Suiform Soundings

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

Volume 14(1)

August 2015

ISSN: 1446-991-X

IUCN/SSC: Wild Pig Specialist Group

Peccary Specialist Group

IUCN

SSC Species Survival Commission


Suiform Soundings is the newsletter of the IUCN/SSC Wild Pig, Peccary, and Hippo Specialist Groups.

This newsletter is electronically available at:
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Javan warty pig (*Sus verrucosus*). Photo taken by Iing Iryantoro, Cikananga Wildlife Center.

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Editorial

From the editor

It is with great pleasure to present you this latest edition of Suiform Soundings, the newsletter of the IUCN/SSC Hippo, Peccaries, and Wild Pigs Specialist Groups.

What these three specialist groups have in common is that, in general, people are not that interested in the species that we focus on. Considering how interesting pigs, peccaries and hippos are, and how cool they look, this may be a surprise. But compared to pandas, orangutans, polar bears, and other conservation icons, we don't stand a chance. Simply, our hippos, peccaries and wild pig species are struggling for international attention, for example in terms of media coverage and donor support.

There is one group of people, however, who stand out with regard to their interest in these suiform species. And arguably it is a far more important group for the species' conservation than all donor and social-media users taken together. I refer to the people who actually live next to hippos and hogs in Africa, the peccary species of the Americas, and the babirusas, pygmy hogs and various pigs and warty pigs in Asia. To many of these people, their co-existence with these species can mean conflict (e.g., with hungry crop consumers), but often also means opportunity (e.g., as a vital source of animal protein to many forest-based poor).

These communities living next to our focal species are really the ones we should be talking to. I feel very strongly that it is with these people that we ultimately have to find our solutions. International attention and funding for our work helps to facilitate such conservation solutions, and this is what our newsletter is targeting. But we should never forget what we ultimately need to achieve, and that is on-the-ground change.

I am always heartened by news stories of wild pigs or peccaries entering the suburbs of Berlin, Barcelona or Tuscon, and being left alone and unharmed there. There are opportunities for these species to live alongside people in relative harmony. But we need to understand so much better what it takes to get there.

How do we effectively reduce over-hunting, hybridization, and habitat loss? How can we develop balanced solutions to maintaining viable populations of threatened species without harming people's livelihoods? In our work we hope to answer such questions, and at least partly share the answers with you through this newsletter.

I hope that you will find some interesting insights from reading this latest issue of Suiform Soundings. And I hope that you can help us translate those insights into new thinking about effective conservation strategies that will save the species that we are concerned with.

With warm regards
Erik Meijaard
Chief Editor.

Behaviour of wild-caught and captive-born Javan warty pigs (*Sus verrucosus*) and implications for reintroduction

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Introduction

The Javan Warty Pig (*Sus verrucosus*) represents one of the most evolutionary unique, yet little known wild pig species in South-East Asia (SEA) (Frantz et al., 2013; Semiadi et al., 2008), and is endemic to Java, Indonesia. The species was assigned a very high conservation priority by the IUCN Species Survival Commission (SSC) as early as 1993 (Oliver, 1993) and categorized as Endangered on the IUCN Red List in 2000 (Semiadi et al., 2008). Despite its threatened conservation status, basic biological and ecological research on the species critical for effective conservation management is lacking behind (Semiadi & Sözer, 2007).

In an interview to survey on the species distribution on Java in 2003 and 2004, *S. verrucosus* was reported present in only 47 % of localities from which it has been reported present by interviewees in 1982 (Semiadi & Meijaard, 2006). Following the rapid population decline inferred from these data, the establishment of a captive-breeding programme was proposed by the

Javan warty pig (*Sus verrucosus*) at Cikananga Conservation Breeding Centre (CCBC).
Photo: I. Iryantoro, Cikananga Wildlife Center.

IUCN/SSC (Semiadi & Meijaard, 2006; Semiadi & Sözer, 2007). The outcome of the programme would be a genetically pure 'ex-situ safety population' for potential reintroduction and the opportunity to study the biology and ecology of the species (Semiadi & Sözer, 2007).

The captive breeding programme was established in 2007 at Cikananga Conservation Breeding Centre (CCBC) in West Java, Indonesia. The breeding programme started with an initial *S. verrucosus* founder population of wild origin. As it was the first time the species was held in captivity, providing an appropriate husbandry that also allows for breeding has been a process of trial and error. After five years of adjusting diet, enclosures, stress factors and group size the first breeding success was achieved in 2012 (Sözer et al., 2013). Successful breeding has taken place at CCBC every year since.

Although reproduction is successful, the breeding programme still experiences challenges in *S. verrucosus* husbandry. Firstly, the founder population of wild-born adult individuals seems 'highly excitable' and easily stressed (Meijaard et al., 2014). Secondly, the juvenile offspring from 2013 and 2014 are currently kept in a single large group with an adult hybrid domestic pig (*S. verrucosus* x *S. scrofa domesticus*) in order to make them calmer than the adults. This may improve their welfare in captivity and allow easier breeding. However, questions are now rising on whether the juveniles are not negatively affected in their reintroduction potential by copying the behaviour from the domestic hybrid pig.

We aimed to provide a general behavioural profile of the captive S. verrucosus at CCBC, to identify the factors causing stress in adults and to assess the extent to which juveniles copy the behaviour of the domestic hybrid pig.

Methodology

Study area

Data was collected from April to July 2015 at the CCBC facilities located in Cikananga Wildlife Centre, a two hours' drive from Sukabumi, West-Java. The CCBC facility has 14 enclosures and currently houses a population of 26 *S. verrucosus*. There are 12 wild-born adult individuals housed in male-female pairs and trios of two females and one male. Next to this there is a single group of 10 captive-born juveniles kept together with an adult hybrid domestic pig and a

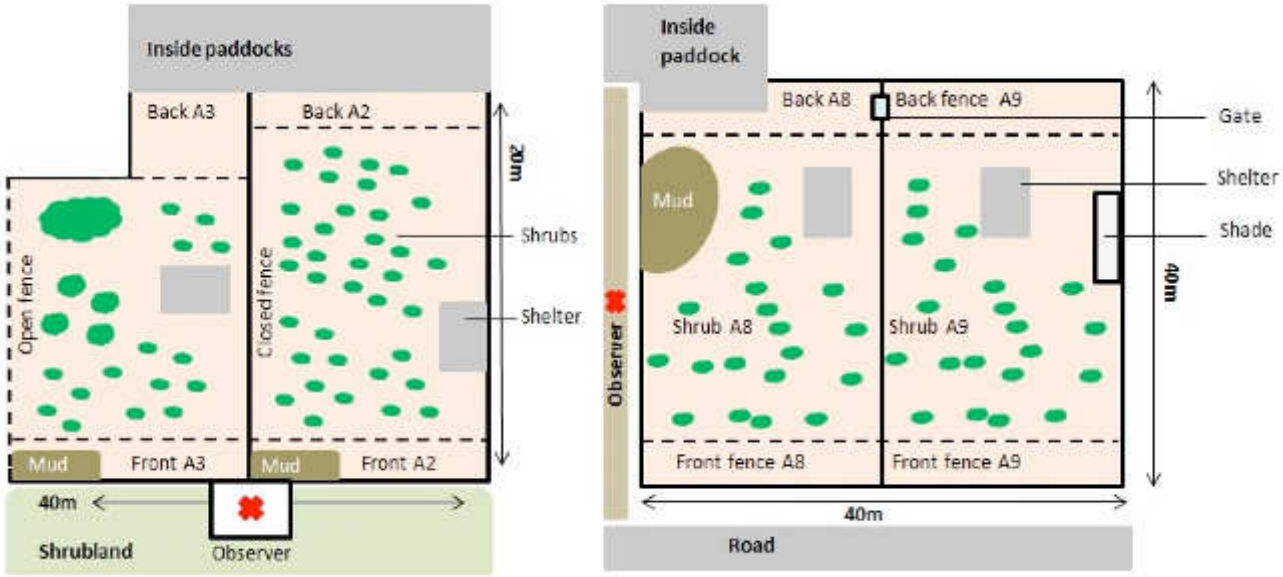

Fig 1. Layout of the enclosures A3, A2 and the interconnected A8-A9 enclosure at CCBC housing the observed Javan warty pigs.

Table 1. Demography of observed Javan warty pigs

Individual	Sex	Age class	origin	born	Enclosure
XY	Male	Juvenile	Captive-born	May 2014	A8-A9
YY	Male	Juvenile	Captive-born	May 2014	A8-A9
XR	Female	juvenile	Captive-born	April 2014	A8-A9
D1	Female	Adult	Captive-born (hybrid)	?	A8-A9
A2F	Female	Adult	Wild-born	?	A2
A2M	Male	Adult	Wild-born	?	A2
A3F	Female	Adult	Wild-born	?	A3
A3M	male	adult	Wild-born	?	A3

separately housed adult wild-born sow with her three piglets born in late March 2015.

Sample unit

The sample units consisted of two male-female pairs of adults housed in enclosures A2 and A3 and the three preselected juveniles X-Y, Y-Y, X-R and the adult hybrid domestic pig in the interconnected A8-A9 enclosure (Fig. 1). X-Y and Y-Y are both males born from the same mother in early May 2014, whereas X-R is a female born from a different mother in late April 2014 (Table 1).

Sample methods

We started with two weeks of preliminary observations to define an ethogram that covered the behaviours displayed by both the adults and juveniles (Table 2) and to get the animals used to the researcher's presence. Observations on the adults were conducted from a camouflaged hide-out overlooking the enclosure. Observations of the juveniles were made from a chair on the side of the enclosure. An acclimatisation period of five minutes was maintained before starting each observation.

The preliminary observations were followed by 20 days of main data collection between the 6th of May and 16th of June 2015. The observations covered the entire day from 05.30 to 17.30 in observation sessions of 1.5 hours per day. We used scan sampling at 1-minute intervals for 30 minutes per focal individual for the juveniles and the domestic pig and scan sampling at 1-minute intervals for 30 minutes per enclosure on the adults in A2 and A3 (Altman, 1974). Observations were ordered so that all individuals had been observed in each 30 minute interval between 05.30 and 17.30. For the adults in enclosures A2 and A3, the behavioural state of the focal individual and distance between individuals were noted down at each interval to establish activity budgets and nearness. For the juvenile group the behavioural state and distance between the focal juvenile and domestic hybrid were noted down to establish activity budgets, investigate the extent of behavioural copying and nearness to the domestic pig. It was planned to do behaviour sampling (following Martin & Bateson, 2007) continuously in all groups for the behaviour "stress-related running" to measure the occurrence and stimulus of this behaviour (Meijaard et al., 2014). However, because this running behaviour did not occur during the

Table 2. Ethogram based on the behavioural states displayed by *S. verrucosus*, partially adapted from Abraham (2008).

Behavioural state	Description
1. Sniff	The act of sniffing a substrate or potential food source
2. Rooting	The rooting of soil for food
3. Feeding	Consuming of a food source
4. Aggressive	Lunching or snapping of one individual to another
5. Alert	Cessation of behaviour by individual upon detecting disturbance and/or sniffing of the air upon detecting a disturbance.
6. Stand/ Freeze	Motionless standing
7. Moving	The act of walking by an individual as it moves from one point to another.
8. Rest	Lying sideways on the ground with ears folded against the body or outward and eyes closed or open.
9. Allogroom	Rubbing of one another with the snout occasionally pulling the hair.
10. Play conspecific	Two individuals chase to each other in turn and face each other afterwards with mouth half open, hairs and tails erect.

observations, except following direct visual contact with the researcher when walking towards or away from the hide-out, this was dropped from the analysis.

Data analysis

The distance between individuals was categorized into <5 m, 5-20 m and >20 m distance. We used standard descriptors to report frequencies of each behaviour, compared to overall displayed behaviour, and z-tests of column proportions with Bonferroni adjusted p-values to compare between individual differences in behaviour and nearness. Next to this we used correspondence analysis to visualize and assess the relationship between the displayed behaviour and position in the enclosure for all individuals to assess the extent of behavioural similarity between the juvenile pigs and adult hybrid domestic pig. Cross-observations (e.g. two individuals performing the same behaviour at the same interval) with a count of less than five were excluded from the correspondence analysis. All statistical tests were performed in SPPS 22.0 with the significance threshold set at P = 0.05.

Results

In total we collected 19.6 hours of observational data on the juvenile group divided over 7 days and 17.5 hours on the two adult pairs in A2 and A3 divided over 13 days. The behaviour frequencies for each individual are displayed in Table 3. The wild born adults from A2 and A3 were significantly more often out of sight and spend less time feeding than the juveniles and domestic pig, except for juvenile X-R (z-test column proportion, P ≤ 0.05).

Wild adult male and female in enclosure A2

The male and female in enclosure A2 spent significantly more time standing compared to the juveniles and domestic pig (z-test of column proportion, P ≤ 0.05). Within the enclosure, they were observed mostly in either the inside paddock (♂ = 47.2 %; ♀ = 47.4 %) or their position was not determinable (♂ = 20.6 %; ♀ = 27.6 %). The male and female were in close proximity of <5 m to one another during most of the observations (83.7 %) and less so at distances of 5-20 m (15.2 %) and >20 m (1 %). Neither the female nor the male showed any rooting, aggressive or play behaviour. Correspondence analysis confirmed the association between out of sight and position in the inside paddock for both male and female (Fig. 2). Next to this, standing behaviour was associated with positioning at the closed side-fences and moving and resting mostly occurred in the shrub area of the enclosure.

Table 3. Percentage scores for behaviour displayed by each Javan warty pig. The category out of sight (grey) was excluded for the computation of percentages of all categories other than out of sight.

Behaviour	♂ A3 (N=509)	♀ A3 (N=509)	♂A2 (N=540)	♀A2 (N=540)	X-Y (N=580)	Y-Y (N=483)	X-R (N=385)	Domest (N=1154)
Out of sight	38.9	48.1	41.6	39.4	19.2	29.4	30.5	17.0
Sniff earth	6.4	2.7	3.2	6.9	17.9	8.5	17.2	5.1
Rooting	1.4	0	0.6	0	2.9	2.4	2.1	0.9
Feeding	1.4	3	0	0.9	20.4	20	2.4	19.7
Aggressive	0	0.8	0	0	0	0.3	0.0	0.2
Alert	3.8	3.4	0.6	9.9	5.2	2.0	6.9	0.8
Stand/Freeze	20.3	31.1	53.6	30.6	8.6	4.3	7.3	2.5
Moving	24.7	18.2	18.2	21.6	12.1	10.9	14.2	8.7
Rest	42.5	40.9	24.0	30.6	35.5	42.5	48.9	71.9
Allogroom	0	0	0	0	0	0	0	0
Play comp.	0	0	0	0	1.3	0	0	0

Wild adult male and female in enclosure A3

Both the male and female did not show any playing behaviour during the observations and the female did not show any rooting behaviour either. Within the enclosure, the male spent most of his time at the open-side fence (♂ = 31.4 %) or in the shrub vegetation (♂ = 34.4 %). The female's positions was mostly not determinable (♀ = 45.5 %). Resting and sniffing behaviour in both the male and female was associated with the open fence (Fig.3). This open fence allows for direct interaction with the pigs in the adjacent enclosure

and this was frequently observed to occur during the observations. Standing and moving behaviour was not clearly associated with a single position in the enclosure. The male and female stayed mostly in close proximity of <5 m of each other (78.4 %), and spent less time at distances of 5-20 m (20 %) and >20 m (1.6 %) of one another.

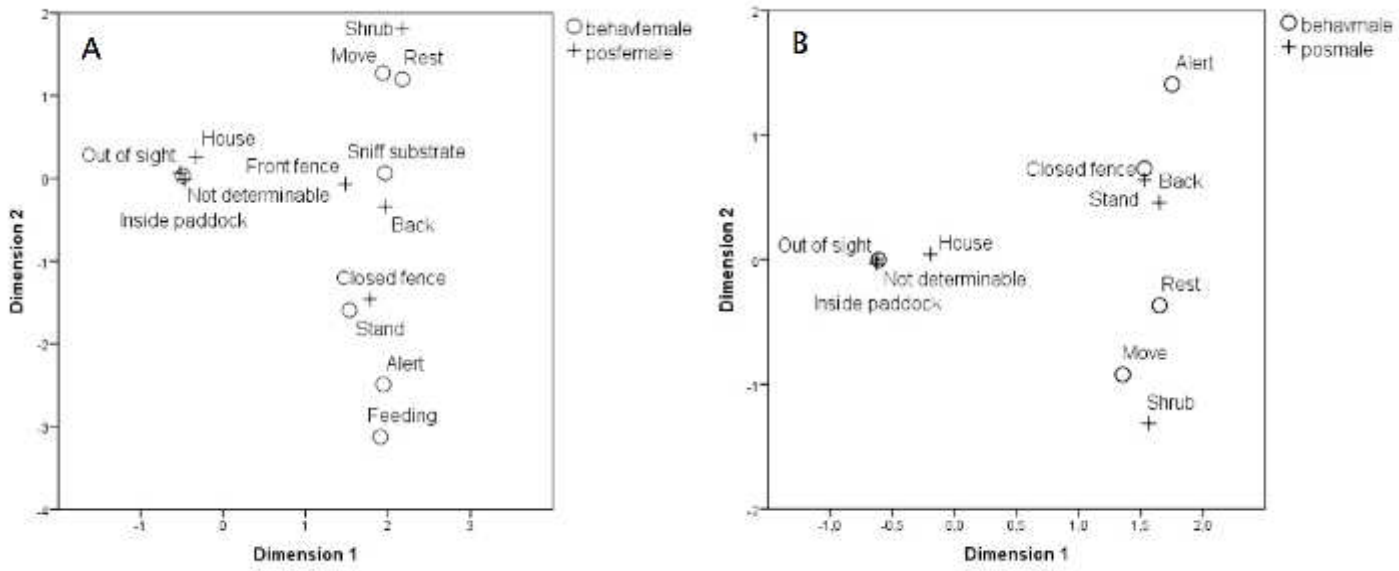

Fig. 2. Correspondence analysis of behavioural and positional association in the wild-caught female (A) and male (B) Javan warty pigs in enclosure A2. Circles denote behaviour categories and crosses denote position in the enclosure.

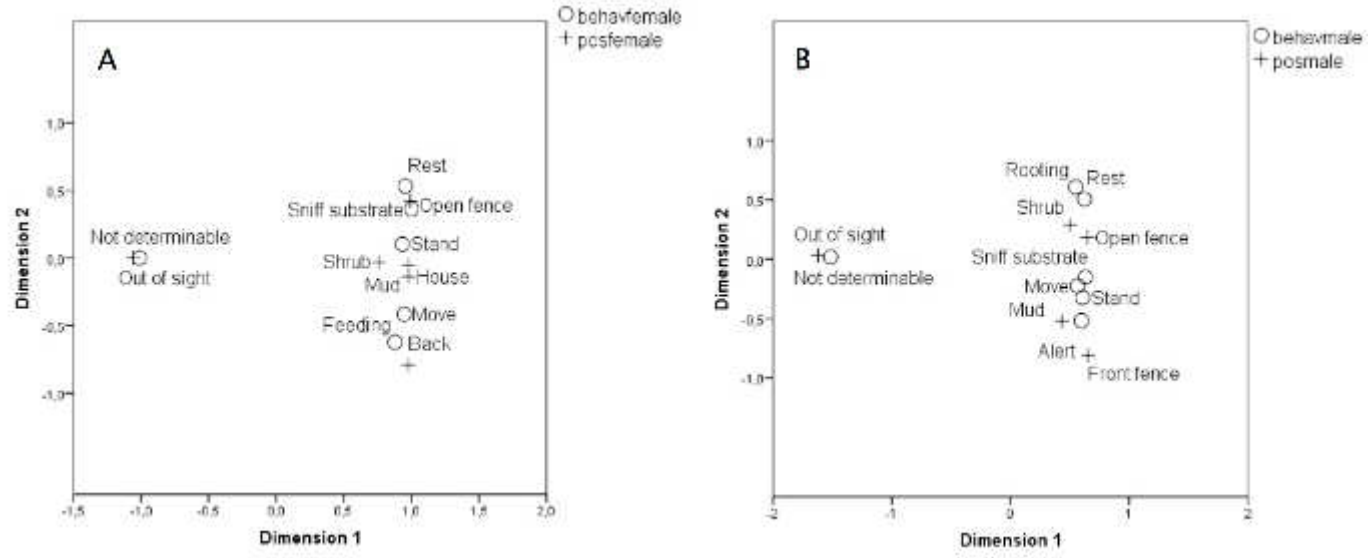

Fig. 3. Correspondence analysis of behavioural and positional association in the wild-caught female (A) and male (B) Javan warty pigs in enclosure A3. Circles denote behaviour categories and crosses denote position in the enclosure.

Captive-born juveniles and adult domestic hybrid in enclosure A8-A9

The domestic pig spent significantly more time resting and less time standing than any of the other individuals (z-test of column proportion, $P \leq 0.05$). Of all the individuals observed only juvenile X-Y showed play behaviour, but this constituted of only 1.3 % of total activity. Behaviours did not differ considerably between the juveniles, with the exception of juvenile X-R who was

showing significantly less feeding behaviour and more time out of sight compared to juvenile Y-Y and X-Y (z-test of column proportion, P ≤ 0.05). Next to this, juvenile X-Y showed significantly more sniffing behaviour than juvenile Y-Y (z-test of column proportion, P ≤ 0.05). Juvenile Y-Y and X-Y show a high degree of behavioural similarity with the domestic hybrid pig (Table 4). Juvenile X-R showed a very low degree of behavioural similarity to the domestic pig. Juvenile X-R spent 46.7 % of its time at a distance of >20 m (Fig.4) from the domestic pig and had low positional similarity (Table 5). Juvenile Y-Y and X-Y spend 58.5 % and 46.6 % of their time at a distance of <5 m from the domestic pig and thus showed a high degree of positional similarity as well.

Table 4. Correspondence table of proportion similarities of behaviour displayed by captive-bred juvenile Javan warty pigs and a domestic hybrid pig during the observations. Counts of <5 m were excluded (-)

Behaviour domestic hybrid	Proportion behavioural similarity with domestic hybrid		
	Y-Y (N=383)	X-Y (N=390)	X-R (N=384)
Sniff earth	0.53	0.65	0.33
Rooting	0.33	-	-
Feeding	0.79	0.88	0.07
Aggressive	-	-	-
Alert		0.83	
Stand/Freeze	0.66	0.53	-
Moving	0.42	0.71	0.23
Rest	0.58	0.39	0.48
Play comp.	-	-	-

Table 5. Correspondence table of proportion similarities of position of captive-bred juvenile Javan warty pigs and a domestic hybrid pig during the observations. Counts of <5 m were excluded (-).

