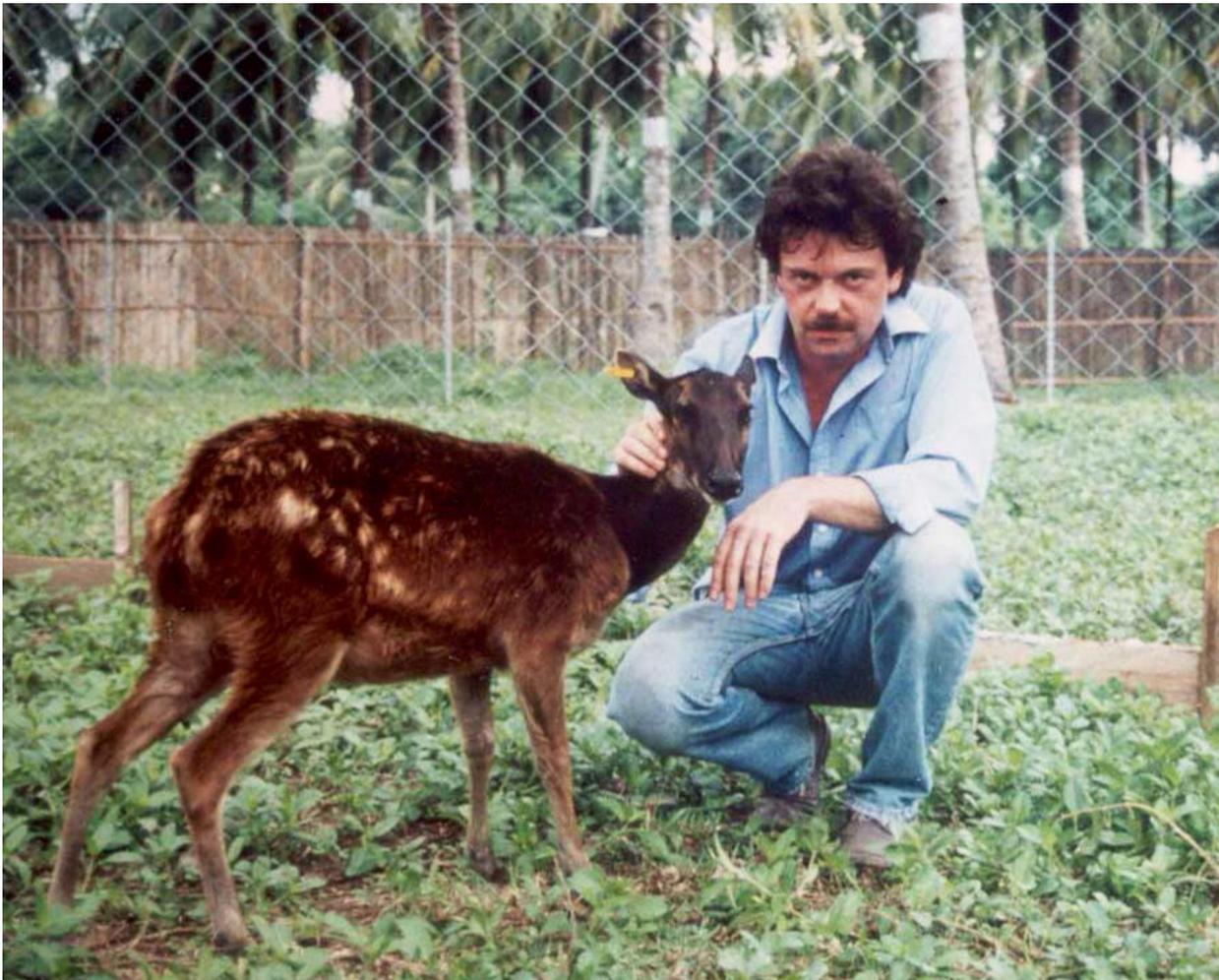


The Pig Man

by Emilia A. Lastica-Ternura

How do you begin to describe a man who has pushed you to the limits of your ability, intelligence, humour and patience? William Oliver was not an easy person to work with. During our first encounter, he struck me as an imposing person, towering over most of the people in a room full of short Filipinos. His presence filled the room, not because of his size, but because of his personality. During that first encounter, we talked about Philippine Biodiversity and my work with Philippine native pigs. It was an embarrassing experience to say the least, as he obviously knew about my country much better than anyone I have ever met. It seemed we hit it off, and after four days, he hired me as the curator for the Biodiversity Conservation Centre (BCC) in Negros.

I would say that William was able to be a good boss if you let him. His passion for his work reflects in how he approached his projects: like a raging bull complete with a profusion of sweat and saliva. He could talk calmly about his beloved Visayan Warty Pigs in one moment, and in the next, get all excited when talking about all the projects we could do for their conservation. We called him Hagrid, after the Harry Potter giant, but he was also the 'Pig Man' of the Philippines to the officials in the Department of Environment and Natural Resources because he knew more about Philippine wild pigs than they do. He lamented about how Filipinos lack



William Oliver with a Visayan spotted deer (*Rusa alfredi*). Williams efforts were crucial to save this (and other Philippine species) from extinction. © Gerardo Ledesma, Philippine Reef and Rainforest Conservation Foundation Inc.





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education about our own patrimony, and the 'Only in the Philippines' series of posters on Philippine Wildlife was born. He was a perfectionist, particularly in the way we write reports. It was a constant battle when documents were sent back and forth full of William's notations, some of them sometimes so honest and direct, they could make a grown man cry. He complained about the Filipino's false humility because we almost always do not mention our successes. In his way, he made us appreciate ourselves as a people who can do big things in spite of the little resources that we have. He often said "a project is as good as the people who work on it" and we who were privileged to have had him as our mentor maintain this principle, understanding that our work is a true reflection of the kind of people that we are. He often criticised, but he also encouraged greatly. With a few words, he could convince a discouraged biologist that he could move mountains and make a world of difference and this person will walk away reborn, ready to face another five years of this steep uphill battle we all call conservation.

And so we carry on. He wanted his legacy to be the instrument of conservation in places like the Philippines, and I suppose that even though he did not live long enough to see it, we - who are his products who work in conservation in the different fields that we have chosen - will carry on, because of William Oliver.

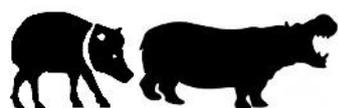
Emilia A. Lastica-Ternura, DVM
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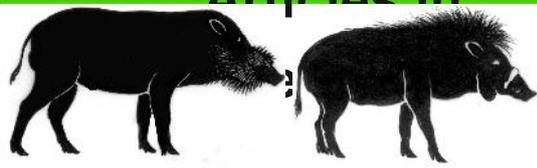


Detail of a poster of the "Only on the Philippines..." series prepared by William Oliver to raise awareness for endemic species of these islands.

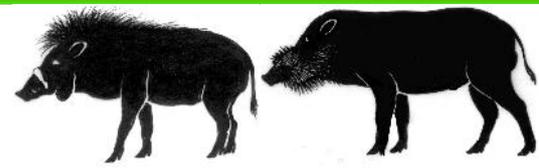


William Oliver's marvellous painting of Visayan spotted deers (*Rusa alfredi*). This is one of the species William helped to rescue from the brink of extinction by organising a conservation breeding program.





Ecology and Conservation



William Oliver – as I knew him

by Goutam Narayan

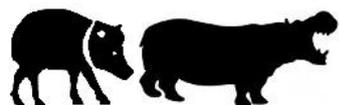
I have worked with William Oliver for almost 20 years and although he may not have been the easiest person at times, he had the most infectious enthusiasm, and deep passion, towards conservation of threatened animals, particularly the pygmy hogs. He had a remarkable sense of what needed to be done for recovery of pygmy hogs in India and a number of endangered species in Philippines where he mostly lived. And he would never make any compromise so far as the best interest of a species and its habitat was concerned. This often did not endear him to many, whose lethargic or bureaucratic ways he had little patience for. While he never had the skills to learn any local language of countries he worked in, he was a wonderful wildlife artist and had produced several illustrations and educative posters translated in local language popularising conservation needs of native threatened species. William was a remarkable character, and a conservation giant who has left a legacy that will be difficult to carry forward.

Some anecdotes about him:

1. William was not too fond of human kids but he simply adored animals. Once I spied on him looking longingly for several minutes at an orphaned juvenile stump-tailed macaque in solitary



William Oliver helping in re-capture of Pygmy hogs in Potasali, Nameri.





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confinement in a zoo cage in Guwahati, Assam. William's eyes were moist and it appeared he just wanted to cuddle and take the baby monkey home. For me this was a new side of a battle hardened conservationist who rarely displayed emotions. Not far from the zoo he once stopped the car he was travelling in, got off and started arguing with a horse-cart driver to stop as he was violently whipping his animal to pull his heavily laden carriage up a flyover.

2. William was a bit careless about how he dressed while in India or even in England. In my visit to Philippines, however, I realised he dressed rather well there! He would sometimes get complimentary air-tickets courtesy British Airways for Conservation in the 1990s. Once he arrived at Delhi airport and was happy like a child as he had been upgraded to the first class in the flight from London despite his appearance. But he wanted to go straight to a shoe shop from the airport. I saw that he was wearing an odd-looking pair of shoes and wasn't walking with ease. In the taxi he told me that he had worn the old pair after taking them out of his attic at home just

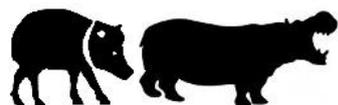
before he left for Heathrow airport. While walking to his seat on the flight he noticed small pieces of black rubber falling on the floor behind him, and then to his horror he realised that the soles of his shoes were disintegrating all over the carpet of the first class cabin. And by the time he landed in India, he had no soles left!

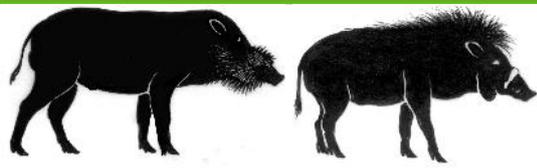


3. William used to speak fast, very fast if he was coming to India from England, and a little slower if was returning from Philippines. I was told by some of his friends that it wasn't often easy for some people even in England to understand him clearly. For most Indians he was non-comprehensible unless he slowed down considerably. But at times this had its advantage. A few officers, in order to avoid the embarrassment of having to admit that they do not understand him, used to take a safe passage of quickly agreeing with him. And thus at times he got away with arguments he wouldn't have otherwise with some indecisive bureaucrats. And was able to get some favourable decisions made for conservation of pygmy hog and its habitat!

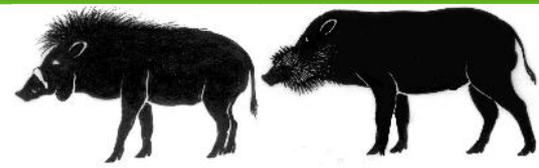
Goutam Narayan
Pygmy Hog Conservation Program (PHCP)
EcoSystems-India and Durrell Conservation
Wildlife Trust

William Oliver at Kaziranga, Assam.





Ecology and Conservation



William Oliver – Obituary for a friend

by Roland Wirth

William Oliver died in a hospital in Manila on 10th September 2014. An era has come to an end with his death.

Simon Stuart (Chair of the IUCN Species Survival Commission (SSC) said: “There are very few people who can judge themselves that they have prevented the extinction of a species with their passion and their vision. William is definitely one of these people”. Doug Richardson, head of Highland Wildlife Park in Scotland, wrote: “If we could all make as tangible a contribution to conservation as William did, the world would indeed be in much better shape.”

I met William first in Jersey Zoo almost 40 years ago, where he worked as a scientist for the legendary Gerald Durrell (whom I later also met due to William's assistance) then. At that time, William had already been head of IUCN SSC Wild Pig Specialist Group and was fighting for the survival for the once thought to be extinct but just rediscovered Pygmy hog (*Porcula salvania*) in North-eastern India. He fought with unbelievable power of endurance to establish the Pygmy Hog Conservation Programme for 20 years against the ongoing resistances of Indian bureaucracy. The Pygmy hog would have been extirpated without this project.

In this first meeting with William in Jersey we became very good friends and began a long-lasting cooperation. Together, we focussed on the Philippines. The conservation breeding projects for Visaya spotted deer (*Rusa alfredi*) and Visayan warty pig (*Sus cebifrons*) are two results of many activities we have initialized some 30 years ago.

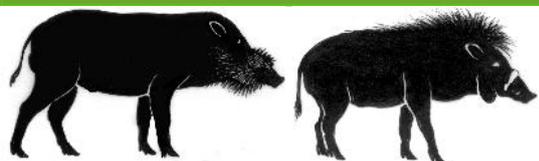
Later William relocated to the Philippines to coordinate the growing number of conservation projects there. He mostly worked voluntarily to use the donated money totally for the projects and for the payments of the Philippine assistants.

William had a high workload – most of the time he started his daily work at 5:00 or 6:00 am writing e-mails, project proposals and reports and continued to work not rarely till midnight. He



William Oliver (center) on a boat near to Palawan, Philippines in 1994 or 1995, taking Calamian deers (*Axis calamianensis*) to San Diego Zoo to initiate conservation breeding.





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coped with his workload by increasing amounts of cigarettes and alcohol in the last years. His body has taken a big toll for this working style.

William was not always easy to work with. On one side, he was very intelligent, dedicated and visionary, on the other side he could be rough-and-ready, undiplomatic and straightforward, if he had an opposite opinion or when conservation projects were not making progress.

All who knew him better, remember some of his tartly comments but most of all a unique man who dedicated his life to conservation of endangered species. The Pygmy Hog Conservation Programme in India, many different conservation projects on the Philippines and conservation breeding projects for several mammals and bird species are his giant heritage.

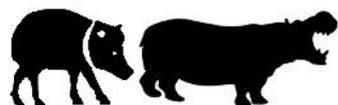
Unfortunately, the future of these projects is not secure in this world hunting for money and profit. Even the conservation breeding projects will only be successful for a long period, if more zoos take their duty more seriously and use more of their space for endangered species. William's giant dedication for species conservation is an example and obligation to all of us. Let us hope, that we will be able to look back in ten or twenty years and then will have managed well the

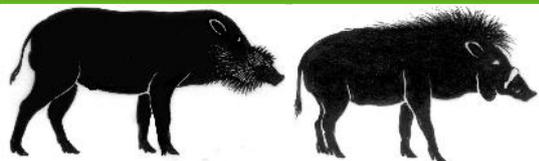
heritage of his projects and that the projects will have made progress. Thank you, William, my dear old friend, and rest in peace!

Roland Wirth
Zoological Society for the
Conservation of Species and
Populations (ZGAP)
Germany

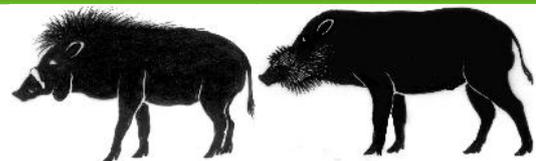
Source: ZGAP Mitteilungen 2/2014

A recent photo of William Oliver. His paintings are used for conservation and nature education and were also printed on stamps (e.g. in Djibouti, picture below).





Ecology and Conservation



Recognising the individuals who save species

by Andrew Terry

On the occasion of Goutam Narayan being awarded the RBS Save the Species award at the 69th annual World Association of Zoos and Aquariums (WAZA) Conference in India, we wanted to look back on two key individuals who have made the rescue of the pygmy hog possible.

Successful conservation relies on individuals; people who dedicate their lives to particular species or places; people who commit to the long-term with a clear vision of what they want to see change. Gerald Durrell was one of these individuals and he inspired a generation of naturalists to follow suit. We are extremely lucky to have had a number of these people work with us over the years leading our conservation programmes both overseas and in the park. I want to take this opportunity to celebrate two of these dedicated individuals who have both shaped the direction of one of our flagship species programmes – the Pygmy Hog Conservation Programme.

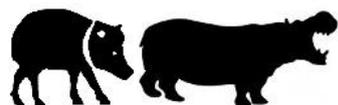
Standing just 30 cm at the shoulder, the pygmy hog (*Porcula salvania*) is the world's smallest and most threatened hog species, but it lives in a big world. Its habitat is the strip of rich tall grasses that runs along the foothill plains south of the Himalayas in Northern and Northeastern India.

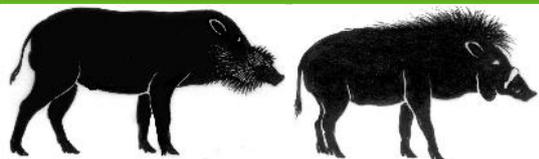
These grasses grow to over three metres in height each year, enough to hide the hog's large neighbours which include elephant, one-horned rhino, tiger and buffalo. Shaped like a bullet, with no discernible neck, the hogs are perfectly designed for running through the grasses at speed. However, being shy and secretive, they are rarely seen and once the grasses have grown, they are nigh on impossible to track. But these grasses have been under great threat from habitat change, over-exploitation and too frequent burning; all of which greatly reduces their diversity and reduces the quality of the habitat for many species such as the hog.

It is the story of how we came to take on this diminutive hog that brings me back to the individuals that make conservation happen. Over 50 years ago the hogs were thought to have gone extinct, having not been seen for years. But they re-appeared dramatically in 1971 with a of number them being flushed out of a scrub fire around Barnadi Reserve Forest and then shortly afterwards being seen for the first time in Manas Wildlife Sanctuary (as these PAs were known then). In fact they were found in a number of small pockets around these areas, sadly, however they were all lost in

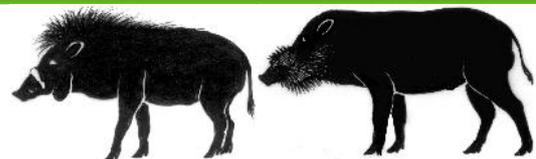


Goutam Narayan with a pygmy hog. © Simon de Trey-White





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the years subsequent to this and the only remaining wild population was in Manas. It was at this point that the first of our individuals became involved, William Oliver, who very sadly passed away in September last year, had joined Durrell in 1974 as a mammal keeper, and he undertook the first extensive field surveys for the species in 1977. This was a life changing experience and he became a passionate advocate for the pygmy hogs and wild pigs in general. It took another 18 years of hard work, surveys and persistence to form a shared agreement between the Government of India, Assam, IUCN and Durrell around an Action Plan for the species governed by a collaborative agreement between the partners. In fact this was the first agreement of its kind in India and the conservation breeding programme that followed was the first for a wild pig.

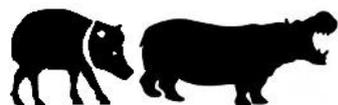
With the launch of the programme in 1995, the second of our key individuals joined the picture and that is Goutam Narayan. With now only one population of hogs remaining, the situation was precarious. Goutam oversaw the development of the captive breeding centre at Basistha with funding secured from the European Union, fieldwork in Manas and other sites to survey remaining hogs and to identify how we could improve the management of the grasslands. Founder animals were captured in Manas (six animals, of which three females were pregnant), and the breeding programme began. From 2002 onwards release plans were starting to formulate. Concerns that all the eggs were in one basket (Basistha centre), also promoted the search for a second facility that could act to acclimatise animals ahead of release. Equally the process began to select release sites. In 2006 the team selected a site called Potasali bordering Nameri National Park, as a pre-release facility and the first group of hogs to be released were moved there. Getting used to life without human intervention the hogs were maintained in large densely planted enclosures before being released into Sonai Rupai Wildlife Sanctuary, after working there to restore the habitat for two years. From this beginning the programme has gone on to release a total of 85 hogs into two sites, the second being Orang National Park.

Goutam and his team have ensured that the pygmy hog now remains in an active captive breeding programme in two sites and has been released to two protected areas separate from the remaining wild population. The Pygmy Hog Conservation Programme has truly been a great success which rightfully earned William the 2013 inaugural Balipara Foundation award and now Goutam has won the RBS Save the Species award. It has been their dedication and commitment, which has overcome many challenges to save this species.

But we are not completely out of the woods yet and Goutam's job is not done (is it ever for a conservationist?) There is real concern about the health of the original wild population, which could now be lower than 200 individuals. Also as we complete a period of collaboration with all the partners, we will be reviewing our progress over the years and developing a new Species Action Plan in 2015 that will set a new strategic direction for this charismatic, if tiny, conservation flagship. So watch this space, as we congratulate Goutam on this well-deserved award, we also look forward to the future for the pygmy hog.

Andrew Terry
Durrell Wildlife Conservation Trust
<http://www.durrell.org/wildlife/species-index/pygmy-hog/>

Source:
<http://www.durrell.org/blog/recognising-the-individuals-who-save-species/>





Ecology and Conservation



Records of Mindoro Warty Pig (*Sus oliveri*) in the interior of Mindoro Island - Philippines

by Emmanuel Schütz

In 2012, the French non-profit organization Noé Conservation, in collaboration with Filipino institutional stakeholders (Tamaraw Conservation Program – Department of Environment and Natural Resources, Provincial Government of Occidental Mindoro) and local partners, has launched a Tamaraw / habitat assessment in order to update the status of the endemic and critically endangered Tamaraw (*Bubalus mindorensis*). Thanks to the relevant incitation of William Oliver (former director of program development and conservation partnership at the Philippines Biodiversity Conservation Foundation), the scope of the investigation was broadened to the Mindoro Warty pig (*Sus oliveri*) and the Philippines brown deer (*Rusa mariana barandana*), both endangered and neglected species.

Therefore, most of the following information comes from the results of this investigation.

The Mindoro warty pig was recognized as a separate species from *Sus philippensis* according to Groves (2001). Nevertheless, little is known of the biology of the species due to a lack of studies and interest from local stakeholders and conservation bodies. It is classified as “Endangered” on the Red List of the IUCN.

The area covered by the present survey extends across most of the southern and western part of Mts Iglit-Baco

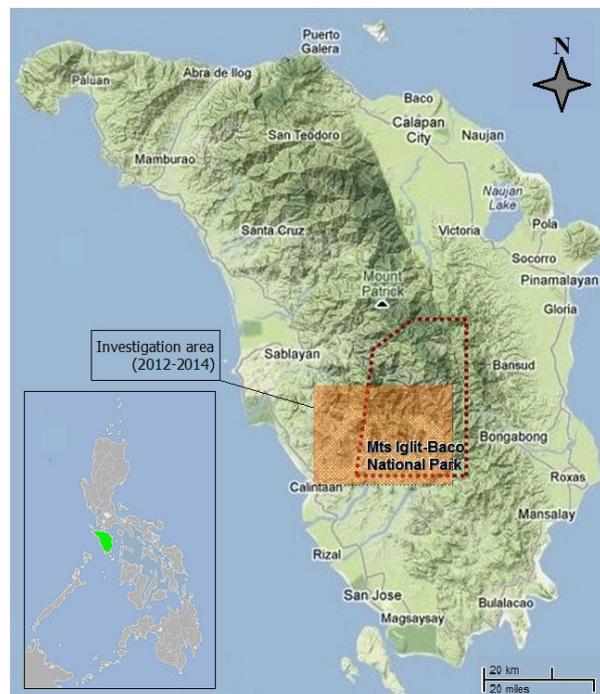
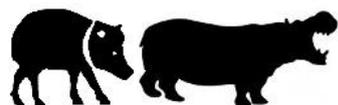


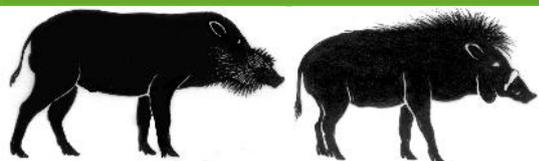
Fig. 1: Map of Mindoro showing the borders of Mts Iglit-Baco National Park and the extend of the investigation area 2012-2014.

National Park (75445 ha), the largest protected area of Mindoro situated in the center of the Island. The survey overlaps with the ancestral domains of the mangyan indigenous tribes lying on the western edge of the Park and encompasses most of the Aruyan Malate Tamaraw Reservation area (Sablayan district) (Fig. 1). The



Fig. 2: Rangers getting information from indigenous people encountered during exploration. © E. Schütz





Ecology and Conservation



goal of the assessment is to explore poorly known, under surveyed or even un-explored areas of the inner Mindoro Island in order to get a clear overview of the ecological and socio-cultural situation of the region. It intends to get beyond the regular monitoring zone of the park's management (which actually covers less than 20 % of the park's extent). So far, nearly 800 km² have been assessed and shall be completed with new exploration in 2015.

Due to the rough and difficult terrain as well as legal restrictions within mangyan territories, only non-invasive techniques were used to collect data:

- field records of indirect signs of presence with GIS position storage
- interviews of tribal leaders and information gathered from indigenous people encountered during field exploration (Fig. 2)



Fig. 3: Domestic pig strain in a mangyan community. © E. Schütz

These preliminary results show that the Mindoro warty pig is broadly found within the area of investigation. Evidence was reported at each exploration. Tracks were spotted in a various range of habitats (forest, river banks, creeks, grassland, swamps, crops and forest under regeneration) from an elevation of 240 m up to 1360 m (Mt. Talafo) and 1700 m (Mt. Wood).

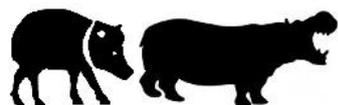
The species seems to avoid valleys of the center of the Island (Lumintao River,

Busuanga River) that are characterized by steep river's banks, a dry landscape and a scarcity of forest patches. In contrast, many tracks were found along forested cricks and wooded slopes indicating the importance of wooded corridors to connect valleys and allow animals to disperse.

The species seems to be quite common in mid elevation areas occupied by Mangyan indigenous people. In these areas, indigenous communities preserve a traditional lifestyle based on hunting and slash and burn agriculture. Several tribes remain very elusive and avoid strangers ("people wearing clothes"). Many tracks were found in mature secondary forest as well as agricultural plots under regeneration (shrubs, thicket and young secondary forest). This observation suggests that the warty pig finds suitable conditions in areas under a pattern of land use with shifting agriculture, despite human density (that can be locally high) and hunting pressure.

The Mindoro warty pig is indeed a traditional source of meat for mangyans, especially among remote tribes who do not have domestic animals. Animals are hunted using pitfall traps, snare traps, spear traps, or spear hunt and driven hunt. Mangyans are not really keen on talking about this topic, thus the number of animals harvested is not easy to evaluate.

Mangyan tribal leaders report persistent intrusion of lowlander Mindorenos poachers using rifle, dogs and even hiring mangyans from other tribes as trackers. Poachers violate ancestral domains to reach territories that preserve substantial wildlife resources (unlike lowland areas). Moreover, the Park's rangers assess that poachers are regularly detected within the "core zone" of the





Ecology and Conservation



Fig. 4: Typical landscape of mid-elevation areas occupied by IPs performing traditional land use (mosaic of mature forest, crops, plots under regeneration, grassland and settlement). © E. Schütz

monitoring. This highlights a dramatic lack of law enforcement and proper monitoring capacities. Furthermore, there is no real record of the number of animals killed on Mindoro but poaching might currently represent the main threat to the species.