Behaviour domestic hybrid	Proportion positional similarity with domestic hybrid		
	Y-Y (N=383)	X-Y (N=390)	X-R (N=384)
Front fence A8	0.76	0.78	
Front fence A9	0.70	0.85	0.15
Back fence A8	1.00	0.13	0.26
Back fence A9	0.67	0.19	0.10
House A8	-	-	-
Shrub A8	0.87	0.68	0.08
Shrub A9	0.60	0.75	0.23
Shade A9	0.80	-	0.25
Mud			
Inside pad o.k.	0.83	0.88	-

Discussion

Behaviour of wild-born adults

The warty pigs were not observed to display running behaviour except for when disturbed by the researcher when he was getting into and out of the hide-out. Other potential disturbances in the breeding centre included cars and loud motorcycles passing by on the road nearby and people talking and collecting resources close to the enclosures, but these all did not solicit a running response. It seems that only close-up visual disturbance by people results in the running behaviour and only if they pause in front of the enclosure. Although being positioned in a hide-out, the observed wild-born adults smelled the presence of the researcher. This might clarify the large proportion of time spent out of sight despite the inside of the enclosures being relatively well visible. Especially the adults in A2 spent a lot of time out of sight in the inside enclosure. This might also be due to a lack of vegetation cover for concealment. In response, a wall has now been placed in their enclosure to provide

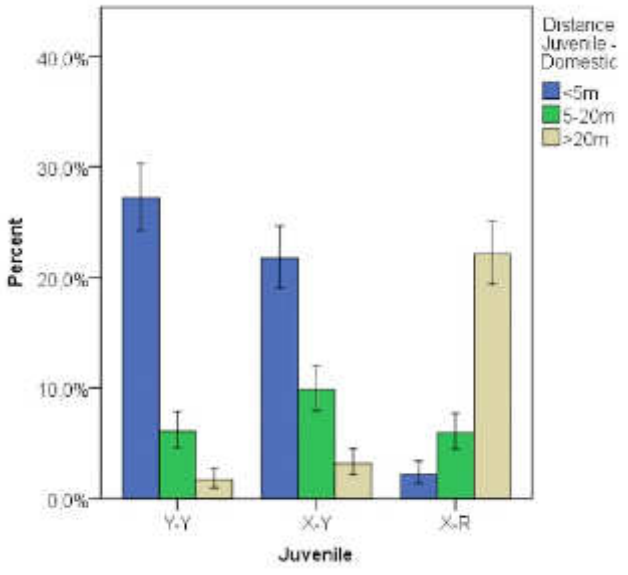

Fig. 4. Distance between the juvenile captive-bred Javan warty pigs and the adult domestic hybrid pig. Error bars display 95 % confidence intervals.

concealment, but further observations are needed to see if this has a positive effect on the time spent in the outside enclosure.
Next to this, feeding behaviour was considerably lower and standing behaviour considerably higher in wild-born adults compared to the juveniles and adult domestic pig. The standing behaviour often followed after an initial alert response. The animals might not have felt at ease feeding during the observation sessions while sensing the researcher's presence.
A last potential reason for the shyness displayed by the wild-born adults may be that the housing in pairs does not conform to the natural situation. Natural group sizes for *S. verrucosus* are unknown, but camera trap and transect data collected on the closely related species Bawean warty pig *S. blouchi* indicate that the species is highly social with groups of 6 to 8 individuals (Rode-Margono & Rademaker, unpublished data). In general, individual vigilance in animals declines with increasing group size, possibly due to an easier detection of predators or a reduction of individual predation risk with higher group sizes (Roberts, 1996). Furthermore, domestic pigs usually kept in large groups showed a marked reduction in aggression towards foreign individuals (Turner et al., 2001). Group sizes and compositions of European wild pigs (*Sus scrofa*) undergo seasonal changes; during the breeding and gestation season the frequency of larger mixed-sex adult groups with several individuals of both sexes increases (Dardaillon, 1988; Fernández-Llario et al., 1996). The possible preference for larger groups in *S. verrucosus* in captivity is supported by the large amount of time spent at the open fence by the adults in A3 through which they could interact with pigs in the adjacent enclosure. The adults in A2 had no such possibility for interaction with other groups.

Behaviour juveniles
Of the juveniles, only the female X-R spent similarly low amounts of time out of sight and feeding compared to the wild-born adults. This is probably due to its low position in the hierarchy. The adult domestic hybrid pig is the dominant individual in the group and both X-Y and Y-Y spent more time close to the domestic hybrid. Next to this, they showed considerably more behavioural similarity with the domestic hybrid compared to X-R, especially feeding, standing and moving. The high similarity with the domestic hybrid's behaviour and apparent reduced shyness in juveniles is interpreted as a positive sign for future captive housing potential of these individuals e.g. in additional ex-situ safety populations. However, the reduced shyness might also have a negative effect on the reintroduction potential of the pigs. Evolutionary changes in temperament traits that may occur in captive-breeding programmes can have important implications for reintroduction success (MacDougall et al., 2006). In captivity individuals may be selected for behavioural traits - especially reduced fearfulness - that make them less likely to survive when reintroduced to the wild. Bremmer-Harrison et al. (2004) for instance found that boldness predicted early death in reintroduction programmes of captive-bred swift foxes (*Vulpes velox*). Therefore the reintroduction of future generations of captive-bred warty pigs might require the use of a facility where the individuals can become "feral" again before being reintroduced, down to the levels of shyness displayed by the current wild-born adults.

Recommendations for husbandry
Group size affects behaviour, welfare and reproduction. Not only group sizes that are too large can have decreased reproduction success but also those that are too small. Knowledge of the species' socio-biology and flexibility in captive housing is therefore crucial (Price & Stoinski,

2007). Although group sizes and their fluctuations are not known yet for *S. verrucosus*, keeping of *S. verrucosus* in pairs may not be the optimal housing strategy for the species when reproduction is aimed for. This is supported by the behavioural findings in this study and a lower reproduction rate at CCBC compared to years in which the animals were housed in groups. Addressing this group-size issue is especially important as females at CCBC who had not reproduced during a breeding season were difficult to breed in the following years as well (Bulk, personal communication). An alternative is to house the individuals in large multi-male and multi-female breeding groups which yielded considerable breeding success at CCBC in the past. Paternity tests should be used in this case to plan breeding efforts of future generations and avoid inbreeding. Regarding conservation breeding with the ultimate aim of reintroduction to the wild, care has to be taken that the diversity of temperament traits will not be reduced by only letting bold individuals breed. This may lead to a domestication process in the long term and in the worst case may even lead to the change of morphological and physiological traits that are linked to temperament traits (MacDougall et al., 2006). Especially species with complex social structures and higher intelligence, such as pigs, have generally lower reintroduction success (Reading et al., 2013). Reading et al. (2013) recommends behaviour indicators, such as the level of boldness, for predicting reintroduction success and to select suitable animals for release. Environmental enrichment should be used to reduce stress for rather shy animals and to avoid a too high level of boldness in animals being trained for reintroduction (Reading et al., 2013).

Acknowledgements

We would like to thank the Indonesian Ministry of Research and Technology (RISTEK) and the Office of Conservation of Natural Resources (BBKSDA) for approving our research and providing the necessary permits, as well as our research counterpart Dr. Gono Semiadi from the Research Center for Biology (LIPI). This research would not have been possible without the field assistance of Pak Aos and recommendations of Stephan Bulk on warty pig breeding and behavior. We are grateful to Berend van Wijk for helping in the conception of this research. This research was partially funded by the Zoologische Gesellschaft fuer Populations- und Artenschutz (Zoological Society for the Conservation of Species and Populations), People's Trust for Endangered Species, Los Angeles Zoo, and Stiftung Artenschutz (Species Conservation Foundation).

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Group of juvenile Javan warty pigs in Cikananga Conservation Breeding Centre. Photo: I. Iryantoro, Cikananga Wildlife Center.

'Warty Watch'
Putting the spotlight on Indonesia's most distinct pig

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Introduction

The Javan Warty Pig (*Sus verrucosus*) is poorly known pig species in South-East Asia [Frantz et al 2013; Semiadi et al 2008]. The species was categorized as Endangered on the IUCN Red List in 2000 and identified as an Evolutionary Significant Unit in 2013. Basic research vital for establishing effective conservation management for this Javan endemic has lacked behind [Semiadi & Sözer 2007]. Of special interest is the current distribution of the mainland species as this has so far been based on interview surveys and inspection of hunted specimens [Blouch 1988; Semiadi & Meijaard 2004] .

Based on the last interview surveys from 2003-2004 a renewed Red list assessment was produced in 2008 consolidating the Endangered status of the species [Semiadi et al 2008]. The outcome looked grim with an estimated population decline of over 53 % in the last three generations. The main threats held responsible for the decline were habitat loss and hunting. However, the previous assessment is now considered dated as it is based on indirect data from more than 10 years ago and forest habitat loss continues to occur [Margono et al 2014]. In the meantime conservation actions have led to the establishment of a captive breeding program [Semiadi & Sözer 2007], but no progress has been made yet in resolving the status of the mainland S. verrucosus population. Warty watch has been formed as a new initiative in an attempt to clarify the current species distribution.

Overview interview locations 2003-2004

In their interview survey covering the years 2003 and 2004 Semiadi and Meijaard collected data from 85 villages. Interviews were conducted with hunters and local authorities. This included interviews from 37 villages visited during a survey by Blouch in 1982 [Blouch 1988]. In 17 of these 37 villages *S. verrucosus* had been eradicated or not sighted anymore for several years [Semiadi

Fig. 1. Mainland Java locations suspected to harbor *S. verrucosus* based on 2003-2004 interviews. Map adapted from Semiadi & Meijaard (2006).

& Meijaard 2006]. Remarkably, *S. verrucosus* was not found present in any of the national parks visited during the interviews although uncertainty still remains concerning Ujung Kulon NP at the tip of West-Java. The interview survey revealed 9 mainland locations where *S. verrucosus* was most likely still present at the time. (Fig. 1) [Semiadi et al 2008]. However, only three (*) mainland locations were confirmed with suspected certainty [Semiadi & Meijaard, 2004]. It must be noted that an additional location, Bawean Island, is now suspected to harbor a separate species of warty pig, rather than an offshore subspecies as assumed earlier [Rademaker and Rode 2015].

Mainland locations suspected to still harbor *S. verrucosus*
1. Malingping-Rangkasbitung, West Java
2. Sukabumi – Cikepuh NR, West Java
3. Purwakarta, West Java
4. Garut, West Java
5. Majalengka – Sumedang, Central Java
6. Ciamis – Tasik, West Java *
7. Cilacap – Nusakambangan NR, Central Java
8. Blora- Bojonegro, Central Java *
9. Subah, Central Java *

Strategy and Methology

From indirect to direct datasets

Interview surveys conducted so far have given important guiding points on where *S. verrucosus* might still occur. However, as the evidence is indirect they provide a probability of presence. Next to this, interviews can be prone to bias depending on the reliability of the interviewees. For example, interview surveys on the island of Bawean suggested that both S. scrofa and S. verrucosus blouchi were present, but that the latter had become very rare. Surprisingly, an intensive three month camera trap survey in 2014 captured only *S. verrucosus blouchi* and showed that *S. scrofa* was not present on the island at all [Rademaker and Rode 2015].

To justify increased conservation efforts in time and money direct confirmation of S. verrucosus presence or absence is needed. As shown in the example above camera trapping has proven to be a reliable method to survey *S. verrucosus*. The complicating factor is that with 139,000 km^2, Java is a much larger island than Bawean which covers just 200 km^2 of surface area. Consequently it will not be possible to revisit all the 85 interview locations from 2003-2004 and provide a full island survey. Warty Watch aims to review existing data collected over recent years by private individuals, authorities and NGO's as a more efficient option. Next to this collaborations can be formed for the future to create an island wide S. verrucosus monitoring network. Under the Warty Watch banner private individuals and organization head employees were contacted via email or Facebook. This because contacting official organizational email addresses often solicits low or no response.

Individuals were asked their survey locations, whether they had captured *S. scrofa* or *S. verrucosus* during any of their surveys and- -whether it would be possible to review (a sample of) the data. Next to this, two supporting documents were provided by Warty Watch.

Assisting identification
The two supporting documents focused on the need of the Warty Watch project and on how to differentiate between *S. verrucosus* and *S. scrofa*. The two species can look quite similar under field conditions and this has led to confusion in the past [Meijaard 2006].

Data storage
In case actual camera trap datasets are obtained, Warty Watch will organize these datasets using Camera Base 1.6 created by M. Tobler [Tobler 207]. Camera Base is an ordering tool for multiple camera trap surveys, so ownership of the data remains clear. The compatibility of this program with ArcGIS will help to provide a distribution map for the Javan warty pig. For potential site specific density analysis additional information on the survey site, no. of cameras deployed, deployment time and date and time descriptors of each capture would be required.

Stakeholders
Wildlife conservation has become a competitive field, with lots of different species projects competing for the same sources of funding. This creates a lot of noise and can make it difficult for the plight of an arguably unattractive species as *S. verrucosus* to be heard. Next to this, it makes professionals nervous to share their valuable data which justifies the funding received. Although one might argue that the efforts for free scientific data sharing [Silva 2014; Holdren 2013; Valsamidou 2015] should come natural to conservation, a field with high moral standards extending beyond the need of financial benefit, this often proves not to be the case. Next to this, personal experience in Indonesia leads me to the opinion that there is a split between foreign projects coming in providing international exposure and activities undertaken by regional authorities and private individuals which can be difficult to track down. In order for Warty Watch to succeed special attention should be given to the needs of all the parties involved concerning data sharing and exposure.

National and international NGO's
The exact number of conservation NGO's currently active in Indonesia could not be found. There are a number of large international players e.g. Conservation International and WWF active, next to national NGO's such as ProFauna and Harimau kita. The international and national NGO's generally focus on the conservation of large-scale ecosystems, biodiversity and flagship species. Additionally, national NGO's often operate as discussion fora.

Private individuals
Every now and then camera trap images pop-up in personal or group Facebook posts, although it is not always clear where these images stem from.

National and regional authorities
National and regional authorities responsible for management of protected areas conduct both independent wildlife monitoring programs [Hance 2012] and collaborate with national and international NGO's [16]. It is these independent programmess, for example the search for the Javan tiger in Meruh Betiri National Park [WWF Indonesia 2015], whose results do not seem to reach outside of the organization itself.

Preliminary results

The Warty Watch project has found five different parties conducting camera trap surveys on Java. Parties included all three stakeholder categories (National and International NGO's = 3, National and Regional authorities = 2, Private individual = 1). Together, the parties surveyed 8 locations (Table 1) in West –Java and a single location on Java's very eastern tip (Fig. 2). Two of the parties were found on Facebook via a post on the popular wildlife page Mamalia Indonesia. The contacts of the remaining three parties were obtained via networking. Photographic evidence to support presence absence claims by contacts were obtained from 3 out of 9 locations. No actual datasets were obtained.

Table 1. Overview of survey enquiries and results

No.	Survey location	Result	Survey party	Stakeholder category
1	Ujung Kulon National Park	Although camera trapping has occurred here for the last decade, a thorough analysis of pig species occurrence and distribution throughout the park has not been made yet. *S. scrofa* has been confirmed but it is unknown whether *S. verrucosus* also occurs. Discussing possibility for reviewing data at the moment.	WWF	International NGO
2	Cikepuh Nature reserve	Prospective location for a camera trap study on Javan leopard (*Panthera pardus melas*) and associated prey densities starting in August 2015. Data will be shared and potential assistance in the form of additional camera traps is considered as the site was mentioned as a *S. verrucosus* location in the 2003-2004 interview survey.	Harimau kita & Cikananga Wildlife Centre	National NGO National NGO
3	Tangkuban perahu	Only *S. scrofa*	Harimau kita	National NGO
4	Gunung Tilu	Only *S. scrofa*	Harimau kita	National NGO
5	Gunung Malabar	Only *S. scrofa*	Harimau kita	National NGO
6	Gunung Papandayan	Various phenotypes of *S. scrofa*, purity unclear.	Alam kita	Private individual
6	Gunung Papandayan	Only *S. scrofa*	Harimau kita	National NGO
7	Ciremai National Park	Only *S. scrofa*	BBKSDA	Regional Authority
8	Nusakambang Nature reserve	Only *S. scrofa*	Flora and Fauna International	International NGO
9	Baluran National Park	Although *S. scrofa* is historically known to occur here camera trapping of parts of the park has not resulted in any pigs being captured yet. Wildlife populations suffered heavy losses in the past years linked to habitat decline due to the invasive plant species *Accacia decurrens*.	BBKSDA	Regional Authority

Interpreting results

One of the first things that catches the eye is the relatively low number of International NGO's actively camera trapping on Java. A quick look at the neighboring island of Sumatra reveals that at least six international NGO's are active with camera traps [ZSL 2015; WWF Global 2015, FFI 2015; Hance 2010; Sumatran Orang Utan Society 2015, Panthera 2015], focused on biodiversity and the flagship species, the Sumatran tiger (*Panthera tigris sumatra*). Harimau kita is a national NGO focused on Sumatran tiger conservation, but because of its expertise on big

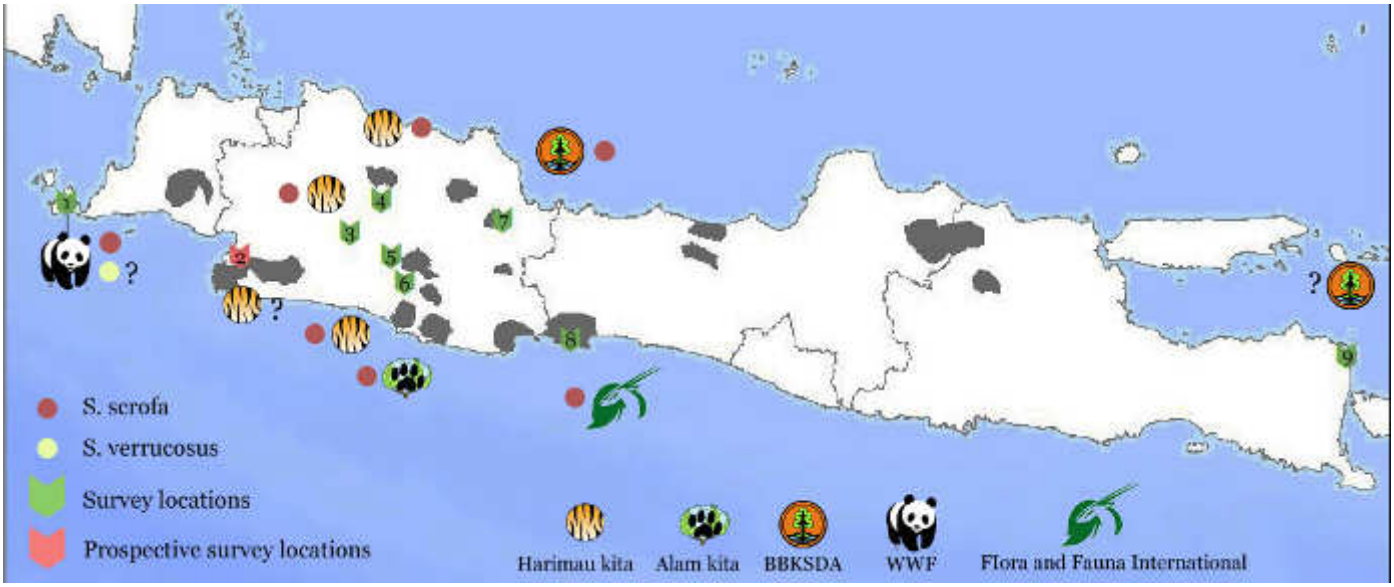

Fig. 2. Overview of camera trap survey locations on Java, the organizations involved and the species found. Question marks indicate that the occurrence of one or both pig species is unknown. The grey polygons indicated suspected *S. verrucosus* distributions and are adapted from Semiadi & Meijaard.

cats it is regularly contacted by the government to help with camera trap assessments of Javan leopards (*Panthera pardus melas*) as well. Alam kita represents a private individual camera trapping on an ad-hoc basis in the Garut region of West-Java to monitor biodiversity. So far, only two National Park authorities conducting camera trap research have been found and contacted, but it is expected that more camera trapping is conducted in other National Parks.
At the moment, not a single one of these 9 projects have captured *S. verrucosus* on camera, although 8 have captured S. scrofa. These include 5 survey locations from the 9 areas (Fig.1) where S. verrucosus populations where still suspected to occur.

Surveys within distribution which not recorded *S. verrucosus*
- Purwakarta area – survey Tangkuban perahu
- Garut area – survey Gunung Malabar
- Garut area – survey Gunung Papandayan
- Cirebon area – survey Ciremai National Park
- Nusakambang- survey Nusakambang Nature reserve

The results obtained so far indicate that *S. verrucosus* distribution might have become smaller or shifted compared to the results obtained in 2003- 2004. It must be said however that the camera trap surveys in Purwakarta and Garut represent mountainous areas at elevations >1000 m ASL, whereas S. verrucosus seems to prefer lowland habitat [Blouch 1988]. Therefore the species might occur outside of the protected mountainous areas.

Future planning
There are still two locations, Ujung Kulon National Park and Baluran National Park, where the presence of *S. verrucosus* is uncertain. The first priority of Warty Watch will therefore be to focus on obtaining results from these locations. Next to this the map on page 9 clearly illustrates a lack of coverage of camera trap projects in Central- and East Java. Especially the area of Blora and Subah deserve special attention as these were mentioned in the 2003-2004 interviews as areas where the species, locally called Babi goteng, might still be common [Semiadi & Meijaard 2004]. If no parties can be found conducting camera trap activities it is highly advised for Warty Watch to actively assist in setting up a camera trap survey in both areas.

International NGO's
The willingness of international NGO's to share information has been a positive sign, but their survey locations are limited to two sites on Java. An additional NGO using camera traps on an ad-hoc basis and willing to share data has been found in the Aspinall Foundation in Bandung. The foundation will be visited in August this year to review the possibilities.