Risk of inbreeding between the Mindoro warty pig and domestic strains in mangyan settlement is very likely. Nevertheless, the rate of hybridization has not been evaluated and no studies are planned on that issue.

The warty pig is very elusive and rarely observed. So far there is no good picture of the species available. Furthermore, collect and transportation of biological

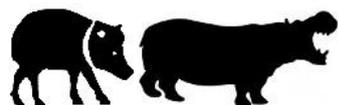
materials is prohibited, thus making anatomical investigation rather difficult.

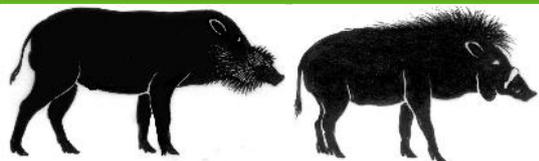
Anyway, these observations suggest that the species might remain relatively abundant in areas of mid elevation, especially those where indigenous people preserve traditional land use pattern and moderate hunting pressure. It shall be also quite common in mountainous areas with substantial extent of forest. Those results and assumption could be extrapolated to other areas with similar bio-geographical and human context.

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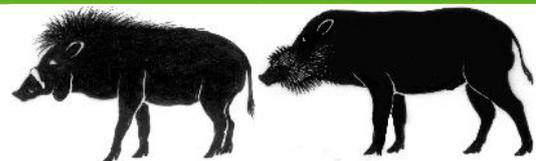
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IUCN Red List Status 2008

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Ecology and Conservation



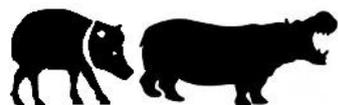
Preliminary results of the first ecological study on Bawean warty pigs *Sus blouchi*

by E. Johanna Rode-Margono and Mark Rademaker

The Bawean warty pig (*Sus blouchi*) is endemic to Bawean island, a small island of 200 km² located 150 km into the Java sea from East Java. Based on morphological measurements, Bawean warty pigs have been considered as a separate species from the Javan warty pig (*Sus verrucosus*) that is endemic to Java island (Groves & Grubb, 2011). On the IUCN Red List Bawean warty pigs are still listed as a sub-species. Both taxa have been categorised as Endangered, but are not protected by Indonesian law.. According to an ethnobiological survey conducted in 2006, Javan warty pigs only remain in nine isolated locations on Java (Semiadi and Meijaard, 2006). Populations are believed to decrease further due to hunting activities such as pest control and the expansion of agriculture land and production forest (Semiadi and Meijaard, 2006; Semiadi and Nugraha, 2009). Competition and hybridisation with the banded pig (*Sus scrofa vittatus*) is possible but currently unknown (Meijaard, 2014). Although there are efforts to establish an ex situ conservation breeding population founded with rescued individuals (Meijaard, 2014), the contribution to conservation by captive populations is still negligible. Finally, no one has ever studied the species' ecology in the wild (Meijaard, 2014). This information is however needed to plan effective conservation.

In November 2013 a workshop on Javan and Bawean warty pigs was organised by the IUCN Wild Pig Specialist Group. The recommendation concerning Bawean warty pigs was to initiate an ecological study on Bawean Island to better understand ecological needs, to conduct an interview-based assessment of threats and to perform a DNA analysis to confirm the taxonomic status of the Bawean warty pig (Meijaard et al., 2014). In November 2014 we started the first conservation research project on Bawean warty pigs „Bawean Endemics Conservation Initiative“ (BEKI). The aim of this project is to lay the basis for an effective conservation planning and long term monitoring programme. The required baseline data is acquired through collecting data on the population size, distribution, biology, ecology and taxonomy of the species. As local communities will play a significant role in the conservation of this legally unprotected species, we also conduct interviews with local community members to investigate their knowledge and attitude towards wild pigs and the threat of hunting. The project runs for one year and may be extended, and expanded to Java mainland depending on funding.

Population size will be calculated using camera trapping following Rowcliffe et al. (2008) where camera traps are placed randomly in the study area. In our case this is Bawean Nature Reserve. Videos will also be used to investigate activity patterns and social group size, the latter being important for ex situ conservation breeding schemes. We are analysing the habitat around trapping locations and compare it to available habitat. This will show whether the animals have certain habitat preferences. Although not confirmed yet, the banded pig is also believed to occur on Bawean. We will compare the habitat use of Bawean warty pigs and the banded pig in order to detect coexistence or competition. Although spot-lighting of pigs is rather difficult, these data will be supplemented by the conduction of nocturnal line transects (Buckland et al., 2001). We use semi-structured interviews to investigate the ecological knowledge of farmers and other local people and their attitude towards pigs, including perceived loss of crops and information about





Ecology and Conservation



hunting activities (Bernard, 2011). Results will be related to social, religious and economic aspects. Camera traps will be installed at likely crop-raiding sites during the wet weather period starting in January to collect detailed information about crop-raiding activities. This information will be used to discuss alternative protection measures that are effective but do not harm the pig population. Finally, we plan to collect biological samples when pigs are hunted in the wet weather period in order to confirm the taxonomic status of the Bawean warty pig.

So far we can confirm the findings of Semiadi and Meijaard (2013) that the Bawean warty pig still exists on Bawean island. Our twenty camera traps have so far revealed several videos showing male warty pigs (Fig. 1) who are easily distinguishable from banded pigs (Meijaard, 2006). Encounters of females or immatures (Fig. 2) must be interpreted carefully as they may look similar to female and immature banded pigs that possibly coexist on Bawean island. Data must eventually be confirmed by genetic analysis. Transects have not yet revealed any pigs, confirming that pigs are difficult to be detected in spot-lighting surveys. First interview results show that farmers perceive pigs as the main threat to their crops. The economy on Bawean is very weak and thus loss of crops is perceived as a severe threat of livelihoods. Especially during the wet weather period pigs are hunted intensively, however, apparently only if they leave the forest as hunting is prohibited in the Nature Reserve.

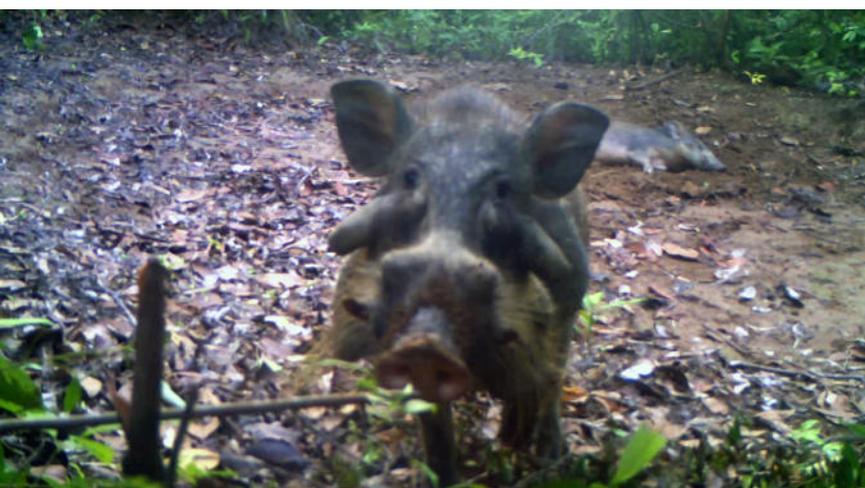
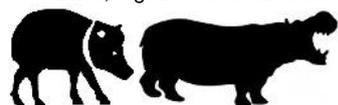


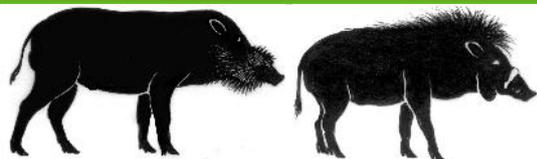
Fig 1 (above): Male Bawean warty pig at a mud hole, female in the background.

© BEKI; Fig. 2: Female Bawean warty pig encountered during a nocturnal transect.

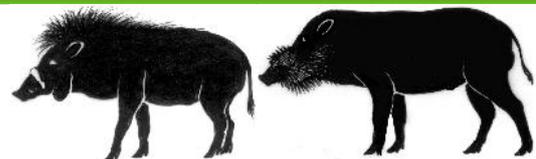
© Simen Blokland

These preliminary results are promising in respect to the likely existence of a relatively healthy population of Bawean warty pigs. On the other hand pigs are hunted intensively which - depending on the actual population size in the protected Nature Reserve - can be an acute threat to the species. Responses of interviewees show the willingness of local people to stop hunting if alternative crop protection measures are found. Overall, the situation on Bawean calls for a long-term conservation project that continues research on behaviour and ecology of Bawean warty pigs, monitors their population, actively acknowledges the economic situation of local people by collectively working on crop-raiding solutions and tries to win the support of local communities by socialisation, education and awareness programmes. As Bawean and Javan warty pigs are probably very similar, our data about ecological needs will benefit reintroduction programmes that are currently planned by the IUCN Wild Pig Specialist Group.





Ecology and Conservation



Acknowledgements

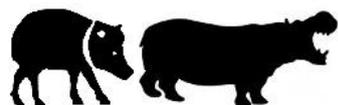
We would like to thank our Indonesian counterpart Dr. Gono Semiadi from LIPI, Erik Meijaard from the IUCN Wild Pig Specialist Group and Mr. Nursyamsi from Bawean Nature Reserve Management for their support, and our field assistants Simen Blokland and Shafia Zahra for their help. This project is conducted under the permission of RISTEK, and is funded by the People's Trust for Endangered Species, LA Zoo and ZGAP.

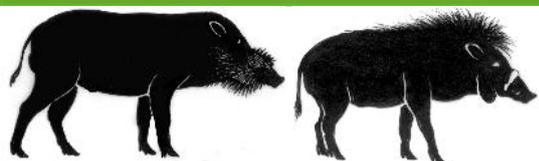
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Ecology and Conservation



Bearded Pig nests

by Erik Meijaard

The photos below were sent to me from northern Central Kalimantan (Indonesian Borneo). They show a sizeable mass of vegetation, which the photographer, an experienced local wildlife tracker, identified as a Bearded Pig (*Sus barbatus*) nest. The leaves are fresh indicating that the nest is unlikely to be much older than a few days. The photographer reported that the nest was only used for farrowing and that sows give birth of this nest. The photos were made on January 7th, 2015. Together with observation of young piglets seen in November 2013 (Meijaard, 2014), this indicates an approximate Bearded Pig farrowing season in this area between November and January.

Reference

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Ecology and Conservation



Peccary and babirusa art

by Alexine Keuroghlian

Kitty Harvill is well-known for her wildlife and conservation-themed artwork. She is the recipient of numerous awards, such as: "Artists for Conservation", "The Wildlife Art Society International Award", and "Award of Merit in Guests Gallery's 4th International Animal Arts Contest". She has also received awards for illustrating books, such as "WISDOM, the Midway Albatross", which won the first place award in the children's picture book category of the Writer's Digest annual competition in self-publishing, and was a finalist for the 2013 Indie Book Award. Although her body of work as an artist is already extensive,

http://www.natureartists.com/artists/artist_biography.asp?ArtistID=1470,

she continues to create amazing pieces that capture the beauty of wildlife and nature. Kitty regularly creates artwork that contributes to wildlife conservation efforts, including the recent book "Abayomi: the Brazilian Puma".

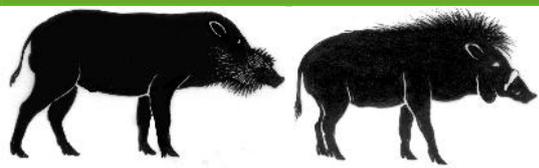
White-lipped peccaries, which occur from southern Mexico to northern Argentina are important bioindicators of healthy and intact forests and ecosystems, and unfortunately are increasingly threatened by habitat loss and hunting. When WCS-BRASIL's team needed an innovative way to help protect the species and educate rural communities about its importance, they contacted Kitty and proposed that the species be the "challenge" for her group of artists that contribute to the, "52 weeks - Nature Painting Challenge" group on Facebook. The creativity and generosity of the artists resulted in over 38 peccary paintings showcasing a wide range of artistic styles, and capturing the peccary's social behavior, environment and charm. These inspirational pieces of art will help raise awareness about the plight of the species and will be an important contribution to environmental education and conservation efforts throughout the many Latin American countries, where the species is threatened.

All the artwork can be found on the IUCN Peccary Specialist FB page:

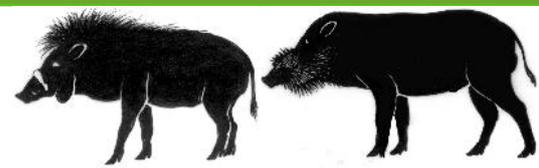
<https://www.facebook.com/media/set/?set=a.887798817914615.1073741832.589402117754288&type=1>

The paintings below page are contributions from a group of artists from the "52 weeks _ Nature Painting Challenge" coordinated by Kitty Harvill. There is one painting of Kitty's in this collage.





Ecology and Conservation



Similarly to the art shown on page 20 the artist group produced a collage of babirusa paintings, see below.

The collage can be found on

<https://www.facebook.com/photo.php?fbid=371005579740471&set=oa.197797343749526&type=3&theater>





Physiology and Anatomy



Record wild boar tusk from Turkey

by Halvdan Nicolaysen

In July 2012 I arranged an escape from beach life with the family. This was in Antalya, Turkey. The escape was a trip up in the nearby Taurus Mountains. The purpose was to help the local farmers get rid of some of the marauding wild boar.

Figure 1 gives a good indication of the landscape. Notice that there are no signs of logging. The village in the background is called Cevizli. From what we gathered from the friendly, German-

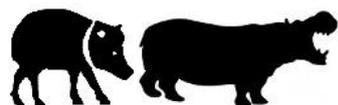


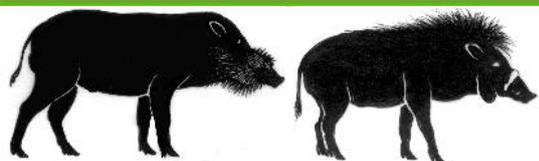
Fig. 1: The author in the area where he shot the wild boar.

© H. Nicolaysen

Fig. 2: Jawbones of the freshly killed wild boar.

© H. Nicolaysen





Physiology and Anatomy



speaking locals, the name means “Walnut”. An interesting naming convention, for sure. The surrounding mountains are known for their healthy population of Bezoar ibex (*Capra aegagrus*). Beautiful animals and noteworthy for being a progenitor of the domestic goat. I ended up shooting the boar on the images (Fig. 2-4).



Fig. 3: Canines and tusks Jawbones of the killed wild boar.

© H. Nicolaysen

From your excellent site I find that this must be a *Sus scrofa lybicus*.

Keep up the good work and keep letting amateur naturalists like me learn about all the wonderful pigs out there.

Halvdan Nicolaysen
Oslo, Norway

Note from the Editor

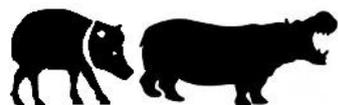
Suiform Soundings infrequently publishes hunting accounts of wild pigs when they are of relevance to the broader issue of wild pig conservation and taxonomy. The above story is of potential taxonomic interest (understanding subspecies characteristics in *Sus scrofa*). Also, I am interested in the societal processes that are taken place in Eurasia where *Sus scrofa* populations are recovering in many places. I therefore wish to draw more attention to knowledge from hunters and others who are dealing with wild pigs.

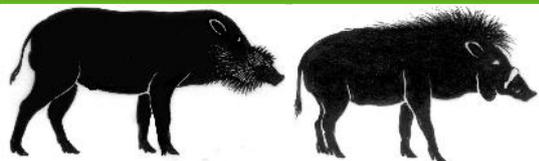
As you can see the upper canine was damaged and the lower was free to keep on growing. When I shot the pig the tip of the tusk was less than a cm from growing into its head.

The tusk was 41.5 cm long. I have checked around and this is the longest tusk ever recorded by a hunter.

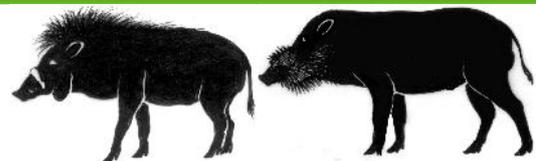


Fig. 4: Padded head of the wild boar. © H. Nicolaysen





Papers and Communications



Reproducción de pecarí de labios blancos (*Tayassu pecari*) en la reserva ecológica La Otra Opción, Catemaco, Veracruz, Méxco

Captive breeding of White-lipped peccary (*Tayassu pecari*) in the ecological reserve “La Otra Opción”, Catemaco, Veracruz, Mexico

Edith Carrera Sánchez, Francisco José Gómez Marín, Kurt Knopfmacher Dugelby y Arturo M. Knopfmacher Basañez
Fotografía: Diana Caballero Alvarado

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Instituto Tecnológico Superior de San Andrés Tuxtla, fjpgmedith@hotmail.com

Abstract

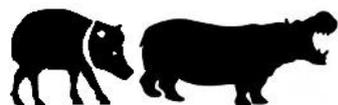
The ecological reserve “La Otra Opcion” is located in the Biosphere Reserve of Los Tuxtlas in Veracruz State in Mexico. Since 2010 this reserve is breeding a captive herd of white-lipped peccaries with reintroduction purposes. In four years the initial herd of ten individuals (two males, six adult females and two juvenile females) have increased to 24 (six males, 12 females and six juveniles). This is a report on breeding success and mortality rate during the first four years of this effort to breed this species in captivity for future reintroduction goals.

Resumen

La Reserva Ecológica La Otra Opción está localizada en la Reserva de la Biosfera Los Tuxtlas en el estado de Veracruz, México. Desde el 2010 mantiene en condiciones de cautiverio a un grupo de pecarí de labios blancos. En estos cuatro años, la piara inicial formada por 10 individuos (dos machos, seis hembras y dos hembras juveniles) se ha incrementado hasta tener actualmente 24 individuos (seis machos, 12 hembras y seis infantiles). En este reporte se presenta el análisis de los nacimientos y muertes de crías ocurridas durante estos años.

Introducción

La Reserva Ecológica La Otra Opción, es una reserva privada manejada por la Asociación Civil del mismo nombre. Colinda con la zona núcleo II “Sierra de Santa Marta” de la Reserva de la Biosfera Los Tuxtlas en Veracruz. El terreno anteriormente estaba dedicado a la ganadería siendo ocupado en su mayoría por potreros. En el 2007 iniciaron las actividades con la restauración de 60 ha en las cuales se plantaron 75 mil árboles de 55 especies nativas. En el 2011 se realizó el primer análisis de sobrevivencia de las áreas reforestadas, dando como resultado una





Papers and Communications



sobrevivencia de 52%, así como una media de 2,500 árboles por hectárea (Lutz, sin publicar). En La Otra Opción, hay tres vertientes de trabajo: la restauración ecológica, el manejo intensivo de fauna y flora nativas amenazadas e inclusive extirpadas de la región de Los Tuxtlas y la colaboración con instituciones académicas y de investigación para realizar estudios sobre los recursos naturales de la zona. Además, se oferta hospedaje en cabañas, recorridos por senderos interpretativos y talleres de fotografía de naturaleza y manejo de vida silvestre.

A partir del 2010 inició el programa de reproducción en cautiverio de cuatro especies de mamíferos: pecarí de labios blancos (*Tayassu pecari*), tepezcuintles (*Cuniculus paca*), serete (*Dasyprocta mexicana*) y temazate (*Mazama temama*); y dos de aves: Hoco faisán (*Crax rubra*) y tucán real (*Ramphastos sulfuratus*).

En el 2014, el Instituto de Biología de la UNAM llevó a cabo la rehabilitación final y liberación de 27 ejemplares de guacamayas rojas (*Ara macao cyanoptera*) en las instalaciones de La Otra Opción después de 40 años de ausencia de esta especie en la región.

Sitio de estudio

La Otra Opción se encuentra entre los 847 y 1,100 metros sobre el nivel del mar. Tiene una superficie de 136 hectáreas y se ubica al sureste del estado de Veracruz (FIGURA 1). Se pueden distinguir tres zonas de vegetación: Bosque Mesófilo de Montaña, área de restauración y el sitio de regeneración natural. Es en esta última zona, la más perturbada, donde se encuentran las instalaciones y se realizan las actividades de manejo intensivo de la vida silvestre.

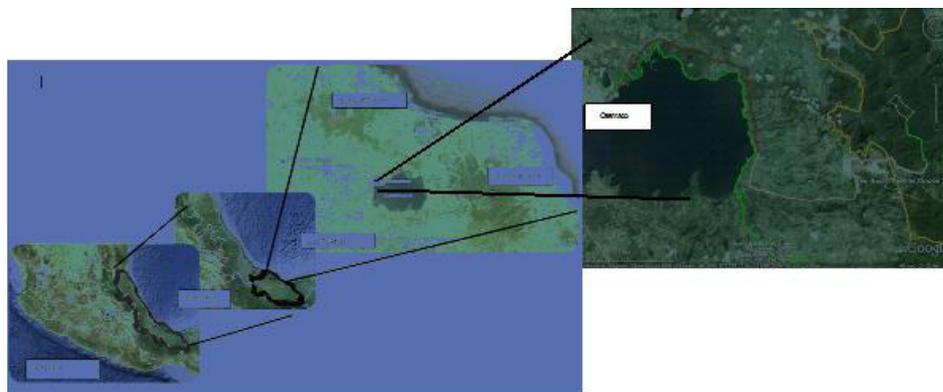
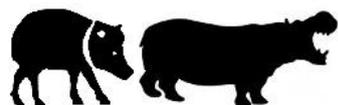


FIGURA 1. UBICACIÓN DE LA REGIÓN DE LOS TUXTLAS, VERACRUZ, MÉXICO Y RESERVA LA OTRA OPCIÓN .

La zona es una de las más lluviosas de México, en algunas partes la precipitación anual supera los 4,000 mm. De noviembre a febrero los desplazamientos de masas de aire polar se cargan de humedad en el mar y llegan con lluvia y vientos fríos. El mes más seco generalmente es mayo y los más lluviosos van desde julio hasta noviembre (Soto, 2004).

El pecarí de labios blancos (*Tayassu pecari*) es una de las dos especies de la familia Tayassuidae de México. Está catalogada por la NOM-059-SEMARNAT-2010 como en “Peligro de extinción”. En Los Tuxtlas se consideraba extinta desde los años ochenta (Coates-Estrada & Estrada, 1986); el Dr. Argudin, en su libro “Relatos de Cacería en el Sureste de México” (1973) todavía la suponía abundante. Es un ungulado de tamaño mediano con el hocico alargado y que termina en un disco nasal. Su actividad es predominantemente diurna y forma manadas de hasta 100 individuos que pueden desplazarse 10 km diarios. Son omnívoros, aunque se alimentan principalmente de frutos y semillas. Alcanza la madurez sexual entre los 12 y 24 meses de edad (March, 2005). En cautiverio se ha reportado un periodo de gestación de 156 a 162 días (Sowls, 1984) y la edad de destete de seis meses (Gottdenker & Bodmer, 1998).

Para La Otra Opción, en el 2010 se adquirieron 10 individuos de pecarí de labios blancos de la UMA Bellreguart de Sochiapa (Veracruz). Originalmente, nueve de estos individuos provenían de





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Guatemala: un macho adulto y ocho hembras (cinco adultas, dos juveniles y una infante) y un macho adulto de Chiapas. Dos hembras llegaron preñadas de un macho guatemalteco. El macho chiapaneco fue traído para renovar el pool genético y desde que llegaron se comporta como macho alfa.

Su encierro tiene una superficie de dos hectáreas (200 por 100 m) y está construido con malla venadera de dos metros de alto enterrada medio metro y circundada por un cerco eléctrico. En la parte central hay una división lo cual permite hacer movimientos del grupo, ocupando medio año cada lado, con el fin de que el área libre se recupere de los problemas de erosión que provocan los ejemplares por sus costumbres de hozar la tierra. Presenta vegetación secundaria y árboles plantados durante la reforestación, además lo cruza un arroyo por lo que los animales tienen agua disponible todo el tiempo. Ambas divisiones están conectadas a un pasillo lateral que conduce a una manga de manejo para facilitar el trabajo con los animales. La dieta de los animales está compuesta de alimento balanceado, maíz, plátano, elotes y chayotes; ocasionalmente, y de acuerdo a la temporada, frutos y semillas silvestres recogidos dentro de las instalaciones. Los animales se encuentran marcados con microchips.

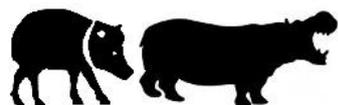
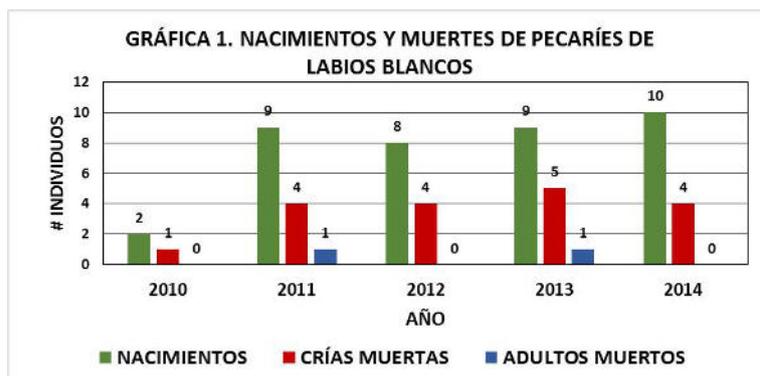


Resultados

En los cuatro años que llevan los pecaríes en La Otra Opción, se han registrado 38 nacimientos de los cuales 18 han muerto. Esto nos da una sobrevivencia del 52% hasta la edad promedio reportada de destete para esta especie. En este periodo, solamente se han tenido dos decesos de animales adultos (Gráfica 1).

Los primeros ejemplares nacidos en la reserva (2010) fueron de dos hembras que llegaron gestantes a las instalaciones. Estos individuos parieron una sola cría, el primero fue un macho que murió a los tres meses de edad y el segundo una hembra que continúa viva. Ambos nacieron en el mes de agosto.

Los nacimientos siguientes ocurrieron un año después de que llegaron los animales (2011). Se tuvieron nueve de los cuales cuatro ocurrieron en junio y cinco en agosto. Cuatro fueron partos dobles y dos partos de una sola cría. Todos los nacidos en el mes de agosto murieron en los siguientes cinco meses (dos en septiembre, uno en octubre, otro en diciembre y uno más en enero). Las muertes coincidieron con días de mucha lluvia y frío. En el 2012, seis nacimientos ocurrieron en julio y dos en agosto, todos de partos dobles. Nuevamente los individuos de agosto murieron, aunque esto ocurrió el mismo día de su nacimiento ya que coincidió con la entrada a la zona de la tormenta "Ernesto" que trajo mucha lluvia y frío. Para el 2013 se registró un nacimiento de una sola cría en el mes





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de febrero, un parto doble en mayo (uno de ellos murió en diciembre del mismo año) y tres partos dobles en el mes de julio. De estos uno murió a los 26 días, otro a finales de agosto y dos más en diciembre.