National NGO's
Although no actual photographic data were obtained and it is not part of their core activities, the information provided by National NGO Harimau kita still provided an indication of the situation in the area around Bandung and Garut. Next to this the upcoming Javan leopard survey in Cikepuh Nature Reserve, a potential lowland *S. verrucosus* location, will be supported with extra camera traps from the Bawean Endemik Konservasi Inisiatif (BEKI) for detection of *S. verrucosus*. With the data from Cikepuh comparisons can be made again to the earlier data from Bandung and Garut to check for reliability of pig identification in the past.

Private individuals

Even though only one private individual was found using camera traps, he proved of great importance by providing actual data from the same site another -party had been active. This allowed for a double check of S. verrucosus presence absence. Next to this he provided S*. scrofa* images for the supporting documents and helped with reviewing appropriate Bahasa Indonesia grammar usage. Unfortunately it is not expected that more private users are found and a Facebook post on the Mamalia Indonesia page elicited no responses.

National and regional authorities

Regional authorities responsible for National Park Management in Ciremai and Baluran have shown to be very interested in the potential presence of *S. verrucosus*. Therefore the plan is to continue and search contact with National Parks management to see where camera traps are used to monitor wildlife or have been used in the past. Searching the internet indicates that small scale camera trapping has occurred in all nine mainland National Parks on Java within the last 5 years, mostly focused on the Javan leopard populations [Hance 2012; Ario 2011; Purnomo 2015; Secher 2014; Hapsari 2015, Taman Nasional Halimun Salak 2013]

Universities

The use of camera trapping by university based programs or in student thesis projects has not been looked into yet. Nevertheless, with universities in Bogor and Jakarta offering general biology and biodiversity conservation programmes [Universitas Indonesia 2015; Institut Pertanian Bogor] this might be worth looking at in the future.

Acknowledgements

I would like to thank all the organizations and persons involved for their willingness to share data, positive responses towards the initiative and recognition of the plight of the Javan warty pig.

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Bearded pigs on the Malayan Peninsular – a travel report

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In March 2015, I took part in a survey of the east coast of the Malayan Peninsula, providing my expert input as a taxidermist. The aim of the survey was to assess populations of any game species which could potentially be hunted. If applicable, agreements relating to sustainable trophy hunting would have to be developed, while my personal objective was to organize preliminary taxidermy methods under tropical conditions. The main focal species of our surveys were muntjacs (*Muntiacus muntjak*), Sambar Deer (*Cervus unicolor*), Eurasian Wild Boar (*Sus scrofa*) and Bearded Pigs (*Sus barbatus*). Bearded Pigs are thought to be rare or possibly even extinct on the Malay Peninsula and any information on their present conservation status is of great value (see Editor's note below).

We asked farmers, employees of oil palm plantations and local hunters question about the above species, along a coastal strip, 100 km north and south of Kuala Rompin (2°48'2" N; 103°29'9" E) and tried to verify their statements via observations and pig traces. We could not find noteworthy populations of muntjacs or Sambar Deer. Eurasian Wild Boar was found in all habitats, including the beach (fresh traces) and a waste dump (observations).
Importantly, we also found evidence of Bearded Pigs, primarily in peatland forests, in the form of direct observations of the species. Additionally, we were able to verify their existence based on sightings in oil palm plantations (Figure 1). Our observation indicate that, at night time, Bearded Pigs leave the forests, cross the deep ditches and the roads bordering the plantations and feed on the palm fruits lying on the ground and growing on small oil palm trees. We found deep pig passings along the ditches and repeatedly saw Bearded Pigs. They run back into the forests at any disturbance. Bearded Pigs were not rare in this area. We were unable to determine whether the pig population in the undisturbed forest is high or if they gather at the edges of the plantations to feed on the almost inexhaustible and reliable food sources in the plantations.

Fig. 1. Bearded pig (part of a small group) encountered in an oil-palm plantation on the Malay Peninsula's east coast. Photo: C. Strehl

Indeed, the above is a question that matters. Both, Eurasian and Bearded Pigs are hunted intensively on the Malay Peninsula. On one night, we observed four different hunting groups along the straight forest edge / plantation boundary. The hunters we met were *Orang Asli* (the indigenous people of the Peninsula) and did not use rifles but spears, battery lights and sometimes gundogs. They have exclusive rights as indigenous people and work mostly as employees in the plantations. They represent a big part of these workers and are enthusiastic and skillful hunters. We also met a group of eight hunters with a recently killed full-grown adult male Bearded Pig. The pig was killed using spears but no gundogs (Figure 2).

Pig meat is directly consumed by hunters and their families or sold. Hunting pressure on wild pigs along the forest / plantation edge is enormous. Due to strict law enforcement, firearms are rarely used for hunting in Malaysia, and hunting occurs almost exclusively with shotguns. Shotguns are used intensively for pig hunting, for example, by Chinese who consume pig meat or by Muslim plantation administrators who consider pigs as pests. Muslim farmers I had met during an earlier journey to Malaysia had told me that they had poisoned pigs (both species), if these were causing damage in oil palm plantations.
Bearded Pigs are a protected species in Malaysia but due to a combination of practicing traditional hunting laws and „pest control" in privately owned estates, there is no hope that the protection status of the species has any positive effect.

A potentially effective alternative that could be better economic use of Bearded Pigs

The damages caused by Bearded Pigs could be tolerated in an area comprising rain forest and oil palm plantations (2000 – 5000 ha would be a minimum size) and the Orang Asli would be asked to stop hunting there. Pigs are smart and will adapt quickly by being more relaxed towards humans. Then they are a target for tourists interested in nature photography and some big old tuskers could be taken for sustainable trophy hunting. According to my own observations, *Sus*

barbatus oi, the subspecies on the Malay Peninsula, seems to be bigger than the pigs from Borneo, which can be found in some European zoos (e.g. Munich and Berlin, Germany). No Bearded pigs of the other subspecies can be found in Europe or North America. The Malayan Bearded Pigs could become a lucrative niche product for nature photography and selective trophy hunting. The reasonable prize for a hunting trip of three to four days including the shooting of one old Bearded Pig tusker could be 4,000 – 10,000 Euros. It is obvious and most important that most of the money paid for such a trip is used as an income for the local people to achieve their acceptance and support. There are already sustainable trophy hunting projects in Tadjikistan and Pakistan, where markhors are hunted.

Fig. 2. Head of a recently killed Bearded Pig. Photo: C. Strehl

Gun and hunting laws in Malaysia prohibited hunting by foreigners at the time of my journey. If this changes, accepting all the caveats against trophy hunting, the sustainable use of Bearded Pigs on the Malayan Peninsula could be a way to save this species.

Editor's note

There are very few reports about Sunda Bearded Pigs on the Malay Peninsula, and this report provides important insights about the continued presence of the species in this region. According to Meijaard, d'Huart and Oliver (2011) unsustainable hunting habitat fragmentation and competition with Indonesian Banded Pigs (*Sus scrofa vittatus*) are the main threats for this species. The Bearded Pig is a Totally Protected species under the Protection of Wildlife Act (1972) in Peninsular Malaysia and cannot be legally hunted. Under the present legal conditions, legal trophy hunting is not permitted. We hope that this report will raise more interest in conservation of Bearded Pigs there, and lead to the development of creative and effective solutions for maintaining viable populations of Bearded Pigs.

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Translated by Thiemo Braasch

In Progress: Updated Home Range Map of *Sus barbatus*

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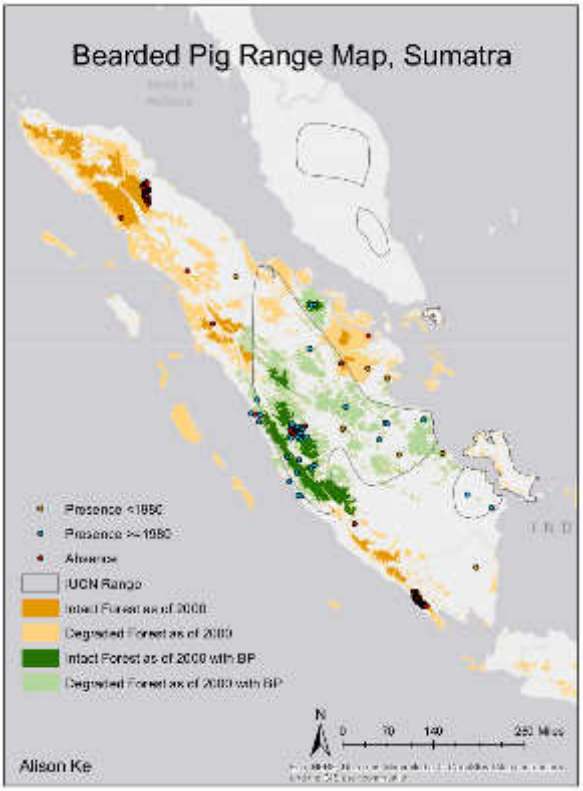
Alison Ke and Matthew Luskin at the University of California, Berkeley are completing a new home range map for the bearded pig (*Sus barbatus*) to be finished this year. The data collection process includes (i) thorough literature review, (ii) combing the species' lists of camera trapping surveys, (iii) original data collection (camera trapping in Sumatra), and (iv) expert consultations. They have identified over 50 records in Sumatra, and are currently expanding this process to surrounding range areas. The range map procedure is a collection of minimum convex polygons (MCPs) around bearded pigs' recorded locations, overlapped with potentially suitable habitat (e.g. current forest cover data from Global Forest Watch). Range contraction is estimated by comparing the pre-1980 bearded pig occurrences and forest cover with more recent observations. If you have any questions or can contribute unpublished observations (presence or absence), please send an email to alisonke@berkeley.edu.



Sunda Bearded Pig. Photo: G. Usher

Alliance for Tompotika Conservation Update: Conservation = Reclaiming Our Identity

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Who knew that the humble babirusa could spark all this?

November, 2012, the Alliance for Tompotika Conservation (AlTo) team, including six volunteers from the U.S., AlTo staff, and dozens of local Tompotika schoolchildren, spent a week creating two huge, beautiful mural paintings on external school walls in Taima and Teku, two villages in the Tompotika region of Sulawesi, Indonesia.". Each mural depicted natural features and wildlife found in that village: maleo birds, sea turtles, tarsiers, crocodiles, anoas, cuscuses, hornbills, babirusas, and more . a veritable who's who of Sulawesi's endemic and endangered wildlife. Some of these species are still found within village limits today, while others were common in our grandparents' day, but now may be found only after venturing into the forests in the village outskirts. In both villages, the mural paintings brought the area's natural heritage to life in all its brilliant color and variety. The murals were a kind of "thank you" gift to the people of each village, intended to honor and celebrate both villages' commitments to working with AlTo to conserve their endangered wildlife. Villagers of all ages were pleased and proud of the murals, pointing out that the murals themselves would serve as great tourist attractions, in addition to the wildlife they depicted.

Taima mural painting. Across the top reads, "Conservation Village Taima". Photo: M. Kinney/AlTO

But in Taima village, as the mural was being completed, one man raised a concern. "Why," he questioned, "is AlTo drawing a pig on our wall?" This man, like most in the village, is a Muslim, and for Muslims, pigs are haram - considered unclean, forbidden to eat or touch, and best avoided entirely. The man was referring to the babirusa, *Babyrousa celebensis*, a strange endangered mammal found only in Sulawesi, which looks a little like a cross between a pig and a deer--and in fact, in Bahasa Indonesia, the national language of the country, "babirusa" means "pig-deer."

The man's question raised alarm. The babirusa, not a pig per se, but a rare and unique species, was formerly common in the area and constitutes an important part of Tompotika's natural heritage - and that of all Sulawesi. But if some objected to its presence in the mural, what should be done about it? A community discussion followed. Some suggested simply removing the babirusa. The mural was all about harmony and happiness - why not just avoid including anything

controversial? Others said to leave it as is - after all, it was only one or two disgruntled guys objecting, and it's only a painting. Still others suggested adding name labels underneath each animal on the mural, where so far there had been no words, only images. With a clear "babirusa" label under it, they suggested, everyone would know that the animal was not a pig, but a babirusa. The discussion went on, no solution really feeling satisfactory.

Babirusas. Photo: C. Bransilver/WCS

But then the conversation took a new twist. AlTo staff and villagers began to talk about how part of the problem is that most people are no longer familiar with babirusa--they are gone from the near-village environs. In the old days, everyone would have recognized that animal as a babirusa, not a pig, because they were used to seeing them. Now they're found only at a distance from the village, and many have never seen one at all. But the older people in the village would know them. Actually, we realized, the older people would not only recognize them, but would call them by another name--their name in Bahasa Saluan, the older, local language of the area. Most of the villagers present, in fact, did not even remember the animal's name in Bahasa Saluan, but AlTo staff, having interviewed plenty of old-timers, supplied it. In Bahasa Saluan, the name for this animal is sangko bulu, which--ironically given the current debate--stresses our connection to this species, meaning "skin like a human," because of the babirusa's hairless skin. In our meeting, we began to go over the names of all the mural's creatures in Bahasa Saluan, and it was as if we were bringing back old friends to the villagers present.

A decision was quickly made: we would insert name labels, not just under the babirusa, but under all of the mural creatures, giving their names in Bahasa Saluan. The solution felt universally and exactly right: it was as if we had not just solved a problem, but rediscovered something precious. In the days that followed, many came by to watch and help out with the work being completed, and older folks nodded their heads in smiling recognition at the names they saw painted under each animal. Not another word objecting to a pig was heard.

The babirusa reminded us of a truth we had nearly forgotten: conservation helps connect us to an older, deeper part of ourselves. And though in many cases, this connection to our heritage has been lost, it is not out of reach. Simply by calling the animal by its older, local name, the babirusa became no longer a strange and suspicious beast, but a connection to the people and landscape that came before us--a connection worth honoring and protecting. In Taima village, the babirusa is helping to transform us: by protecting what's left of these animals and their habitat, we protect not only a unique and wonderful fellow species. We also protect our bonds to the people and places that have made us who we are.

Sangko Bulu, or babirusa - detail from the Taima mural. Photo: M. Kinney/AITO

Surveys on Buru and Taliabu fail to reveal sign of babirusa

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Moluccan Babirusa (*Babyrousa babirussa*) is one of the least known wild pig species. It occurs on two of the Sula Islands (Mangole and Taliabu) and on Buru in Indonesia, but is reported extinct on Sanana. Buru Island is a potential stronghold for the species, but very little is known about the islands fauna. For several decades, the island housed a prison for Indonesia's political prisoners, and was off-limits to researchers. Only since the late 1990s has access been improved, although the island remains rarely visited. The most recent report relevant to Moluccan Babirusa were two observations in 1999 on an unsuccessful hiking trip to the summit of Mt Kepala Mada and a single sighting above Menanga village on Taliabu in 1999 (Verbelen, 2003). Locals claimed them as 'not uncommon' and 'well known', respectively.

Over the past few years, we visited Buru four times, primarily for bird surveys (August - September 2006, October 2012, October 2014, December 2014). Trips lasted between 2 days and 2 weeks and included by lowland and highland habitats, up to 1450m. We conducted both day and night-time surveys, including driving along disused logging roads at night, dawn and dusk. Although we were looking and listening for birds, we always kept an eye out for pigs or signs of pigs. Sus scrofa on the island appeared to be numerous and easy to see in the coastal lowlands, but we never saw any sign of babirusa on any of our surveys. Locals in one fishing village told us that there are two species of babi hutan (wild pig) on the island, a smaller species in the lowlands and a much bigger one in the mountains.

Buru montane. Photo: R. Hutchinson

Lowland forests on the islands are being selectively logged, and logging is going into higher altitudes now. There is now a logging track going up to 1450 m towards Rana Lake, although there are still few people present on it. Fortunately, the highest, unexplored mountains currently remain inaccessible. It is not clear why no babirusas were seen. Of course, we could have overlooked them, but if the species was present, we would at least have expected to see signs. Hunting may be a problem (although we didn't specifically ask about this). In the hills Christians dominate, while in the lowlands you have Muslims, who rarely hunt pigs. *S. scrofa* is still numerous in the lowlands, and may have displaced babirusas from there, which could then experience high hunting pressure in higher altitude areas. Additionally, 3 ornithological visits to Taliabu (2 visits by Frank E. Rheindt totaling 17 field days, and ROH 02-07 December 2012) did not encounter any babirusa on the island, despite surveying up to 1300m elevation, well away from the close human habitation in the coastal lowlands. Taliabu (along with Sanana and Mangole) are Christian dominated islands with very high hunting pressures.

We recognize that our findings are preliminary at best, but suggest that not all is well with the Moluccan Babirusa and that more detailed field and interview surveys are urgently needed to clarify the present conservation status of this species.

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Update on the 'Wild Pig Challenge 2015'

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Over the past 20 years, Asia has seen dramatic changes in its geopolitics, economy and environment. Environmental change, especially widespread poaching and forest loss and fragmentation, has taken a toll on the majority of the wild pig populations. Nearly all extant wild pig species (12 out of 13) in Asia face the threat of extinction. For many species, recent and comprehensive knowledge about their status and severity of threats is lacking. As such, it is critical to revise sections of the current IUCN/SSC Wild Pig Action Plan that was published in 1993.

To identify status, threats and conservation opportunities for Asian wild pig species, we conceived the "Wild Pig Challenge 2015" – a series of short questionnaire surveys that will be published over the forthcoming months starting from June 2015. Compared to many other Asian flagship species, there is less dedicated research to wild pig species, so to maximize responses the survey series is targeting field researchers in Asia who are working within wild pig species' range. The survey data will be analysed and shared with the Asian Wild Pig Specialist Group members to support the development of a set of recommendations during a future regional wild pig priority setting workshop.

In mid-June, invitations were sent out for participation in the first online survey. The intention was to maximize the response rate by keeping the survey completion time short (<2 minutes). The first batch of questions solely focused on species population status (presence/absence and population trend) and received an enthusiastic feedback, with 107 individual species responses, of which nearly 80% were provided within the first three days. From this, responses for the threatened wild pig species (Sus scrofa was intentionally excluded) and the countries reported on is as follows:

India (n = 3): Pygmy hog (3)
Indonesia (31): Sulawesi babirusa (5), Sulawesi warty pig (8), Sunda bearded pig (21), Bawean warty pig (3), Javan warty pig (3), Togean babirusa (1) and Moluccan babirusa (0)
Malaysia (31): Sunda bearded pig (31)
Philippines (9): Mindoro warty pig (1), Palawan bearded pig (2), Philippines warty pig (5), Visayan warty pig (1).
Based on survey feedback, the current population trends for threatened Asian wild pig species are generally perceived to be decreasing, if not uncertain. The only exceptions are the reports of increase in a Visayan warty pig population in Negros Occidental, Philippines, and the Sunda bearded pig population in the Kinabatangan Wildlife Sanctuary in Sabah, Malaysia (which may in fact be because of pigs benefitting from oil palm expansion).
Through this survey, we also found that the distribution of the Sunda bearded pig in Indonesian Borneo may be wider than reflected on current IUCN maps. There are several other wild pig species in Indonesia which have reportedly become absent from previously occupied sites, and they include Javan warty pig from the Upper Cisokan Watershed and Togean babirusa and Sulawesi babirusa from Lore Lindu National Park.
To further fill knowledge gaps about survival threats and conservation opportunities of Asian wild pig species, we will be sending out the next 2 minute batch of questions. If you are interested in participating in the Wild Pig Challenge survey, please contact us at jasline1404@gmail.com. In the meantime, we would like to wholeheartedly thank all those who have provided critically important information.

Female Visayan Warty Pig. Photo: M. Greśkowiak, Zoo Poznan, Poland

Introducing new Africa and Asia coordinators for the WPSG

Erik Meijaard
Chair WPSG

It is with great pleasure that I announce a new team to support our group's work on the conservation of threatened wild pig species. Dr Matt Linkie is our new coordinator for Asia, while Prof. Rafael Reyna has agreed to help with the coordination of our work in Africa. We are very pleased to have these long-term conservation experts join our team, and feel confident that they will strengthen our ongoing efforts to ensure the continued survival of all wild pig taxa.
I would like to warmly thank outgoing Africa coordinators, Dr Tom Butynski and Dr Yvonne de Jong for their many years of assistance to the WPSG, and wish them well with their ongoing conservation work and research on Common and Desert Warthog, Bushpigs and other wild African pigs.

Let me introduce you to the new coordinators.
Matt Linkie (Figure 1) spent over 16 years conducting applied research and managing conservation projects in southeast Asia. At the Durrell Institute of Conservation and Ecology (DICE) he obtained his MSc and PhD degrees and conducted post-doc research all on tigers and their prey. This period also included six months working as the IUCN/SSC George Rabb intern on the Red List 2000 Programme. Working in Indonesia, he has encountered Bearded Pigs in the Sumatran rainforest on many occasions, including at the summit of Mount Kerinci (3,805m asl). According to Matt, Bearded Pigs remain one of the most interesting Sundaland terrestrial mammals, with their migratory habits for following mast fruiting episodes. This behaviour has led to a locally-held belief that these pigs turn into dolphins and swim away in the river when they 'disappear' from a forest patch. Matt is now based in Indonesia, where he works as Chief Advisor for the Wildlife Conservation Society (WCS) Indonesia Programme. Matt presently supervises two interns from the National University of Singapore (Jasline Ng and Zhi Qi Lim) to: i) develop and conduct an expert-based questionnaire survey to ascertain the status of Asian wild pig species across their range; and, ii) compile camera trap data sets on several

Fig. 1. Matt Linkie at work in Sumatra. Photo: M. Linkie

species. He is also on the PhD committee of University of Berkeley student Matthew Luskin who investigates interactions between Eurasian Wild Boar and Sunda Bearded Pig and works with a small team to update the latter's range map.

Rafael Reyna (Figure 2) is a wildlife biologist from Mexico that has carried research in the Maya forest of Mexico for the last 15 years and in Kibale National Park in Uganda since 2010. Rafael was the first biologist in Mexico to conduct a field study on white-lipped peccary a tropical ungulate that moves across scales of hundreds of kilometers in the tropical forest. During 2012 to 2014 and with the support of the Committee of Research and Exploration of National Geographic, Rafael led a study about the largest of the wild pigs in the world, the Giant Forest Hog, in Kibale Uganda. Rafael has a Professor/Research position in El Colegio de la Frontera Sur in Mexico. He earned MSc and PhD degrees from the Department of Wildlife Ecology and Conservation of University of Florida and enjoyed a postdoctoral position in McGill University for two and a half years. Rafael has published or collaborated on 22 papers, 11 book chapters and several publications of science divulgation including National Geographic news and Newsweek in Spanish. Rafael is advisor of three PhD students and two master students. His students come from several countries including Guatemala, Belize and France.