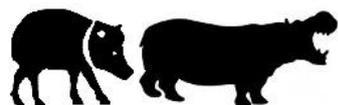
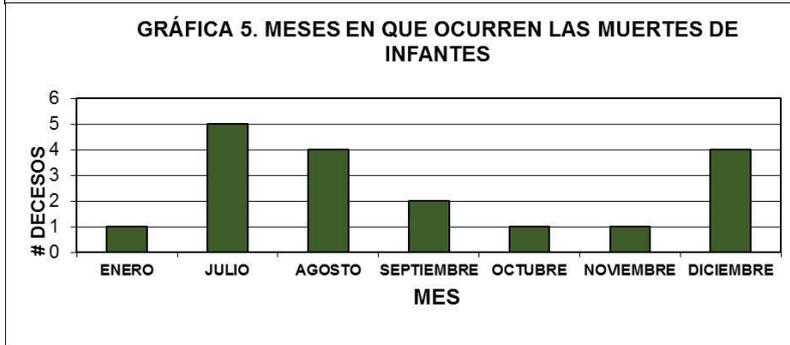
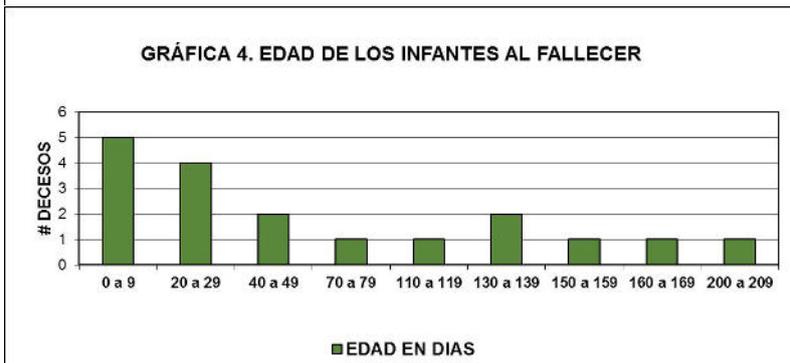
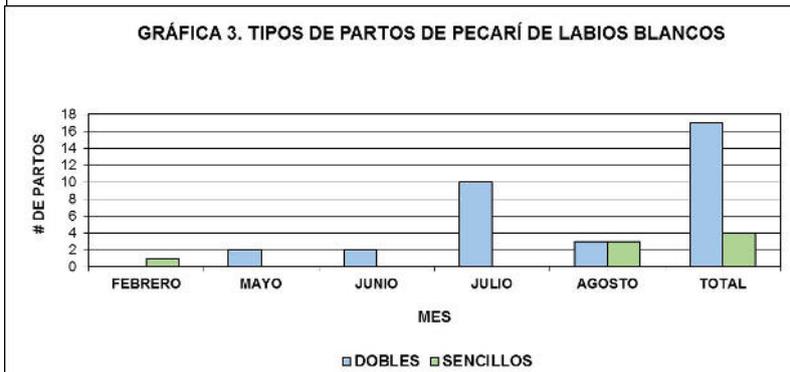
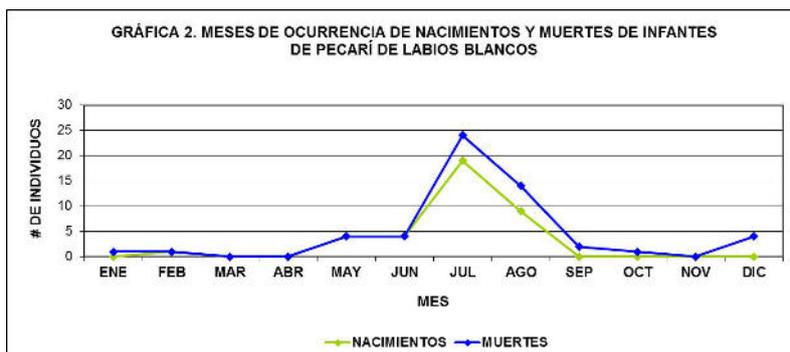
Hasta noviembre de 2014, se ha registrado un parto doble en mayo y cuatro partos dobles más en julio. De los nacimientos de julio, uno murió al día siguiente, otros dos a los 20 días y uno más a finales de agosto.

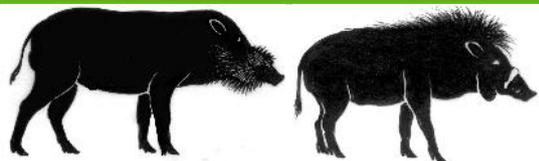
En general, los nacimientos ocurren entre los meses de mayo a agosto, con un único nacimiento ocurrido en el mes de febrero (Gráfica 2). La mayoría de los partos son dobles (89.47%) (Gráfica 3).

La edad promedio a la que ocurren los decesos es de 65 días, el rango de muertes va desde un día de nacido hasta 209 días (Gráfica 4). Los decesos ocurren en la estación de lluvias (Gráfica 5), pero particularmente durante periodos de lluvia prolongada y abundante y temperaturas relativamente bajas, mostrándose una coincidencia de los picos de nacimientos y muertes a lo largo del año; lo cual es de esperarse, dado que las muertes de las crías ocurren a baja edad. Sin embargo, en las observaciones de campo se ha observado que los individuos nacidos en los meses de la época seca, tienen más posibilidades de sobrevivir ya que para la época de lluvias y fríos se encuentran de mayor edad y con más independencia de la madre en cuestión de alimento.

Discusión

En La Otra Opción han ocurrido nacimientos de pecaríes de labios blancos desde el primer año en que llegaron a las instalaciones aunque estos fueron de hembras que ya venían preñadas. Es preciso notar que todas las hembras adultas de la piara han parido, inclusive aquellas que llegaron jóvenes. El grupo necesitó un periodo de adaptación a las nuevas condiciones del sitio, por lo que los nacimientos de hembras preñadas ya en las instalaciones ocurrieron hasta el año siguiente de su llegada. Si consideramos un periodo de gestación de alrededor de seis meses, las primeras hembras fueron preñadas a los ocho meses de su llegada, es decir, alrededor del mes de noviembre. En estos





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años, se han visto algunas montas pero no se ha observado que estén asociadas a nacimientos, por lo que consideramos que no han sido viables. Aunque los reportes indican que se pueden reproducir todo el año (Leopold, 1959), hay una mayor frecuencia en los meses de abril y junio, coincidiendo con las épocas de mayor disponibilidad de alimento (March, 2005). Reportes de nacimientos en Brasil, indican una tendencia a que los nacimientos ocurran en la primavera (Sowls, 1984). En La Otra Opción, los nacimientos han ocurrido con más frecuencia en los meses de mayo a agosto. Sin embargo, en los últimos dos años, ya no ha habido partos después del mes de julio.

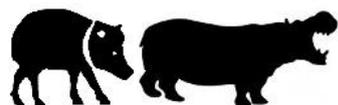
Conclusiones y recomendaciones

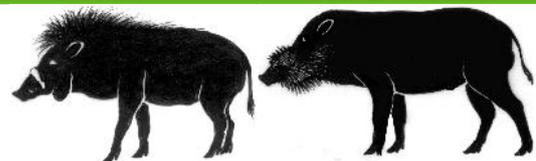
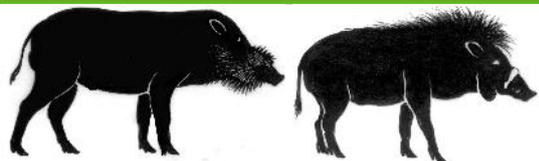
La información anterior permite llegar a las siguientes conclusiones: desde su llegada, todos los años han habido nacimientos de los pecaríes de labios blancos en la Reserva Ecológica La Otra Opción. Se tiene un 52% de sobrevivencia de las crías hasta la edad promedio del destete. A partir de esa edad solamente se registró la muerte de dos adultos, el de una hembra ocurrida por problemas respiratorios y el de un macho al ser atacado por el macho dominante. Los primeros seis meses de vida son críticos para la supervivencia, dadas las condiciones climatológicas de la zona en la que se encuentran. El encierro puede estar demasiado expuesto a las inclemencias meteorológicas y los animales tienden a deteriorar el suelo. Se han tomado medidas para mitigar los decesos infantiles proporcionando al grupo mejores refugios durante las épocas de mayor frío y humedad, reforzando la alimentación, el seguimiento y supervisión del estado de salud de los individuos, particularmente de las crías. Algunos sitios del encierro con mayor ocupación por los animales han sido reforzados para evitar mayor erosión. Los individuos pueden estar aun adaptándose a las condiciones del sitio, pero se nota una tendencia a que no ocurran más partos después del mes de agosto. Sin embargo, hace falta una mayor muestra para afirmar esta hipótesis.

Por lo anteriormente expuesto, se propone: Realizar un estudio de los factores que afectan la reproducción y supervivencia de la piara. Promover la realización de estudios etológicos, particularmente respecto al cuidado materno y alimentación de las crías. Analizar la mortalidad de las crías y número de camada en relación a factores climáticos. Proporcionar sitios más secos y resguardados del viento, humedad y de la lluvia.

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Sex identification of white-lipped peccary (*Tayassu pecari*) by multiplex PCR with ZFX and ZFY specific primers and cross-amplification in collared peccaries (*Pecari tajacu*)

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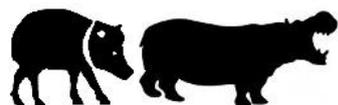
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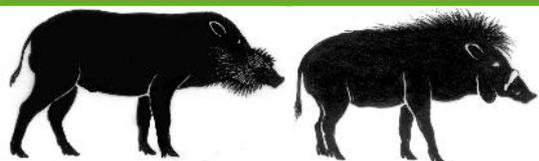
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Accurate sex identification of free-ranging animals is fundamental to understand many aspects of their ecology, including population dynamics, dispersal, social structure and behavior (e.g., Crawford et al., 2008; Lucchini et al., 2002; Woods et al., 1999). Advances in molecular techniques have enabled researchers to address these questions by analyzing DNA extracted from noninvasive samples like feces and hair (Reed et al., 1997; Vigilant, 1999). Noninvasive sampling is especially important for studies of species that are difficult to capture or at risk of extinction (Hedmark et al., 2004). However, this kind of sample usually provides low quality and quantity of DNA, which is associated with an increased risk of DNA contamination and relatively high rates of amplification and genotyping errors (Taberlet et al., 1999). Since the main constraint imposed by DNA degraded samples is the size of the amplified fragment, the ideal is to develop specific primers sets to amplify short fragments (ideally < 300bp, Buchan et al., 2005).

In mammals, molecular sexing is usually based on the co-amplification of homologous regions present on both sex chromosomes (e.g., ZFX/ZFY, Durnin et al., 2007; Shaw et al., 2003; amelogenin - AMELX and AMELY, Brinkman & Hundertmark, 2009; Fontanesi et al., 2008). As these PCR products differ in length, they can be analyzed by standard agarose gel electrophoresis: males produce two bands and females, only one. Many sexing methods developed for ungulate species use primer sets that amplify fragments longer than 300 bp (e.g., Aasen & Medrano, 1990; Lindsay & Belant, 2008; Shaw et al., 2003); thus, are not highly efficient for use with noninvasive samples. However, two primer pairs of amelogenin gene amplify fragments smaller than 300 bp. The SE47/SE48 primer set was originally developed for cattle (Ennis & Gallagher, 1994), but can also be used in other bovid and also cervid species (Brinkman & Hundertmark, 2009; Pfeiffer & Brenig, 2005; Weikard et al., 2006). The KY1/KY2 primer set was developed for sexing sika deer (*Cervus nippon*) fecal samples (Yamauchi et al., 2000) and it also revealed to be applicable to other cervid and bovids species (Brinkman & Hundertmark, 2009).

Here we describe the optimization of a simple molecular sexing method for noninvasive samples from white-lipped peccary (*Tayassu pecari*), a social ungulate that occurs in the Americas, from south-eastern Mexico to northern Argentina and southern Brazil (Sowls, 1997). This species plays





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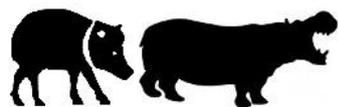


an important role in Neotropical forests as a seed predator and disperser, and as ecosystem engineers (Beck, 2006; Keuroghlian & Eaton, 2008; Keuroghlian et al., 2009). First, we test the applicability of three primer sets available in the literature: two successfully developed for ungulate species (SE47/SE48 and KY1/KY2, Ennis & Gallagher, 1994, Yamauchi et al., 2000, respectively) and one successfully used with cetacean species (ZFYX0582F/ ZFYX0938R Schneider-Gädicke et al., 1989; or ZFY00767R - Bérubé & Palsbøll, 1996). Although these tests worked relatively well with blood samples, they failed to amplify noninvasive ones. Therefore, here we describe a specific primer set to sex noninvasive samples for white-lipped peccaries. We also tested the cross-amplification of this primer pair on samples of another member of the Tayassuidae family, the collared peccary (*Pecari tajacu*).

Blood and hair samples from white-lipped peccaries of known sex were obtained from two populations of the Brazilian Pantanal: Fazenda Rio Negro (19°34'52"S, 56°14'74"W) and Fazenda Santa Emília (19°30'23"S, 55°36'43"W). Blood samples from captive collared peccaries were collected in Fazenda Vale Verde, São Miguel Arcanjo, State of São Paulo. DNA was extracted from both types of samples using a standard proteinase K and phenol:chloroform protocol (Sambrook et al., 1989). Just one hair was used per extraction and it was always accompanied by a negative control to detect possible contaminations.

The primer sets SE47/SE48 (5'-CAGCCAAACCTCCCTCTGC-3' and 5'-CCCGCTTGGTCTTGTCTGTTGC-3', respectively - Ennis & Gallagher, 1994) and KY1/KY2 (5'-GCCAGCAGCCCTTCCAG-3' and 5'-TGGCCAAGCTTCCAGAGGCA-3', respectively - Yamauchi et al., 2000) were tested in six blood and hair samples (three males and three females) of white-lipped peccaries following the conditions described in Brinkman and Hundertmark (2009). For blood samples, both primer sets amplified a band in females and two bands in males as expected. However, when we used hair samples no bands were observed, even after decreasing the annealing temperature from 60°C to 50°C.

We also tested the amplification of the ZFX/ZFY genes in four blood and hair samples (two males and two females) using the following primers: ZFYX0582F (5'-ATAGGTCTGCAGACTCTTCTA-3') and ZFYX0938R (5'-CTTACACCTAAATGGAAGATCC-3') designed from human ZFX sequences (Schneider-Gädicke et al., 1989), and ZFY00767R (5'-TTTGTGTGAACTGAAATTACA-3') designed from cetacean ZFY sequences (Bérubé & Palsbøll, 1996). PCR was performed in 25µl reactions containing 40-60ng of DNA, 1X PCR buffer (Pharmacia, Piscataway, New Jersey), 0.2mM of dNTPs (Pharmacia), 0.5U of Taq polymerase (Pharmacia) and 1mM of each primer. Cycling conditions were: initial denaturation at 95°C for 5 min, 35-45 cycles of 94°C for 1 min, 56°C for 1 min and 72°C for 1.5 min, followed by a final step at 72°C for 6 min. For blood samples, the primer set amplified a band in females and two bands in males as expected. For hair samples, only the band correspondent to ZFX was observed for all the tested samples. Since the ZFX/ZFY primers showed higher success with noninvasive samples, we focused on these genes to develop a new primer set specific to sex white-lipped peccary noninvasive samples. First, we amplified portions of the ZFX/ ZFY genes from five male and four female blood samples using the primers and conditions cited above. Products were purified for sequencing using polyethylene glycol precipitation. Both strands were directly sequenced using ABI





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PRISM®Big Dye™ Terminator v.3.0 cycle sequencing kit in an ABI 3100 automated sequencer (Applied Biosystems Inc., Foster City, California). Sequence analyses and alignments were conducted using Codoncode Aligner (Codoncode Inc., Dedham, Massachusetts).

We successfully amplified and sequenced approximately 370 bp from the ZF locus of white-lipped peccary (GenBank accession numbers GU441764 and GU441765). The ZFX sequence was obtained from female samples (homozygous ZFX/ZFX) and the ZFY sequence was drawn as a logical conclusion from male samples (heterozygous ZFX/ZFY). Two reverse primers were designed to co-amplify the genes ZFX/ZFY based on the presence of two polymorphic sites (Fig. 1): TZFX (5'-CTTGAGTTCTGAAGGCCTG-3') and TZFY (5'-GAAATTATGTGTCGTTTCAAATCA-3'). Together with the forward primer ZFYX0582F (Schneider-Gädicke et al., 1989), they produce fragments of 287 and 214 bp, respectively.

This new primer set was initially tested in multiplex PCR using 30 DNA samples extracted from blood (previously sexed individuals: 16 males, 14 females). The reactions were performed under the same conditions as described above, but with 1.4 mM of primer ZFYX0582F, 1.4 mM of primer TZFY, 0.8 mM of primer TZFX. An initial denaturation at 94°C for 5 min was followed by 40 cycles of 94°C for 1 min, 58°C for 1 min and 72°C for 1 min, and a final extension at 72°C for 7 min. PCR products were separated by electrophoresis in 2% agarose gel. As expected, this new primer set produced two fragments in male samples and just one in female samples (Fig. 2a). All the 30 blood samples tested (100%) were correctly assigned to the right sex.

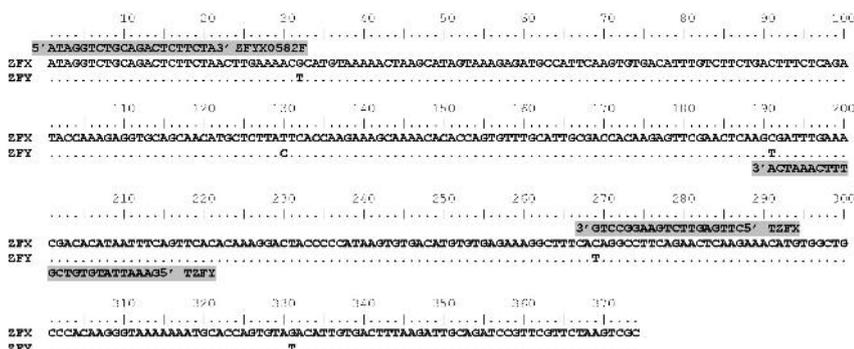
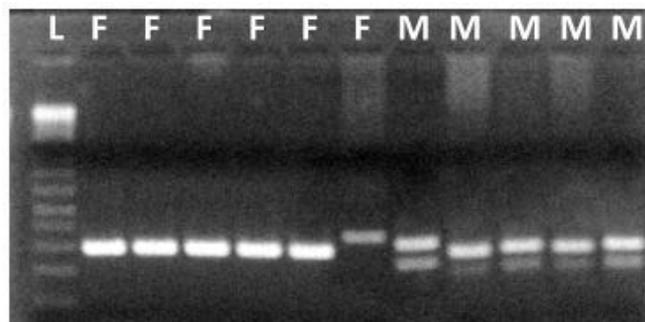
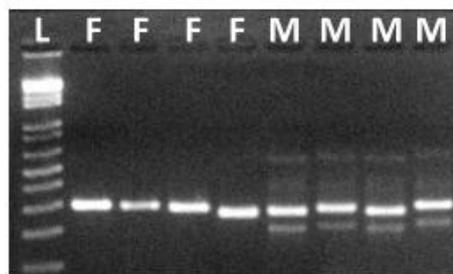


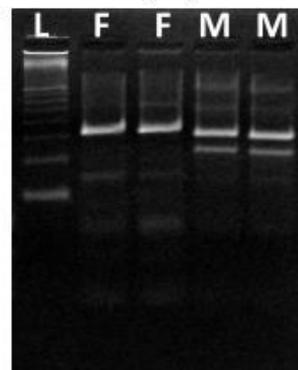
Fig. 1: Alignment of *Tayassu pecari* ZFX/ ZFY sequences. In grey are the anchoring locations of the primers ZFYX0582F, TZFX, and TZFY. Polymorphic sites are shown.



(a)

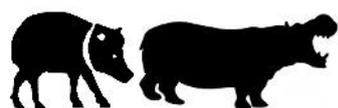


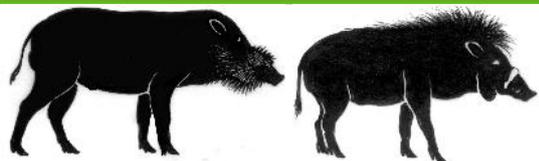
(b)



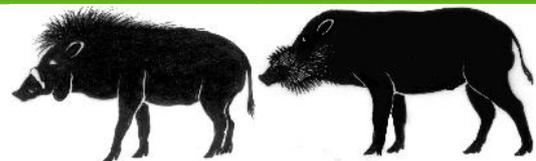
(c)

Fig. 2: Agarose gels loaded with PCR products obtained with the new primer set: ZFYX0582F, TZFX, and TZFY. (a) DNA extracted from white-lipped peccary blood. (b) DNA extracted from white-lipped peccary hair. (c) DNA extracted from collared peccary blood. L, 100 bp ladder; F, female; M, male.





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In order to test the application of this protocol to noninvasive samples, we amplified 18 hair samples (previously sexed individuals: nine males; nine females) using the same conditions cited above, but with the following modifications: 1.6 mM of primer ZFYX0582F, 1.2 mM of primer TZFY, 0.4 mM of primer TZFX, 0.4 mg/ml of BSA (New England Biolabs, Ipswich, Massachusetts), 1.0 mM of MgCl₂ (Pharmacia) and 50°C of annealing temperature (Fig. 2b). From 18 hair samples tested, 15 (83.3%) were correctly assigned. Two female and one male sample showed no amplification, possibly because of the small quantity and/or degradation level of the DNA.

Then, we tested the cross-amplification of this primer set with eight DNA blood samples from previously sexed collared peccaries (four males; four females) using the same conditions cited above for white-lipped peccary blood samples but with three annealing temperatures (58°C, 55°C, and 52°C). The amplification was successful at 55°C and the sizes of the fragments obtained were similar to those observed in white-lipped peccaries (Fig. 2c).

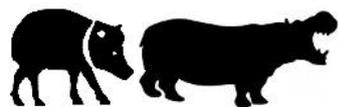
The high percentage of males and females correctly assigned for both blood and hair samples in white-lipped peccaries and for blood samples in collared peccaries showed that the method described here is efficient to identify sex and an important useful tool for molecular ecology and conservation studies of both species.

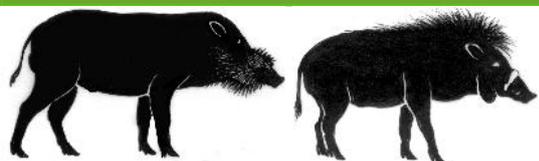
Acknowledgements

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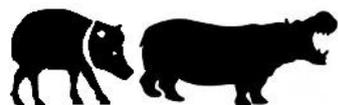


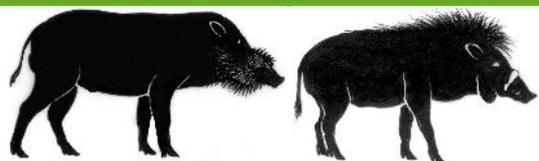


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The spread of porcine endogenous retroviruses among different populations of wild boar and domestic pig

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Background

Porcine endogenous retroviruses (PERVs) became an integral part of swine genomes, including *Sus scrofa*, before the formation of the *Sus* genus. This is confirmed by their presence in bushpigs (*Potamochoerus larvatus* and *P. porcus*) and warthogs (*Phacochoerus africanus*) (Niebert, Tonjes, 2005).

Three PERV classes are known: A, B, and C. Different classes are highly similar in the nucleotide sequences of the gag (groupspecific antigens) and pol (polymerase) genes but differ in the nucleotide sequence of the receptor-binding domain of the env (envelope) gene, which encodes the envelope protein of the virus (Le Tissier et al., 1997; Akiyoshi et al., 1998; Takeuchi et al., 1998). This difference is responsible for the host range in various virus classes.

PERV copies carried by different pig varieties are distinct in nucleotide composition, expression, and ability to produce infectious virions. It is believed that the pig genome can carry 6-10 replication competent proviruses, 30-50 full-size PERV copies, and 100-200 loci carrying truncated virus sequences (Niebert, Tonjes, 2005). Significant variations in the distribution and number of proviruses were found in the Large White breed (Rogel-Gaillard et al., 1999; Bosch

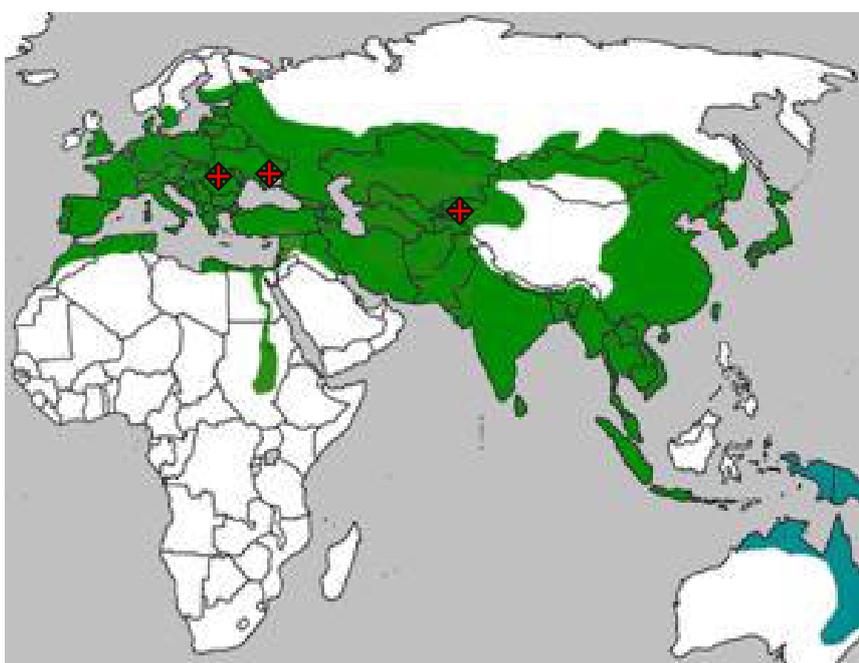
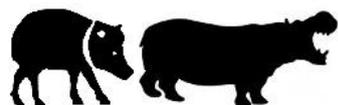
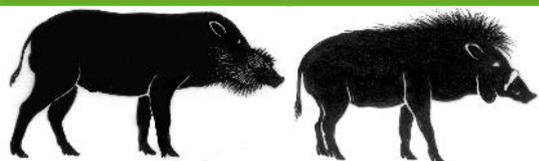


Fig. 1a: Range of wild boars (*Sus scrofa*): native (green), introduced (blue) and sample locations (cross).

Fig. 1b: Eurasian wild boar and piglet.





Papers and Communications



Table 1: Populations of wild boars and domestic pigs.

Subspecies or breed, locality	Designation	Sample size
Wild boar <i>S. s. scrofa</i> , Voronezh Biosphere Reservation	SSS	12
Wild boar <i>S. s. attila</i> , Carpathians (Ukraine)	SAC	12
Wild boar <i>S. s. attila</i> , Ukraine, Nikolaev Region	SAN	7
Wild boar <i>S. s. nigripes</i> , Kyrgyzstan	SSN	4
Large White breed, Novosibirsk type, Inya farm	LWN	101
Large White breed, Achinsk type, Inya farm	LWA	99
Kemerovo breed, Yurginskii breeding farm	KMR	165
Landrace, Kudryashovskoe farm	LNK	15
Landrace, Experimental Farm	LNE	30
SM1 precocious meat breed, Tulinskoe work-study unit	SM1	21
Duroc, Kudryashovskoe farm	DRK	10
Miniature pigs, Experimental Farm	MS	160

et al., 2000; . Herring et al., 2001). A number of pig breeds also differ in the PERV copy number, chromosomal distribution, and presence of full-length PERV sequences (Jin et al., 2000; Lee et al., 2002; Edamura et al., 2004; Li et al., 2004). These traits also varied within the breeds.

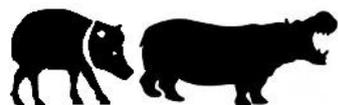
The aim of the study was analysis for differentiation between populations of wild and domestic pigs, using statistical assessment of the population frequencies of chromosomes carrying certain PERV classes and combinations by maps constructed in two principal component coordinates.

Material and Methods

Experiments were performed with blood samples from three subspecies of wild boars: *S.s. scrofa* (Central Russia), *S.s. attila* (South of Ukraine) and *S.s. nigripes* (Kirgizstan); five commercial breeds of domestic pigs, and one breed of laboratory miniature pigs (Table 1). DNA was isolated and analyzed for the presence of PERV classes by polymerase chain reaction (Figure 1) (Le Tissier et al., 1997; Akiyoshi et al., 1998; Takeuchi et al., 1998).

The population frequencies of chromosomes carrying various PERV classes and their combinations were determined by Bernstein method modified for a gene with multiple copies located on different chromosomes. Phylogenetic relationships among the populations under study were studied in maps constructed in two principal component coordinates. After scaling, each population was defined as a point in a 500x500 arbitrary unit area. Three types of genetic distances were used: 1) Euclidean distances; 2) Harpending-Jenkins distances; 3) Nei's distances.

Two models were considered for construction of maps. In model M-1, the frequencies of chromosomes carrying PERV classes were presented as frequencies of three independent factors with two variables: *envA+* and *envA-*, *envB+* and *envB-*, *envC+* and *envC-*. In model M-2, the frequencies of chromosomes carrying PERV class combinations were presented as frequencies of seven independent factors with two variables: *envA+* and *envA-*, *envB+* and *envB-*, *envC+* and *envC-*, *envAB+* and *envAB-*, *envAC+* and *envAC-*, *envBC+* and *envBC-*, *envABC+* and *envABC-*.





Papers and Communications



Results

Model M-1, which considers the frequencies of chromosomes carrying certain PERV classes, and model M-2 that deals with the frequencies of chromosomes carrying combinations of these classes, yield different results (Figure 2).

Four population clusters can be recognized in maps constructed on the base of frequencies of chromosomes carrying PERV classes. Cluster 1 is formed by wild boars; cluster 2 by domestic meat breeds; cluster 3 by meat-and-lard (universal) breeds, and cluster 4 by miniature pigs. According to the M-1 model, the frequencies of PERV classes show the following trend associated with morphotypes: wild boar-
commercial meat morphotype-commercial meat-and-lard morphotype.

A markedly different pattern is seen in the maps constructed on the base of frequencies of chromosomes carrying PERV class combinations. It is similar to that obtained by using the M-1 model in that the miniature pig population is distant from other populations, whereas wild boar populations still form a compact cluster. However, the clusters of meat and universal meat-and-lard breeds are extended in parallel to the 0, 0; 500, 500 line, so that the populations belonging to these clusters are located on the opposite sides of the wild boar cluster. The populations can be combined into clusters according to their locations in the maps. Cluster 1 includes Landrace and Duroc domestic pigs from the Kudryashovskoe farm and the Novosibirsk subbreed of Large White pigs. Cluster 2 includes Large White pigs of the Achinsk subbreed and the Kemerovo breed. Cluster 4, located in the centre of the map includes wild boars, SM-1 pigs, and Landrace pigs from the Experimental Farm.

There were two questions to be raised in our work: what wild boar population is closer to the present-day domestic pig according to PERV prevalence and what domestic pig breeds are closer to wild boars? To answer these questions, the distances between populations seen in the maps (Figure 2) are presented as bar graphs (Figure 3). The graphs obtained on the base of the M-1 model show that the European wild boar *Sus scrofa scrofa* subspecies from the Voronezh Biosphere Reserve is the closest to the domestic pig, and the Central Asian wild boar subspecies *Sus scrofa nigripes* is the farthest. The distances determined on the base of the M-2 model show the same result. Both models indicate that modern domesticated swine meat breeds are the closest to the wild type.

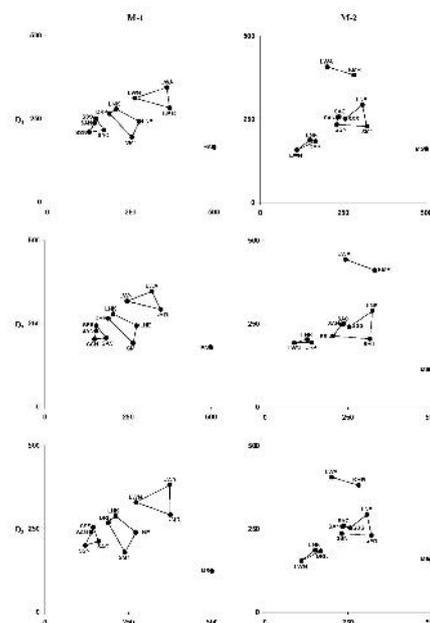


Fig. 2: Maps constructed in two principal component coordinates on the base of frequencies of chromosomes carrying PERV classes (M-1) and class combinations (M-2). Designations: D_1 , D_2 , D_3 are genetic distances: Euclidean, Harpending–Jenkins', and Nei's ones, respectively. Population designations follow Table 1.

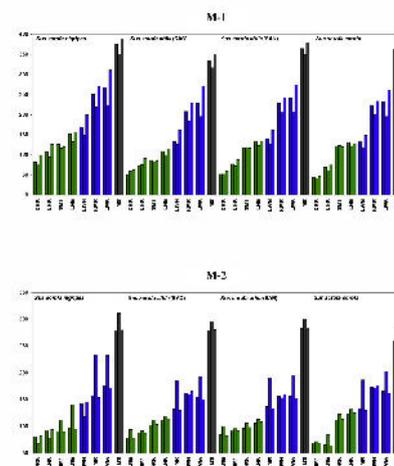
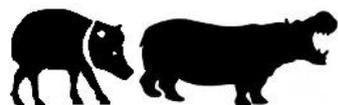
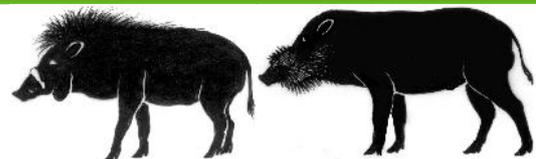
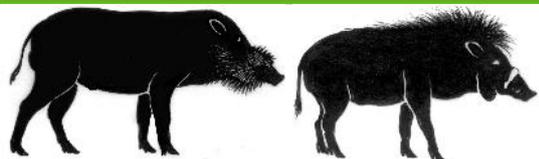


Fig. 3: Distances between wild boar populations and domestic pig breeds according to maps constructed in two principal component coordinates. For each breed, the first bar presents Euclidean distances; the second, Harpending–Jenkins' ones; and the third, Nei's ones, respectively. Population designations follow Table 1.





Conclusions

It appears from analysis of differentiation of wild boars and domestic pigs in the frequencies of chromosomes carrying certain PERV types and type combinations, that PERVs were not neutral elements in the evolution of the pig genome and may cause variation in pig physiology.

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Articles in the news

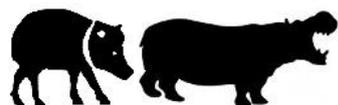
Princess Anne's pig killed in 'wild boar attack'

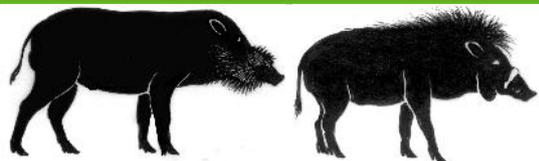
8 January 2015

<http://www.bbc.com/news/uk-england-gloucestershire-30722210>

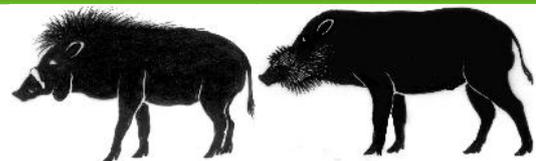
A pig belonging to Princess Anne was killed after a wild boar got on to her estate, the royal has said. She told a farming conference her property had been visited by a wild boar on Tuesday, according to the Western Morning News. The Princess Royal is reported to have told delegates her "Gloucester Old Spot boar is no longer with us as a result". The princess, who lives at Gatcombe Park, is patron of the Gloucestershire Old Spots Pig Breeders' Club. She has kept pigs for a number of years at her Gloucestershire home.

The princess told the conference: "We had a visitation in my woods the other day from a wild boar. "Unfortunately, my two sows are obviously in season, but we had just put the boar in with them. "My Gloucester Old Spot boar is no longer around - he was killed by this visiting wild boar. "So far, we haven't found the origins of this particular invader and I'm hoping I'm not going to see him again for a bit. "But you never quite know where your challenges are going to come from, do you?" 'Gloucestershire Old Spots are listed as a minority breed on the Rare Breeds Survival Trust watchlist, with between 500 and 1,000 breeding females believed to be in the country. There is a large population of wild boars in the Forest of Dean - 17 miles (27km) away from Gatcome Park. On Monday, 47-year-old Raymond Green was killed on the M4 in Wiltshire in a crash caused by a wild boar wandering onto the motorway. Sgt Steven Love, from Wiltshire Police, said it was a "truly tragic incident" involving a "particularly large wild animal". The two incidents have prompted





Articles in the news



North Wiltshire MP, James Gray, to write to Natural England expressing his concern about wild boar sightings. "People are increasingly worried that the wild boar population is now out of control and constituents of mine in Box and in nearby Corsham have spotted them recently", he said. "I have therefore taken the opportunity of writing to Andrew Sells, Chairman of Natural England, to seek details of the evidence known to him on the current wild boar population, and to seek his advice on what can be done about this growing problem."

Airline: 'Emotional support' pig kicked off flight for being disruptive

2 December 2014

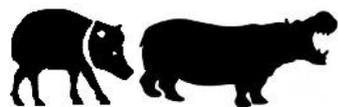
<http://edition.cnn.com/2014/11/30/travel/emotional-support-pig-booted-flight/index.html>

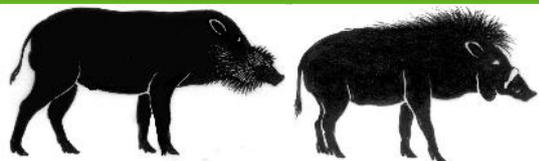
When US Airways passenger Robert Phelps first saw the woman coming down the aisle of the plane, he thought she had a "really big dog" or a stuffed animal thrown over her shoulder. It was about 6:10 a.m. the day before Thanksgiving, and Phelps was waiting to take off from Connecticut's Bradley International Airport for Washington. He thought it could be a service animal, but service animals are usually in crates, he thought to himself.

As she got closer, there was no denying that the woman was carrying a big brown pig, perhaps between 70 and 80 pounds, Phelps said. "Everybody was trying to surmise what it could be, because no one thought it was a pig," he said. "Other than a Fellini movie, where would you see a person with a pig?" The passenger was allowed to bring the pig on board as an "emotional support animal" under Department of Transportation guidelines, a US Airways spokeswoman said. Apparently, it was not meant to be. Before the plane took off, the passenger and her pig were kicked for being "disruptive," spokeswoman Laura Masvidal said.

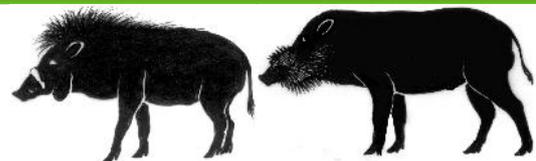
How disruptive? Fellow passengers told the Hartford Courant that the big brown pig stank up the cabin of the tiny D.C.-bound aircraft and defecated in the aisle. Phelps watched in amusement and horror as the pig began "dropping things" in the aisle while his owner stowed her belongings. When she tied him to the armrest and tried to clean up after him, he began to howl. "She was talking to it like a person, saying it was being a jerk," he said. "I have no problems with babies, but this pig was letting out a howl." A flight attendant asked her to move to the front of the plane, and eventually she left, he said. He took a photo of her as she walked past him. "I understand dogs and cats on planes. They come in crates, but this was way too big, and it had no container," he said. "It looked heavy. It was not a tiny, cute little pig."

Why was the animal allowed on the plane to begin with? People have been bringing "emotional support animals" on planes in increasing numbers in recent years, as well as to restaurants, museums and stores. In 2003, the Department of Transportation updated its policy regarding animals in air transportation to say that "animals that assist persons with disabilities by providing emotional support" qualify as service animals. It's up to airline personnel to determine whether an animal is a service animal. They can do so by seeking "credible verbal assurances"; looking for physical indicators on the animal, such as a backup or identification tag; or requesting documentation for service animals. When it comes to emotional support animals, airlines may require supporting documentation from a mental health professional. The documentation should state that the passenger has a mental health-related disability and that "having the animal





Articles in the news



accompany the passenger is necessary to the passenger's mental health or treatment or to assist the passenger." It is not clear whether the passenger on Wednesday's flight provided such documentation.

Saving Mangalica: How the rare 'sheep-pig' was rescued

14 November 2014

<http://www.bbc.com/news/business-30042761>

In eastern Hungary there is an increasingly common sight - a field of pigs with snouts and trotters but also curly, woolly fleeces. To the uninitiated it is a sheep-pig. In reality it is the Mangalica, a comical but appealing breed that is taking the food industry by storm.

The Mangalica was first bred for the tables of the Austro-Hungarian emperors, but under communism it nearly disappeared altogether. The breed was rescued from the brink of extinction by the efforts of animal geneticist Peter Toth. After the fall of the Berlin Wall in 1989, he went on a mission to rescue the Mangalica, buying up the last pigs directly from the abattoirs. Now, as President of the Mangalica Breeders Association, he has fallen in love with the breed and oversees the production of 20,000 pigs, and Mangalica - famed as the "Kobe beef of the pork world" - is served in Michelin-starred restaurants the world over.

Peter Toth told BBC News why the Mangalica was so special, and what saving the breed means to him.

Massive wild boar cull targets swine fever

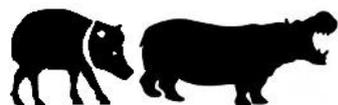
11 November 2014

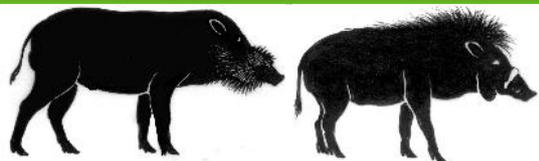
<http://www.news24.com/Green/News/Massive-wild-boar-cull-targets-swine-fever-20140211>

Daugai - In the dead of the bone-chilling Lithuanian winter, a hunter cocks his gun and squints as he takes aim at a wild boar foraging for food 30 paces away. A sharp crack from the rifle and the prey, a pregnant female, collapses as blood trickles onto the snow. It's open season on wild boar after Vilnius ordered a record cull amid an outbreak of African swine fever that has prompted Russia to ban pork imports from across the EU. But there is concern in this Baltic state that killing off 90% of its estimated 60 000 wild boar will upset the delicate balance of the food chain. "We feel bad about shooting a female carrying babies, but we have to because we know the possible consequences," said Aurimas Trunce, head of a hunting club in southern Lithuania. African swine fever is harmless to humans but lethal to pigs and has no known cure.

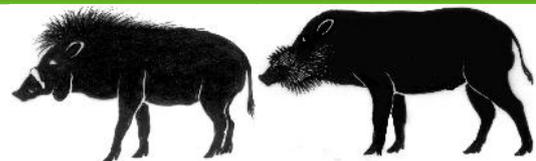
State of emergency

It has spread throughout the Balkans, the Caucasus and Russia since 2007, and is endemic to areas of Africa, according to the United Nations' Food and Agriculture Organisation (FAO). The FAO warns of "vast losses" if it migrates from Russia to China, which is home to half of the world's pigs. The Lithuanian cull is one of the largest in the world but state veterinary officials in





Articles in the news



Vilnius say similar measures are now being applied in Belarus and parts of Russia. They believe the virus crept over the border from neighbouring Belarus and fear it could spread to, and decimate commercial pig farms, triggering a wave of bankruptcies.

"Our agriculture sector will suffer a huge loss if we do not solve this problem," Prime Minister Algirdas Butkevicius has warned. An EU member since 2004, Lithuania has also imposed a state of emergency in affected areas, slapping a temporary ban on shipments of live pigs, and is mulling a cull. Time is of the essence, insist state veterinary officials that are overseeing the six-month cull in the wild ending in June. Come spring, the virus will spread faster as warm weather brings back birds and the mites they bear. But environmentalists are also sounding the alarm, warning that the massive cull will wreak havoc with the food chain of wildlife populations.

Undesired effects

"They are treating boars here the way homeless dogs are being treated in Sochi, as they are both being totally eliminated," said an angry Andrejus Gaidamavicius, referring to the mass killing of stray dogs in Sochi ahead of the Winter Olympics in Russia. Stronger animals could also develop an immunity to the virus, the environmentalist added. "It is outrageous that hunting will also be allowed in nature reserves," Gaidamavicius said. With wild boars virtually wiped out, predators like wolves will turn to hunting deer and could severely deplete their numbers, experts insist. EU and UN experts admit excessive hunting could have other undesired effects: It might encourage individual animals to migrate in an effort to escape hunters and thus spread the virus. In a bid to stop more infected animals migrating from Belarus, Lithuania has also asked Brussels to co-finance a fence along its southern-eastern border. All wild boar hunted down in the cull will be incinerated if tests show they carry the virus; those not infected could still be used for meat. Of the nearly 1 500 animals killed in January, only two tested positive for the disease, according to state veterinary officials.

Carrot and stick

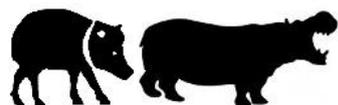
The EU has termed Moscow's 29 January import ban of its pork "disproportionate". Russia imports a quarter of the bloc's pork exports, worth around €1.4bn (\$1.9bn) annually. Lithuania has adopted a carrot and stick strategy for the mass cull: It is offering hunters 250 litas (\$98) for each carcass, but hunters who refuse to participate risk having their licences suspended. Environment Minister Valentinas Mazuronis even promised to charm their wives into letting the hunters head for the woods for the weekend. "I'll write letters to hunters' wives: Don't be angry at your husbands who go hunting Fridays, Saturdays and Sundays. We appreciate you letting them go all in a good cause," he said only half-jokingly. -AFP

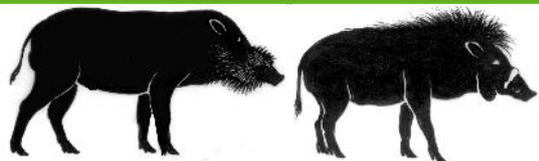
Millions of wild pigs run amok in US

27 October 2014

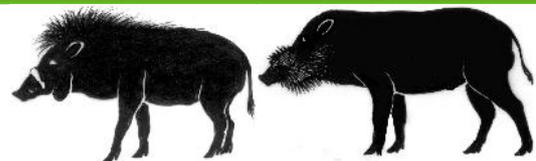
<http://www.bbc.com/news/world-us-canada-29747529>

Wild pigs are running amok across large parts of the US, causing an estimated \$1.5 billion in damage each year. In Louisiana alone more than 500,000 of the feral hogs are thought to be on





Articles in the news



the loose. The animals - which can weigh up to 400lbs - reproduce quickly, have no natural predators and adapt to survive in any environment. As well as the damage they cause to agricultural land, the wild hogs pose a public health risk because they can be riddled with disease. Benjamin Zand from BBC Pop Up talked to farmers, trappers and scientists in Louisiana about the most effective - and humane - way to control the feral pig population.

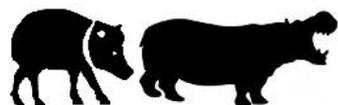
Iberian pig genome remains unchanged after five centuries

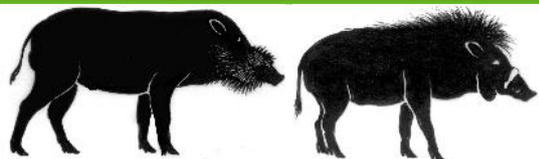
17 September 2014

<http://www.sciencedaily.com/releases/2014/09/140917120557.htm>

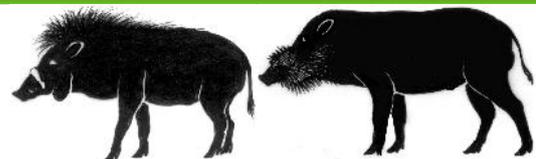
A team of Spanish researchers have obtained the first partial genome sequence of an ancient pig. Extracted from a sixteenth century pig found at the site of the Montsoriu Castle in Girona, the data obtained indicates that this ancient pig is closely related to today's Iberian pig. Researchers also discard the hypothesis that Asian pigs were crossed with modern Iberian pigs. The study, published in *Heredity*, sheds new light on evolutionary aspects of pig species, and particularly on that of the Iberian breed, considered to be representative of original European Mediterranean populations. The study was led by Miguel Pérez-Enciso, ICREA researcher at Universitat Autònoma de Barcelona (UAB) and at the Centre for Research in Agrigenomics (CRAG). Researchers from the Institute of Evolutionary Biology (CSIC-Pompeu Fabra University) and the National Centre for Genome Analysis (CNAG) also participated in the study. The sample dates approximately from the years 1520 to 1550 and is previous to the introduction of Asian pigs in Europe, which were later crossed with local European breeds which are the origin of today's international pig species. The sample pig is contemporary to the beginning of America's colonisation.

"Although it is a very fragmented sample, the gene sequence offers very interesting information," Miguel Pérez-Enciso says. "First of all, we know it is not a white pig because it is missing a duplicated KIT gene which would make it this colour. This coincides with the majority of paintings from that period, in which the animal was always painted black or in reddish tones. We were also able to establish that it is very closely related to today's Iberian pig species, and specifically to the 'Lampião del Guadiana' strain. We could say that the Iberian pig is very similar to the pigs which existed in the sixteenth century and no great changes have been registered in this genome. Therefore, more studies will be needed before we are able to distinguish the modern species from the older ones." The study indicates that the pig was a domestic pig, given that the sequence presents a series of markers typical of domestic pigs and which are very rare or absent in wild boars (the precursor animals to the domestic pig); moreover, this coincides with the historical registers of the castle, which clearly indicates that pig breeding was an important castle activity. Nevertheless, there is also evidence of occasional crossbreeding between wild boars and ancient pigs, as has happened between wild boars and Iberian pigs. "This close relation between the Iberian pig, the European boar and the ancient pig confirms, as stated in previous studies, that crossbreeding between the Asian pig and modern Iberian pigs did not exist or was insignificant," Miguel Pérez-Enciso points out. The study also compared the ancient pig sample with the genome of modern pigs of different breeds, including 'Creole' pigs, which are presumably the





Articles in the news



descendents of the animals Spanish colonizers brought to America. Researchers demonstrate that this hypothesis is incorrect and that there is very little remaining of those first Spanish animals in today's creole pigs, which were crossbred mainly with international pig breeds.

Story Source:

The above story is based on materials provided by Universitat Autònoma de Barcelona.

Piglet weaning age no bar to litter frequency

27 August 2014

<http://www.sciencedaily.com/releases/2014/08/140827090134.htm>

University of Adelaide research has shown that piglets can be weaned later with no negative effects on sow birthing frequency. The outcome of the study at the University's Roseworthy campus, published in the journal *Animal Reproduction Science*, is an important finding for pig producers. It allows improvements in piglet health and welfare without loss of production.

"Sows don't usually start their oestrous cycles again during lactation, only coming on heat after their piglets have been weaned," says Ms Alice Weaver, PhD candidate with the School of Animal and Veterinary Sciences.

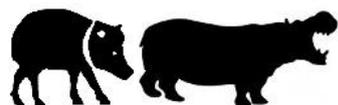
"In commercial pig production, this has meant the reduction of piglet weaning ages in order to maximize the number of litters a sow can produce each year. Unfortunately piglets weaned early often don't thrive, with reduced growth and diarrhea common." Ms Weaver's study investigated whether oestrus could be stimulated while sows were still feeding their piglets so the sows could be mated before their piglets were weaned. Her project was under the supervision of Dr Will van Wettere, who leads a number of research projects in improving pig fertility and life expectancy of piglets. Different treatment groups were set up among the Large White/ Landrace cross sows, with half of the sows weaned early at day seven after birth and half at day 26. Half of each group had daily contact with boars from day seven. "The research showed that providing sows daily contact with a mature male pig seven days after giving birth is sufficient to stimulate oestrus regardless of whether they were still suckling a litter or not," says Ms Weaver. "We've shown that piglet weaning age should be able to be increased with sows still producing the average 2.4 litters a year.

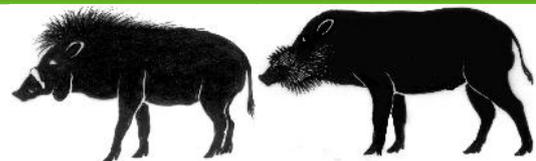
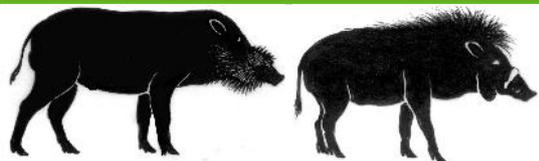
"This is very important to the pig industry and should lead to improvements in post-weaning growth and the welfare and survival of piglets. "Most piglets in Australia are weaned at an average of 24 days. If we can push that out to at least 30 days, the extra time will have significant benefit for the piglets."