Fig. 2. Rafael Reyna and chimpanzees in Kibale National Park, Uganda, July 2014. Photo: R. Reyna

New born Visayan warty pigs in Biodiversity Conservation Center

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We are pleased to announce that two Visayan Warty pig piglets were born on 18 March 2015 from breeding pair Julio and Olivia. Two more piglets were born from another female Amor on 20 March 2015, also from the same father Julio. All are first-born piglets from these individuals. This brings the current captive population of Visayan warty pig of Negros origin at 40 (15♂♂21♀♀4Unk).

Two Visayan Warty pig piglets.

Photos: Philipines Biodiversity Conservation Foundation Inc.

Two Chacoan peccary triplets born in Tierpark Berlin in April and May this year

Tierpark Berlin, one of the two zoos in Berlin, Germany, announced, that two Chacoan peccary triplets were born 15th April and 1st May this year. Chacoan peccaries are the biggest of all three peccary species living in the Chaco area in Bolivia, Paraguay and Argentina. The total population there is estimated to comprise only 2000 to 3000 animals. Tierpark Berlin was the first European zoo keeping this species, getting the first peccaries from the USA and is now keeping 21 Chacoan peccaries (this is similar to app. 1 % of the population if this species in Paraguay). Tierpark Berlin's first successful breeding of Chacoan peccaries happened 2013 and later Tierpark sent some of the offspring to the zoos of Jihlava (Czech Republic) and Wroclaw (Poland) and is establishing a European Endangered Species Programme (EEP). Furthermore, Tierpark Berlin also financially supports the conservation breeding center Proyecto Taguá in Paraguay.

Translated by Thiemo Braasch

Source (in German):
http://www.tierpark-berlin.de/de/aktuelles/news/artikel?tx_news_pi1%5Bnews%5D=23&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Baction%5D=detail&cHash=47b03f203e5ffdf192866a79aab8cc7e

Some of the Chacoan peccary piglets born in Tierpark Berlin with their parents.
Photos: T. Braasch

The Giant Forest Hog (*Hylochoerus meinertzhageni*) and other Terrestrial Mammals of Kibale National Park, Uganda

Final report for National Geographic Committee for Research and Exploration

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Abstract

African wild suids living in forest environments have been poorly studied and some species as the giant forest hog (*Hylochoerus meinertzhageni*) -the largest species of wild pigs of the world- are disappearing at alarming rates, especially the eastern Africa populations due to habitat encroachment and hunting pressure. Here we present results of the first ecological study on this species in Kibale National Park, a mountain- tropical forest of southwestern Uganda. The goal of this research was to determine group size, group's movement patterns, habitat use, and foraging patterns. We also assessed parasites transmission among giant forest hog, bush pig and domestic pigs living in the periphery of the park. We tracked for two years two groups of this species and estimated home range, foraging patterns, and habitat use. With the help of automated camera traps deployed in salt licks and bathing points we also obtained the first account of group size and group structure for the population of Kibale National Park. More than 300 feces of both wild species were collected and analyzed to determine gastrointestinal parasites communities. Home range of groups of giant forest hog was estimated at 10.7 km2 (Fixed kernel at 95%) with a core area of 2.7 km2 (Fixed kernel at 50% of observations). Areas with dense bushes and sparse trees surrounded by mature forests seem to be the favorite habitat for the giant forest hog where they feed on the herbaceous plants and rest in shady areas of 5 x 5 m approximately called "sleeping sites" located under the densest thickets. Giant forest hogs were captured on camera traps 28 different times and the more than 500 photos obtained showed that group size is highly variable and ranges from 3 to 11 individuals with occasional sightings of solitary individuals. Large groups are conformed by a dominant male, one or two additional males, several adult females, and up to four juveniles. Fourteen species of gastrointestinal parasites were found in both, the bush pigs and the giant forest hog, and it was found that individuals living far from humans have less parasites species and less prevalence than individuals living in the park periphery. Conservation of the largest pig of the world in eastern Africa will require the protection of forest ecosystems and the mosaic of habitats associated to them as the dense bushes and open gaps surrounded by mature forest. Kibale National Park is one of the last strongholds in Uganda of the population of this endangered species.

Photo of a Giant forest hog in Kibale National Park taken by camera trap. Photo: R. Reyna

Are we ready for meta-analyses of mammalian faunas based on faunal lists? A case-study using the Plio-Pleistocene African Suidae

Unpublished report of the postdoctoral grant of the Fyssen Foundation

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Introduction

Human evolution is one of the most intensively researched areas of paleontology. Although the fossil record of hominids has been tremendously improved during the last few decades (e.g., Brunet et al. 2002; Lordkipanidze et al. 2013; White et al. 1994, 2003), it is still relatively small compared to many other mammalian groups. Because of their scarcity, it is difficult to understand the causes of the evolution of hominids by using their fossils alone. To the opposite, other mammalian groups are represented by abundant fossils directly associated with the hominids. These and their contexts constitute the best evidence for understanding the multiplicity and complex interactions among the many factors involved in our evolutionary history.

Information on the timing, place, and environmental context of the dispersals of hominid species can be gained from the study of associated contemporaneous faunas. Similarly, the effects of different but interrelated factors (e.g., climate, vegetation, and tectonics) on the evolution of hominids can be tested using whole mammalian faunas, notably by examining correlations among these variables. Numerous meta-analyses have recently used both comparisons of faunal lists (lists of species present in a particular fossil assemblage) and analyses of relative abundances of taxa to infer patterns of dispersal or patterns of extinction/speciation (e.g., Alemseged 2003; Bobe 2006; Faith 2014).

All faunal lists are generated through the practice of systematics, the science of describing, understanding, and classifying biological organisms. For paleontology, this practice requires studying the morphology of numerous specimens in detail. It is not only foundational to address larger questions, but it is also very costly both in terms of money and time. Any mistake introduced during this basic step will obviously have important consequences on the reliability of the subsequent analyses. These larger questions involve broader studies of phylogeny (relationships of the species), biochronology (dating of fossils and the deposits that yield them by comparing the degree of evolution of the faunas), ecology, and biogeography (relationships between the different geographic areas based on the study of faunas).

Here, I will use the family Suidae (pigs) as a simple case study to test whether the primary data upon which meta-analyses of faunal lists are based are reliable. A Google Scholar™ search using the keywords "*Kolpochoerus* OR *Metridiochoerus*" (the two extinct genera of suids that I specialized on) yielded not less than 38 papers comparing faunal lists and published since 2000. What is most striking is the fact that most of those papers (33 out of 38) were written by only one or two authors. Obviously, one or two authors cannot be specialized on every group of mammals included in the faunal lists they are comparing. In turn, this indicates that they cannot be aware of all the systematic issues and recent systematic changes peculiar to each group. Therefore, it is

possible that many of those meta-analyses include faunal lists that are outdated or contain mistakes.

I will present here a few recent systematic changes based on my own research and recent literature dealing with the evolution of pigs during the part of Plio-Pleistocene (the last 5 million years). I focused on the evolutionary history of the extant African pigs and their closely related extinct taxa. The subfamily Suinae comprises three extant African genera (*Potamochoerus*, *Hylochoerus*, and *Phacochoerus*) and two extinct African genera (*Kolpochoerus* and *Metridiochoerus*). I studied several thousand pig fossils coming mostly from eastern Africa using modern methodologies commonly employed in systematics. I reached my systematic conclusions via two steps: 1) the building of an extensive comparative reference basis of morphological variation documented in extant African pigs (Fig. 1); and 2) the study of a much improved fossil record, notably original fossils coming from Ethiopia.

Morphological variation and the importance of a comparative series of extant species

Morphological variation, especially within a species, is a complicating factor for most researchers conducting systematic studies. This was recognized long ago, notably by Charles Darwin, when he was conducting his 8-year-long systematic revision of the extant and fossil barnacles (tiny crustaceans generally living inside their own calcified shells) (Fig. 1; Darwin 1854). Among pigs, sexual dimorphism, the difference between males and females of the same species, is relatively important as it is in many mammals. Morphology also changes dramatically during the growth of an individual: juveniles and adults obviously have very different sizes and morphologies, but differences among subadults, adults, and senile individuals can also be important. Additionally, populations of the same

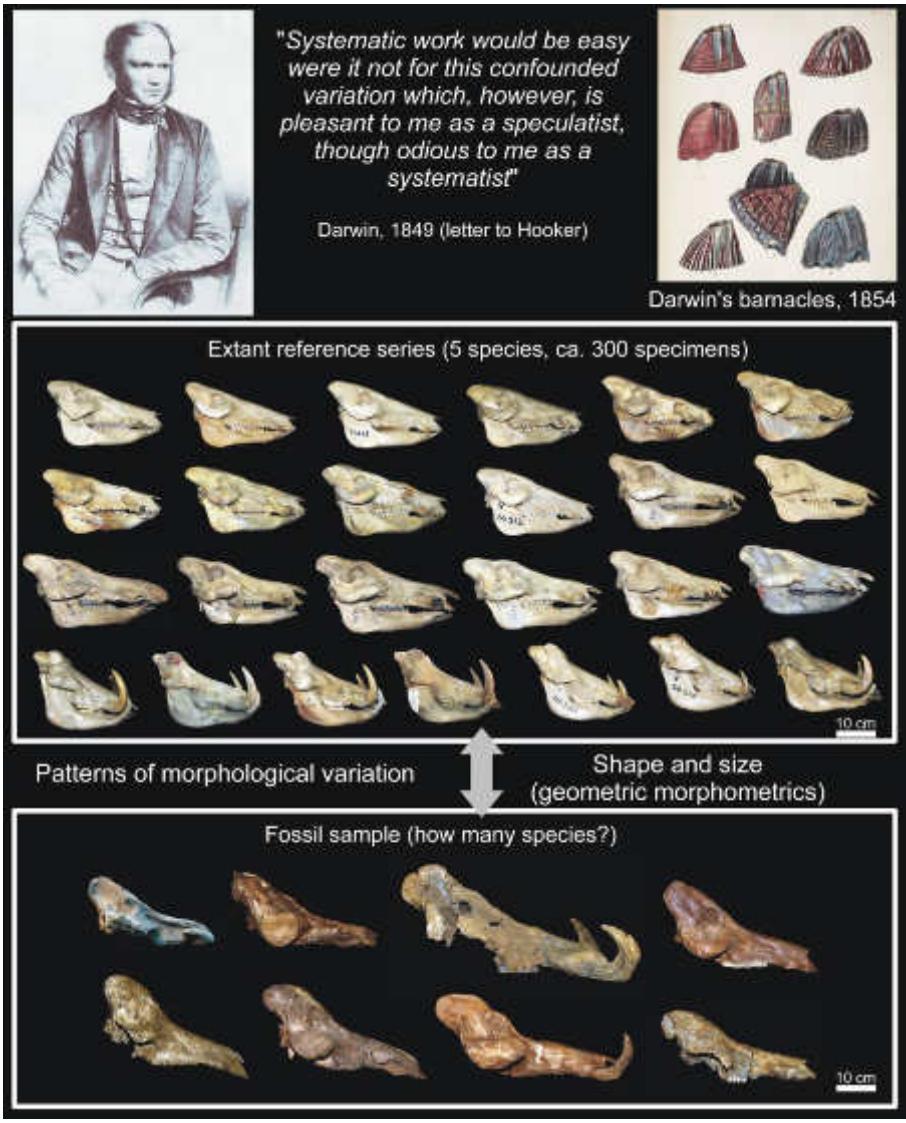

Fig. 1. Morphological variation and the importance of a reference series of extant species.

Top: portrait of Charles Darwin in 1849 (left, by T. H. Maguire, Wikipedia Commons) when he was conducting his systematic revision of the barnacles (right, reproduced with permission from John van Wyhe ed. 2002-. The Complete Work of Charles Darwin Online http://darwin-online.org.uk/). Middle: morphological variation of the skull in extant African suids (a subsample of 25 specimens from my extant suid dataset, including both males and females for each of the five extant species). Bottom: sample of eight crania of *Kolpochoerus* from eastern African Plio-Pleistocene sites, illustrating the strong variation in shape and size.

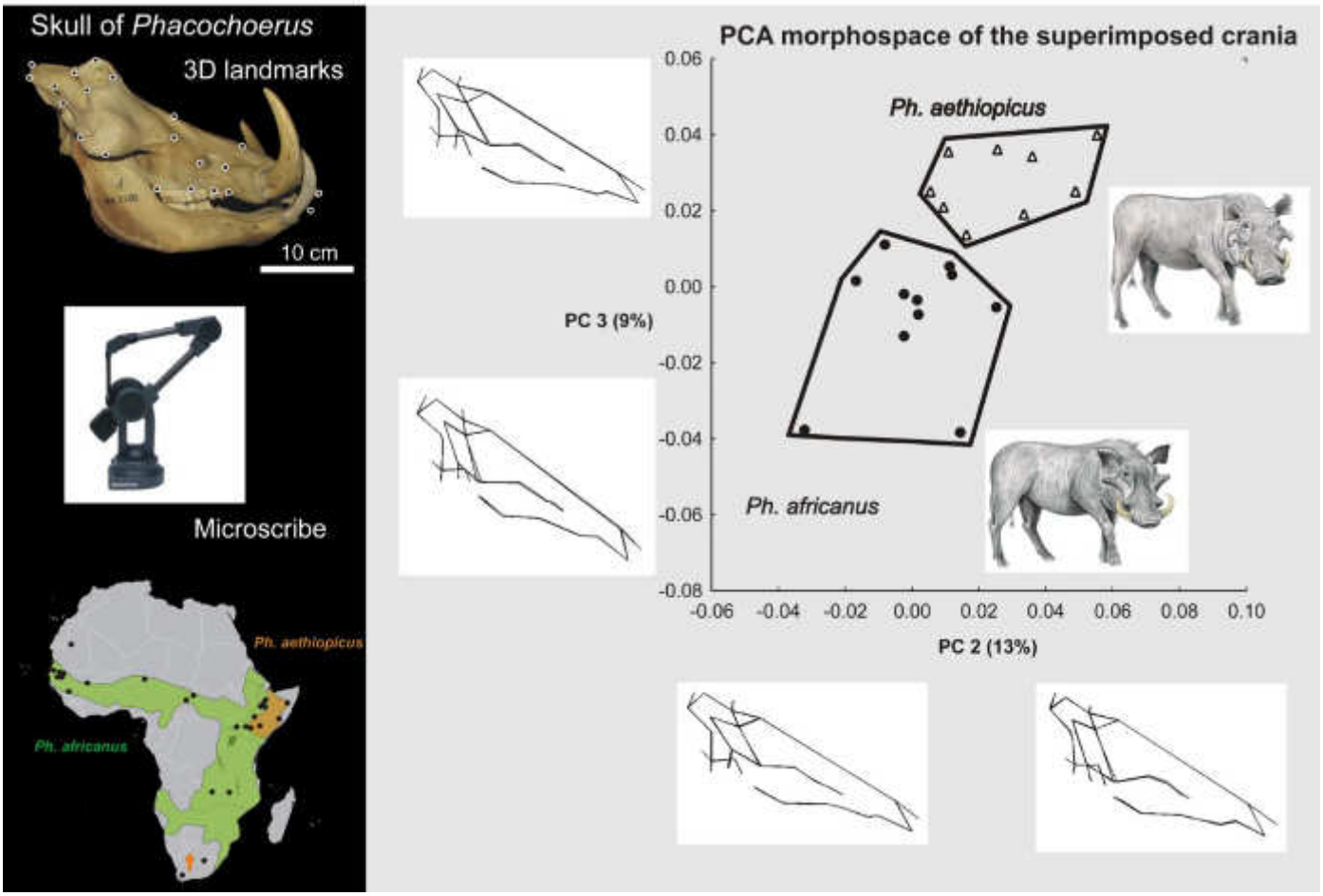

Fig. 2. Analysis of cranial shape in the two extant species of warthogs using geometric morphometrics.

Top left: lateral view of the skull of an extant *Phacochoerus aethiopicus* illustrating the position of the 3D landmarks (black dots) digitized on the cranium using a microscribe instrument (middle left). Bottom left: map of Africa showing the geographic ranges of the two species and the sampled localities (black dots). Right: morphospace of cranium shape formed by the axes PC2 and PC3 of the PCA conducted on the Procrustes superimposed 3D coordinates of the warthog crania. All specimens included in this graphic are adults of the same dental age. Morphological differences can be observed using wireframe visualization (here, lateral views of specimens displaying extreme values along the PC axes are represented). Warthog drawings are from Grubb & d'Huart (2010).

species living in different parts of its overall geographic range can display morphological differences. When dealing with fossils, that are usually rare and incomplete, it can be very difficult to trace boundaries between the species, especially if the morphological variation is not well understood in taxonomically and/or ecologically closely related extant taxa.

The first step of my PhD thesis was to build an extensive comparative series from osteological specimens derived from extant suid taxa. This documented the inter- and intra-specific craniodental variation in size and morphology of the extant African pigs. I studied around 300 specimens belonging to the five extant species of sub-Saharan pigs: the bushpig (*Potamochoerus larvatus*), the red river hog (*Po. porcus*), the giant forest hog (*Hylochoerus meinertzhageni*), the common warthog (*Phacochoerus africanus*), and the desert warthog (*Ph. aethiopicus*). I sampled males and females, juveniles and adults at different growth stages, and individuals coming from different parts of the geographic range for each species.

The patterns of morphological variation observed in the extant species were quantified using geometric morphometric methods (see below). This variation was then compared to that observed in the fossil record of closely related extinct genera (*Kolpochoerus* and *Metridiochoerus*). This enabled a more accurate definition of each fossil species (Fig. 1).

A much improved fossil record of pigs: evidence from Ethiopia

The systematic revision I conducted is based on a much improved fossil record for the Plio-Pleistocene African pigs, notably including numerous unpublished but well-dated specimens discovered by two active projects working in Ethiopia: 1) the Omo Group Research Expedition; and 2) the Middle Awash research project. Those two projects share similar goals and methodologies: they document the context of human evolution by describing the geological, faunal, and environmental changes during the last million years. The stratigraphic context of each fossil collected is carefully documented during the surface collection activities and attendant excavations, and the spatial position is registered using GPS positioning (e.g., Boisserie et al. 2008; Gilbert & Asfaw 2008). The fossiliferous strata investigated by these projects have yielded numerous fossils of mammals (>50,000 from the Shungura Formation; >20,000 from the Middle Awash research area). The fossils are well-dated using a combination of radiochronological (obtained on the intercalated volcanic ashes), magnetostratigraphic, and biochronological considerations.

Both projects have amassed numerous well-dated pig fossils, including several skulls in addition to numerous isolated teeth. These fossils formed the basis of the systematic revisions carried during my PhD thesis and my postdoctoral researches (Souron 2011, 2012; Souron et al. 2015; Suwa et al. 2014). During this work, I have been able to directly compare these unpublished fossils to previously published fossil pigs from numerous fossiliferous sites throughout Africa and Eurasia.

Each new fossil is a potential source of information to be used to enhance systematic studies, particularly well-dated and relatively complete specimens. This occurs because such fossils can: 1) illustrate parts of the morphology that were previously unknown for a particular species; 2) sometimes represent a new species displaying an original combination of morphological features; 3) repeatedly test previous observations and hypotheses by increasing the sample size for a particular species and/or morphological part.

Two fairly recent technological developments have enabled me to more easily incorporate the enhanced extant comparative samples and expanded fossil record for the African Suidae: 1) computer-assisted statistical analyses of shape, most notably geometric morphometrics (Fig. 2); and 2) efficient and affordable digital photography allowing a specimen-based comparative approach by documenting each studied fossil in high detail.

Geometric morphometrics in systematics

In addition to comparative anatomy, quantification of the size and shape of organisms has always been a crucial part of systematic studies. For the past few decades, different methodologies have been developed to greatly facilitate the quantification of shape and size in biological objects, notably the “geometric morphometrics” (Rohlf & Marcus 1993). Modern acquisition and processing technology enable the investigator to analyze differences in size and shape independently, and to analyze the relationships between those two components of morphology. Allied powerful visualization tools greatly simplify comparisons of shape between different

individuals and species. Geometric morphometrics notably include analyses of shape using 3D landmarks. This consists in the digitization of the 3D coordinates (X, Y, Z) of homologous anatomical points on each specimen (Fig. 2). The 3D coordinates are then subjected to Procrustes superimposition, which enables removal of the information about the size of the specimen, theoretically leaving only the information regarding the shape. It proceeds in three steps (translation, rotation, and scaling) so that every specimen's position and orientation are the same, and so that they are globally at the same size. Finally, the superimposed coordinates of the specimens are subjected to different kinds of statistical multivariate analyses. The most common is Principal Component Analysis (PCA), which enables the investigator to establish the main axes of morphological variation and to observe the morphological differences within a morphospace defined by only a few dimensions. I used geometric morphometrics analysis of 3D landmarks on the skulls of extant and fossil African pigs as a part of my systematic revisions (Souron 2011, 2012). An example of analysis will be discussed in the section Results (Fig. 2).

Digital photography in systematics

Until recently, fossil specimens for research and publications were illustrated via drawings and/or analog photography. Drawing is generally too time-consuming to illustrate every studied specimen. Analog photography is too expensive and time-consuming to employ in photographing multiple views of every studied specimen. Therefore, paleontologists traditionally selected a few specimens to use in their comparative work and to illustrate their findings. These highly selected specimens were usually the most complete or most significant ones. The remaining specimens were studied, but usually not illustrated. Only a few notes or measurements regarding their morphology were taken.

Recently, digital photography has become very efficient and affordable. Along with the availability of cheap digital storage devices with exponentially increasing capacities, it is now possible to take as many photographs as is required for comprehensive systematic assessment. This is truly a revolution for systematists because it enables documentation of every specimen studied in high resolution and fidelity. During my research, I photographed each specimen in multiple standardized views. From these data, I built a digital photography database (>25,000 photographs) that contains more than 5,000 specimens of fossil pigs and around 300 specimens of extant pigs. This enables me to refer to any specimen at any time during the ongoing research: during the data sorting, the data analysis, and the composition or review of manuscripts to be published. At any time, it is possible to go back to a particular specimen to verify the taxonomic identification, the element identification, the side, the morphology, and even the size (in addition to the measurements). This approach enables the investigator to compare collections of fossils that are impossible to compare directly because they are not stored in the same institution, or even on the same continent. A notable example involves the fossils from Olduvai Gorge, Tanzania, which are held by institutions in England, Germany, France, Netherlands, United States of America, and Tanzania. It also allows verification of the morphology of fossils at any time, even years after the initial data collection. The latter is particularly important in sustained systematic analyses of thousands of fossils from hundreds of occurrences because this work sometimes shifts the "mental construct" of fossil taxa en route to a well-validated systematic conclusion.

Results: a few examples of recent systematic changes in the pigs

1) There are two extant species of warthogs. *Phacochoerus africanus*, the common warthog, is

very well known in terms of morphology and ecology, and occurs in most of sub-Saharan Africa in open environments (Fig. 2). *Phacochoerus aethiopicus*, the desert warthog, on the contrary, is very poorly known. The latter species occurs nowadays only in some parts of the Horn of Africa (Somalia, Ethiopia, and Kenya) (Fig. 2). Until the end of the XIXth century, it was also present in some parts of South Africa but it became extinct there, probably in part because of the rinderpest pandemics. The two species are well separated both genetically and morphologically (Grubb & d'Huart 2010 and references herein). Previous studies notably found several discrete morphological differences in dental (development of incisors, shape of canines, and timing of root fusion in the third molars) and skull morphology (basicranium and zygomatic morphology) as well as in external appearance (shape of the ears and the facial warts). To supplement those discrete differences, I conducted a study of the skull shape in those two species using 3D landmarks geometric morphometrics methodologies. Figure 2 illustrates the morphological distinction between the two species in the morphospace defined by two axes of the PCA conducted on the Procrustes superimposed coordinates of the 3D landmarks on the crania. This confirms that both species are also well separated in terms of cranial proportions. However, many articles using faunal lists of modern faunas often present mistakes of systematics of the warthog species. Both species are often lumped into one, or even confused for each other. This example illustrates the fact that even modern ecosystems observable by contemporary zoologists are still poorly known in terms of the mammals that they include.

2) I described, along with my PhD advisors, a new species of pig from the Pliocene of Ethiopia (Souron et al. 2015). We named it *Kolpochoerus phillipi* in honor of the late South African paleoanthropologist Phillip V. Tobias. It comes from the Matabaietu catchment in the Middle Awash research area, in sediments dated to around 2.5 Ma. The type specimen is a mostly complete skull whose cranium and mandible were found associated in situ (Fig. 3). We interpreted this new species as a potential ancestral species for the well-known Pleistocene species *K. majus*, and suggested a close relationship between those two extinct species and the extant giant forest hog. This example illustrates how newly discovered fossils from previously poorly sampled strata can result in important systematic changes. This new species differs from previously described species of *Kolpochoerus* mostly in terms of skull morphology. Therefore, it seems unlikely that it would have been recognized as a different species if only isolated teeth had been found. It also illustrates how new taxa can provide new insights on the phylogeny and systematics of a group. Similarly, several new species of fossil pigs have been

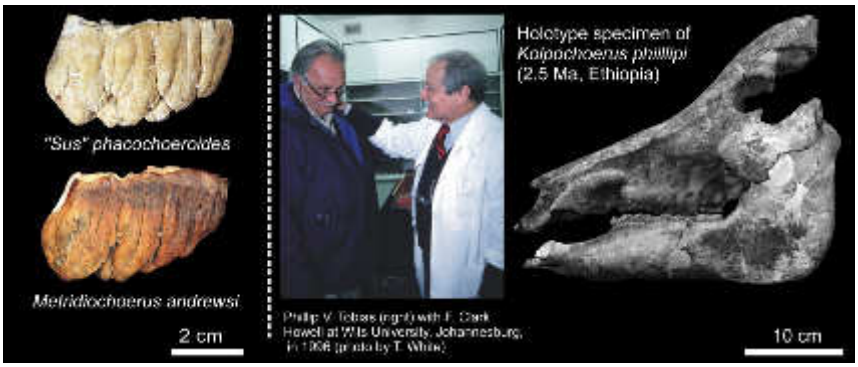

Fig. 3. New systematic results. Left: lateral (lingual) views of right upper third molars of "*Sus*" *phacochoeroides* (AaO-3580) from Ahl al Oughlam, Morocco (top) and *Metridiochoerus andrewsi* (OMO 76-1969-255) from Shungura Formation, Ethiopia (bottom) illustrating the dental characters (e.g., vertical grooves on the lateral sides of main cuspids) suggesting that the former species also belongs to the genus *Metridiochoerus*. Right: lateral view of MAT-VP-1/5, holotype specimen (associated cranium and mandible) of a newly described species *Kolpochoerus phillipi* (Souron et al. 2015), coming from deposits of the Matabaietu catchment, dated to ~ 2.5 Ma, in the Middle Awash research area, northern Ethiopia. The species was named in honor of the late South African paleoanthropologist Phillip V. Tobias (middle).

erected during the last decades: e.g., *K. deheinzelini* and *K. cookei* (Brunet & White 2001), *Notochoerus clarki* (White & Suwa 2004), and *Nyanzachoerus khinzir* (Boisserie et al. 2014). Each has refined the systematics of the particular suid clade involved.

3) *Sus phacochoeroides* from northern Africa (Algeria and Morocco) and *Sus falconeri* from the Indian subcontinent (Siwalik Hills in India and Pakistan) were described in 1884 by Thomas and Lydekker respectively (Lydekker 1884; Thomas 1884). Both species were recently attributed to the genus *Kolpochoerus* (Chavasseau 2008; Geraads 1993; Pickford 2012). I reviewed an important quantity of material attributed to those two species, along with Dr. Olivier Chavasseau, and we concluded that they very likely belong to the genus *Metridiochoerus*, notably based on their dental morphology, which is very peculiar to the latter genus (i.e., presence of vertical grooves on the side of the molar cusps) (Souron 2012; Souron & Chavasseau, in prep.; Fig. 3). This example illustrates how specific and/or generic misattributions can seriously obscure evolutionary history. If *S. falconeri* belonged to *Kolpochoerus*, this would indicate that an African species of *Kolpochoerus* (a genus of African origin) dispersed from Africa to Eurasia. Rather, as we determined, *S. falconeri* belonged to *Metridiochoerus*, this would indicate a dispersal of an African species of *Metridiochoerus* from Africa to Eurasia. Those two hypotheses are very different and involve contrasting ecological and environmental scenarii because the genus *Metridiochoerus* consists exclusively of species of pigs feeding on grasses in open and dry grasslands, whereas the genus *Kolpochoerus* includes species displaying much more varied diets and environments.

Conclusions: are we ready for meta-analyses using faunal lists?

The examples I presented illustrate how much the systematics of the extant and fossil pigs are still a work in progress. No need to conduct any fancy statistical analysis or model simulations to understand that, at least for the pigs, the primary data upon which the meta-analyses of faunal lists are based are not reliable and therefore cannot yield meaningful results. Based on the evidence from the pigs, a rather small group, such mistakes and/or substantially different interpretations of the systematics of the same fossils likely permeate the literature on African Neogene mammal evolution. Is it possible to generalize those results to other mammalian groups? The paleontological literature reveals several hints that the same situation also applies to other mammalian groups. For example, before 2002, all extant and fossil species of hippopotamids were lumped into two genera, *Hippopotamus* and *Hexaprotodon*. A recent systematic revision resulted in the re-organization of all those species in at least five genera, and examination of the overall fossil record provided evidence for an additional four new species among them (e.g., Boisserie, 2004; Boisserie et al. 2003, 2005; Boisserie & White 2004). This is still a work in progress and more systematic changes will likely be published in the future (Boisserie, pers. comm.). In a similar way to what is observed for the pigs, many meta-analyses using faunal lists do not take into account this kind of recent modifications in the systematics of hippopotamids.

Similarly, systematic revisions are currently being applied to most mammalian groups as ongoing laboratory and field work proceeds rapidly. What does this mean for the paleontologists already employing anachronistic faunal lists to infer patterns of dispersals, modes of extinction/speciation, and causal correlations with tectonic and climatic events? There is still so much original fossil material to study and so much material to re-study using recent technological developments that it seems high time to re-focus our resources (time, funding, and training) on the basic steps of paleontological research: field work, which results in original material, and

systematic studies founded on extant analogs. In the future, once all the groups have been revised in detail by taking into account extant analogs, new fossils, and new technological developments, assemblage-based faunal lists will be more reliable and could potentially be a far more valid and informative source for meta-analyses. This will be particularly true if they are conducted jointly by teams of researchers, each of them specialist of a particular group, and if the fossils themselves are well controlled in terms of their chronostratigraphic positions.

Acknowledgements

I am most grateful to the Fyssen Foundation for funding and recognizing the importance of my postdoctoral work on the systematics of extant and fossil pigs. Fundings during my PhD were provided by the Agence Nationale de la Recherche (project ANR-09-BLAN-0238, Michel Brunet) and a SYNTHESYS grant (GB-TAF 886). I am most thankful to the staff and the curators of the numerous institutions hosting the extant and fossil suids that I studied for the last five years. The approaches developed in my research have been strongly inspired and made possible by the support of Jean-Renaud Boisserie and Tim White. I also thank my colleagues from iPHEP/Université de Poitiers and HERC/University of California, Berkeley, for financial, logistical, moral, and scientific support.

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Articles in the News

Farmers worried over pig attacks!

By umaircnn | Posted August 18, 2015 | swabi, Pakistan
http://ireport.cnn.com/docs/DOC-1264684

SWABI: Farmers have to guard their maize crops throughout the night to protect them from the attacks of increasing number of pigs. The pigs had been damaging maize fields during search for food at night. As the dark spreads, pigs start search for food in the fields and the grown maize crop is their target, they added. The growers said it was during construction of Tarbela Dam in 1970s that foreigners brought pigs along with them, and since then their population has increased manifold.

Wild boars are gaining ground
Climate change boosts population growth

August 12, 2015
http://www.sciencedaily.com/releases/2015/08/150812103703.htm

Summary:
The wild boar population in Europe is growing. However, the reasons for this growth were not yet clear. Scientists have now found that climate change plays a major role. The number of wild boars grows particularly after mild winters, suggesting that food availability is a decisive factor. The wild boar population in Europe has been constantly growing since the 1980s. This is more and more becoming a problem for agriculture when animals raid the fields, looking for feed. "It is not so easy to determine the number of wild boars in Europe," says wildlife biologist and first author of the study, Sebastian Vetter. "Therefore we analysed data on hunting bags and road accidents involving wild boar. Doing this we were able to depict the growth of the wild boar population."

More wild boars after mild winters
Vetter and his colleagues compared annual wild boar population growth to temperature and precipitation data from twelve European countries, with data being available for up to 150 years in some regions. They identified a clear trend. "There is a sharp increase in the number of wild boars after mild winters. As mild winters are becoming more frequent, also wild boar populations are growing exponentially," Vetter explains.
One reason is thermoregulation. If temperatures are very low, a lot of energy is necessary in order to maintain a high body temperature. As a consequence, less energy is available for reproduction and rearing the offspring in the following year. Furthermore, harsh winters claim the lives of many young animals. In warmer winters, more piglets survive.

Availability of feed makes hard winters bearable
Wild boars mainly feed on beechnuts and acorns. In so-called mast years when these trees bear a lot of fruits there is abundant feed available for the pigs. Such mast years occur in irregular intervals and, during the last decades, increasingly frequent. If a harsh winter is preceded by a mast year, the animals have enough energy for thermoregulation. The population can continue to grow despite unfavourable temperatures.

Regional differences affect wild boar populations
A wild boar population only grows in the following season if the average temperature during winter has reached a certain threshold. In southern regions this threshold is higher than in the north. "These regional differences are due to the animals' body size. Wild boars in the south are smaller than those in the north. This changes the relation of body surface and volume and hence heat dissipation. Being small is unfavourable in the cold but thermoregulatory beneficial during hot southern summers. Regionally differing body size of wild boar is the reason why population growth began virtually simultaneously throughout Europe, despite considerable differences in winter temperatures," Vetter explains.
Vetter and the research team at FIWI working with wild boars are going to continue their research in this field. "Wild boars produce a surprisingly large number of young animals compared to other

ungulates. This enables the strong growth of populations which we are currently observing. Therefore we are particularly interested in the factors that influence reproduction of this species," Vetter underlines.

Story Source:
The above post is reprinted from materials provided by University of Veterinary Medicine -- Vienna. Note: Materials may be edited for content and length.

Journal Reference:
1. Sebastian G. Vetter, Thomas Ruf, Claudia Bieber, Walter Arnold. What Is a Mild Winter? Regional Differences in Within-Species Responses to Climate Change. PLOS ONE, 2015; 10 (7): e0132178 DOI: 10.1371/journal.pone.0132178

Estonia to cull pigs to stop spread of African swine fever

2015-08-12 17:47
http://www.news24.com/Green/News/Estonia-to-cull-pigs-to-stop-spread-of-African-swine-fever-20150812

Copenhagen - Estonian authorities say they will cull about 3 700 pigs to prevent the spread of African swine fever. Agriculture ministry spokesperson Karin Volmer says two more cases of the disease have been found in domestic pigs in southern Estonia, the northernmost of the three Baltic countries. Volmer said on Wednesday a total of 15 700 pigs have been killed in Estonia to prevent the spread of the disease since the first case was reported there on July 21. Unlike swine flu, the disease doesn't affect humans, but it can be deadly for domestic and wild boars, and cause massive losses to the farming sector. Since 2014, dozens of cases have been reported on farms and in wild boars in the Baltic countries and Poland, prompting Russia to ban EU pork imports.

Filthy swines! Bizarre festival game in Canada where contestants must catch GREASED pigs in a muddy pen before tossing them into a barrel

By Jack Crone for MailOnline
Published: 15:55 GMT, 9 August 2015 | Updated: 07:03 GMT, 10 August 2015
http://www.dailymail.co.uk/news/article-3191310/Canada-s-answer-Rodeo-Bizarre-festival-game-contestants-catch-GREASED-pigs-muddy-pen-tossing-barrel.html

Festival - in its 37th year - features several pig-related events such as placing plastic rings around boars' necks. The biggest of these shows draws crowds of 6,000 and sees contestants chase and catch pigs in a filthy pen. The hugely popular 'pig race' has been criticised by animal rights groups who have labelled it as 'cruel'. The festival is now in its 37th year and takes place in Sainte-Perpétue, which is 150km northeast of Montreal.
As well as the pig race, there is an event which sees participants attempt to place plastic rings around boars' necks. While plenty of people seem to enjoy watching and taking part, the pig race has been slammed by animal rights activists , who say the game is cruel. Montreal SPCA

spokesperson Anita Kapuscinska told The Montreal Gazette: 'We would never allow dogs to be subject to this sort of activity. 'Yet, we allow pigs, who are even more sensitive and more intelligent than dogs, and they're being used in this matter, simply for entertainment.' While no injuries to pigs have been reported at the event, Kapuscinska said that doesn't mean some animals haven't been hurt over the years.The international animal rights group PETA has also spoken out against the festival, claiming 'tradition is no excuse for cruelty'. But festival worker Nancy Morin hit back at the comments, telling the newspaper that the animals are given food and water - and a veterinarian was present during the races involving pigs.

Peppa Pig will be jealous! Piglets in China have their OWN luxury resort where hogs can dive, swim and get a massage in the Jacuzzi

By Qin Xie For Mailonline
Published: 11:13 GMT, 7 August 2015 | Updated: 14:09 GMT, 7 August 2015
http://www.dailymail.co.uk/news/peoplesdaily/article-3187812/Peppa-Pig-jealous-Piglets-China-luxury-resort-hogs-dive-swim-massage-jacuzzi.html

Water resort is part of a wildlife and leisure park in Qingyuan, a city in the Guangdong province of southern China. At the resort adult pigs get to dive and swim three times a day while piglets enjoy supervised pool access once daily. The pool lets the animals escape the heat. Since starting the regime, the pigs are said to be healthier and stronger. As the rest of China suffers from extreme heat, a litter of piglets have been enjoying themselves at a luxury summer resort. The water resort is part of Tian Ye wildlife and leisure park in Qingyuan city in Guangdong province, southern China, reported People's Daily Online. Pictures released today of the resort show the pigs diving and frolicking in the pool. Owners of the park have created the water resort in a bid to keep the pigs cool while allowing them to exercise. Adult pigs at the resort have diving sessions three times a day. They can also swim in the pool after their dive. For the litter of piglets, some just two weeks old, there's a jacuzzi pool where they can wash and enjoy a bubbly massage once a day. As some are just a little bigger than guinea pigs, staff at the resort have to help them get acquainted with the water. According reports, the pigs have become stronger and healthier since starting their new regime.

What a porker! Scientists breed MUSCLY PIGS that could one day lead to super-lean bacon

By Victoria Woollaston for MailOnline
Published: 14:05 GMT, 30 June 2015 | Updated: 02:25 GMT, 1 July 2015
http://www.dailymail.co.uk/sciencetech/article-3144549/What-porker-Scientists-breed-MUSCLY-PIGS-one-day-lead-super-lean-bacon.html

Researchers used a gene-editing technology known as Talen. They modified the myostatin gene, which manages muscle development.Mutated genes were then added to fetal cells and 32 piglets were cloned. But only two have survived, and only one is classed as 'healthy'. It can take decades of breeding to introduce features in animals that improve their size, taste or behaviour. But molecular biologists in Japan have been able to to speed up this process by editing specific genes. Using a DNA-cutting and binding technology, they were able to breed super-muscly piglets

that could one day produce leaner bacon. The study is the latest in a long line of research looking at ways in which genes can be manipulated to enhance or add new features. Led by Jin-Soo Kim, a molecular biologist at Seoul National University, the team of researchers took DNA from a pig and edited its genetic makeup. In particular, they used a technology called Talen, which is an acronym for 'Transcription activator-like effector nuclease'. It uses a protein that binds to DNA and guides an enzyme to the specific gene cells before cutting them. In this case, the researchers selected the myostatin gene (MSTN). This gene regulates the size of muscles as embryos begin to develop and stops them growing too large.When the gene cell is cut, it attempts to repair itself but typically heals with some base pairs missing or damaged, meaning the cell is classified as 'dysfunctional'. When this gene is modified, the muscle cells aren't inhibited, meaning they multiply and create a bulk of muscle tissue.The researchers transferred the mutated DNA cells into the pig fetal cells and cloned 32 piglets - however, only 13 of the 32 lived to eight months old due to their larger sizes.Two of these are still alive, but only one is considered 'healthy'. It is not known how old these pigs are now and MailOnline has contacted the researchers to learn more about the trial.Professor Kim told David Cyranoski at Nature: 'We could do this through breeding, but then it would take decades.'The work is yet to be published and the researchers said they don't have any immediate plans to create meat from these pigs. Regulators, including the US Food and Drug Administration, have yet to approve genetically engineered meat for human consumption because of concerns about environmental and health issues. Instead the team plans to sell edited pig sperm to farmers.

Forest of Dean wild boar numbers double despite cull

24 July 2015
http://www.bbc.com/news/uk-england-gloucestershire-33648362

Wild boar numbers in the Forest of Dean have nearly doubled since 2013 despite an increase in the number culled, according to the Forestry Commission. Results of an annual thermal imaging survey estimate the population is now more than 1,000 animals. The commission carries out a yearly cull in a bid to limit numbers to an agreed population of 400 animals. In 2012 the cull was suspended over concerns the numbers were too low and the species could be eradicated.

'Disappointing results'
The Forestry Commission said there were an estimated 535 animals in spring 2013, 819 in spring 2014 and 1,018 in spring 2015. This is despite 135 animals being shot in 2013/14 and 361 in 2014/15. Deputy surveyor for the Forest of Dean, Kevin Stannard, said: "Our long-term aim of managing the population of boar to maintain a thriving population of around 400 animals on the forest has not changed. "The most recent survey results are disappointing in so far as they show a further population growth at a time when we also achieved a significant increase in the cull. "It remains our intention in the short-term to stop the population from increasing, and then to bring that population back to a level where the boar can live in harmony with our community and in balance with our rich woodland ecology."

Pet porkers pack rescue shelters

2015-07-22 22:59
http://www.news24.com/Green/News/Pet-porkers-pack-rescue-shelters-20150722

Los Angeles - Eva Monroy bought a mini pig for her family and fed it what the breeder instructed: a half-cup of food in the morning and a half-cup at night. But the piglet named Hammond started raiding the pantry and digging through the trash. A veterinarian told Monroy that he was behaving badly because he was starving. The breeder promised the diet would keep him a mere 30cm tall. But when Hammond grew to 50cm and 80kg, "my husband couldn't handle it any more. 'Either the pig goes or I go,'" Monroy, of El Monte, California, says he told her. So she took the animal to Lil' Orphan Hammies, a rescue about 200km northwest of Los Angeles. It's a common story across America, leaving thousands of pet pigs homeless and rescues packed. The crunch has led many sanctuaries to limit how many pigs they will accept or stop taking them completely. Anna Key, vice president of the North American Potbellied Pig Association, estimated that 90% of pigs adopted in the US are later taken to a rescue or sanctuary. Complicating things is their care: Some veterinarians won't treat them because they consider them farm animals. Many cities and counties do not allow pigs on property not zoned for livestock, but that doesn't stop many pet owners. The craze for tiny pet pigs started decades ago and gets reignited every few years. Online sellers offer teacup pigs for thousands of dollars, promising the animals will stop growing after age 1 and stay small if fed a restricted diet. But the tiny pigs keep growing until age 4 and will starve if they aren't fed properly with potbellied-pig food or a blend of vegetables, animal groups say. Once they grow too big to handle, people give them up. "There are not enough homes out there anymore. These pigs are in big trouble," said Sue Parkinson of Lil' Orphan Hammies in Solvang, which took in Monroy's porker and others no one else would.