Continuing research is looking at whether there are any negative impacts on the following litter, which would be conceived and gestating while the sow was still suckling the previous litter. The research is supported by the Pork CRC which is based at the Roseworthy campus.

Story Source:

The above story is based on materials provided by University of Adelaide.





Sumatran secrets start to be revealed by high altitude camera trapping

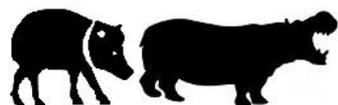
16 September 2014

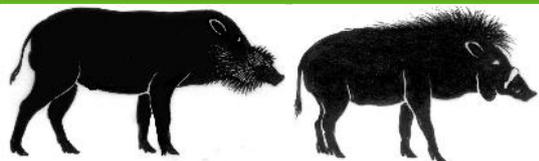
http://www.fauna-flora.org/sumatran-secrets-revealed-high-altitude-camera-trapping/?utm_source=All+e-news+subscribers&utm_campaign=3691f800fa-Nov_e_newsletter_2014&utm_medium=email&utm_term=0_f30c72e1be-3691f800fa-213183417

Biologist and wildlife photographer Jeremy Holden continues his Rainforest Diaries series, with a glimpse of life around Lake Gunung Tujuh in Sumatra's Kerinci Sebat National Park, Indonesia. Our camera trapping efforts are rewarded as he uncovers the secret life of the mammals in Sumatra's high altitude forests.

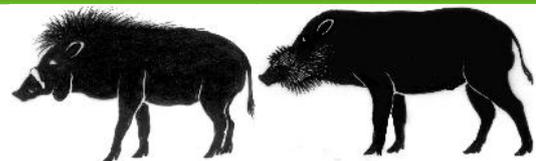
Sunday 13 April

At 2,000 metres above sea level, surrounded by mountains and tropical forest, the weather at camp can be unpredictable. Tonight thick clouds spill over the crater rim and the rising moon is haloed by a huge circular spectrum – a 'moon ring' or 22° halo – formed by light refracting from ice crystals high in the atmosphere. The temperature drops rapidly and we all suffer a frigid and sleepless night. In the two months since I was last here heavy rain has fallen. The vegetation has run riot and the paths are muddy. I can see from the churned-up trails that pigs have arrived. In four months of camera trapping we have not recorded a single pig. In any other area of the park this would be very unusual. At this altitude, however, pigs appear to be rare. This kind of information is what we hope to learn from this high altitude camera-trapping programme. The fact that there are many pig footprints suggests that this is a migration event. Within tropical rainforest, pigs, especially the larger bearded pigs, *Sus barbatus*, constantly migrate, covering vast distances. I suspect that these signs may be from bearded pigs. If so this will be the first record from Gunung Tujuh. Even the local guides are not familiar with them, at least not from forest at this altitude. But it doesn't mean that they don't travel here. In Sumatran folklore the bearded pig is known as lumba lumba, the same name used for dolphin. This is no coincidence. In the past, when the pigs arrived in an area, they came through in large herds, crashing through the forest when disturbed like pods of breaching dolphins. Then mysteriously, as quickly as they came, they would be gone. In 18th Century England, Gilbert White explained the disappearance of swallows in autumn with the notion that they enter a torpid state. Others thought they hibernated underwater in reed-fringed lakes. In Sumatra, the belief for bearded pigs was similar: after moving through the forest they traveled to the sea and became dolphins. Clearly this is not the case, but the movements of bearded pig remain a mystery, and a detailed study is long overdue. Learning more about the movements of bearded pigs is essential for more than simply satisfying our curiosity. In mainland Malaysia, for instance, bearded pig numbers have crashed. This is probably because of habitat fragmentation causing forest blocks to become smaller and isolated, and in consequence unable to support the large numbers of pigs that formerly used them. With their old migration routes compromised, and known food sources now destroyed or unreachable, it seems that bearded pigs are disappearing across their former range. In Sumatra bearded pigs are still relatively common, but if the trend in habitat fragmentation continues they will start to vanish from these forests, too.





Articles in the news



Monday 14 April

A bright morning filled with gibbon song and the metallic calls of Sumatran treepie, a bird endemic to these mountains. We set off from camp early to check the camera traps. In front of one camera we find huge cloven hooved prints, too large for anything but an adult bearded pig or a sambar deer. I suspect the former and am delighted when we check the memory card to find footage of a huge bearded pig. On other cameras we record a pack of wild dogs, or dhole. This is another unusual species at this altitude and clearly the dholes are here because the pigs are here. The pigs are not only a vital prey species for predators such as dhole and tiger, but also important for a healthy functioning rainforest. When the pigs come through an area of forest they plough up the ground in search of food, helping to aerate the soil and aid with the germination of new seedlings. As with many of the complex relationships between species in the rainforest, we still know little about the role that bearded pigs play in the ecosystem. I suspect in this case their disappearance will have many repercussions, not least for predators like dhole and tiger that feed on them.

Saving Sulawesi's 'pig-deer', the babirusa

6 December 2010

http://news.mongabay.com/2010/1206-clayton_interview_hance.html#sthash.FVFd7b67.A0bQNa1E.dpbs

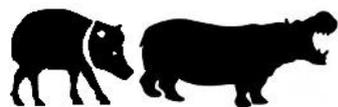
The babirusa of Sulawesi may be one of the world's oddest looking—and acting—mammals. Literally meaning 'pig-deer' the babirusa, which includes four species, belongs to its own genus 'Babyrousa' in the pig family. Males are especially unique, sporting four tusks, two of which appear to come right out of the animal's snout. To make it to the top of the babirusa hierarchy, males will combat each other in an activity dubbed 'boxing' where they will rear up on their hind legs and club at each other. Despite their many oddities, the babirusa were not formally studied until the late 1980s when Dr. Lynn Clayton spent four years in Sulawesi's forest observing them.

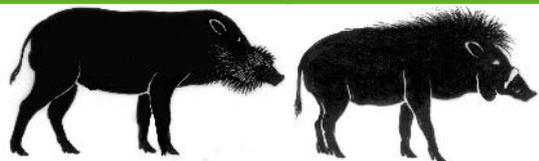
"Like [biologist Alfred Russel] Wallace a century before I traveled by wooden boat, slept in remote palm huts and spent long hours 'perched on platforms in trees' awaiting a sighting of the elusive babirusa. Occasionally results were spectacular as when I observed 44 babirusa together on the Adudu salt-lick at Nantu," Clayton told mongabay.com in a recent interview.

Her time in the Sulawesi forests, observing a charismatic mammal that few people had ever heard of, pushed Clayton to work toward saving the species—which was disappearing due to habitat loss and hunting—as its forest home. "The illegal poaching and rain forest destruction I observed during this time led me and my team of local colleagues to implement anti-poaching checkpoints and to campaign for formal protection of the Nantu/Paguyaman forest," she says. In the twenty years since, Clayton along with local field workers, have managed to successfully preserve 62,000 hectares of the Nantu rainforest ecosystem.

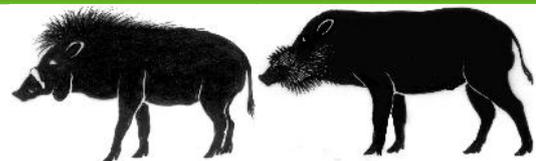
Since achieving legal protection of the Nantu forest Clayton and local collaborators have set up a number of innovative programs including planting tens of thousands of trees as a buffer zone between the forest and villages and creating a children's book to highlight the babirusa.

Clayton says that the key to longterm protection of Nantu is "facilitating first hand experience of





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rainforest biodiversity by local school-children, students and other stakeholders." Since achieving legal protection of the Nantu forest Clayton and local collaborators have set up a number of innovative programs including planting tens of thousands of trees as a buffer zone between the forest and villages and creating a children's book to highlight the babirusa. Clayton says that the key to longterm protection of Nantu is "facilitating first hand experience of rainforest biodiversity by local school-children, students and other stakeholders."

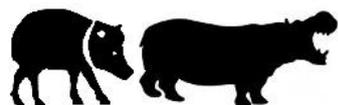
Lion v Warthog: The stunning moment when a warthog steps into the path of a hungry lion (Spoiler alert: the lion wins)

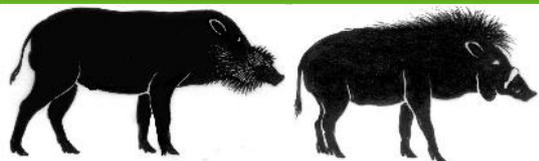
23 April 2014

<http://www.dailymail.co.uk/news/article-2611074/Lion-v-Warthog-The-stunning-moment-warthog-steps-path-hungry-lion-Spoiler-alert-lion-wins.html>

Incredible pictures show the moment a unsuspecting warthog walked into the path of a hungry lion. Lion then pounces on the warthog and a battle ensues before devouring the animal. The pictures were captured by Dr Trix Jonker at the Addo Elephant Park in the Eastern Cape province of South Africa Says that she was 'absolutely stunned by what she saw that afternoon and it was 'amazing' to capture it on camera. This is the moment a warthog stepped into the path of a hungry lion and then became its prey. The incredible pictures show the warthog step into the lion's den, but it was only ever going to end one way, as the predator then leaps out with brute force to capture the animal. The lion then goes on to devour the wild pig, proving his status as top of the animal food chain. The stunning images were caught on camera by photographer Dr Trix Jonker, at the Addo Elephant Park in the Eastern Cape province of South Africa. Dr Jonker, 57, from Bloemfontein in the Free State province of South Africa, revealed she almost missed the moment as the warthog had a lucky escape first of all, but foolishly walked back into the lion's den and this time was not so lucky. But she managed to capture the action at the perfect minute. She said: 'It was getting late and the gates were closing in an hour. I looked away and when I looked back I saw the warthog coming straight towards some resting lions.

'The poor unsuspecting warthog did not spot the lions at all and she disappeared behind a bush where a lion was lying, and it was taken by surprise. Dr Jonker revealed the warthog first had a lucky escape after it accidentally woke a sleeping lioness and startled her so she didn't attack. But she couldn't believe her eyes when the same warthog went back into the lion's den. She added: After the warthog escaped, I thought the action was over. But the warthog went back in a circle and went back on the same path as before, straight back into the lions. 'By this time, a male lion had woken up and was sat up straight trying to see what the commotion was. 'He saw the warthog coming and went straight into the attack position. This was when I had my camera poised as I knew this time something was going to happen. 'At one stage there was only this big dust cloud and I could not see what was happening. 'Then when the dust cleared and I saw the lion holding the warthog between his front paws and looking straight at me. 'He stayed like that for quite a while then lifted the warthog into the air and started dragging her away. 'I couldn't believe how tough the warthog was, and was absolutely stunned by what I saw that afternoon. It's amazing I managed to capture it on camera.'





Articles in the news



Where Peccaries Wallow, Other Animals Follow

Peccaries are like pigs: They wallow. In the Peruvian rain forest, those mud puddles are wildlife magnets.

27 September 2014

<http://news.nationalgeographic.com/news/2014/09/140927-peccary-wallow-amazon-rainforest-camera-trap-biodiversity-science/>

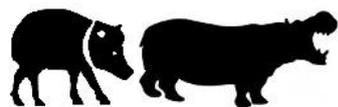
Rolling and bathing likely removes parasites, says tropical ecologist Harald Beck of Towson University in Maryland, and it certainly coats the peccaries' backs with mud, which keeps them cool. It also may be just plain fun. "They behave like little kids," says Beck. "A lot of splashing around, social behavior and grooming."

COCHA CASHU BIOLOGICAL STATION, Peru—At this research outpost in Manú National Park, east of the Andes, there's an open space in the Amazon rain forest, a wet clearing where the surrounding vegetation is covered in splattered mud. In the central puddle, diving beetles ripple the surface as they rise to sip oxygen from the air. An aquatic cricket swims laps. The mud around the puddle is spangled with the tracks of animals—and in particular with the impressions, like strokes from a wire brush, left not by the feet but by the stiff hair of the collared peccary. This is a peccary wallow. Collared peccaries (*Pecari tajacu*) are piglike animals, and like domestic pigs, they love to wallow in mud.

But as Beck's research here at Cocha Cashu has shown, peccary wallows have a serious and surprisingly large ecological impact. During the dry season from May to October, the wallows become water holes for an enormous array of animals, from frogs to tapirs to ocelots.

Trapped on Camera

On a cool morning this week Beck is changing the memory card on a camouflaged, motion-triggered camera that he has set up at a wallow. Over the birdsong and the hum of insects, he explains that he can let his camera run for months at a time because peccary wallows are persistent. In fact, the animals return to the same spots to wallow year after year. As they roll in the mud, they create a depression, lined with a water-resistant layer of peccary-molded clay, that fills with rainwater and stays filled even in the dry season. During the driest months, almost all the surface water available in the forest, apart from lakes and rivers, is in wallows. Beck became interested in these wallows when he discovered next to one of them a foam nest of tadpoles—a structure some frogs build to house their young when they are small and vulnerable to predators. When the tadpoles are larger, they slither from the nest into the water. Observing the foam nest intrigued Beck; it meant the wallows were being used by frogs as a place to reproduce. His systematic study of peccary wallows revealed that their water was chemically identical to that in natural puddles at Cocha Cashu. But because of their water-resistant bottoms, wallows held more water for longer than the puddles did. Beck and his students found more frog species there and at a much higher density. Wallows turn out to be an especially good place for vulnerable tadpoles. The wallows are more reliably wet than puddles are, and don't have the large predators found in lakes and rivers. Previous observations in Brazil have shown that when rain forest areas became





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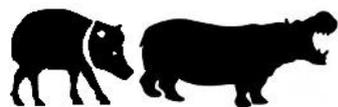
too small to support peccaries, some frogs quickly become locally extinct—presumably because there are no more wallows for them to reproduce in.

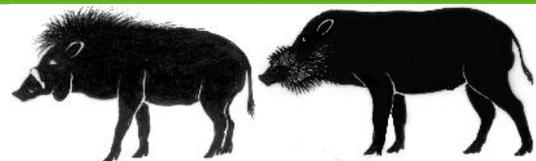
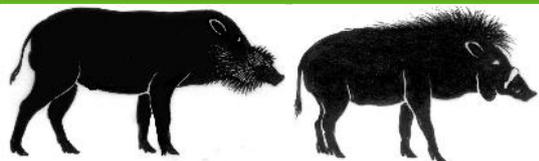
Everyone Likes a Wallow

Now Beck is expanding his study to other vertebrates that use wallows. Many come to drink at a reliable water source during the dry season. And he's catching many of them on camera. Back at his office, a cubicle in the palm-thatched, mosquito-screened lab at Cocha Cashu, which is operated by the San Diego Zoo, Beck downloads the camera's pictures. One image has captured the powerful back of a puma, another the fleeting form of an ocelot. A third shows a bat swooping low to drink, its ten-inch-long wing outstretched. Over the past few years, Beck has seen an amazing array of jungle animals visiting the wallows, including jaguars, tapirs, falcons, owls, monkeys, and nocturnal spotted pacas. "Everyone and their grandmother comes here," he says. In one of his favorite photos, a razor-billed curassow (a large black bird with a gaudy red beak) seems to wait its turn as a brown agouti (a large, graceful rodent) bathes in the wallow. The collared peccaries themselves stop by a couple of times a week to bathe and frolic, keeping the wallows open. They come in small families, the adults weighing up to 77 pounds (35 kilograms). They're not the only animals that act as ecosystem engineers. Beavers dam streams and make wetlands; bison create dust wallows that collect moisture in the prairies. Alligators create "gator holes" in the Everglades, wet depressions in which they wait out dry conditions—accompanied by many species of insect, fish, and bird. "Peccary wallows are wet areas surrounded by dry areas; gator holes are wetter areas in a wet landscape," explains Frank Mazzotti, an ecologist at the Fort Lauderdale Research and Education Center of the University of Florida. "Both provide wetter habitats for species that would not otherwise be able to exist."

A Forest Without Peccaries

Historically, a larger species of peccary was common in Manú National Park as well as elsewhere in Central and South America. White-lipped peccaries (*Tayassu pecari*) weigh up to 121 pounds (50 kilograms) and roam in larger groups than collared peccaries—herds of up to a thousand individuals were sighted in the past. The wallows made by such herds must have been immense. But white-lipped peccary populations are down 30 percent in the past 18 years, and they have gone locally extinct in many places due to disease, habitat loss, and overhunting. "All you need is a dog and a shotgun and you can take out a whole herd," Beck says. Beck's work suggests that local extinctions of peccaries could lead to a wave of extinctions and population reductions in species that rely on the wallows. "There is a lot that cascades through the ecosystem, and we are just starting to understand this," Beck says. Ecologists have long studied the effects that can ripple out from the loss of a key predator or prey species. But they're paying more attention lately to what happens when an ecosystem loses its engineer, and in the process they're discovering new ways in which the extinction of a species, locally or globally, can impoverish an entire community.





Whipsnade unveils endangered pygmy hippo baby

15 January 2015

<http://www.bbc.com/news/uk-england-beds-bucks-herts-30833089>

A miniature hippopotamus whose species is endangered has been born at ZSL Whipsnade Zoo. The pygmy hippopotamus was born on Boxing Day but the Bedfordshire zoo has only just revealed the birth having "waited until mum and baby settled in". The animals are listed as endangered and there are believed to be about 2,000 left in their native West Africa. Senior keeper Steve White said the male calf is "happily waddling around and seems to love spending time in water". Pygmy hippos are found in Liberia, Sierra Leone, Guinea and the Ivory Coast.

- Adults grow 70 to 80cm high (27.5 to 31.4in)
 - They are nocturnal and live alone or in pairs
 - They live near swamps and rivers to keep their skin wet
 - They eat grass, leaves, shoots and fallen fruits
 - Pygmy hippos are classified as endangered by the IUCN Red List of Threatened Species
- Source: The Pygmy Hippo Foundation/ZSL

'Teary-eyed' hippo dies in Taiwan

29 December 2014

<http://www.news24.com/Green/News/Teary-eyed-hippo-dies-in-Taiwan-20141229>

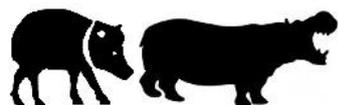
Taipei - An injured hippopotamus that caught national attention in Taiwan after jumping out of a moving vehicle last week was found dead on Monday. The 32-year-old hippo, named A-He, jumped out of a truck that was carrying it to a recreational farm in central Taiwan on Friday. It suffered injuries including broken teeth and a broken leg. A video surfaced showing the animal lying on the street with a pained expression and tears streaming from its eyes. The hippo was taken to a fish farm on Saturday, where it suffered another accident when the container carrying it accidentally fell from a height of 2 m due to weak ropes. According to a veterinarian, A-He could also have been under stress after hundreds of people visited the pond to take photos. Animal rights groups and legislators on Monday expressed their concerns over the procedures for transporting huge animals in Taiwan. The hippo was kept by Sky Zoo. The body was taken to the Taipei Zoo to determine its cause of death. -SAPA

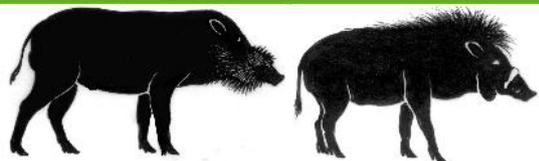
Tanzania: Hippo Trespasses Into Resident's Toilet Pit

6 Decembe 2014

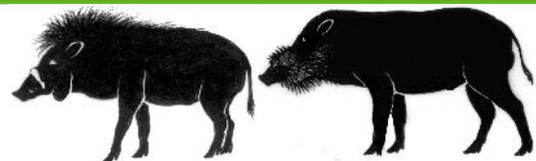
<http://allafrica.com/stories/201412080632.html>

Hippos are large, aggressive and usually reside in water but when one such amphibious mammal





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was discovered inside a toilet pit in Babati District of Manyara region, it caused major pandemonium. The incident, which occurred at Nangara Ziwani area, some distance from the Babati Township, attracted hundreds of people who thronged the old toilet pit to have a look at the sunken hippo which however was still alive and it took hours for the villagers to dig it out. The District Information Officer, Ms Grace Msovela said the hippo happened to be one of the large water mammals that usually leave Lake Babati at night, venturing into nearby farms to feed on grass and sometimes maize. The pit into which the hippo fell used to be a latrine but somehow the owner decided to abandon it and got overgrown with grass such that the animal, known for its poor eyesight failed to detect it at night and went straight in," she explained. Meanwhile Lake Babati, which was meant to be closed off from human activities next week, will remain open until July 2015, according to Ms Msovela. The Lake which was sealed off in December 2013 and got opened up last August, was meant to be closed in December 2014 to allow ample time for the fish species to replenish as well as saving the water body's surrounding environment which for years suffered under destructive human activities. The Manyara Regional Commissioner, Mr Elaston Mbwilo was recently quoted warning the local fishermen not to apply crude fishing methods including using banned nets, spraying chemicals and drawing out small fishes.

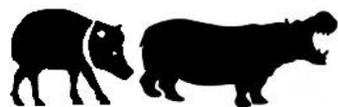
Last May some rogue fisherman had poured deadly chemicals into the lake and killed therein tons of fish, causing widespread stench across Babati township due to the rotting remains. It seems like the culprits had chosen to poison the fish either in retaliation or as a way of harvesting them en-masse at night unnoticed due to the closure order. The Manyara Regional Authorities had at that time halted fishing and other human activities on Lake Babati and Lake Burunge all found in Babati District, as well as at Lake Basoutu (or Lake Balangida) located in Hanang' District for six months from last December. The steps were taken in efforts to preserve the environment in addition to let the fish and other marine species in the water bodies to breed and replenish . Manyara Region has also been experiencing invasion of alien fish buyers from as far as the Democratic Republic of Congo and Kenya who have been dishing out huge sums money to local boatmen with instructions to get them fishes. Official figures indicate that Manyara Region produces more than 10,000 tons of fish in a year. Lake Babati which is also a tourism attraction, being home to some of the largest and most ferocious Hippopotamuses and Crocodiles, shares same eco-system with Lake Basoutu . During the night many of the hippos can be spotted moving between the lakes, located over 100 kilometers apart.

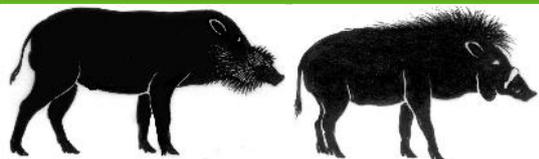
12 kids, 1 villager dead after Niger hippo attack

19 November 2014

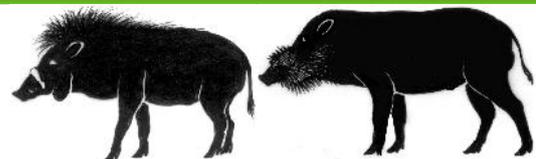
<http://www.news24.com/Africa/News/12-kids-1-villager-dead-after-Niger-hippo-attack-20141119>

Niamey - Twelve children and a villager have been confirmed dead after a hippopotamus attacked a boat near the Niger capital Niamey earlier this week, officials said on Wednesday. The students, aged 12 to 13, died when their boat transporting them across the Niger River was flipped by a hippo on Monday. A number of students in the West African nation take such boats to attend school on the other side of the river. "Ultimately it was 12 students, including seven girls and five boys, who died after the attack," Aichatou Oumani, minister of secondary education, told state





Articles in the news



television. A villager on the same boat was also killed, according to an official in Libore, the village near the site of the accident. An earlier toll had spoken of two deaths, 11 missing and five survivors. At least 18 people were aboard the boat, mostly students. "We have already given the order for the animal to be identified and killed," Hassoumi Djabirou, governor of the Tillaberi region, said on local television. Game wardens shot dead a hippo last year after it killed a teenager in Niamey. Hippos with young in tow are the most aggressive, even attacking cattle that come to graze on the banks of the Niger River, experts say. -AFP

Sweden: Pygmy hippopotamus born in Parken Zoo

4 September 2014

<http://www.bbc.com/news/blogs-news-from-elsewhere-29062119>

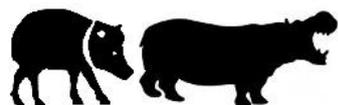
A Swedish zoo has published pictures of its latest addition - a rare baby pygmy hippo that staff have already dubbed "Michelin Man" because of her appearance. Olivia only weighed 6kg (13lb) when she was born a month ago in Parken Zoo, Eskilstuna, to female Krakunia and male Anton, the Aftonbladet newspaper reports. "She is the cutest little fatty you can imagine," Jennie Westander, a zoologist at Parken zoo, tells the paper. Olivia was born under an international breeding programme, and after spending two years with her mother, will be sent off to another zoo in Europe. Pygmy hippos - an endangered species native to West Africa - look like the more well-known hippopotamus amphibius, but common hippos are about twice the size and weigh four times as much as most of their pygmy relatives. There are fewer than 3,000 of the mammals thought to be remaining in the wild.

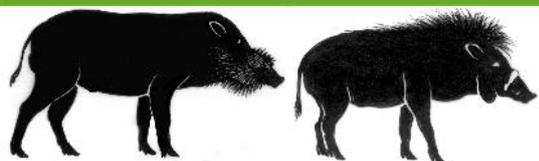
Orphaned hippo Douglas has been successfully released back into the wild

26 August 2014

<http://www.wildlifeextra.com/go/news/douglas-release.html>

An orphaned baby hippo named Douglas, who captured the hearts of many after he starred on ITV1's 'Paul O'Grady's Animal Orphans' with his two terrier friends Molly and Coco, has been successfully released back into the wild in Zambia. Back in February 2013 Douglas (or Douglasette as she/he is sometimes known as sexing hippos is not an easy task) was just two weeks old and close to death when he was rescued by Conservation Lower Zambezi and sent to the Chipembele Wildlife Education Trust (CWET) to be under the care of experienced wildlife rehabilitators Anna and Steve Tolan. This was the first time Anna and Steve, had taken in a hippo. Steve Tolan said: "We constructed a pool and brought in dedicated carers to look after Douglas who initially was bottle fed and looked to his human carers for reassurance and companionship and even swimming lessons. "Douglas has now been fending for himself since he was weaned in January and is surviving and thriving. He has made his first few attempts to join the wild pod in the Luangwa River. It will probably be a long, slow process until he is fully accepted into the pod but he is on his way."





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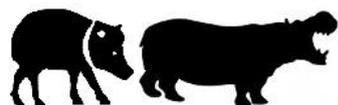
Veterinary, Genetic and Physiological Studies

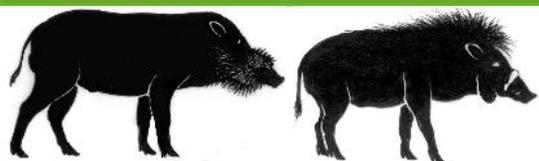
Chiari M, Ferrari N, Giardiello D, Avisani D, Pacciarini ML, Alborali L, Zanoni M and Boniotti MB (2015). Spatiotemporal and Ecological Patterns of *Mycobacterium microti* Infection in Wild Boar (*Sus scrofa*). *Transbound Emerg Dis*. 2015 Jan 12. doi: 10.1111/tbed.12313.

Mycobacterium microti has recently been described as the causative agent of tuberculosis-like lesions in wild boar (*Sus scrofa*), a reservoir specie of *Mycobacterium tuberculosis* complex (MTBC) in some European Mediterranean ecosystem. Through a five-year survey on tuberculosis in free-living wild boars, the epidemiological trend of *M. microti* infections and the host and population risk factors linked with its occurrence were described. Retropharyngeal and mandibular lymph nodes of 3041 hunted wild boars from six different districts were macroscopically inspected. The sex and age of each animal were registered, as well as the animal abundance in each district. Lesions compatible with tuberculosis (190) were collected and analysed using a gyrB PCR-RFLP assay. *M. microti* was identified directly in 99 tissue samples (Prev = 3.26 %; 95 % CI: 2.67-3.97 %), while neither *Mycobacterium bovis*, nor other members of the MTBC were detected. The probability of being *M. microti* positive showed spatio-temporal variability, with 26% of increase of risk of being infected for each year. Moreover, a positive effect of wild boar abundance and age on the prevalence was detected. The generalized increase in the European wild boar population, coupled with its sensitivity to *M. microti* infection, poses a future concern for the identification and management of MTBC members in wild boar.

Kukielka D, Rodriguez-Prieto V, Vicente J and Sánchez-Vizcaíno JM (2015). Constant Hepatitis E Virus (HEV) Circulation in Wild Boar and Red Deer in Spain: An Increasing Concern Source of HEV Zoonotic Transmission. *Transbound Emerg Dis*. 2015 Jan 9. doi: 10.1111/tbed.12311.

Hepatitis E is a viral zoonosis that affects multiple hosts. The complete dynamics of infection in wildlife are still unknown, but the previous fact facilitates the maintenance and circulation of the virus, posing a risk to human health in the case of meat consumption from susceptible animals. In Spain, it has been shown how domestic pigs, cattle and wildlife (i.e. wild boar and red deer) clearly interact in hunting farms, generating a complex epidemiological situation in terms of interspecies pathogen transmission. Therefore, in this study, we aimed to (i) evaluate the circulation of the virus in geographically close domestic (Iberian pigs) and wild animals (wild boar and deer) living in hunting areas from central Spain over an 8-year period (2003-2010) and (ii) to determine whether HEV could be used as a marker of domestic-wildlife contact. For these purposes, a longitudinal analysis of Iberian pig, wild boar and red deer samples (n = 287) through virological and serological tests was conducted to shed light upon the circulation events of HEV. Regarding HEV RNA detection by real-time RT-PCR, 10.12% samples (95% CI: 5.44-14.8) from wild boar and 16.05 % samples (95 % CI: 8.06-24.04) from red deer were positive. As for the Iberian pigs, none of the 48 samples was positive for HEV RNA detection. In the serological analysis, 43.75% (95 % CI: 29.75-57.75) from Iberian pig, 57.40% (95 % CI: 48.10-66.70) from wild boar and 12.85 % (95 % CI: 5.01-20.69) samples from red deer presented anti-HEV antibodies. Positive samples were distributed among all study years (2003-2010). These results





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depict the urgent need to improve the inspection and surveillance of these species and their products. In the case of HEV, it is clear that the stable and constant presence of the virus in wildlife and its contact with Iberian pigs pose a risk for human health as they are all destined for human consumption.

Pérez-González J, Costa V, Santos P, Slate J, Carranza J, Fernández-Llario P, Zsolnai A, Monteiro NM, Anton I, Buzgó J, Varga G and Beja-Pereira A (2014). Males and females contribute unequally to offspring genetic diversity in the polygynandrous mating system of wild boar. *PLoS One*. 2014 Dec 26;9(12):e115394. doi: 10.1371/journal.pone.0115394.

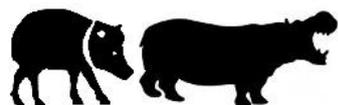
The maintenance of genetic diversity across generations depends on both the number of reproducing males and females. Variance in reproductive success, multiple paternity and litter size can all affect the relative contributions of male and female parents to genetic variation of progeny. The mating system of the wild boar (*Sus scrofa*) has been described as polygynous, although evidence of multiple paternity in litters has been found. Using 14 microsatellite markers, we evaluated the contribution of males and females to genetic variation in the next generation in independent wild boar populations from the Iberian Peninsula and Hungary. Genetic contributions of males and females were obtained by distinguishing the paternal and maternal genetic component inherited by the progeny. We found that the paternally inherited genetic component of progeny was more diverse than the maternally inherited component. Simulations showed that this finding might be due to a sampling bias. However, after controlling for the bias by fitting both the genetic diversity in the adult population and the number of reproductive individuals in the models, paternally inherited genotypes remained more diverse than those inherited maternally. Our results suggest new insights into how promiscuous mating systems can help maintain genetic variation.

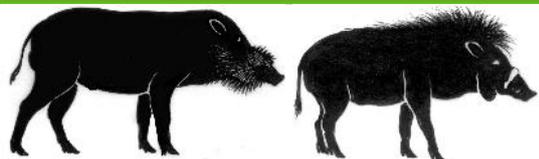
Ran ML, He J, Tan JY, Yang AQ, Li Z and Chen B (2014). The complete sequence of the mitochondrial genome of Luchuan pig (*Sus scrofa*). *Mitochondrial DNA*. 2014 Dec 24:1-2.

Luchuan pig is one of the famous native breeds in China. In this study, we report the complete mitochondrial genome sequence of Luchuan pig for the first time, which is determined through the PCR-based method. The total length of the mitogenome is 16,710 bp with the base composition of 34.67 % A, 13.33 % G, 25.82 % T and 26.18 % C, and an A + T (60.48 %)-rich feature is detected, which contains 1 control region (D-loop region), 2 ribosomal RNA genes, 13 PCGs and 22 tRNA genes. The complete mitochondrial genome of Luchuan pig provides an important data in genetic mechanism and the evolution genomes.

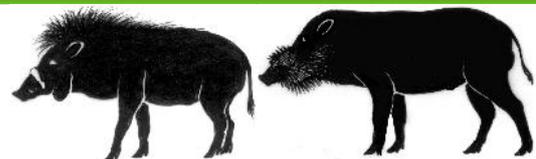
Vale-Gonçalves HM, Cabral JA, Faria MC, Nunes-Pereira M, Faria AS, Veloso O, Vieira ML and Paiva-Cardoso MN (2014). Prevalence of *Leptospira* antibodies in wild boars (*Sus scrofa*) from Northern Portugal: risk factor analysis. *Epidemiol Infect*. 2014 Dec 18:1-5.

Leptospirosis is a zoonosis of worldwide distribution, caused by infection with pathogenic spirochaetes of the genus *Leptospira*. The wild boar (*Sus scrofa*), an important hunting species in Europe, seems to play a significant role in the epidemiological cycle of leptospirosis. A total of 101 serum samples from wild boar hunted in Northern Portugal were analysed for leptospiral





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antibodies detection by microscopic agglutination test. Sera were collected during hunting seasons (2011-2013) and tested with 17 different pathogenic serovars of *Leptospira*. Antibodies against nine serovars were detected in 66 (65.4%) of these sera. Serovars Tarassovi and Altodouro exhibited the highest seroreactivity rates (23.8 % and 16.8 %, respectively), followed by Autumnalis (7.9%) and Bratislava (6.9%). Age and district of origin were found to be risk factors for the presence of leptospiral antibodies in contrast to gender. From a One Health perspective, this study revealed that wild boar should be considered as a potential source of leptospirosis dissemination for humans and animal species (domestic and wild) in shared environments, particularly in the Trás-os-Montes region.

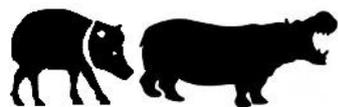
Pedersen K, Pabilonia KL, Anderson TD, Bevins SN, Hicks CR, Kloft JM and Deliberto TJ (2014). Widespread detection of antibodies to *Leptospira* in feral swine in the United States. *Epidemiol Infect.* 2014 Dec 18:1-6.

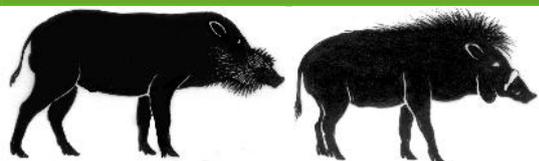
As feral swine continue to expand their geographical range and distribution across the United States, their involvement in crop damage, livestock predation, and pathogen transmission is likely to increase. Despite the relatively recent discovery of feral swine involvement in the aetiology of a variety of pathogens, their propensity to transmit and carry a wide variety of pathogens is disconcerting. We examined sera from 2055 feral swine for antibody presence to six serovars of *Leptospira* that can also infect humans, livestock or domestic animals. About 13% of all samples tested positive for at least one serovar, suggesting that *Leptospira* infection is common in feral swine. Further studies to identify the proportion of actively infected animals are needed to more fully understand the risk they pose.

Beerli O, Blatter S, Boadella M, Schöning J, Schmitt S and Ryser-Degiorgis MP (2014). Towards harmonised procedures in wildlife epidemiological investigations: A serosurvey of infection with *Mycobacterium bovis* and closely related agents in wild boar (*Sus scrofa*) in Switzerland. *Vet J.* 2014 Oct 27. pii: S1090-0233(14)00436-5.
doi: 10.1016/j.tvjl.2014.10.023.

Bovine tuberculosis (bTB) is a (re-)emerging disease in European countries, including Switzerland. This study assesses the seroprevalence of infection with *Mycobacterium bovis* and closely related agents in wild boar (*Sus scrofa*) in Switzerland, because wild boar are potential maintenance hosts of these pathogens. The study employs harmonised laboratory methods to facilitate comparison with the situation in other countries. Eighteen out of 743 blood samples tested seropositive (2.4 %, CI: 1.5-3.9 %) by ELISA, and the results for 61 animals previously assessed using culture and PCR indicated that this serological test was not 100% specific for *M. bovis*, cross-reacting with *M. microti*. Nevertheless, serology appears to be an appropriate test methodology in the harmonisation of wild boar testing throughout Europe. In accordance with previous findings, the low seroprevalence found in wild boar suggests wildlife is an unlikely source of the *M. bovis* infections recently detected in cattle in Switzerland. This finding contrasts with the epidemiological situation pertaining in southern Spain.

Barman NN, Bora DP, Khatoon E, Mandal S, Rakshit A, Rajbongshi G, Depner K, Chakraborty A





New literature on Suiformes

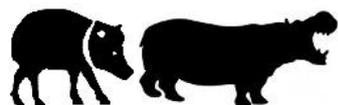


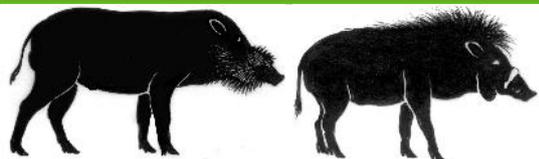
and Kumar S (2014). Classical Swine Fever in Wild Hog: Report of its Prevalence in Northeast India. *Transbound Emerg Dis.* 2014 Nov 27. doi: 10.1111/tbed.12298.

Classical swine fever virus (CSFV) is the causative agent of a highly contagious disease, hog cholera in pigs. The disease is endemic in many parts of the world and vaccination is the only way to protect the animals from CSFV infection. Wild hogs belong to the species *Sus scrofa cristatus* under the family Suidae are quite susceptible to CSFV infection. The epidemiological role concerning classical swine fever (CSF) in India is largely unknown. We report here the three isolated cases of CSF in wild hogs from three National parks, namely Kaziranga National Park, Manas National Park and Jaldapara National Park, from north-east part of India. The post-mortem and histopathological findings were clearly indicative for CSFV infection. The presence of CSFV genome was demonstrated in several organs and tissues collected from hogs died due to viral infection. In addition, CSF-specific antibodies were detected in two wild hogs as well as in eighteen feral pigs from the same locations. The phylogenetic analysis of the partial E2 protein gene and 5' untranslated region of CSFV isolates from the wild hog showed identities with genotype 2.2 of the Indian isolates. Occurrence of CSF in wild hogs may pose a potent threat in the epidemiology of the virus in Northeast part of India. To the best of our knowledge, the report presented in the manuscript is the first comprehensive report on CSF in wild hogs from Northeast India. The findings reported would help us to understand the epidemiology and biology of CSFV in wild animals.

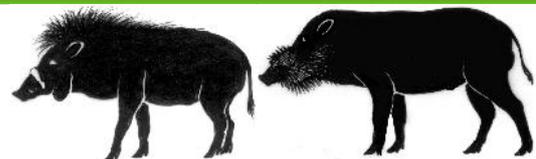
Kriz B, Daniel M, Benes C and Maly M (2014). The role of game (wild boar and roe deer) in the spread of tick-borne encephalitis in the Czech Republic. *Vector Borne Zoonotic Dis.* 2014 Nov;14(11):801-7. doi: 10.1089/vbz.2013.1569.

In the Czech Republic, the incidence of human tick-borne encephalitis (TBE) has been increasing over the last two decades. At the same time, populations of game have also shown an upward trend. In this country, the ungulate game is the main host group of hosts for *Ixodes ricinus* female ticks. This study examined the potential contribution of two most widespread game species (roe deer [*Capreolus capreolus*] and wild boar [*Sus scrofa*]) to the high incidence of TBE in the Czech Republic, using the annual numbers of culls as a proxy for the game population. This was an ecological study, with annual figures for geographical areas-municipalities with extended competence (MEC)-used as units of analysis. Between 2003 and 2011, a total of 6213 TBE cases were reported, and 1062,308 roe deer and 989,222 wild boars were culled; the culls of roe deer did not demonstrate a clear temporal trend, but wild boar culls almost doubled (from 77,269 to 143,378 per year). Statistical analyses revealed a positive association between TBE incidence rate and the relative number of culled wild boars. In multivariate analyses, a change in the numbers of culled wild boars between the 25th and 75th percentile was associated with TBE incidence rate ratio of 1.23 (95 % confidence interval 1.07-1.41, $p=0.003$). By contrast, the association of TBE with culled roe deer was not statistically significant ($p=0.481$). The results suggest that the size of the wild boar population may have contributed to the current high levels and the rising trend in incidence of TBE, whereas the regulated population of roe deer does not seem to be implicated in recent geographical or temporal variations in TBE in the Czech Republic.





New literature on Suiformes

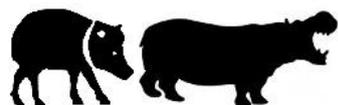


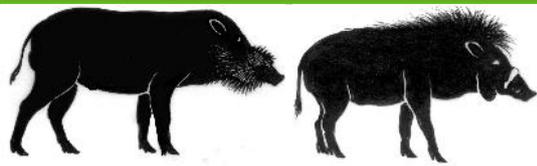
Mesquita JR, Oliveira RM, Coelho C, Vieira-Pinto M and Nascimento MS (2014). Hepatitis E Virus in Sylvatic and Captive Wild Boar from Portugal. *Transbound Emerg Dis.* 2014 Nov 18. doi: 10.1111/tbed.12297.

Hepatitis E virus (HEV) is a zoonotic agent today considered a major Public Health issue in industrialized countries. HEV strains belonging to zoonotic genotype 3 are widely present in swine, being today considered important reservoirs for human disease. Unlike in swine, only scarce data are available on the circulation of HEV in wild boar. This study describes the detection and molecular characterization of HEV in livers from sylvatic wild boar hunted in Portugal and destined for consumption. Additionally, the detection of HEV in stools of a confined wild boar population also destined for consumption is also described. A total of 80 liver samples collected during the hunting season of 2011/2012 and 40 stools collected in February 2012 from a wild boar breeding farm in Portugal were tested by a nested broad-spectrum RT-PCR assay targeting open reading frame (ORF) 1. Twenty livers (25.0%) and 4 stools (10 %) were positive for HEV. Phylogenetic analysis showed that all strains clustered with sequences classified as HEV genotype 3 subgenotype e. To our knowledge, this is the first report documenting the occurrence and molecular analysis of HEV in sylvatic and captive wild boar destined for human consumption in Portugal. This report demonstrates for the first time the circulation of HEV in wildlife reservoirs of Portugal adding knowledge to the epidemiology of HEV in wild boar populations.

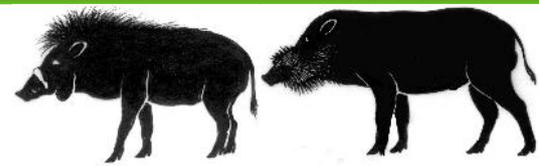
Vergne T, Guinat C, Petkova P, Gogin A, Kolbasov D, Blome S, Molia S, Pinto Ferreira J, Wieland B, Nathues H and Pfeiffer DU (2014). Attitudes and Beliefs of Pig Farmers and Wild Boar Hunters Towards Reporting of African Swine Fever in Bulgaria, Germany and the Western Part of the Russian Federation. *Transbound Emerg Dis.* 2014 Aug 6. doi: 10.1111/tbed.12254.

This study investigated the attitudes and beliefs of pig farmers and hunters in Germany, Bulgaria and the western part of the Russian Federation towards reporting suspected cases of African swine fever (ASF). Data were collected using a web-based questionnaire survey targeting pig farmers and hunters in these three study areas. Separate multivariable logistic regression models identified key variables associated with each of the three binary outcome variables whether or not farmers would immediately report suspected cases of ASF, whether or not hunters would submit samples from hunted wild boar for diagnostic testing and whether or not hunters would report wild boar carcasses. The results showed that farmers who would not immediately report suspected cases of ASF are more likely to believe that their reputation in the local community would be adversely affected if they were to report it, that they can control the outbreak themselves without the involvement of veterinary services and that laboratory confirmation would take too long. The modelling also indicated that hunters who did not usually submit samples of their harvested wild boar for ASF diagnosis, and hunters who did not report wild boar carcasses are more likely to justify their behaviour through a lack of awareness of the possibility of reporting. These findings emphasize the need to develop more effective communication strategies targeted at pig farmers and hunters about the disease, its epidemiology, consequences and control methods, to increase the likelihood of early reporting, especially in the Russian Federation where the virus circulates.





New literature on Suiformes



Krajewska M, Lipiec M, Zabost A, Augustynowicz-Kopeć E and Szulowski K (2014). Bovine tuberculosis in a wild boar (*Sus scrofa*) in Poland. *J Wildl Dis.* 2014 Oct;50(4):1001-2. doi: 10.7589/2013-07-187.

Poland is officially tuberculosis free and bovine tuberculosis (BTB) cases are rarely found except in bovids. We found BTB in a wild boar (*Sus scrofa*) in the Bieszczady Mountains, southeastern Poland. Studies suggest possible transmission of infection between free-living European bison (*Bison bonasus caucasicus*) and wild boar in this area.

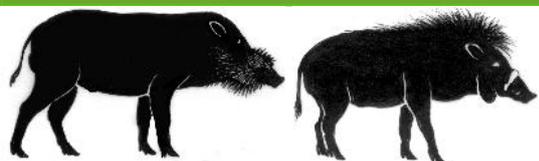
Maia KM, Peixoto GC, Campos LB, Silva AM, Castelo Tde S, Ricarte AR and Silva AR (2014). Estrous Synchronization in Captive Collared Peccaries (*Pecari tajacu*) using a Prostaglandin F2 α Analog. *Zoolog Sci.* 2014 Dec;31(12):836-9. doi: 10.2108/zs140112.

We verify the efficiency of a protocol for estrus synchronization in captive female collared peccaries (*Pecari tajacu*) using the prostaglandin analog D-cloprostenol. Five adult female collared peccaries received an intramuscular administration of 60 μ g D-cloprostenol, which procedure was repeated after a 9-day interval. For 10 days after second the D-cloprostenol administration, females were monitored for changes in external genitalia, ovarian ultrasonography, vaginal cytology and reproductive hormonal dosage. As a result, four females synchronized their estrous at 9.5 ± 0.5 days after the second administration of the prostaglandin analog. Such females showed external signs of estrus, including vulvar opening, hyperemic vaginal mucosa, and vaginal mucus, concomitant with an increase in the proportion of superficial cells (52.2 ± 9.9 %) verified through vaginal cytology. An estrogen peak of 22.7 ± 3.4 pg/ml was detected by hormonal dosage, and the presence of anechoic follicles measuring $0.29 \pm 0.05 \times 0.32 \pm 0.07$ mm were detected in the ovary by ultrasonography. Given these findings, we suggest that D-cloprostenol may be effective for use in estrus synchronization in collared peccaries.

Choi, S. K., J.-E. Lee, et al. (2014). Genetic structure of wild boar (*Sus scrofa*) populations from East Asia based on microsatellite loci analyses. *BMC Genetics* 17: 85.

Background: Wild boar, *Sus scrofa*, is an extant wild ancestor of the domestic pig as an agro-economically important mammal. Wild boar has a worldwide distribution with its geographic origin in Southeast Asia, but genetic diversity and genetic structure of wild boar in East Asia are poorly understood. To characterize the pattern and amount of genetic variation and population structure of wild boar in East Asia, we genotyped and analyzed microsatellite loci for a total of 238 wild boar specimens from ten locations across six countries in East and Southeast Asia. Results: Our data indicated that wild boar populations in East Asia are genetically diverse and structured, showing a significant correlation of genetic distance with geographic distance and implying a low level of gene flow at a regional scale. Bayesian-based clustering analysis was indicative of seven inferred genetic clusters in which wild boars in East Asia are geographically structured. The level of genetic diversity was relatively high in wild boars from Southeast Asia, compared with those from Northeast Asia. This gradient pattern of genetic diversity is consistent with an assumed ancestral population of wild boar in Southeast Asia. Genetic evidences from a relationship tree





New literature on Suiformes



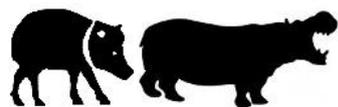
and structure analysis suggest that wild boar in Jeju Island, South Korea have a distinct genetic background from those in mainland Korea. Conclusions: Our results reveal a diverse pattern of genetic diversity and the existence of genetic differentiation among wild boar populations inhabiting East Asia. This study highlights the potential contribution of genetic variation of wild boar to the high genetic diversity of local domestic pigs during domestication in East Asia.

Leslie, E., B. Cowled, et al. (2014). Effective Surveillance Strategies Following A Potential Classical Swine Fever Incursion in a Remote Wild Pig Population in North-Western Australia. *Transboundary and Emerging Diseases* 61(5): 432-442.

Early disease detection and efficient methods of proving disease freedom can substantially improve the response to incursions of important transboundary animal diseases in previously free regions. We used a spatially explicit, stochastic disease spread model to simulate the spread of classical swine fever in wild pigs in a remote region of northern Australia and to assess the performance of disease surveillance strategies to detect infection at different time points and to delineate the size of the resulting outbreak. Although disease would likely be detected, simple random sampling was suboptimal. Radial and leapfrog sampling improved the effectiveness of surveillance at various stages of the simulated disease incursion. This work indicates that at earlier stages, radial sampling can reduce epidemic length and achieve faster outbreak delineation and control, but at later stages leapfrog sampling will outperform radial sampling in relation to supporting faster disease control with a less-extensive outbreak area. Due to the complexity of wildlife population dynamics and group behaviour, a targeted approach to surveillance needs to be implemented for the efficient use of resources and time. Using a more situation-based surveillance approach and accounting for disease distribution and the time period over which an epidemic has occurred is the best way to approach the selection of an appropriate surveillance strategy.

Murakami, K., S. Yoshikawa, et al. (2014). Evaluation of genetic introgression from domesticated pigs into the Ryukyu wild boar population on Iriomote Island in Japan. *Animal Genetics* 45(4): 517-523.

We evaluated genetic introgression from domesticated pigs into the Ryukyu wild boar (RWB) population on Iriomote Island based on their genetic structure and diversity. We used a combination of mitochondrial DNA D-loop region (596 bp) polymorphisms and 23 microsatellite markers. RWBs ($n = 130$) were collected from 18 locations on Iriomote Island and compared with 66 reference samples of European and Asian domestic pigs. We identified six distinct haplotypes, involving 22 single nucleotide polymorphisms (including one insertion) in the RWB population. The phylogenetic tree had two branches: the RWB group and domestic lineage. Fourteen of 130 RWBs (10.8 %) belonged to the European domestic lineage, including 11 RWBs from the Panari Islands, northwest of Iriomote Main Island (IMI). The heterozygosity values, total number of alleles, number of effective alleles and polymorphism information content of the RWB groups were lower than those of the European domestic groups. The RWB population on IMI had a lower heterozygous deficiency index ($FIS = 0.059$) than did the other populations, which indicates that this population was more inbred. There was a large genetic distance ($FST = 0.560$) between





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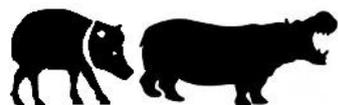
RWBs on IMI and the Meishan populations. Structure analysis using the 23 microsatellite markers revealed that 16 RWBs had an admixture pattern between RWB and domesticated pig breeds. These results suggest that gene flow may have occurred from domestic pigs to RWBs and demonstrate that there was low genetic variation in the IMI population.

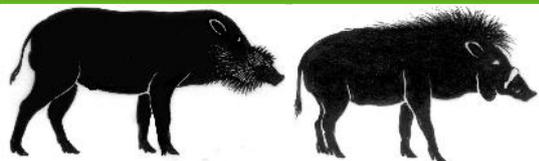
Ridoutt, C., A. Lee, et al. (2014). Detection of brucellosis and leptospirosis in feral pigs in New South Wales. *Australian Veterinary Journal* 92(9): 343-347.