Grazin' Pig Acres

Parkinson, who has saved 1 000 pigs since founding the rescue 23 years ago, says she gets 20 calls a day from people trying to get rid of their pigs. Same goes for Nancy Koontz and her husband at Grazin' Pig Acres in Ramona, 65km northeast of San Diego. "We absolutely fell in love with the potbellied pig. But we can't take more because we don't have the time, money or help," she said. As pets, people get potbellied pigs, which are a fraction the size of commercial pigs. They typically weigh between 45.36kg and 54.43kg, while farm pigs bred for slaughter often weigh 453.6kg to 544.32kg. Breeders say pet pigs can stay tiny because they're learning to eat less, but rescues say they're emaciated and losing muscle mass. "I have never seen a full-grown, healthy, 15kg pig live to maturity," said Susan Magidson, owner of Ross Mill Farm in Jamison, Pennsylvania, north of Philadelphia. It's one of busiest rescues in the country, with 250 pigs and services such as grooming, massage and acupuncture. Breeder Patty Morrisroe of Dallas, Oregon, says her smallest pigs weigh 7kg to 22kg for life by eating specially made feed. She says that her pigs stop growing after one year but that feeding them potbellied-pig food and letting them nibble on grass fattens them up. When pigs grow larger than expected, it can lead to heartrending decisions. Holly Jasma ordered a piglet costing $2 500 from a breeder who promised it would stay small. She had to give it to a rescue when it grew to 68kg. "It was gut-wrenching - pretty traumatic for me," the Seattle resident said.

Soybean meal positively affects pigs with PRRSV

http://www.sciencedaily.com/releases/2015/07/150721150218.htm
July 21, 2015

Summary:
Increased soybean meal concentrations in the diet may help alleviate the effects of PRRSV in infected weanling pigs. PRRSV infected pigs fed high soybean meal concentrations had a more efficient virus elimination compared to PRRSV infected pigs fed the low soybean meal diet. Porcine reproductive and respiratory syndrome virus (PRRSV) is the most widespread disease in the swine industry. In sows, PRRSV causes reproductive problems during gestation, including abnormal litters or abortions. Growing pigs with the disease will have respiratory problems and poor growth. In 2012, Holtkamp and colleagues estimated the annual losses due to PRRSV to be a staggering $664 million in the U.S. alone. Producers on larger farms use vaccines and enhanced biosecurity measures to prevent eradicating an entire herd during a PRRSV outbreak. Unfortunately, these methods sometimes yield little success. Thus, other measures, like increasing the amount of soybean meal in the diet are being used. Increased soybean meal concentrations may help alleviate the effects of PRRSV. Soybean meal is the primary protein source fed to swine. It also contains isoflavones, compounds that have anti-inflammatory and antiviral properties. In the June 2015 issue of the Journal of Animal Science, Dr. Ryan Dilger, Assistant Professor at the University of Illinois, and colleagues determined the "Effects of dietary soybean meal concentration on growth performance and immune response of pigs infected with [PRRSV]." "Prior research suggested there are value-added benefits for adding soybean meal to health-challenged weanling pigs, but a specific mode of action was not identified," said Dilger. "Our objective in this research was to provide 'proof of concept' evidence that addition of soybean meal to a weanling pig diet at concentrations above typical industry standards would [benefit] pigs experimentally infected with PRRSV." The team fed 64 weanling pigs either a low or high concentration of soybean meal to pigs either inoculated or not inoculated with PRRSV. Blood was taken to determine soybean meal's effects on immune responses and to determine a possible mode of action. The trial lasted for 14 days. "Analyses corresponded to early, mid, and recovery periods of PRRSV infection, which typically lasts 14 days," said Dilger. All pigs infected with PRRSV had increased temperatures, decreased daily feed intake and decreased feed efficiency compared to pigs not infected. However, within the PRRSV-infected group, pigs that were fed the high concentration of soybean meal tended to have increased average daily gain compared to those fed low concentrations. Pigs not infected with PRRSV had similar growth performance whether or not they were fed high or low concentrations of soybean meal. On day 14, PRRSV-infected pigs fed the high soybean meal concentrations had lower serum PRRSV loads and decreased TNF-α (a cytokine involved with systemic inflammation) compared to pigs fed a low soybean meal diet. This suggests that infected pigs fed high soybean meal concentrations had more efficient virus elimination compared to infected pigs fed the low soybean meal diet. Overall, feeding a higher level of soybean meal in the diet to pigs with PRRSV could increase growth and performance in certain production settings. Dilger hypothesized that "two independent modes of action may be involved," either through non-essential amino acids, like glutamine, or through isoflavones in soybean meal. In the future, Dilger's lab will identify immune-cell phenotypes and functions throughout a 14 day period. "Eliciting health benefits to the weanling pig has great

potential for improving the efficiency of production during later growth phases," said Dilger. "While our focus has been on immune and growth benefits only in the starter phase, future research will also need to incorporate longer-term benefits over the entire grow-out period."

Story Source:
The above post is reprinted from materials provided by American Society of Animal Science.
Note: Materials may be edited for content and length.

Journal Reference:
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Hog Wild In Florida: UF Experts Say Feral Pig Problem Here To Stay

June 7, 2005
http://www.sciencedaily.com/releases/2005/06/050607012122.htm

Summary:
Florida's population boom now includes some 500,000 wild hogs whose piggish habits are causing problems for farmers, residents and health officials as well as native flora and fauna.

GAINESVILLE, Fla. --- Florida's population boom now includes some 500,000 wild hogs whose piggish habits are causing problems for farmers, residents and health officials as well as native flora and fauna. "Nothing personal, but the only state with more wild hogs than Florida is Texas," said Bill Giuliano, an assistant professor of wildlife ecology at the University of Florida's Institute of Food and Agricultural Sciences. Wild or feral hogs can now be found in every Florida county and in at least 35 states -- including 1 million to 2 million hogs in the Southeast. Nationwide, their population totals about 3 million. "Because they are prolific breeders, there is no way to completely eradicate them," Giuliano said. "Even with intensive hunting pressure, you're not going to get rid of them." He said the problem can be traced to 1539 when Hernando DeSoto brought hogs into southwest Florida, and some of them found freedom in the New World. Nearly 500 years later, there are some 3 million descendants of these "pioneer pigs" across the nation. In Florida, some of the highest densities of feral hogs can be found north and west of Lake Okeechobee where large forested tracts, dense vegetation, abundant water and limited public access provide an ideal environment for the pigs. Hog numbers tend to be lower in areas with intensive agriculture or urban development. "Although they are a popular target for hunters, wild hogs are coming into conflict with people and wildlife," Giuliano said. "Farmers are not happy when feral hogs root up their fields, and health officials say the animals carry diseases that could affect wildlife, livestock and people." Giuliano, who conducts research on the animals with George Tanner, a professor in the UF wildlife ecology and conservation department, said hogs can also host many diseases and parasites, including hog cholera, psuedorabies, brucellosis, tuberculosis, salmonellosis, anthrax, ticks, fleas, lice and various flukes and worms. "Wild hogs, which usually weigh 100 to 200 pounds, are dangerous," Giuliano said. "Although they prefer to run and escape

danger, they can be aggressive when they're injured or cornered. They can move with great speed and can cause serious injury with their tusks." Acorns are their favorite food, but they will eat almost anything, including dead animals, and it seems like they're always looking for opportunities, he said. When natural foods are scarce or inaccessible, hogs will forage on almost any agricultural crop and livestock feed. They will also feed on tree seeds and seedlings, causing significant damage in forests, groves and plantations. In Florida and the Southeast, this may be a problem in regenerating long-leaf pine forests. In addition to the effects of consuming, knocking down and trampling large amounts of native vegetation and crops, the rooting behavior of wild hogs causes significant damage, Giuliano said. Rooting -- digging for foods below the surface of the ground -- destabilizes the soil surface, uprooting or weakening native vegetation, damaging lawns and causing erosion. Their wallowing behavior destroys small ponds and stream banks, which may affect water quality. They also prey upon ground-nesting wildlife, including sea turtles.
"Wild hogs compete for food with other game animals such as deer, turkeys and squirrels, and they may consume the nests and young of many reptiles, ground-nesting birds and mammals," he said. "With their fine sense of smell, wild hogs can find and consume young domestic livestock, including poultry, lambs and goats. Millions of dollars are spent each year to prevent damage from hogs." Tanner said it may be possible to limit further population expansion by hunting, various trapping methods and exclusion. "Hunting is an important control method for wild hogs because it provides recreational opportunities," he said. "Baited hog traps may be more successful than hunting, especially when the animals are nocturnally active. The traps should be strong enough to contain large hogs and have tall walls or a wire roof to prevent them from escaping. And remember that hogs are powerful animals that are easily excited when trapped." Fencing is an effective but expensive control option for a small area such as a garden, but hogs are intelligent and resourceful animals that often find ways through many types of fences, Tanner said. Chain link fences buried at least 12 inches under the ground with heavy supports and posts, and various types of mesh or multi-stranded electric fence provide the best results.

Story Source:
The above post is reprinted from materials provided by University Of Florida. Note: Materials may be edited for content and length.

Miss Piggy honoured with a feminist award!

2015-06-06
http://www.channel24.co.za/Movies/News/Miss-Piggy-honoured-with-a-feminist-award-20150606

New York - Screen and TV star, diva and beloved Muppet, Miss Piggy, is being recognised for her contributions to society with a feminist award at the Brooklyn Museum in New York.
The glamorous, outspoken pig received the award at the evening ceremony from the Elizabeth A Sackler Center for Feminist Art. The presentation included a conversation with veteran women's rights campaigner Gloria Steinem and a 20-minute video retrospective of Miss Piggy's career. "Moi is thrilled, but frankly, not surprised to be receiving this Sackler Center First Award," Miss Piggy said in a statement. "It is truly wonderful to be celebrated and share this honour with fellow legends, role models, and pioneers of female fabulosity. We rock!" Miss Piggy's long-time squeeze, Kermit the Frog, was in the audience for the ceremony. The annual Sackler Center First

Awards honour extraordinary women who are first in their fields. Elizabeth A. Sackler, the president of the centre for feminist art, theory and advocacy for women's issues, said Miss Piggy embodies exceptional spirit, determination and grit and has taught important lessons about overcoming obstacles to generations of fans. Miss Piggy starred in The Muppet Show, that ran from 1976 to 1981, and has appeared in films, including 2014's Muppets Most Wanted.

Erik Meijaard: Saving the Jungle Hipster of Borneo

By : Erik Meijaard | on 08:53 AM May 20, 2015
http://jakartaglobe.beritasatu.com/opinion/erik-meijaard-saving-jungle-hipster-borneo/

What is the most important wildlife species on Borneo? Depending on whom you ask this question, answers will surely vary. A forestry official might argue that any tree of the dipterocarp family is obviously most important, because that's where the timber cash is. And for the same reason, an oil palm grower would likely reply that the oil palm tree is by far the most important species. Many people in Australia, Europe or North America may reply "the orangutan," or maybe "the rhino" or "proboscis monkey," because, after all, those species are highly threatened and many worry about their survival. But ask a person from Borneo and the dominant answer would likely be quite different. In fact, I think that many would argue that the Bearded Pig is by far the most important. Are you surprised? Had you even heard of Bearded Pigs? Bear with me and I will explain. First, a quick 101 on these pigs. This enigmatic species of wild pig occurs only in the southern part of Sumatra and on Borneo. And they indeed have beards, both males and females, and are thus true jungle hipsters, at least in the sense of the current popular beard subculture. Interestingly, Bearded Pigs are among the very few rainforest species that makes long distance migrations, the kind of animal movement more associated with species like Wildebeest on open African savannas. Every so many years, Bearded Pig populations erupt and thousands and thousands of pigs starts moving through the jungle. One such migration which occurred in 1935 was described as follows: "For five or six weeks, at points sixty to a hundred miles [100-160 kilometers] apart, moves a steady stream of wild pigs, a few solitary, some family parties of seven or eight, many packs from fifteen to thirty of forty, occasionally convoys estimated at two hundred, sufficiently large to deter the natives from attack. Every ten minutes or quarter of an hour pigs pass by, a few large, old individuals, many of medium size, none in very fat condition. Silent, not quarrelsome, almost furtive, intent on something, looking round little, they push on undeterred by waiting natives, who club and spear them at river crossings until weary of pork. Whence came the pigs, and where they go none know."

Intriguing or what?
Now, depending on your religion, you may consider pigs to be rather gross or totally wonderful. Certainly, Christian communities on Borneo heavily rely on these pigs for meat and other products. Studies in Malaysian Borneo indicated that between 54 percent and 72 percent of the dressed weight of all animals hunted is Bearded Pig meat. A hunting study in one remote village in Kalimantan showed that over a period of 21 months people caught 707 Bearded Pigs, which was probably more than 90 percent of the weight of all species caught. In a different hunting study, people in one village caught 429 Bearded Pigs in one year or about 81 percent of the dressed weight of all species. That adds up to a lot of pork! For many millions of people on

Borneo, Bearded Pigs are the most important source of meat, although apparently this is changing. Based on information from interviews across Borneo, Bearded Pig populations seem to be in decline. The big migrations have apparently stopped and increasingly small populations are now sedentary. We don't know what causes these population declines. Bearded Pigs feed heavily on seeds of dipterocarp trees, the same trees favored by the forestry officials mentioned above. With many such trees now gone, pigs may have fewer resources to feed on. Also, hunting pressure is and has always been high. But with forest habitats being fragmented, there may now be many small populations of pigs whereas in the past Borneo's pigs were really one big population. Such small populations are easier to hunt to extinction and once gone the pigs may not be able to move back in. So, declining pig populations are a worry for many people. If an estimated 4,000 Christian villages on Borneo catch on average 300 pigs per year at 50 kilograms of dressed meat per pig, and at a price of maybe $2 per kilogram, that would be $120 million per year of free meat. If that meat is no longer available, people would need to buy other meat in markets and for that they would need cash. In poor rural societies though, availability of cash is often limited. Declining wild pig populations could therefore have real impacts on people's nutrition and health. Many local people are very aware of the importance of pigs in their lives. In fact, I have found over the years that it is much easier to talk to people about Bearded Pigs than about a species like orangutans. In my experience, trying to talk to local people in Borneo about orangutans sends them to sleep or makes them change the subject within a few minutes. Start talking about pigs, though, and three days later they will still be telling new stories. Bearded Pigs are what is called a cultural keystone species. They play a crucial role in many people's lives. So, what to do about declining populations? More research is needed, because we don't know much about these pigs. But while that research is happening, management can be implemented as well. For example, experiments with no-hunting seasons or no-take zones could be conducted to see how this affects overall population trends. Unless, we think that local communities could develop and implement these hunting controls themselves, such solutions require buy-in and policy assistance from government. Unfortunately, however, governments on Borneo have generally not paid much attention to pigs, maybe also because of religious reasons. Interestingly, I came across an article about Bearded Pigs in a colonial-era newspaper from 1935 that noted exactly the same issue: "unregulated exploitation of the pigs could result in their disappearance, and one cannot expect the required [management] insights from these tribes, so that also here the Government will need to step in and make required arrangements." Right, that's 80 years ago. So, when is the government going to step up to the task to ensure that Borneo's Jungle Hipster is there to stay for the benefit of Borneo's people? Erik Meijaard coordinates the Borneo Futures initiative from Jakarta.

Wild boar hogs limelight in Hong Kong shopping mall

2015-05-11 14:57
http://www.news24.com/Green/News/Wild-boar-hogs-limelight-in-Hong-Kong-shopping-mall-20150511

Hong Kong - A wild boar which strayed into Hong Kong's urban jungle caused havoc when it wandered into a shop and forced staff and customers to leave, authorities said on Monday.
The 25kg female, around 0.91m long, ventured into a children's wear shop at a mall in the

crowded Chai Wan district late on Sunday. "The wild pig entered a shop and people called police. When officers arrived, staff and customers were evacuated. It then went up to seek a hideout in the loft," a police spokesperson told AFP. During a stand-off with about 10 officers that lasted several hours, the animal also briefly entered a changing room and knocked down and bit a mannequin, the South China Morning Post reported. Eventually it was tranquillised and taken to an animal centre for observation. It was likely to be released back to the wild later. The Post said the incident was the second such incursion of the day, after a boar was seen taking a swim at a pool in a public park in Tsuen Wan. It was tranquillised and returned to the wild. Despite its densely packed high-rise districts, country parks and nature reserves make up 40% of Hong Kong's land area. It is not especially unusual for wildlife – notably pythons and other snakes – to find their way into urban areas. Authorities advise the public to avoid contact with boars, which have been known to charge humans.

Researchers find treasure trove of unique, threatened animals in Philippine forest

8th May 2015 / Shaira Panela
http://news.mongabay.com/2015/05/researchers-find-treasure-trove-of-unique-threatened-animals-in-philippine-forest/

A group of more than 30 researchers is surveying the the forests of Cleopatra's Needle, on the Philippine island of Palawan. They have already found many endemic animals, and hope to use their findings to confer more protection to the region. Palawan, an island-province of the Philippines near Borneo, is home to many species of plants and animals found nowhere else in the world. Considered the Philippines' "last biodiversity frontier" by many researchers and conservation groups, Palawan still holds about 45 percent of its original forest cover, much of which is old growth. Currently, a group of more than 30 researchers is surveying the the forests of Cleopatra's Needle, one of Palawan's highest mountains. While their expedition is not yet over, the researchers have already found many endemic animals, and hope to use their findings to confer more protection to the Cleopatra's Needle mountain range. The survey was a collaborative effort between the Centre for Sustainability (a non-profit organization based in Puerto Princesa City), the Palawan Council for Sustainable Development (PCSD), Survival Alliance, and the Rainforest Trust. Global Wildlife Conservation and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) funded the expedition, which will continue until August, 2015. With their findings, the team members propose to officially declare Cleopatra's Needle Forest Reserve a Critical Habitat. To be defined as a Critical Habitat, an area must fulfill two requirements: it supports high biodiversity, and the animals and plants that live in it must be threatened. Cleopatra's Needle harbors some of the largest remaining tracts of intact forests in the Philippines, Jonah van Beijnen, vice president for the Centre for Sustainability, told mongabay.com.
"There are no roads crossing it. Once you cut roads through the forests, the biodiversity decreases automatically," he added. Many species that live in the forests of Cleopatra's Needle cannot be found anywhere else outside of Palawan. They include the Palawan toadlet (Pelophryne albotaeniata), Malatgan River caecilian (Ichthyophis weberi), Palawan tree shrew (Tupaia palawanensis), Palawan pencil-tailed tree mouse (Chiropodomys calamianensis), Palawan bearded pig (Sus ahoenobarbus), and Palawan hornbill (Anthracoceros marche), among

many others. They also saw previously unknown species of dragonflies, and undescribed species of crustaceans and aquatic insects. During the survey, the research team encountered 12 amphibian, 65 bird, and 14 reptile species. They also identified several mammals captured via cage, pitfall, and camera traps. They recorded a high number of endemic and threatened species, such as Neurobasis daviesi, a rare species of damselfly. Their observation marked the first time N. daviesi had been officially documented since the 1990s. The team also encountered the Malatgan River Caecilian (Ichthyophis weberi), a wormlike, subterranean amphibian that had not been recorded since the 1961 despite several previous attempts to find it. “Caecilians are very secretive animals… But for those of us who care about the status of secretive amphibians in the country, and spend a lot of time worrying about rare species that have not been recorded in many years, this was a great discovery,” said Dr. Rafe Brown, a herpetologist from the University of Kansas who was a part of the expedition. The survey also revealed that some species that are considered rare or highly threatened, such as the Pawalan flat-headed frog (Barbourula busuangensis), may be more common than previously thought. “Some of these ‘rare’ or suspected ‘endangered’ species have now turned out to be commonly encountered and locally abundant—now that we know how and where to find them,” Brown said.

According to a press release by the Centre for Sustainability, this survey marks the first time bird experts found all Palawan’s endemic bird species in one location. The team, led by German conservationist Peter Widmann in collaboration with Rommel Cruz, asserts this find further strengthens the need for preservation of the forests surrounding Cleopatra’s Needle.The report also concluded that protecting and preserving Cleopatra’s Needle also means preserving the ancestral lands of the Tagbanua and Batak indigenous communities that live in, depend on, and manage its forests. Palawan is facing increasing development pressure from the palm oil industry and population growth. The forests around Cleopatra’s Needle, while among the least disturbed in the Philippines, are also threatened by human activities. “There are a variety of factors that threaten the area: development, deforestation, mining, and the steady encroachment of agriculture and slash-and-burn farming along the slopes of the mountain range,” Brown said.Van Beijnen, who has lived in Puerto Princesa for eight years said that the main problem the northern region faces is rapid urban development fuelled in large part by promotion of the city as a tourism destination, while the south is affected by large-scale commercial agriculture and mining. “Prices of land are getting higher,” he said. “People want to build rest houses, resorts in the Philippines’ last frontier.” While there have been reports of plans to develop areas of Palawan for palm oil production, he said he has not seen evidence of forests being converted to plantations in and around the survey area. He attributes this to location; most palm oil activity is concentrated in the south part of the island and Cleopatra’s Needle is in the north. A century ago, according to Van Beijnen, 95 percent of the Philippines was covered with forests. Now, he says forests cover only 3 percent of lowland areas and 20 percent of the uplands. According to Global Forest Watch, nearly 4 percent of the nation’s remaining tree cover was lost to either deforestation or plantation harvesting from 2001 through 2013. Despite comparatively escaping the Philippines’ historical deforestation and being almost entirely designated a protected “game refuge,” Palawan has fared slightly worse than its parent country in recent times. Global Forest Watch data shows the island lost more than 6 percent of its tree cover from 2001 through 2012. Palawan lost a further 3,400 hectares of tree cover in 2013. According to Global Forest Watch, the forests around Cleopatra’s Needle lost 3 percent of their tree cover from 2001 through 2013. The region supports one of the Philippines’ few remaining intact forest landscapes — areas of undisturbed forest large enough to

retain their original levels of biodiversity — but its edges have been whittled away by degradation since 2000. To preserve what's left of Philippine wilderness, Van Beijnen says current conservation policy must be bolstered and expanded. "A comprehensive system of environmental protection laws already exist in the Philippines – this is already a great start," he said. "Now, the task at hand, and this is urgent and critical, is that these laws trickle down to the grassroots, that real, effective protection and enforcement happens on the ground while respecting tribal rights. This is and should be the priority for local and national government bodies, both in implementing the systems and mechanisms so that environmental protection is a reality, but also in supporting other non-state actors to aid these efforts. Let's make this happen at Cleopatra's Needle!"