Objective To determine the presence and estimate the prevalence of *Brucella suis*, *Leptospira interrogans* serovar Pomona (hereafter L. pomona) and *Leptospira borgpetersenii* serovar Hardjo (hereafter L. hardjo) in feral pigs culled in New South Wales (NSW), Australia. **Methods** During 2012 and 2013, 239 serum samples were collected from feral pigs killed as pests or game in NSW. All sera were subjected to the rose-bengal test for *B. suis*, with positives subjected to the complement fixation test (CFT). Attempts were made to detect *B. suis* by culture and PCR on CFT-positive samples. All sera were tested separately for the presence of L. pomona and L. hardjo antibodies using the microscopic agglutination test. **Results** Of 238 samples tested, 7 were positive (4 with CFT titres ≥ 32) for *B. suis* antibodies (3 % seroprevalence). However, *B. suis* was not cultured or detected by PCR. Of 239 sera tested for L. pomona antibodies, 126 samples were positive (53%) and 9 (4 %) were positive for L. hardjo. **Conclusions** The findings are the first tangible evidence that feral pigs in northern NSW harbour *B. suis*, providing a plausible explanation for recent human and canine cases of brucellosis related to pig hunting. The increased seroprevalence of L. pomona occurred in years preceded by flooding and rodent plagues, suggesting a potential for zoonotic infection much greater than previously realised. **Advice** to the community should focus on encouraging the adoption of improved hygiene practices during pig hunting and consideration of vaccinating livestock against leptospirosis.

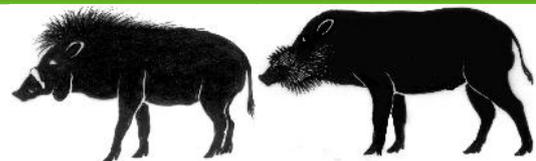
Umhang, G., C. Richomme, et al. (2014). Pigs and wild boar in Corsica harbor *Echinococcus canadensis* G6/7 at levels of concern for public health and local economy. *Acta Tropica*: 64-68.

Cystic echinococcosis (CE) is a parasitic zoonosis widespread in the Mediterranean area. The parasite is commonly maintained in a domestic cycle involving dogs and livestock species. As no new data have been made available for the last 15 years concerning the French Mediterranean island of Corsica, a cross-sectional survey at the slaughterhouse was conducted in 2009-2010 to describe the current presence of *Echinococcus granulosus* sensu lato in intermediate hosts. Only pig infections with the G6/7 genotype of *Echinococcus canadensis* were observed. No infection was detected in other breeding species but this should be interpreted with caution because 75% of the cows inspected during the survey were calves, and all sheep and goats were younger than two months old. In parallel four wild boars harvested during the 2010-2011 hunting season were also infected by the same genotype. These data constitute the first report of *E. canadensis* in France and the first molecular characterization of *E. granulosus* sensu lato in a wild species in France. The current prevalence observed in pigs (5.9%, n =2527) highlights the fact that CE is still of economic concern on Corsica, an island where certain regional products are produced using pig's liver ("Figatelli"). This prevalence, and the similar one observed in wild boars (4.0 %, n=101), is a consequence of certain breeding practices and hunting practices which enable





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circulation of the parasite in the environment in close contact with humans.

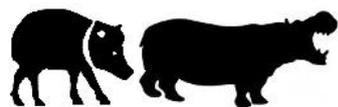
Nogueira-Filho, S. L. G., R. M. Borges, et al. (2014). Nitrogen Requirements of White-Lipped Peccary (Mammalia, Tayassuidae). *Zoo Biology* 33(4): 320-326.

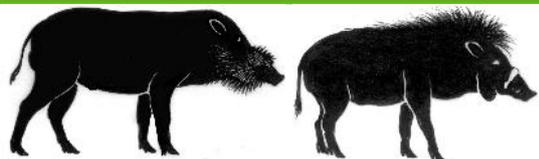
A study was conducted to determine the protein requirement of the white-lipped peccary (*Tayassu pecari*) performing a nitrogen (N) balance digestion trial. In a 4 x 4 Latin square design, four adult captive male peccaries were fed four isoenergetic diets containing four different levels of N (13.3, 19.2, 28.7, and 37.1 g N/kg dry matter). After 15 days of adaptation, the total collection of feces and urine was carried out for five consecutive days. By regression analysis between N intake and N in feces and urine, the metabolic fecal nitrogen (MFN=3.1 g/kg of dry matter intake) and daily endogenous urinary N (EUN=91.0 mg/kg^{0.75}) were determined. Likewise, by regression analyses between consumption of nitrogen and the nitrogen balance (NB=N consumed-(fecal N + Urine N)) we estimated the daily requirement of 336.5 mgN/kg^{0.75}. Therefore, if food intake is unrestricted, white-lipped peccaries require a minimum content in their diet of about 4.5% crude protein as percentage of dry diet. These values are similar to those found in frugivorous wild ruminants, which reinforces the proposition that peccaries have a digestive physiology nearer to that of ruminants than of domestic pigs. Furthermore, the low nutritional maintenance requirements for white-lipped peccary may explain how this species thrive in the Neo-tropical region eating predominantly palm-fruits that normally have low crude protein contents. (C) 2014 Wiley Periodicals, Inc.

Martins Gomes de Castro, A. M., T. Brombila, et al. (2014). Swine infectious agents in *Tayassu pecari* and *Pecari tajacu* tissue samples from Brazil. *Journal of Wildlife Diseases* 50(2): 205-209.

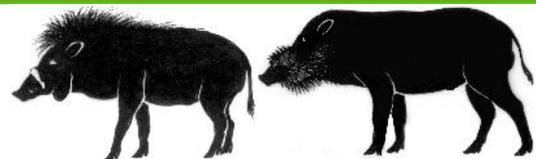
Peccaries and pigs, Tayassuidae and Suidae respectively, diverged approximately one million years ago from a common ancestor. Because these families share some pathogens, peccaries can act as reservoirs of infectious pathogens for domestic and wild swine. We evaluated the presence of swine infectious agents in the spleen and lung tissues of white-lipped peccaries (WLP; *Tayassu pecari*) and collared peccaries (CP; *Pecari tajacu*) in Brazil. Samples from 10 adult CP and three WLP, which had been hunted by locals or hit by motor vehicles, were obtained from two free-ranging Brazilian populations. The samples were tested by PCR for *Mycoplasma hyopneumoniae*, *Bordetella bronchiseptica*, *Pasteurella multocida*, porcine circovirus 2 (PCV2), Suid herpesvirus 1 (SuHV-1), and porcine parvovirus (PPV). Positive samples were sequenced. Both species were negative for PPV and *B. bronchiseptica* and positive for PCV2 and SuHV-1. The lungs of two animals were positive for *M. hyopneumoniae* and *P. multocida*. This report is the first demonstration of PCV2 and SuHV-1 swine viruses and of *M. hyopneumoniae* and *P. multocida* bacteria in peccaries. One factor contributing to this detection was access to tissue samples, which is uncommon. The role of these infectious agents in peccaries is unknown and further epidemiologic studies should be performed. This study identified several infectious agents in peccaries and highlighted the importance of the tissue type used to detect pathogens.

Rouillé A, Pedrono M, Rakotomalala E, Grosbois V, Ramy-Ratiarison R and Roger F (2014). Abundance of the *Potamochoerus larvatus* bush-pig in the savannah zones of North-western





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Madagascar and associated epidemiological risks. *Bois et Forêts de Tropique* 320(2)

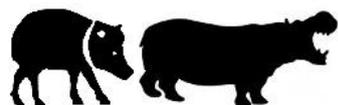
The *Potamochoerus larvatus* bush-pig is a potential reservoir of enzootic diseases in the wild in Madagascar. Among these, African swine fever (ASF) is one of the most alarming. Diagnosed in the country in 1998, this specific viral swine disease is still widespread. Characterising the transmission of the virus between domestic pigs and wild pigs is an essential preliminary step before implementing health measures against ASF. This paper reports on a study to determine the risk of disease transmission between wild pigs and domestic pigs in the savannah zones of Ankarafantsika National Park in north-western Madagascar, where there are many rural pig farms. The Kilometric Abundance Index method used showed a significant increase in the abundance of wild pigs outside forests during the fruiting period of *Strychnos spinosa*. The ASF transmission risk in the savannah zone during this period is therefore higher in sites where these shrubs occur. Epidemiologically, the mature fruit can serve as an indicator of bush-pig presence. Using this indicator to adapt farming practices with a view to reducing contact could limit the potential risk of contamination by the ASF virus or other pathogens carried by bush-pigs.

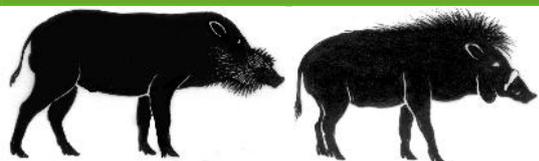
Taxonomic, Morphological, Biogeographic and Evolutionary Studies

Evin A, Flink LG, Bălăşescu A, Popovici D, Andreescu R, Bailey D, Mirea P, Lazăr C, Boroneanţ A, Bonsall C, Vidarsdottir US, Brehard S, Tresset A, Cucchi T, Larson G and Dobney K (2015). Unravelling the complexity of domestication: a case study using morphometrics and ancient DNA analyses of archaeological pigs from Romania. *Philos Trans R Soc Lond B Biol Sci.* 2015 Jan 19;370(1660). pii: 20130616. doi: 10.1098/rstb.2013.0616.

Current evidence suggests that pigs were first domesticated in Eastern Anatolia during the ninth millennium cal BC before dispersing into Europe with Early Neolithic farmers from the beginning of the seventh millennium. Recent ancient DNA (aDNA) research also indicates the incorporation of European wild boar into domestic stock during the Neolithization process. In order to establish the timing of the arrival of domestic pigs into Europe, and to test hypotheses regarding the role European wild boar played in the domestication process, we combined a geometric morphometric analysis (allowing us to combine tooth size and shape) of 449 Romanian ancient teeth with aDNA analysis. Our results firstly substantiate claims that the first domestic pigs in Romania possessed the same mtDNA signatures found in Neolithic pigs in west and central Anatolia. Second, we identified a significant proportion of individuals with large molars whose tooth shape matched that of archaeological (likely) domestic pigs. These large 'domestic shape' specimens were present from the outset of the Romanian Neolithic (6100-5500 cal BC) through to later prehistory, suggesting a long history of admixture between introduced domestic pigs and local wild boar. Finally, we confirmed a turnover in mitochondrial lineages found in domestic pigs, possibly coincident with human migration into Anatolia and the Levant that occurred in later prehistory.

Gamelon M, Focardi S, Gaillard JM, Gimenez O, Bonenfant C, Franzetti B, Choquet R, Ronchi F, Baubet E and Lemaître JF (2014). Do age-specific survival patterns of wild boar fit current





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evolutionary theories of senescence? *Evolution*. 68(12):3636-43. doi: 10.1111/evo.12519.

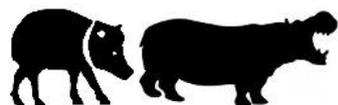
Actuarial senescence is widespread in age-structured populations. In growing populations, the progressive decline of Hamiltonian forces of selection with age leads to decreasing survival. As actuarial senescence is overcompensated by a high fertility, actuarial senescence should be more intense in species with high reproductive effort, a theoretical prediction that has not been yet explicitly tested across species. Wild boar (*Sus scrofa*) females have an unusual life-history strategy among large mammals by associating both early and high reproductive effort with potentially long lifespan. Therefore, wild boar females should show stronger actuarial senescence than similar-sized related mammals. Moreover, being polygynous and much larger than females, males should display higher senescence rates than females. Using a long-term monitoring (18 years) of a wild boar population, we tested these predictions. We provided clear evidence of actuarial senescence in both sexes. Wild boar females had earlier but not stronger actuarial senescence than similar-sized ungulates. Both sexes displayed similar senescence rates. Our study indicates that the timing of senescence, not the rate, is associated with the magnitude of fertility in ungulates. This demonstrates the importance of including the timing of senescence in addition to its rate to understand variation in senescence patterns in wild populations.

Tumram NK, Dhawne SG, Ambade VN and Dixit PG (2014). Fatal tusk injuries from a wild boar attack. *Med Leg J*. 2014 Aug 19. pii: 0025817214528431.

Injuries caused by wild boar attacks are rare. The pattern of the tusk injuries by wild boar is rarely been mentioned in literature. Such injuries can be termed "tusk injuries". Herein, we discuss the pattern of a wild boar tusk wound following an attack on a 65-year-old man who sustained fatal injuries as a result.

Evin, A., T. Cucchi, et al. (2014). Using traditional biometrical data to distinguish West Palearctic wild boar and domestic pigs in the archaeological record: new methods and standards. *Journal of Archaeological Science*: 1-8.

Traditionally, the separation of domestic pig remains from those of wild boar in zooarchaeological assemblages has been based on the comparison of simple size measurements with those from limited numbers of modern or archaeological reference specimens and then applying poorly defined cut-off values to make the identification calls. This study provides a new statistical framework for the identification of both domestic and wild *Sus scrofa* using standard molar tooth lengths and widths from a large modern comparative collection consisting of 407 West Palearctic wild boar and domestic pigs. Our study continues to rely upon so-called 'cut-off' values that correspond to the optimal separation between the two groups, but based upon a measure and visualisation of the error risk curves for erroneous identifications. On average, wild boar have larger teeth than domestic pigs and cut-off values were established for maximum tooth length and width, respectively as follows: 239 cm and 1.85 cm for second upper molar, 3.69 cm and 2.13 cm for third upper molar, 2.26 cm and 1.50 cm for second lower molar, 3.79 cm and 1.75 cm for third lower molar. Specimens below and above these cut-offs are most likely to be, respectively, domestic pig and wild boar and the risk of providing a wrong identification will depend on the





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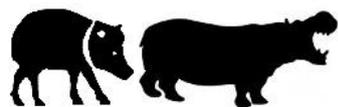
distance to the cut-off value following a relative risk curve. Although likely containing high risk of inherent statistical error, nonetheless this basic metrical identification-tool (based only on recent specimens), is here shown to correctly re-identify 94% of the Neolithic pigs from Durrington Walls (England) as domestic pig. This tool could be employed not only to systematically re-evaluate previous identifications of wild or domestic *Sus scrofa*, but also to establish new identifications where more powerful and reliable approaches such as Geometric Morphometrics cannot be applied. [copyright] 2013 Elsevier Ltd. All rights reserved.

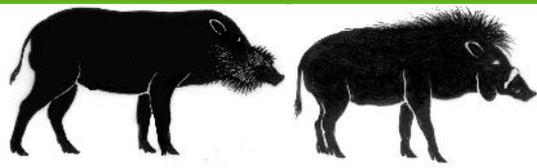
Owen, J., K. Dobney, et al. (2014). The zooarchaeological application of quantifying cranial shape differences in wild boar and domestic pigs (*Sus scrofa*) using 3D geometric morphometrics. *Journal of Archaeological Science*: 159-167.

The process of domestication increases the variety of phenotypes expressed in animals. Zooarchaeologists have attempted to study these changes osteologically in their search for the geographic and temporal origins of initial animal domestication during the late Pleistocene and early Holocene. Traditional biometric approaches have explored broad changes in body size over time, but this approach provides poor resolution. Here we investigate whether geometric morphometric (GMM) analyses of cranial shape can be used to provide better resolution between wild and domestic pigs (*Sus scrofa*), since shape is less affected by environmental factors than size. GMM combined with traditional multivariate statistics were applied to the crania of 42 modern domestic pigs (representing 6 breeds), 10 wild x domestic first generation hybrid pigs and 55 adult wild boar. Further analyses were carried out on morphologically discrete portions of the crania to simulate the fragmented nature of archaeological mammal remains. We found highly significant discrimination between wild and domestic pigs, both on the whole crania, and subsets including the parietal, the basicranium, the angle of the nasal and the zygomatic. We also demonstrate that it is possible to discriminate different domestic breeds on the basis of cranial morphology, and that 1st generation hybrid wild x domestic pig morphology more closely resembles wild pigs than domestic, suggesting that a wild phenotype (here represented by morphology) is dominant over a recessive domestic one. Our data demonstrate that GMM techniques can provide a quantifiable, clear classification between wild and domestic *Sus* (even using partial cranial remains) which has significant implications for zooarchaeological research.

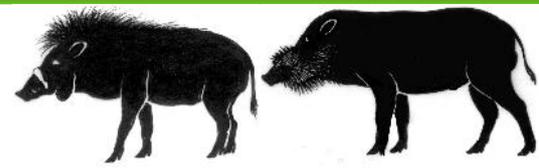
Fujita, M., S. Yamasaki, et al. (2014). Body size reduction in wild boar (*Sus scrofa*) from the late Pleistocene Maehira Fissure Site in Okinawa-jima Island, Japan, with relevance to human arrival. *Quaternary International* 7: 289-299.

Late Pleistocene to Holocene terrestrial vertebrate fossils were excavated at a newly-found fossil locality, Maehira Fissure Site, Itoman City, Okinawa-jima Island, Ryukyu Archipelago, Japan. Location F1 in this site can be divided into three beds characterized by dominance of extinct deer (*Cervus astylodon* and *Mutiacinae* sp.), birds, and wild boar in ascending order. 14C dating indicated approximately 23-20 ka BP from a snail shell collected from the deer bed and a charcoal from the boar bed. It has been considered that deer and boar lived together in the Okinawa-jima Island. However, the results indicate that deer extinction occurred before wild boar increase. The molar teeth of the late Pleistocene boar excavated from Location F1 of this site





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were larger than those of the Holocene boar from Location F2. This is the first report to demonstrate that the molar size of late Pleistocene boar is larger than that of Holocene boar from the same site.

Souron A, Merceron G, Blondel C, Brunetière N, Colyn M, Hofman-Kamińska E and Boisserie J-R (2014). Three-dimensional dental microwear texture analysis and diet in extant Suidae (Mammalia: Cetartiodactyla). *Mammalia*, DOI 10.1515/mammalia-2014-0023

We investigated the dietary differences among four extant suid genera using 3D dental microwear texture analysis on the enamel surfaces of molar shearing facets. We tested the differences among four taxa for four variables: complexity, anisotropy, and heterogeneity at two scales. This enabled us to distinguish omnivorous taxa (*Sus s. scrofa* and *Potamochoerus* sp.) from herbivorous ones (*Phacochoerus africanus* and *Hylochoerus meinertzhageni*) in terms of complexity. Heterogeneity likely distinguishes the suids displaying specialized diets (homogenous surfaces in the grazer *Ph. africanus*) from the more generalized suids (heterogeneous surfaces in the omnivorous *S. scrofa* and *Potamochoerus* sp., and mixed feeder herbivorous *H. meinertzhageni*). This study represents the first step toward a better comprehension of the diet and ecology of extant and fossil suids and also puts forward new hypotheses to be tested, especially on the effects of rooting behavior.

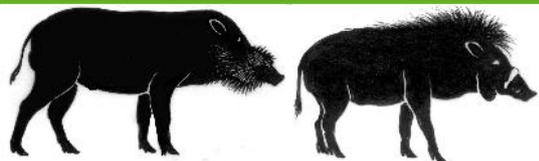
Souron A and Boisserie J-R TD, 201X. A new species of *Kolpochoerus* from Ethiopia. *Acta Palaeontologica Polonica* XX (X): xxx-xxx.

Although the suid genus *Kolpochoerus* is well known from the Plio-Pleistocene of Africa, the evolutionary history of one of its constituent species, *K. majus*, remained obscure until substantial fossil evidence accumulated during the last 20 years, largely from sites in Ethiopia. Here, we describe the new *Kolpochoerus phillipi* sp. nov., based on a fairly complete skull and the remains of additional individuals from ~2.5 Ma deposits at Matabaietu, in the Middle Awash study area of Ethiopia. Based on a phylogenetic analysis, we suggest that *K. phillipi* sp. nov. belongs to a clade of “bunolophodont suines” including *K. majus* and the extant giant forest hog *Hylochoerus meinertzhageni*. Within this clade, *K. phillipi* sp. nov. may represent a potential ancestor of *K. majus*, based on its morphology and stratigraphic position.

Souron A, Balasse M and Boisserie J-R (2012). Intra-tooth isotopic profiles of canines from extant *Hippopotamus amphibius* and late Pliocene hippopotamids (Shungura Formation, Ethiopia): Insights into the seasonality of diet and climate. *Palaeogeography, Palaeoclimatology, Palaeoecology* 342–343: 97–110.

We investigated the potential use of intra-tooth variations of stable carbon and oxygen isotopes in hippopotamid canines to retrieve signals of seasonality in continental contexts. A high-resolution serial isotope analysis of enamel was performed on both lower and upper canines of one extant common hippopotamus from the Sarh region (Chad). We discussed three methodological points: canine growth rates, optimal sampling resolution, and record of seasonality within hippopotamid canine enamel. In this 21-year old specimen, growth rates of 39.1 mm/year and 31 mm/year were





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established for the lateral part of lower and upper canines respectively. Our results suggest that the optimal sampling resolution to capture the seasonality is ca. 1–3 mm. Seasonal changes were observed in both $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values, indicating an important C3 component in the diet during the rainy seasons (up to 50%) and a diet dominated by C4 grasses during the dry seasons (around 70 %). Next, we performed a similar test on two fossils from the Shungura Formation (south-western Ethiopia). Seasonal variations in $\delta^{13}\text{C}$ of the diet were also observed in the fossil specimens and the palaeoenvironmental implications are discussed. Preliminary conclusions from the $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ sequences seem consistent with a rise of seasonality during the Pliocene, synchronous with the global aridification and opening of the environments.

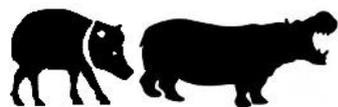
Aubert M, Brumm A, Ramli M, Sutikna T, Saptomo EW, Hakim B, Morwood MJ, van den Bergh GD, Kinsley L and Dosseto A (2014). Pleistocene cave art from Sulawesi, Indonesia. *Nature*. 514: 223-227. doi:10.1038/nature13422

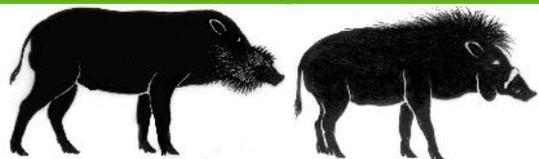
Archaeologists have long been puzzled by the appearance in Europe 40–35 thousand years (kyr) ago of a rich corpus of sophisticated artworks, including parietal art (that is, paintings, drawings and engravings on immobile rock surfaces) and portable art (for example, carved figurines), and the absence or scarcity of equivalent, well-dated evidence elsewhere, especially along early human migration routes in South Asia and the Far East, including Wallacea and Australia, where modern humans (*Homo sapiens*) were established by 50 kyr ago. Here, using uranium-series dating of coralloid speleothems directly associated with 12 human hand stencils and two figurative animal depictions from seven cave sites in the Maros karsts of Sulawesi, we show that rock art traditions on this Indonesian island are at least compatible in age with the oldest European art. The earliest dated image from Maros, with a minimum age of 39.9 kyr, is now the oldest known hand stencil in the world. In addition, a painting of a babirusa ('pig-deer') made at least 35.4 kyr ago is among the earliest dated figurative depictions worldwide, if not the earliest one. Among the implications, it can now be demonstrated that humans were producing rock art by 40 kyr ago at opposite ends of the Pleistocene Eurasian world.

Ecological, Behavioural and Conservation Studies

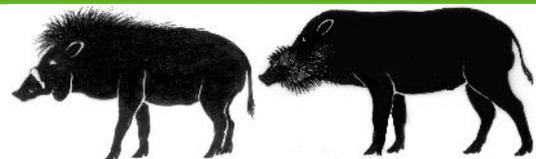
Massei G, Kindberg J, Licoppe A, Gačić D, Sprem N, Kamler J, Baubet E, Hohmann U, Monaco A, Ozoliņš J, Cellina S, Podgórski T, Fonseca C, Markov N, Pokorný B, Rosell C and Náhlik A (2014). Wild boar populations up, numbers of hunters down? A review of trends and implications for Europe. *Pest Manag Sci*. 2014 Dec 16. doi: 10.1002/ps.3965.

Across Europe wild boar numbers increased in the 1960s-1970s but stabilised in the 1980s; recent evidence suggests that numbers and impact of wild boar grew steadily since the 1980s. As hunting is the main cause of mortality for this species, we reviewed wild boar hunting bags and hunter population trends in 18 European countries from 1982 to 2012. Hunting statistics and numbers of hunters were used as indicators of animal numbers and hunting pressure. The results confirmed that wild boar increased consistently throughout Europe whilst the number of hunters





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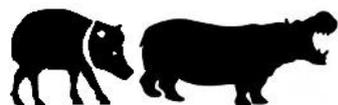
remained relatively stable or declined in most countries. We conclude that recreational hunting is insufficient to limit wild boar population growth and that the relative impact of hunting on wild boar mortality had decreased. Other factors, such as mild winters, reforestation, intensification of crop production, supplementary feeding and compensatory population responses of wild boar to hunting pressure might also explain population growth. As populations continue to grow, more human-wild boar conflicts are expected unless this trend is reversed. New interdisciplinary approaches are urgently required to mitigate human-wild boar conflicts that are otherwise destined to grow further.

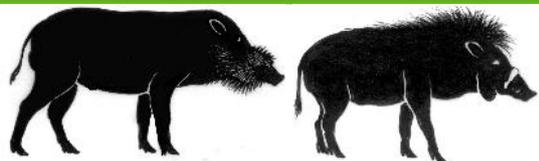
Barasona JA, Latham MC, Acevedo P, Armenteros JA, Latham AD, Gortazar C, Carro F, Soriguer RC and Vicente J (2014). Spatiotemporal interactions between wild boar and cattle: implications for cross-species disease transmission. *Vet Res.* 2014 Dec 12;45:122. doi: 10.1186/s13567-014-0122-7.

Controlling infectious diseases at the wildlife/livestock interface is often difficult because the ecological processes driving transmission between wildlife reservoirs and sympatric livestock populations are poorly understood. Thus, assessing how animals use their environment and how this affects interspecific interactions is an important factor in determining the local risk for disease transmission and maintenance. We used data from concurrently monitored GPS-collared domestic cattle and wild boar (*Sus scrofa*) to assess spatiotemporal interactions and associated implications for bovine tuberculosis (TB) transmission in a complex ecological and epidemiological system, Doñana National Park (DNP, South Spain). We found that fine-scale spatial overlap of cattle and wild boar was seasonally high in some habitats. In general, spatial interactions between the two species were highest in the marsh-shrub ecotone and at permanent water sources, whereas shrub-woodlands and seasonal grass-marshlands were areas with lower predicted relative interactions. Wild boar and cattle generally used different resources during winter and spring in DNP. Conversely, limited differences in resource selection during summer and autumn, when food and water availability were limiting, resulted in negligible spatial segregation and thus probably high encounter rates. The spatial gradient in potential overlap between the two species across DNP corresponded well with the spatial variation in the observed incidence of TB in cattle and prevalence of TB in wild boar. We suggest that the marsh-shrub ecotone and permanent water sources act as important points of TB transmission in our system, particularly during summer and autumn. Targeted management actions are suggested to reduce potential interactions between cattle and wild boar in order to prevent disease transmission and design effective control strategies.

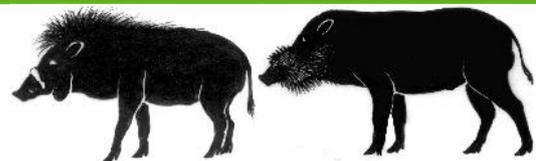
Camerlink I, Turner SP, Ursinus WW, Reimert I and Bolhuis JE (2014). Aggression and affiliation during social conflict in pigs. *PLoS One.* 2014 Nov 26;9(11):e113502. doi: 10.1371/journal.pone.0113502.

Social conflict is mostly studied in relation to aggression. A more integral approach, including aggressive and affiliative behaviour as well as physiology, may however give a better understanding of the animals' experience during social conflict. The experience of social conflict may also be reflected in the spatial distribution between conspecifics. The objective was to





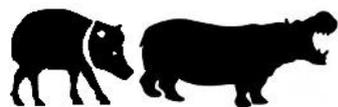
New literature on Suiformes

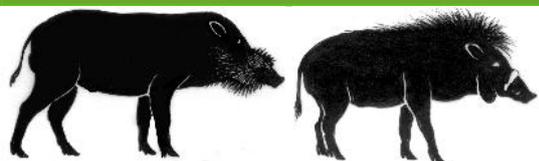


assess the relationship between behaviour, physiology, and spatial integration in pigs (*Sus scrofa*) during social conflict. Hereto, 64 groups of pigs (9 wk of age) were studied in a 24 h regrouping test whereby pairs of familiar pigs were grouped with 2 unfamiliar pairs, in either barren or straw-enriched housing. Data on aggressive and affiliative behaviour, skin lesions, body weight, and haptoglobin could be summarized into three principal component analysis factors. These three factors were analysed in relation to spatial integration, i.e. inter-individual distances and lying in body contact. Pigs stayed up to 24 h after encounter in closer proximity to the familiar pig than to unfamiliar pigs. Pigs with a high factor 1 score were more inactive, gave little social nosing, had many skin lesions and a high body weight. They tended to space further away from the familiar pig ($b=1.9$ cm; $P=0.08$) and unfamiliar ones ($b=0.7$ cm; $P=0.05$). Pigs that were involved in much aggression (factor 2), and that had a strong increase in haptoglobin (factor 3), tended to be relatively most far away from unfamiliar pigs ($b=0.03$ times further; $P=0.08$). Results on lying in body contact were coherent with results on distances. Pigs in enriched housing spaced further apart than pigs in barren housing ($P<0.001$). The combined analysis of measures revealed animals that may either promote or slow down group cohesion, which may not have become clear from single parameters. This emphasizes the importance of an integral approach to social conflict.

Zuberogoitia I, del Real J, Torres JJ, Rodríguez L, Alonso M and Zabala J (2014). Ungulate vehicle collisions in a peri-urban environment: consequences of transportation infrastructures planned assuming the absence of ungulates. *PLoS One*. 2014 Sep 24;9(9):e107713. doi: 10.1371/journal.pone.0107713.

Ungulate vehicle collisions (UVC) provoke serious damage, including human casualties, and a large number of measures have been developed around the world to avoid collisions. We analyse the main factors involved in UVC in a road network built in the absence of ungulates, where mitigation structures to avoid UVC were not adequately considered. Ungulate population greatly increased during the last two decades and now Roe Deer and Wild Boars are widely distributed over the study area, but even after this increase, the road network was not adapted to avoid UVC. A total of 235 Roe Deer (RDVC) and 153 Wild Boar vehicle collisions (WBVC) were recorded between January 2008 and December 2011. We randomly selected 289 sample points (87 RDVC, 60 WBVC and 142 controls) separated by at least 500 metres from the next closest point and measured 19 variables that could potentially influence the vehicle collisions. We detected variations in the frequency of RDVC on a monthly basis, and WBVC was higher at weekends but no significant differences were detected on a monthly basis. UVC were more likely to occur at locations where sinuosity of the road, velocity, surface of shrub and deciduous forest area were greater, the presence of fences entered with positive relationship and distance to the nearest building was less. RDVC were more likely to occur at locations where timber forest area increased and distance to the nearest building decreased and WBVC was related to open fields cover and also to the presence of fences. Sinuosity and velocity entered in both cases as significant factors. Major roads, in which the traffic volume is greater and faster, caused more accidents with ungulates than secondary roads. Nowadays, the high frequency of ungulate road-kills deserves a new strategy in order to adapt infrastructure and adopt mitigation measures.





New literature on Suiformes

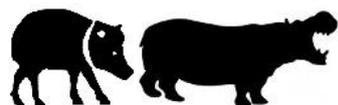


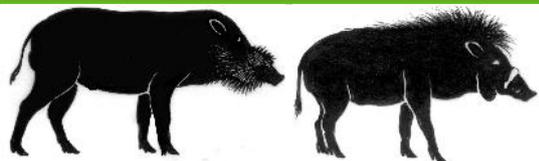
Lohr CA, Lepczyk CA and Johnson ED (2014). The islands are different: human perceptions of game species in Hawaii. *Environ Manage.* 2014 Oct;54(4):814-27. doi: 10.1007/s00267-014-0353-4.

Hawaii's game animals are all non-native species, which provokes human-wildlife conflict among stakeholders. The management of human-wildlife conflict in Hawaii is further complicated by the discrete nature of island communities. Our goal was to understand the desires and perceived values or impacts of game held by residents of Hawaii regarding six game species [pigs (*Sus scrofa*), goats (*Capra hircus*), mouflon (*Ovis musimon*), axis deer (*Axis axis*), turkeys (*Melagris gallopavo*), and doves (*Geopelia striata*)]. We measured the desired abundance of game on the six main Hawaiian Islands using the potential for conflict index and identified explanatory variables for those desires via recursive partitioning. In 2011 we surveyed 5,407 residents (2,360 random residents and 3,047 pre-identified stakeholders). Overall 54.5 and 27.6 % of the emailed and mailed surveys were returned (n = 1,510). A non-respondent survey revealed that respondents and non-respondents had similar interest in wildlife, and a similar education level. The desired abundance of game differed significantly among stakeholders, species, and islands. The desired abundance scores were higher for axis deer, mouflon, and turkeys compared to pigs, goats or doves. Enjoyment at seeing game and the cultural value of game were widespread explanatory variables for desired abundance. Models for Lanai emphasized the economic value of game, whereas models for Maui identified the potential for game to contaminate soil and water. Models for Oahu and Kauai revealed concern for human health and safety. Given our findings we recommend managers design separate management plans for each island taking into consideration the values of residents.

Webber AD and Hill CM (2014). Using participatory risk mapping (PRM) to identify and understand people's perceptions of crop loss to animals in Uganda. *PLoS One.* 2014 Jul 30;9(7):e102912. doi: 10.1371/journal.pone.0102912.

Considering how people perceive risks to their livelihoods from local wildlife is central to (i) understanding the impact of crop damage by animals on local people and (ii) recognising how this influences their interactions with, and attitudes towards, wildlife. Participatory risk mapping (PRM) is a simple, analytical tool that can be used to identify and classify risk within communities. Here we use it to explore local people's perceptions of crop damage by wildlife and the animal species involved. Interviews (n=93, n=76) and seven focus groups were conducted in four villages around Budongo Forest Reserve, Uganda during 2004 and 2005. Farms (N=129) were simultaneously monitored for crop loss. Farmers identified damage by wildlife as the most significant risk to their crops; risk maps highlighted its anomalous status compared to other anticipated challenges to agricultural production. PRM was further used to explore farmers' perceptions of animal species causing crop damage and the results of this analysis compared with measured crop losses. Baboons (*Papio anubis*) were considered the most problematic species locally but measurements of loss indicate this perceived severity was disproportionately high. In contrast goats (*Capra hircus*) were considered only a moderate risk, yet risk of damage by this species was significant. Surprisingly, for wild pigs (*Potamochoerus* sp), perceptions of severity were not as high as damage incurred might have predicted, although perceived incidence





New literature on Suiformes



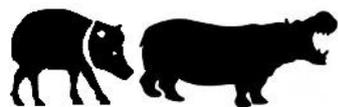
was greater than recorded frequency of damage events. PRM can assist researchers and practitioners to identify and explore perceptions of the risk of crop damage by wildlife. As this study highlights, simply quantifying crop loss does not determine issues that are important to local people nor the complex relationships between perceived risk factors. Furthermore, as PRM is easily transferable it may contribute to the identification and development of standardised approaches of mitigation across sites of negative human-wildlife interaction.

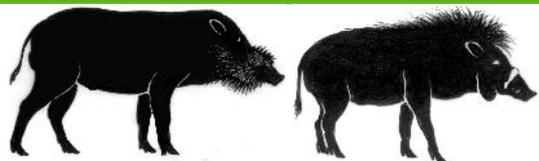
Biondo C, Izar P, Miyaki CY and Bussab VS (2014). Social structure of collared peccaries (*Pecari tajacu*): Does relatedness matter? Behav Processes. 2014 Nov;109 Pt A:70-8. doi: 10.1016/j.beproc.2014.08.018.

Relatedness is considered an important factor in shaping social structure as the association among kin might facilitate cooperation via inclusive fitness benefits. We addressed here the influence of relatedness on the social structure of a Neotropical ungulate, the collared peccary (*Pecari tajacu*). As peccaries are highly social and cooperative, live in stable cohesive herds and show certain degree of female philopatry and high mean relatedness within herds, we hypothesized that kin would be spatially closer and display more amicable and less agonistic interactions than non-kin. We recorded spatial association patterns and rates of interactions of two captive groups. Pairwise relatedness was calculated based on microsatellite data. As predicted, we found that kin were spatially closer than non-kin, which suggests that relatedness is a good predictor of spatial association in peccaries. However, relatedness did not predict the rates of social interactions. Although our results indirectly indicate some role of sex, age and familiarity, further studies are needed to clarify the factors that shape the rates of interactions in collared peccaries. This article is part of a Special Issue entitled: Neotropical Behaviour.

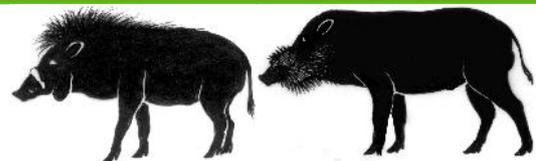
Merta, D., P. Mocala, et al. (2014). Autumn-winter diet and fat reserves of wild boars (*Sus scrofa*) inhabiting forest and forest-farmland environment in south-western Poland. Folia Zoologica 63(2): 95-102.

Diet, carcass weight (dressed weight) and kidney fat index (KFI) in wild boar populations were compared between two different lowland environments in south-western Poland. In the forest-farmland environment of the Lasy Slaskie forest (LS), fodder root crops and cereals made up 67.6 % of the dry weight (d.w.) of stomach content (n = 40). In the large compact forest of the Bory Dolnoslaskie forest (BD), 69.6 % of the stomach content (n = 43) was made up of roots and browse. Piglets and older animals harvested in BD were significantly lighter than those harvested in LS (13.6 kg vs. 25.6 kg and 47.3 kg vs. 55.9 kg respectively). The KFI of piglets and older animals harvested in LS were significantly higher than those in corresponding age classes of wild boars from BD. The metabolized energy of stomach content amounted to 13.2 MJ/kg d.w. in LS and 8.9 MJ/kg d.w. in BD. This is probably the chief cause of the differences in carcass weight and KFI between the wild boars living in the compared study areas.





New literature on Suiformes



Podgorski, T., D. Lusseau, et al. (2014). Long-Lasting, Kin-Directed Female Interactions in a Spatially Structured Wild Boar Social Network." *PLoS ONE* 9(6): e99875.

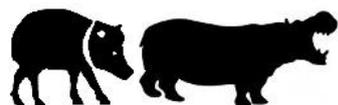
Individuals can increase inclusive fitness benefits through a complex network of social interactions directed towards kin. Preferential relationships with relatives lead to the emergence of kin structures in the social system. Cohesive social groups of related individuals and female philopatry of wild boar create conditions for cooperation through kin selection and make the species a good biological model for studying kin structures. Yet, the role of kinship in shaping the social structure of wild boar populations is still poorly understood. In the present study, we investigated spatio-temporal patterns of associations and the social network structure of the wild boar *Sus scrofa* population in Bialowieza National Park, Poland, which offered a unique opportunity to understand wild boar social interactions away from anthropogenic factors. We used a combination of telemetry data and genetic information to examine the impact of kinship on network cohesion and the strength of social bonds. Relatedness and spatial proximity between individuals were positively related to the strength of social bond. Consequently, the social network was spatially and genetically structured with well-defined and cohesive social units. However, spatial proximity between individuals could not entirely explain the association patterns and network structure. Genuine, kin-targeted, and temporarily stable relationships of females extended beyond spatial proximity between individuals while males interactions were short-lived and not shaped by relatedness. The findings of this study confirm the matrilineal nature of wild boar social structure and show how social preferences of individuals translate into an emergent socio-genetic population structure.

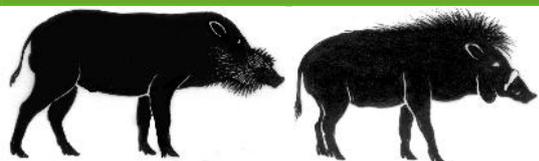
Thurfjell, H., G. Spong, et al. (2014). Effects of weather, season, and daylight on female wild boar movement. *Acta Theriologica* 59(3): 467-472.

Animals often modify their behavior to reduce the effects of adverse weather conditions. By studying wild boar equipped with the Global Positioning System (GPS) collars, we explored the effects of weather conditions on movement and activity patterns across seasons. We found that the most prevailing strategy for wild boar exposed to stressful weather conditions is to reduce movement. Wild boar thus decreased movement at low temperatures and in precipitation during winter. We also found that wild boar increased movement in late summer, and with precipitation during late summer, despite higher food availability and facilitated foraging by the rain. We also confirm previous results that snow depth reduces movement of wild boar, likely by making movements more energetically costly.

Senn, H., P. O'Donoghue, et al. (2014). Hundreds of SNPs for the Endangered pygmy hippopotamus (*Choeropsis liberiensis*). *Conservation Genetics Resources* 6(3): 535-538.

The pygmy hippo is an Endangered mammal endemic to West Africa, of which only 2,000-3,000 are left in the wild. Until now genetic resources to conduct monitoring of wild populations and to facilitate captive breeding have been lacking. In this study we used restriction-site associated DNA sequencing of five pygmy hippo samples to generate 1,619 high confidence candidate





New literature on Suiformes



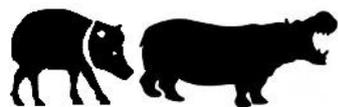
single nucleotide polymorphisms (SNPs) suitable for population genetic analysis. A subset of 10 of SNPs generated were validated via resequencing with 100 % success rate and through the use of KASPar DNA probes (Kbiosciences) with 90 % success rate. To facilitate future research we present the list of 1,619 SNPs ranked according to mean genotype confidence and mean coverage.

Briceno-Mendez, M., R. Reyna-Hurtado, et al. (2014). Habitat preferences and relative abundance of *Tayassu pecari* in an area with hunting in the region of Calakmul, Campeche, Mexico. Preferencias de habitat y abundancia relativa de *Tayassu pecari* en un area con caceria en la region de Calakmul, Campeche, Mexico." *Revista Mexicana de Biodiversidad* 85(1): 242-250.

Investigating the habitat preferences and relative abundance of wild mammals provides basic information for conservation or management programs. The white-lipped peccary (*Tayassu pecan*, PLB, for its Spanish initials) is a species classified as in danger of extinction in Mexico. This study evaluated the habitat preferences and relative abundance of this species in the southern part of the Calakmul Biosphere Reserve and the ejido Nuevo Becal, both sites are located in the state of Campeche. Twenty kilometers of transects were established at each site, in each of these sites we recorded the tree species present and the number of tracks during 4 months of the rainy season and 2 months of the dry season. The analysis of habitat use indicates that although the highest number of records occurred in the medium semi-perennial forest, the PLB preferred the low flooded forest. After surveying 240 km, we obtained a relative abundance of 0.53 signs per km walked. Brosimum alicastrum and Manilkara zapota were the tree species that had the highest abundance of fruits in the 2 sites. White-lipped peccary species is very sensitive to deforestation and other anthropogenic disturbances, so it is important to develop a strategy for the conservation of the habitat of the species considering not only the protected areas, but also the communal areas.

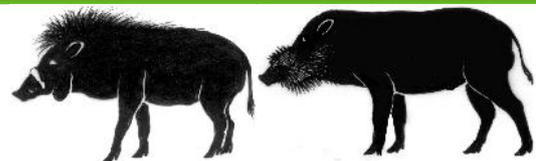
Michel, N. L., T. W. Sherry, et al. (2014). The omnivorous collared peccary negates an insectivore-generated trophic cascade in Costa Rican wet tropical forest understorey. *Journal of Tropical Ecology* 30(1): 1-11.

Insectivorous birds and bats often protect plants through density- and trait-mediated cascades, but the degree to which insectivores reduce herbivorous arthropods and leaf damage varies among systems. Top-down interaction strength may be influenced by the biotic and abiotic context, including the presence of vegetation-disturbing animals. We tested two hypotheses: (1) insectivorous birds and bats initiate trophic cascades in tropical rain-forest understorey; and (2) the native, omnivorous collared peccary (*Pecari tajacu*) negates these cascades via non-trophic effects. We studied the top-down effects of birds and bats on understorey plants in north-eastern Costa Rica using 60 netted exclosures within and outside existing peccary exclosures. Excluding birds and bats increased total arthropod densities by half, both with and without peccaries. Bird/bat exclosures increased Diptera density by 28 % and leaf damage by 24 % without peccaries, consistent with a trophic cascade. However, bird/bat exclosures decreased Diptera density by 32 % and leaf damage by 34 % with peccaries, a negation of the trophic cascade.





New literature on Suiformes



Excluding peccaries increased leaf damage by 43 % on plants without birds and bats. This is the first study, to our knowledge, to demonstrate that the non-trophic activity of an omnivorous ungulate can reverse a trophic cascade.

Bengsen, A. J., M. N. Gentle, et al. (2014). Impacts and management of wild pigs *Sus scrofa* in Australia. *Mammal Review* 44(2): 135-147.

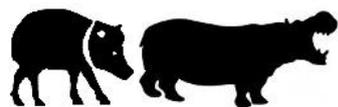
Globally, wild or feral pigs *Sus scrofa* are a widespread and important pest. Mitigation of their impacts requires a sound understanding of those impacts and the benefits and limitations of different management approaches. Here, we review published and unpublished studies to provide a synopsis of contemporary understanding of wild pig impacts and management in Australia, and to identify important shortcomings. Wild pigs can have important impacts on biodiversity values, ecosystem functioning and agricultural production. However, many of these impacts remain poorly described, and therefore, difficult to manage effectively. Many impacts are highly variable, and innovative experimental and analytical approaches may be necessary to elucidate them. Most contemporary management programmes use lethal techniques to attempt to reduce pig densities, but it is often unclear how effective they are at reducing damage. We conclude that greater integration of experimental approaches into wild pig management programmes is necessary to improve our understanding of wild pig impacts, and our ability to manage those impacts effectively and efficiently.

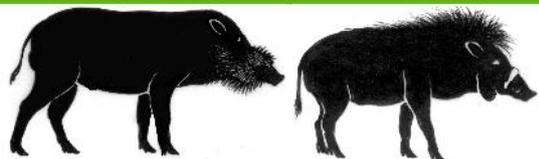
Datiko D and Bekele A (2013). Conservation challenge: human-herbivore conflict in Chebera Churchura National Park, Ethiopia. *Pak J Biol Sci.* 2013 Dec 1;16(23):1758-64.

An investigation on human-herbivore conflict was carried out in CCNP between 2011 and 2012 in seven randomly selected villages (Chebera, Serri, Yora, Shita, Delba, Chuchra, Chewda) around the Park. A total of 312 household samples were identified for interview. Group discussion and field observation were also carried out. Among the respondents, the majority (83.9 %) faced crop damage. African elephant (*Loxodonta africana*), Hippopotamus (*Hippopotamus amphibious*), African buffalo (*Syncerus caffer*), Desert warthog (*Phacochoerus aethiopicus*), Wild pig (*Sus scrofa*), Porcupine (*Hystrix cristata*), Vervet monkey (*Cercopithecus aethiops*) and Anubis baboon (*Papio anubis*) were identified as the most problematic animals in the area. However, buffalo, monkey and warthog were considered as the notorious pest. Crop damage and threats to human safety were the major problems encountered resulting in conflict between human and wildlife. Most respondents had a negative attitude towards the problem-posing animals. This will lead to a change in public attitude from one that supports wildlife conservation to sees wild herbivores as a threat and a potential negative consequence for wildlife conservation. Active measures have to be implemented to solve the problems and safeguard the future of the wildlife management in the park.

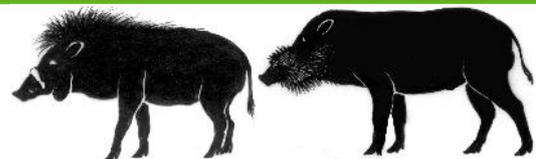
Fagiani, S., D. Fipaldini, et al. (2014). "Monitoring protocols for the evaluation of the impact of wild boar (*Sus scrofa*) rooting on plants and animals in forest ecosystems. *Hystrix* 25(1): 31-38.

The management of wild boar (*Sus scrofa*) is an issue of increasing global conservation concern.





New literature on Suiformes



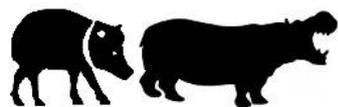
Statistically robust monitoring protocols, allowing the detection of biologically relevant changes in biodiversity indices due to wild boar activities, are crucial tools for the management of wild boar populations. The goal of our study was to present a robust procedure targeted towards elaborating monitoring protocols for the evaluation of the impact of wild boar rooting on forest plants and animals. We compared two pairs of macro-areas characterized by contrasting levels of rooting activity. We then evaluated the effect of rooting on several parameters of four forest communities: understory vascular plants, ground invertebrates, Carabid beetles and small mammals. We found that the evenness of the Carabid community was significantly higher in high-rooting macro-areas. Moreover, the diversity and evenness indices of understory vascular plants were higher in high-rooting macroareas, while the abundance of the Etruscan shrew (*Suncus etruscus*) was higher in the low-rooting macro-areas, although these differences were only marginally significant. The results of the remaining tests were all non-significant. However, confidence intervals of measured effect sizes always included biologically relevant effects; therefore, these results should be considered inconclusive. The magnitude of the effect we detected on several biodiversity indices was considerably small (probably due to a certain degree of rooting affecting currently and in the past all the macro-areas), therefore high sampling effort should be required to detect such subtle differences. Researchers and practitioners should carefully consider the complexity of monitoring the impact of wild boar and the choice of the parameters to investigate since our study clearly shows that monitoring some biodiversity indices requires a substantial investment of sampling effort and a well-structured a priori-planning phase. Failing to do so will inevitably lead to a waste of resources and /or wrong management decisions.

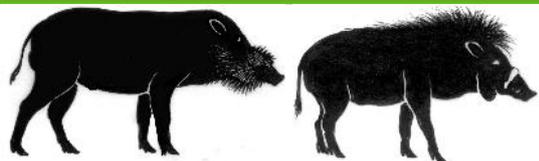
Richard-Hansen, C., N. Surugue, et al. (2014). Long-term fluctuations of white-lipped peccary populations in French Guiana. *Mammalia* 78(3): 291-301.

The white-lipped peccary (*Tayassu pecari*) is a large ungulate species with an extensive distribution across South and Central America. As such, it is a key game species for forest communities throughout its range. It is also considered an "ecosystem engineer", having a significant impact on forest structure and function. The species has recently been upgraded to "vulnerable" owing to decreasing population trends. Many studies report evidence of strong population fluctuations, but data are lacking from long-term surveys. Our study documents population fluctuations in French Guiana based on both line transect and hunting monitoring in hundreds of sites across the country, over 15 consecutive years. Our results show that white-lipped peccary populations drastically decreased in French Guiana between 2000 and 2010, and that low-density periods have repeatedly occurred during the past decades. White-lipped peccaries were absent from the Nouragues Reserve during 4 years of camera trapping monitoring (2006-2010) and probably from most of the country. However, more recent data suggest that the species is becoming more common again in French Guiana, supporting the hypothesis of cyclic population fluctuations.

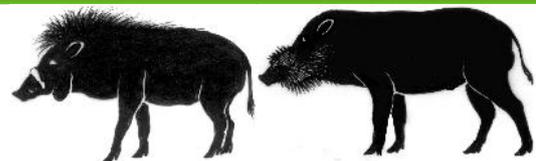
Bender, L. C., M. E. Weisenberger, et al. (2014). Occupancy and habitat correlates of javelinas in the southern San Andres Mountains, New Mexico. *Journal of Mammalogy* 95(1): 1-8.

Javelinas (*Pecari tajacu*) are expanding their range northward in the southwestern United States,





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but little is known of habitat relationships in northern populations. We used occupancy modeling and maximum entropy modeling of data collected from a camera-trapping grid to investigate javelina occupancy and identify habitat correlates associated with presence in the southern San Andres Mountains of south-central New Mexico. Corrected for incomplete detection, occupancy increased from 0.036 (SE= 0.035) in 2007 to 0.327 (SE= 0.082) by 2011. Presence of javelinas was most strongly associated with areas in close proximity to permanent water sources; with overstory or high shrub canopies of riparian, oak mountain mahogany, or pinyon-juniper; and with low (< 6 %) slopes. Areas with $P > 0.75$ for javelina presence comprised only 6.7% of the San Andres landscape. Circadian patterns of behavior indicated that javelinas were primarily diurnal during colder months and nocturnal during warmer months. Expansion of javelina occupancy may be related to a slight trend in increasing minimum winter temperatures, because severe winters were hypothesized to limit the northern distribution of javelinas. Additionally, javelinas appear dependent upon a tree or shrub overstory, ideally associated with riparian corridors, to mitigate heat stress associated with occupancy of Chihuahuan Desert habitats.

DISCLAIMER

- with respect to content:

IUCN encourages meetings, workshops and other fora for the consideration and analysis of issues related to conservation, and believes that reports of these meetings are most useful when broadly disseminated. The opinions and views expressed by the authors may not necessarily reflect the formal policies of IUCN, its Commissions, its Secretariat or its members.

- with respect to geography:

The designation of geographical entities in this book, and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of IUCN concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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 these groups is to promote the long-term conservation of wild pigs, peccaries and hippos and, where possible, the recovery of their populations to viable levels.

Pigs, peccaries and hippopotamuses are non-ruminant ungulates belonging to the Suborder Suiformes of the Order Artiodactyla (the even-toed ungulates).

Within the Suborder Suiformes, pigs belong to the Family Suidae, peccaries to the Family Dicotylidae and hippopotamuses to the Family Hippopotamidae.