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Ongoing overkill: loss of big herbivores leading to 'empty landscapes

1st May 2015 / Jeremy Hance
http://news.mongabay.com/2015/05/ongoing-overkill-loss-of-big-herbivores-leading-to-empty-landscapes/

Megaherbivore collapse particularly acute in Asia and Africa.

Ten thousand years from now, human historians—or alien ones—may view the current wave of biodiversity loss and extinctions as concurrent with the Pleistocene extinction that saw everything from mammoths to woolly rhinos to saber-toothed cats wiped out. At that time, peaking around 11,000 years ago, many scientists argue that sophisticated, migrating human hunters killed off the majority of the world's big species in a great wave, leading to cascading impacts on top predators and global environments. According to a new paper today in Science Advances history may be repeating itself or, more simply, this 'overkill' may simply be ongoing.

"The wave of species extinctions that obliterated 80 percent of the Pleistocene megaherbivores (over 1,000 kilograms) on planet Earth appears to be continuing today in Africa and Southeast Asia," the 16 scientists write in the paper. " The very recent extinctions of Africa's western black rhinoceros and Vietnam's Javan rhinoceros are sober reminders of this long-term trend."

Looking at the surviving megaherbivores (or big plant-eating mammals), the paper found that 60 percent are currently threatened with extinction and 58 percent have declining populations. And just like how early humans hunted big mammals to extinction, the team found that hunting was still one of the biggest threats to today's megaherbivores."I expected that habitat change would be the main factor causing the endangerment of large herbivores," said lead author William Ripple with Oregon State University."But surprisingly, the results show that the two main factors in

herbivore declines are hunting by humans and habitat change. They are twin threats." Ripple's study defined megaherbivores as those over 100 kilograms (or 220 pounds) which means 74 currently-identified species, including elephants, rhinos, gorillas, giraffe and okapi, horses, hippos, tapirs, camels, as well as a number of the biggest deer, antelope, andbovine, and six species of wild pigs.

The bulk of these endangered megaherbivores are found in Asia and Africa. In fact, all 19 of the megaherbivores in Southeast Asia are threatened with extinction. Of Africa's 32 megaherbivores, 12 are threatened. South America is only home to five megaherbivores, but four of these are threatened with extinction. Only one species in Europe is threatened (the European bison) and none in North America. The study follows similar research on top predators last year, also headed by Ripple, that found 77 percent of the world's 31 biggest carnivores were in decline.

Overkill

It's well-reported that rhinos and elephants are suffering from a poaching crisis that has put nearly all of their members at risk, but hunting is also impacting a wide variety of other megaherbivores, including everything from wild pigs to giraffe and hippos to tapirs. "Extensive overhunting for meat across much of the developing world is likely the most important factor in the decline of the largest terrestrial herbivores," the researchers write. "Slow reproduction makes large herbivores particularly vulnerable to overhunting. The largest- and slowest-to-reproduce species typically vanish first, and as they disappear, hunters turn to smaller and more fecund species, a cascading process that has likely been repeated for thousands of years." In Southeast Asia, overhunting and poaching has led to the so-called empty forests syndrome, where whole forests have been virtually emptied of large-bodied mammals and birds. But, the researchers now argue that this idea could be expanded toward "empty landscapes," where large herbivores are wiped out to feed rising demand for bushmeat and traditional medicine. Of course, hunting isn't the only threat. Habitat loss is the other big player and, for some species, eclipses hunting. Looking at one third of the megaherbivores, the researchers found that species on average had lost 81 percent of their historical range. And many of the world's megaherbivores are increasingly competing with humankind's favorite herbivores: cattle, goats, or sheep. According to the paper, livestock production tripled from 1980 to 2002 in the developing world. "There are an estimated 3.6 billion ruminant livestock on Earth today, and about 25 million have been added to the planet every year...for the last 50 years," the researchers write. But, according to the authors, the underlying drivers behind megaherbivore loss is the same as biodiversity loss in general. "The ultimate forces behind declining large mammal populations are a rising human population and increasing per capita resource consumption."

Roles: from birth to death

The world's biggest species, not surprisingly, play a number of big—and vital—roles in their respective ecosystems. They disperse seeds far-and-wide (some of which can only be dispersed by big mammals), create open areas in forests, maintain grasslands, decrease the length and intensity of fires through heavy browsing, and when they die they provide food for the world's favorite top predators and the lesser-adored, but just as important, scavengers. Even the leftovers are important. "Carcasses...add a variety of nutrients to the soil such as calcium, with effects that can persist several years after the death of the animal," the researchers write. Although the interaction between big herbivores and predators or scavengers is straightfoward, the

researchers have also found an astounding number of links between megaherbivores and less obvious species. "Large herbivores interact with a suite of small animals including birds, insects, rodents, lizards, and others," the write. "For example, several fish species feed on flesh wounds of hippopotamus, and the dung of Asian elephants may be used by amphibians as daytime refuge...Bison wallows support amphibians and birds by creating ephemeral pools, and bison grazing may facilitate habitat for prairie dogs and pocket gophers. Oxpeckers depend on the large herbivores for their diet of ectoparasites, and blood-sucking insects such as tsetse flies largely depend on herbivores for food." Big herbivores are also key for tourism. Think: white rhinos in South Africa, gorillas in Rwanda, elephants in India, and bison in Poland. "Charismatic large herbivores are important flagship fauna that draw many tourists to protected areas, especially when they are sympatric with large carnivores," the researchers write.

Happy herbivores

The current state of megaherbivores doesn't mean they are doomed to extinction. The last hundred-plus years comes with several stories of conservationists saving charismatic plant-eating mammals from the very edge of extinction. In 1894, there were only 40 white rhinos in the world, but today, there are around 20,000, (though these face a brutal poaching crisis). In 1900 there were only around 2,000 American bison, today 30,000 are in conservation herds and half a million on bison farms. Just after World War I, the European bison went extinct in the wild, but now there are 2,300 roaming free. Meanwhile, black rhino numbers have doubled in the past 20 years after bottoming out in the mid-1990s. And, after going extinct in the wild in the 1960s, Prezwalski's horse is back: over 300 horses are roaming free in Mongolia today. Such history lessons prove that big herbivores can make remarkable comebacks with concerted conservation efforts, even with just a few individuals left. Indeed, all of today's European bison descend from just a dozen captive animals, and all of the Prezwalski's horses stem from only 14. But, researchers say that protecting our megaherbivores will depend on funds and efforts from the developed world.

"The world's wealthier populations will need to provide the resources essential for ensuring the preservation of our global natural heritage of large herbivores," they write, adding that "a sense of justice and development is essential to ensure that local populations can benefit fairly from large herbivore protection." In order to do this the researchers call for tackling demand of wildlife products from endangered species, expanding and connecting protected areas, switching out meat protein for plant protein, and more research on lesser-known megaherbivores. The researchers also hold up community conservation, where locals are brought in as stakeholders, as a model for moving forward. "It is essential that local people be involved in and benefit from the management of protected areas," they write. "Local community participation in the management of protected areas is highly correlated with protected area policy compliance." Finally, they say it's time to start thinking beyond the popular, well-known megaherbivores. "We advocate for a global government-funded scheme for rare large herbivores beyond elephants and rhinoceros, as well as the establishment of a nongovernmental organization that focuses exclusively on rare large herbivores, like what the Arcus Foundation does for apes or what Panthera does for large cats," the researchers write.

Citations:

William J. Ripple, Thomas M. Newsome, Christopher Wolf, Rodolfo Dirzo, Kristoffer T. Everatt, Mauro Galetti, Matt W. Hayward, Graham I. H. Kerley, Taal Levi, Peter A. Lindsey, David W. Macdonald, Yadvinder Malhi, Luke E. Painter, Christopher J. Sandom, John Terborgh, Blaire Van

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Large animals invaluable for tree-seed dispersal and regeneration of tropical forests

30th March 2015 / Alexander Montoro

http://news.mongabay.com/2015/03/large-animals-invaluable-for-tree-seed-dispersal-and-regeneration-of-tropical-forests/

Nearly two-thirds of tropical forests in Southeast Asia have been degraded by logging, agriculture and other human uses, and their fauna have been decimated by hunting and the bushmeat trade. But if those degraded tropical forests are to recover naturally, they will need to rely on their remaining large wild animals to disperse large tree seeds, according to a new study. The study published in mongabay.org's open-access journal Tropical Conservation Science examined the importance of large mammals such as wild primates, deer, civets, wild pigs, and tapirs to the dispersion of large seeds throughout the Harapan Rainforest of Sumatra, which has been degraded by logging and agriculture. The researchers found that large, wide-ranging, animals were vital to the restoration process of this forest, and by extrapolation other degraded forests across Southeast Asia.

The Harapan Rainforest is located in the eastern lowlands of Sumatra on dryland soils with an elevation ranging from 98-394 feet (30-120 meters). It is one of the first Ecosystem Restoration Concessions of its kind in Indonesia, covering 3809.5 square miles (985.5 square kilometers) that have previously been heavily logged or cleared and burned for farming. Industrial oil palm, rubber, acacia plantations, and small-scale agriculture operations exist on the periphery of the site. The least disturbed portions of the rainforest are characterized by a closed canopy, and a mix of large animal species common in lowland rainforests. Digital camera traps were installed throughout the Harapan survey site to monitor terrestrial mammals. Data was collected from camera traps at 148 locations for a 30 day duration, with a cumulative time period of 4,155 days. Seed dispersing terrestrial mammals captured by the cameras were ranked by a number of factors, including the capacity and propensity of the species to ingest or carry seeds rather than chew or immediately discard them; the average distances the animals traveled; the variety of tree seed species they consumed; and, wherever possible, the viability for germination of excreted seeds. The amount of forest canopy cover at camera locations was evaluated based on satellite imagery obtained simultaneously with the collection of camera trap data.

The study revealed that the most common species of seed dispersers were the pig-tailed macaque (Macaca nemestrina), red muntjac (Muntiacus muntjak), Eurasian wild pig (Sus scrofa), lesser mouse deer (Tragulus kanchil), Malayan tapir (Tapirus indicus), and all species of civet. Sun bears (Helarctos malayanus) and Malayan Tapirs (Tapirus indicus) were recorded at around a third of locations. Only ten camera trap locations lacked any record of potential dispersers, and the two main mammalian species not recorded at any location were the Orangutan (Pongo abelii) and Sumatran Rhinoceros (Dicerorhinus sumatrensis).

"The most striking result from our survey of terrestrial mammalian seed dispersers in a degraded lowland forest in Sumatra is that a high diversity of species were retained and at comparatively high levels of occupancy, despite high levels of habitat degradation," wrote the researchers. "These species can therefore be regarded as resilient to degradation, at least in the timescale we

measured."
The study concluded that forest degradation does not always lead to the loss of large terrestrial seed-dispersing animals, and therefore, proper protection is required for these species from outside threats. The regulation of hunting, bushmeat trade and logging are all important to the forest management plans of restoration concessions if these forests are to regenerate naturally.
"We have shown that providing hunting pressure is low, such areas can harbor significant populations of many large mammals including some globally threatened species," the researchers wrote. "Many of these species are important tree seed dispersers so can be expected to play an important role in the recovery of the vegetation in these areas, thus directly fulfilling the aims of such [restoration] concessions. The effective protection of large mammals in these concessions is therefore a win-win scenario for both forest restoration and biodiversity conservation."
Citation:
Lindsell, J. A., Lee, D. C., Powell, V. J. and Gemita, E. 2015. Availability of large seed-dispersers for restoration of degraded tropical forest . Tropical Conservation Science Vol.8 (1): 17-27. Available online: www.tropicalconservationscience.org

Yes, now there's a micro pig cafe

By Barry Neild, CNN
Updated 1534 GMT (2334 HKT) March 23, 2015
http://edition.cnn.com/2015/03/23/travel/micro-pig-cafe-london/index.html

(CNN)Try to contain your squeals of delight: There's a pop-up micro pig cafe opening in London. For one weekend in May, a venue in the city's hispter-infested eastern burbs is offering hands-on hog time with pocket-sized porkers. The ticket-only "Pignic" will allow guests to experience what it's like to trough down with the animals.And no, there won't be bacon on the menu. Though it may sound like an absurd new trend -- we're looking at you Moomin Cafes -- the Pignic (based in The Proud Archivist cafe, 2-10 Hertford Road, London; +44 2035982626) claims to have a serious purpose. Organized by listings website Yelp in conjunction with animal charities and welfare groups, it's billed as an attempt to educate would-be pig owners about what to expect alongside the pitter-patter of tiny trotters.
Yelp's Alex Shebar says he came up with the concept after hearing about how a trend for micro pigs, spurred by celebs such as Paris Hilton, resulted in abandoned animals. Often sold as "teacup pigs" because of their diminutive size at birth, most grow to the size of a large dog, much to the horror of some ill-informed owners. "London has had this love affair with animal cafes recently -- cat cafes and owl cafes -- and at Yelp I'm trying to get people to further explore their city, so I thought this would be an interesting way to do it," Shebar said. "Then I read about this trend of abandoning micro pigs, it really upset me. So I thought we could do something that combined this love of animal cafes with educating people about the needs of the pigs."Yelp says the £30-a-ticket event ($45) has proved popular, with scores of people signing up in the hope of snagging a place on one of the five days from May 21-25. There are no plans for any further Pignics, but Shebar says it might happen.

Chinese Pigs are Changing the World

by Dan Stone
March 7, 2015
http://onward.nationalgeographic.com/2015/03/07/chinese-pigs-are-changing-the-world/

We've all heard about China's incredible pace of development. Now, finally, we have a symbol of that runaway growth: pork. Demand for pork in China is growing so fast, farmers can't keep up. The average Chinese person eats 86 pounds of pork a year, more per capita than any country, and five times more pork than in the 1970s. China has traditionally preferred to be self sufficient with food production, but it now needs to look abroad for ways to feed those pigs. Imports of soybeans, the primary feedstock for pigs, are rising so quickly that demand in countries far away from China are pumping out as many soybeans as possible to sell to China. The Economist explains it:

As a result, land use is changing drastically on the other side of the world. In Brazil, more than 25m hectares of land [61 million acres]—parts of which were once Amazon rainforest—are being used to cultivate soy (Chinese companies have not signed up to the "soy roundtable", a voluntary association, the members of which agree not to buy soyabeans [also known as soybeans] from newly deforested land). Entire species of plants and trees are being sacrificed to fatten China's pigs. Argentina has chopped down thousands of hectares of forest and shifted its traditional cattle-breeding to remote areas to make way for soyabeans. Since 1990 the Argentine acreage given over to that crop has quadrupled: the country exports almost all of its whole soyabeans—around 8m tonnes [8.8 million short tons]—to China. In some areas farmers harvest two or three crops a year, using herbicides that have been linked to birth defects and increased cancer rates.

By one estimate from the International Institute of Social Studies, within the next decade, more than half of the world's feed crops will be eaten by Chinese pigs. In the short term, there's some good news buried in that stunning statistic. Dependence on other countries holds China accountable on some thorny issues, like currency manipulation, human rights questions, even its support for North Korea. But it's not hard to see an unsustainable pace, especially as more countries—namely the MINT nations (Mexico, Indonesia, Nigeria, and Turkey)—add similar strain on the planet to increase their quality of life, too. Can it be stopped? Certainly not easily. Stress on farmland is more likely to be alleviated by farming innovation than by asking developing countries to simply demand fewer pigs. Just ask the average Chinese man, who has just begun to experience the delight of pork . Good luck convincing him to give it up.

'Peppa' pig in Peterborough hog roast stand-off

12 February 2015
http://www.bbc.com/news/uk-england-cambridgeshire-31436336

An abandoned pig has been saved from being turned into a hog roast in a dramatic stand-off near Peterborough. The pig's owner left him in a field near a riding school five weeks ago. The school owner fed and looked after him and then contacted Hillside Animal Sanctuary in Norfolk to collect him. As they were on their way earlier, a hog roast company van turned up and the driver tried to load the pig inside. After "some negotiation", "Peppa" was saved and taken away to the

sanctuary. Paula Nicholls, who owns the New Range Riding School and Horse Rescue Centre at Eye Green, discovered the black kunekune-type pig abandoned in a locked shed in the field near her school. "Its owners had been renting at a caravan site there, but just left it to starve when they moved out," she said.

'Real panic'
After several weeks trying to contact them, Mrs Nicholls decided to call Hillside Sanctuary in Frettenham. "We were waiting for them to arrive this morning when the pig's owner turned up with a man in a van that said 'hog roast and pulled pork' on it," Mrs Nicholls said.
"They were trying to round it up into the van. The landowner was great and blocked the gate so they wouldn't be able to get out." Mrs Nicholls informed the sanctuary who posted a message on Facebook asking people to help in the pig rescue. Sanctuary founder Wendy Valentine said: "It was a real panic. Our driver was an hour away and the pig was destined to be hog roast." Despite attempting to negotiate, Mrs Nicholls eventually had to pay £100 for the pig, which she had named Peppa.Peppa has now been safely delivered to Norfolk, where he will "live out the rest of his days at the sanctuary", Ms Valentine said.

Ugly 5 safari: Tracking Africa's least glamorous animals in Botswana

by Laura Ma, for CNN
Updated 1222 GMT (2022 HKT) January 8, 2015
http://edition.cnn.com/2015/01/08/travel/ugly-five-safari/index.html

(CNN)"That's the ugliest bird I've ever seen." The statement doesn't so much roll off my tongue as it stumbles out of my mouth as I look at the scrappy tufts of feather on the leathery head of a marabou stork. Others on the boat mutter similar sentiments.
"It's one of the Ugly Five," says Amos, our captain and guide on an afternoon safari cruise at Moremi Game Reserve in Botswana's Okavango River Delta. His enthusiasm feels exaggerated for such a hideous bird. Elephants can be seen while flying into the delta, freeing up safari time searching for less celebrated wildlife.Safaris tend to focus on the so-called Big Five -- lions, leopards, buffalo, rhinos, elephants -- but the Ugly Five makes for a fun alternative for anyone who's already checked off the safari stars. The list runs like a cast call for the "Lion King's" least majestic animals: marabou stork, hyena, vulture, wildebeest and warthog. And we're here to meet them all.
Marabou stork
The marabou stork doesn't just rely on its looks -- it's also got a scent thing going down. "They can grow up to five feet long," says Amos as we get close enough to see the scabby-looking beak of one these large birds. "And be glad it's not close enough that you can smell him." Everyone, except our guide, cringes as the bird spreads its malodorous 12-foot wings and takes off from a tree, giving us a full view of its underbelly and wrinkly throat sack. The Okavango Delta is one of two breeding grounds for the marabou stork.During mating season, the birds are known to eat live prey, including adult flamingos. The stork also goes by the name of the "undertaker bird" in recognition of the grim but important role it plays in the Delta -- reducing diseases and cleaning up the ecosystem by devouring rotten carcasses.
Hyena

One the next morning's bush walk, we get lucky in spotting a hyena. We're certainly luckier than the smelly dead animal it's devouring. "Your nose is the strongest tracker of game," says Amos. Apparently, your ears are the second, but we're alerted to the hyena'spresence not by its notorious cackling laugh but by the sound of the bones it's crunching. We peer over the brush to see a spotted hyena with its snout in the stomach of an impala. Before anyone can ask, our guide says: "It probably didn't steal this meal from lions. Hyenas are very successful hunters." The hyena registers low on the cuteness meter. This one couldn't get any more ugly unless it was covered in blood. Which it is. My friend Anja, disagrees, claiming that hyenas are so unattractive they're actually endearing. "They're only ugly because they're villains in movies," she says. It's debatable how cute this hyena cub is. Showing me a photo of a hyena cub her sister took in South Africa's Kruger National Park, she adds, "The babies are so cute!" That's debatable, but they certainly get uglier with age. As we're watching, our hyena pulls its bloody face out of the carcass, revealing its elongated neck, hunched gait and dirty, scrappy fur.

Vulture

With one of the strongest jaws in the animal world, hyenas don't leave much for scavengers. Even so, where there are carcasses, there are usually vultures. While the marabou is the only species of stork on the list, the entire vulture family can claim membership to the ugly club. Circling overhead in a flying "kettle" (unusual collective noun alert!), the vultures we see aren't too bad to look at. Their wings silhouette magnificently against the blue sky. The illusion is broken when a few fly down to compete with the hyena for impala meat, revealing that though they have the wings of an eagle, they have the face of Freddy Kruger. It's no surprise the bird's hooked beak and hunched stature have inspired a marvel comic villain. "Their ugliness is efficient," says Amos. (He says that about all the Ugly Five.)The curved beak is effective in ripping meat, according to our guide. The vulture's ugliest feature, the featherless head and neck, is easy to keep clean after eating carrion. Logistically, it makes sense. Esthetically, it's the stuff of nightmares.

Warthog

The warthog is another case of practicality over prettiness. These wild pigs are plagued with useful but unappealing warts on both sides of their faces, landing them firmly in the ugly crowd. The protuberances protect the faces of male warthogs when they fight, even if they do look like surgery gone wrong. Warthogs are plentiful in the Okavango Delta. Anywhere out of scent-range from carnivores, we see warthog families digging for roots with their front knuckles. Together with warts, shaggy mohawks down their backs and uneven body hair, the warthog is the least appealing pig in the delta (although their roasted ribs are delicious.) They're shaped like torpedoes with pig noses. Their bodies seem disproportionately stocky in comparison to their skinny legs and short necks.As we're watching a mother and two babies, someone in our group steps on a twig and spooks them. We're treated to the beautiful sight of warthog butts with tails straight up in the air.

Wildebeest

During an afternoon heading out from the Delta's Moremi Crossing resort in a mokoro dug-out canoe, we cross paths with the last of the Ugly Five: wildebeest. As we slosh from one end of the small herd to another, a dozen weary black faces with straggly manes stare us down, perhaps concerned we might try to eat them. Attractiveness is no problem for wildebeests. They're practically blind. Because they're one of the most populous safari animals -- and not much to look at -- many people don't bother to photograph them, says Amos. As the unpretty cousin of the more elegant eland and gazelle, the wildebeest is a peculiar genetic mishmash. It has the head of

a buffalo, body of an antelope and tail of a shaggy horse. Its elongated face is connected to a dirty-looking neck fringe and features a mouth shaped, and used, like a lawnmower. Murky gray bodies decorated with black and white markings add to the unkempt appearance. "Its ugliness is no problem for mating, they're practically blind," Amos laughs.

Getting There

The only way to get to Moremi Crossing is by small plane, followed by a five-minute boat ride. The guided cruise, bush walk and mokoro rides are part of all-inclusive packages for guests. Accommodations include luxury tents, outdoor showers and nightly hippo serenades.

Moremi Crossing, Maun, Botswana; +267 686 0023; from $335 per person

Camera traps catch rare Amazon bird following peccaries

21st April 21 2015 / Jeremy Hance
http://news.mongabay.com/2015/04/camera-traps-catch-rare-amazon-bird-following-peccaries/

Although a large, attractive bird found across Latin America, scientists know almost nothing about the rufous-vented ground cuckoo (Neomorphus geoffroyi). Renzo Piana, the director of science and research with the Amazon Conservation Association, described the bird as "rare," "cryptic," "mainly solitary," and "mostly silent"—much of which explains why so little is known about it. But camera traps are helping to reveal more about this, and thousands of other little known species.

Piana and colleagues recently documented never-before-seen behavior of the rufous-vented ground cuckoo on camera trap in the Peruvian Amazon. A series of photos shows the cuckoo boldly following a group of collared peccaries (Pecari tajacu). "It is suspected that the cuckoo benefit by increasing their chances of finding food," explained Piana, who added that the cuckoo probably scavenge peccary leftovers as well as insects on the run from peccary herds that can reach as many as 50 individuals. Other scientists have documented rufous-vented ground cuckoos following army ants, various primates, and even white-lipped peccaries. The rufous-vented ground cuckoo is currently listed as Vulnerable by the IUCN Red List. "It is suspected that the species relies on primary forest," said Piana. "Major threats are habitat loss due destruction of primary forest for agriculture and cattle ranching, and road construction that leads to forest fragmentation."

Brazilian farmers urge return of big cats to Cerrado to protect crops from rampaging peccaries

7th April 2015 / Brendan Borrell
http://news.mongabay.com/2015/04/brazilian-farmers-urge-return-of-big-cats-to-cerrado-to-protect-crops-from-rampaging-peccaries/

Margie Peixoto was driving her pickup across her farm in the Brazilian state of Mato Grosso do Sul one February afternoon when she spotted some broken corn stalks and a trio of white-lipped peccaries (Tayassu pecari) ambling along the red-clay road as if they owned it. The moment these wild pig relatives spotted the truck, they snorted, snarled and disappeared into the head-high crop, where dozens more likely hid. “Every year the group gets bigger and bigger, and every year the damage to the crop is greater,” said Peixoto, a fit middle-aged woman from Zimbabwe,

who met her Brazilian husband while traveling in Africa, and immigrated here to farm more than 30 years ago. Peixoto estimates that wild peccaries destroyed as much as 10 percent of her crop last year, amounting to losses of 250,000 Brazilian reals ($100,000). One peccary attacked and killed the family dog. She is not alone in her concern. Marcos Da Silva Cunha, the director of the nearby Emas National Park, said that the size of peccary packs in the region's agricultural areas can be as large as 80-100 individuals, compared to packs of 40 individuals observed in their natural habitat.

Brazilian environmental regulators agree that the population explosion is a serious problem, but one that they have not yet been able to solve. Hunting isn't the answer, since peccaries are protected both in and outside the national park. Instead, a few conservationists and farmers have proposed a counterintuitive partnership and peccary control measure: one that encourages bigger populations of jaguars and pumas. Leandro Silveira, president of the Jaguar Conservation Fund, said the big cats used to be persecuted by cattle ranchers, but his research on radio-collared animals has shown that the cats are able to prowl through cane thickets and find refuge in vegetated watercourses. "Jaguars are breeding every year on this agricultural landscape," he said. "They are living their entire life cycle outside of the park." Silveira is in discussions with farmers and with Odebrecht — a Brazilian petroleum, engineering and agriculture conglomerate that owns much of the cropland — to embrace a "jaguar-friendly" certification scheme. Under the low-cost program, farmers would be obligated to maintain a certain level of well-connected jaguar habitat on their agricultural properties and agree not to persecute big cats or their peccary prey. In return, the cats would naturally control peccary numbers, reducing crop harm.

Peixoto likes the idea. Her 9,390-acre (3,800-hectare) soy, corn, and cattle farm, sits on the border of Emas National Park — a mix of grassland savanna and forest that has been compared to the African plains because of plentiful, charismatic wildlife. With few trees to obstruct views, it is one of the best places in the country to watch tapir (Tapirus terrestris), giant anteater (Myrmecophaga tridactyla), maned wolf (Chrysocyon brachyurus), and, of course, the greater rhea (Rhea americana), the large flightless bird related to the ostrich which is locally known as "ema" in Portuguese. The national park encompasses the largest intact remnant of grassland savanna in the area and is isolated by encircling plantations of soy, corn, and sugarcane stretching to the horizon.

Although the conversion of pasture for sugarcane and other monocrops on Peixoto's farm has contributed to the degradation of the Cerrado ecosystem, she and her husband consider themselves nature lovers, and are ready to welcome back the big cats. "We have good farming methods. We do no tillage. We are very careful with our spraying and the products that we use," she said. More than a third of her farm remains undeveloped, above the legal minimum of 20 percent. "We could get permission to chop that down and plant soybeans. We don't want to. We like having natural land."

What she doesn't like are peccaries.

"We do our part," she said. "Why don't they do their part?" She is talking about Brazil's environmental regulators, including the national park agency, known as the Chico Mendes Institute for Biodiversity Conservation (ICMBIO), and the Ministry of the Environment's administrative arm, known as the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA). Recently, IBAMA nixed a proposal — popular among farmers — to capture young peccaries, raise them in captivity, and slaughter them for their prized meat. That's why the jaguar certification plan to encourage big cat habitat on agricultural lands is getting support from

farmers, and it may be critical to ensuring the future of Brazil's threatened Cerrado biome and its rich biodiversity. Cunha, the head of Emas National Park, also wants to naturally reduce peccary numbers. "The excess of [that] species is not good for the park," he agreed. The peccaries root around in the vegetation, creating mud wallows, and disturbing the sensitive natural springs that Emas is well known for." Emas serves as the headwaters for several Brazilian rivers, including the Araguaia, which flows 1,632 miles before feeding into the Amazon.

In response to the growing peccary population, Cunha has seen a rise in illegal hunting of the animals, and has investigated two cases of farmers poisoning peccary groups. Though peccaries are over abundant around Emas, he points out that the animals are classified as endangered in the Cerrado and are extinct in several national parks, including Iquaçu Falls and Serra Canastra. "Only Emas has a surplus," he said.

Cunha disagrees, however, that controlling peccaries is his responsibility. "It's not only the park's problem," he said. "It's a problem for man and nature." He traced the overpopulation of peccaries to the explosive growth of sugarcane farms over the last eight years. Beginning in the 1970s, the land around Emas was converted to cattle pasture, and, later, to corn and soy. In 2007, the Odebrecht conglomerate, which boasts $30 million in annual revenues, began buying up farmland around Emas. Today, the company has three sugar ethanol plants in cities to the north, south and east of the park, plus 333,592 acres (135,000 hectares) of farmland. Although peccaries previously emerged from the national park to raid corn crops, Cunha contends that the sugarcane now allows them to survive year round outside its borders. After a fire in 2010 burned 90 percent of the parklands, wildlife became even more dependent on surrounding farms.Odebrecht denies that agriculture has tipped the ecological balance. In a statement to mongabay.com they wrote that "there is no scientific evidence to indicate the population growth of peccary in the sugarcane fields," and that "agricultural activities have not led to the disappearance of excess of any species." Silveira concurs that a large peccary population existed long before the sugarcane arrived. "The peccary problem has to do with the corn and not sugarcane," he asserted. "It has become worse every year because the peccary population is growing. It is a basic mathematical problem."Whatever the root cause, Silveira is continuing his negotiations with Odebrecht and farmers to embrace his "jaguar-friendly" certification idea. However, his championing of a monocrop like sugarcane as a means of supporting big cats is an unpopular position among some conservationists. Cunha, for one, believes it's shortsighted. "Monoculture causes disequilibrium," he said. Certainly, species like peccary and jaguar benefit from sugarcane, but other species suffer, he added. For example, dense cane thickets act as a barrier to the rhea. Cunha has proposed managing the problem through a combination of better fencing, supplemental feeding of peccaries inside the park, and sterilization, but he lacks the funds or the power to carry out such a proposal.

Emas National Park — the gem of the Cerrado biome — is perpetually low on funds. Though its 509 square miles (1,320 square kilometers) was designated a UNESCO World Heritage site in 2001, its concrete paths are crumbling. A guardhouse and visitor center are empty because the park can't afford to pay employees to staff them, and a wooden viewing tower has been closed indefinitely with no money for repair. By contrast, national and state parks in the Amazon benefit from the Amazon Region Protected Areas program, which has received $200 million from the World Bank, World Wildlife Fund, and Ford Foundation. For now, farmers feel optimistic about Silveira's program because it doesn't depend on the government or the whims of international funders. Peixoto would much rather have feline predators roving the landscape than crop-raiding

peccaries. “We have had puma kill some of our cows,” she said, “but it’s not a big loss when you think they kill the wild pigs.” If things work out, as Silveira hopes, sugarcane and peccaries — proven to be a bad combination for local farmers — could turn into a boon for big cats and other wildlife. “I’m very optimistic,” he said. “If the habitat is well-connected, it could sustain all or our Cerrado fauna intact.”
Article published by Morgan Erickson-Davis on April 7, 2015

Horrific moment a two day old hippo is mauled to death after its mother introduced it to the herd for the first time

By Tom Wyke for MailOnline
Published: 11:18 GMT, 10 August 2015 | Updated: 15:43 GMT, 10 August 2015
http://www.dailymail.co.uk/news/article-3192197/Two-day-old-hippo-mauled-death-mother-introduces-herd-time-crocodile-joins-in.html

The baby hippo was only two days old and was being introduced to the rest of the pod by its mother Several adult hippos quickly set upon the small infant calf and maul it to death before it is eaten by a crocodile The gruesome scene took place in Hwange National Park, Zimbabwe, where Cecil the Lion was killed. A two day old hippo calf has been mauled to death after its mother introduced it to the pod and the other hippos turned upon the infant.
The baby was being introduced to the rest of the pod when it was suddenly set upon and torn to pieces in the water in the Hwange National Park, situated in Zimbabwe. The remains of the calf were later seized upon by an opportunist crocodile, who quickly ate the animal's tattered corpse following the devastating water attack. The graphic photographs of the brutal scene were captured by James Wilson, who spotted the attack in Hwange National Park, Zimbabwe, where Cecil the Lion was controversially killed. Wilson said the attack was so shocking 'even the most seasoned guides felt a little traumatised by the sight.' It is believed that hippos sometimes commit infanticide when they are overpopulated or struggling with a form of sickness. The reasons for hippos to commit infanticide remain relatively unknown due to the difficulty of studying the aggressive creatures. Hippos tend to attack humans who stray too near their water pool, fearful that their calfs may be at risk from humans.Photographer James Wilson said: 'We're not sure exactly what possessed the hippo to do this but the point is that this is the reality that is life and death in the African bush. Although we were all a little startled by what we had just seen, we knew we had been fortunate enough to witness an incredible moment in nature.' 'We mostly see hippos lazing in the water with the cute tips of their ears and eyes poking out they're seemingly lazy creatures.There had been an exception shortage of rain during the wet season, but the heavens opened for two consecutive days.
'It became apparent that a mother hippo, separated from the pod, was suckling her new-born calf. The mother usually isolates herself from the pod to give birth and slowly introduces the calf when she feels ready we were fortunate enough to arrive at that very moment, a special experience,' he said. 'While the mother was protective of the calf, she made no obvious attempt to keep the younger hippo from coming too close as it wobbled precariously during its first few steps on land. For no apparent reason the mother began backtracking something was about to go down. He described the attack as 'a scene of complete chaos.' Recalling the shocking scenes, he said: 'Three adults launched themselves towards her and sent her fleeing for safety. The calf was left

stranded on the other side while they continued to target the mother.' 'Suspecting the calf might be in trouble we watched as a few adult hippo cornered the mother on one side of the waterhole, while about seven hippo began moving in on the calf,' he said. A pod of hippos normally contains between 10 to 15 large hippos and have been known to kick out other hippos from the herd in an act of male dominance. They are well known for their aggressive behaviour and have been known to kill humans if they sense danger. Hippos spend most of their time in water in order to prevent their skin from cracking in the heat.A hippopotamus, meaning 'river horse', can weigh as much as 3,200 kg and are not considered as an endangered species.

That's a rude awakening….Leopard creeps up on a sleeping warthog and prods it before killing it in a fierce battle in South Africa

By James Dunn For Mailonline
Published: 16:00 GMT, 30 July 2015 | Updated: 19:33 GMT, 30 July 2015
http://www.dailymail.co.uk/news/article-3180244/That-s-rude-awakening-Leopard-creeps-sleeping-warthog-prods-killing-fierce-battle-South-Africa.html

With dangerous predators like leopards roaming the unforgiving terrain, these photos show that it's no place to be caught sleeping. This dozing boar was snoozing by the water at Kruger National Park when wide-eyed leopard sensed an opportunity for an easy meal. It quietly stalks its prey and seems unsure if the beast is sleeping or dead, so it tentatively pokes it with a paw, prompting it to awake from its slumber and desperately try to jump up from the ground. But the battle is already lost, and the leopard pins its prey to the ground after a short battle, then wraps its vice-like jaw around its neck. Amateur photographer Lisl Moolman, 41, took the photos in Kruger National Park in South Africa, after spotting the scene through her binoculars. Moolman, from Phalaborwa, South Africa, said: 'Some visitors indicated to me that the leopard was lying behind a mopani bush, on the other side of the dam. Through the binoculars I could see it looking intently in one direction. 'The leopard approached the oblivious sleeping boar. Blissfully unaware, the warthog only realised his fate when the leopard gently touched him with his front paw. What a rude awakening. 'The leopard almost seemed surprised at how easy this was. The whole process from touching it with its paw, until it died, lasted approximately ten minutes. The warthog feebly struggled from time to time, but stood no chance against this strong male leopard.'

Escape from the hungry hippos: Hapless impala nearly becomes lunch after being chased by menacing pair

By Becky Pemberton For Mailonline
Published: 11:23 GMT, 29 July 2015 | Updated: 13:15 GMT, 29 July 2015
http://www.dailymail.co.uk/travel/travel_news/article-3178545/Incredible-pictures-fearsome-animals-chasing-chomping-helpless-impala-gone-water-escape-pack-wild-dogs.html

Two large hippos attack a desperate impala running into a river to escape a pack of wild dogs. The incredible moment was captured by wildlife photographer Hannes Lochner by the Khwai River in Botswana Miraculously the impala manages to reign triumphant over the giant creatures and escape to dry land. A terrified antelope ran into a river in an attempt to escape the clutches of

a pack of wild dogs - only to run into two much more fearsome predators. Two massive hippos in the Khwai River in Botswana lay waiting for the helpless impala and were not going to let it go without a fight. One of the powerful animals snapped its jaws around the tiny creature, before both of them came crashing down on its body to try and drown it. After being tossed around in the water, the lucky antelope was able to escape the huge creatures and get back to dry land. Professional wildlife photographer Hannes Lochner, 43, captured the images in the Okavango Delta region, in July last year.
He said: 'This is the kind of scene I love to capture. 'It was a great story to watch unfold and I was relieved it came to a happy ending. 'I don't think this kind of event has ever been pictured before. It's certainly not something you see every day. 'After its struggle, the impala was left with just a bite on its leg.' South African photographer Hannes took the images after watching a group of impalas run from a pack of wild dogs. The event was not isolated as reportedly an hour earlier another impala had ran into the water, but was drowned and killed by the ruthless hippos.In addition to this, a less fortunate antelope was eaten by a crocodile in the river, while another managed to get away completely unscathed.

Gambia: Hippos On Rampage At Ma-Njumba Rice Fields

The Daily Observer (Banjul)
23 July 2015
http://allafrica.com/stories/201507240747.html
By Lamin S.m Jawo

Crr — The women of Ma-njumba village in Niani district, CRR north on Saturday July 19, called on the district Chief of Niani- Alh. Pierre Bah, to inform him about hippos intrusion in their rice fields, which destroyed some rice fields. The women, who were seen in tears, said four villages are currently cultivating in the said rice fields and that during the recent hippos invasion about ten hectares of rice has been destroyed. Destruction as a result of hippos' intrusion in rice fields in CRR is increasing and people of Jahally also complaint of similar problems. Narrating the incident, one Kumba Banora, president of the women association, said hippos go out in pairs and grazed on their rice fields. She informed that women in the area are doing everything possible to contribute towards household food security, adding that some of their fields were about to be harvested when it was invaded by hippos' and as a result some areas were destroyed. She thus appealed to the authorities concern through the district Chief for urgent assistance so as to tackle the hippos' menace in the area. The vice president of Ma-njumba Women Association, Penda Njie, said hippos invasion is on the increased and it is hindering their food self- sufficiency goals. She said four villages cultivate rice in the said area namely; Ma-njumba, Dokkeh, Sinchu Ndura and Sinchu Jenum. She disclosed that the produce they harvest from these fields are used to feed their respective families, while some are sale for other purposes.

Tbilisi floods: Hippo roams free

Updated 1056 GMT (1756 HKT) June 14, 2015
http://edition.cnn.com/2015/06/14/europe/gallery/tbilisi-floods/index.html

Melbourne Zoo shows off baby pygmy hippo

June 7, 2015
Source: Reuters - Light News Video Online / Powered by NewsLook.com
http://www.sciencedaily.com/videos/8c477cfd5440a41497237faac122e223.htm

Summary:
A pygmy hippopotamus calf is unveiled at Melbourne Zoo, the first to be born at the zoo since 1981. Rough cut (no reporter narration). Video provided by Reuters

Zoo finds baby hippo's gender after 7 weeks

2015-05-13 23:20
http://www.news24.com/Green/News/Zoo-finds-baby-hippos-gender-after-7-weeks-20150513

San Diego - The gender of a baby hippo has been surprisingly hard to find for the San Diego Zoo, taking nearly two months to uncover. But the zoo said on Tuesday that it has determined with 100% certainty that the calf born in March is female. Like most hippopotamus moms, Funani was secretive and protective of her baby, keeping the calf hidden in vegetation in the enclosure's pool and using her own 4-ton body to block the baby from sight. That kept zoo staffers from learning the calf's sex for some seven weeks. The new girl, named Devi, weighs about 40kg and is expected to keep nursing with her mother for eight months. She is the fifth baby born to Funani.

Newborn hippo makes a splash

http://www.sciencedaily.com/videos/76f93158b76fcbcc4789098f683d16b0.htm
March 25, 2015
Source: Reuters - US Online Video / Powered by NewsLook.com

Summary:
A newborn hippopotamus makes a splash with its mum at the San Diego Zoo. Sharon Reich reports. Video provided by Reuters

Brave young hippo faces nine lions

2015-04-03 14:59
http://www.news24.com/Green/News/Brave-young-hippo-faces-nine-lions-20150403

Harare - Rare footage has emerged from Zimbabwe showing a daring young hippo confronting a pride of lions at a watering hole. The hippo emerges repeatedly from a pan in Hwange National Park, in the west of Zimbabwe, and tries to confront nine lions basking in the early morning sunshine near the water. For much of the time, the lions look bored, but are clearly aware of the hippo's presence. One of the lions and the hippo yawn at each other. But when the hippo gets too close, they chase it and it flops back into the water.
At one point a lion prowls the sandy bank of the Nyamandlovu Pan, eyes fixed on the water in

what appears to be a warning to the hippo to stay where he is. But the hippo gets out of the water again and faces the lions. This repeats itself several times until the hippo finally opts to stay in the water. The footage was taken last Friday by Swiss nationals Heidi and Kurt Haas, who are currently living in Bulawayo and are frequent visitors to Hwange. "Never before have I seen anything like that," Kurt Haas told News24. "This hippo is not yet fully grown and [is] apparently trying to figure out where the boundaries are for survival."
He said the hippo was playing "a very dangerous game".

Mvuu the hippo moves to town

2015-03-04 16:51
http://www.news24.com/Green/News/Mvuu-the-hippo-moves-to-town-20150304

Harare - Conservationists in Zimbabwe were on Wednesday trying to dart a wandering hippo who risks being shot after taking up residence in a dam, dangerously near the busy town of Chitungwiza, the Aware Trust reported. The state national parks body has warned that Mvuu the Hippo, as he has been nicknamed, will be shot if he is not moved out of the storage dam by Friday. Mvuu means hippo in Zimbabwe's Shona language.
"Waiting for hippo to surface so he can be darted... [Mvuu] is being very elusive," Animal and Wildlife Area Research Trust (Aware), a local veterinary conservation group, said in a post on Facebook. "The boat has been on water for one-and-a-half hours. Every time he surfaces the huge crowd whistles. He's feeling pressure and now not showing himself," it added. Authorities fear Mvuu could be a threat to Chitungwiza residents if he got into residential areas at night. Chitungwiza has an estimated population of at least 1.5 million. Hippos are almost never seen there. "This is technically the most difficult African mammal to move, and there is considerable risk to both the animal and the people involved in the capture," the trust said earlier. Aware plans to move Mvuu nearly 300km away to Kyle Recreational Park in southern Zimbabwe. It had appealed for $3 000 (around R35 427) to carry out the operation. Hippos are one of the most dangerous animals in Africa. They are most likely to come into contact with humans at night, when they leave the water and travel for miles in search of grazing.

Who's your daddy? Hippo ancestry unveiled

2015-02-25 05:00
http://www.news24.com/Green/News/Whos-your-daddy-Hippo-ancestry-unveiled-20150224-2

Paris - A great-great grandfather of the hippopotamus likely swam from Asia to Africa some 35 million years ago, long before the arrival of the lion, rhino, zebra and giraffe, researchers said Tuesday. Analysis of a previously unknown, long-extinct relative also confirmed that cetaceans - the group to which whales, dolphins and porpoises belong - are in fact the hippo's closest living cousins. "The origins of the hippopotamus have been a mystery until now," Fabrice Lihoreau, a palaeontologist at France's University of Montpellier and co-author of the study, told AFP. "Now we can say that hippos came from anthracotheres" - an extinct group of plant-eating, semi-aquatic mammals with even-toed hooves. Until now, the oldest known fossil of a hippo ancestor dated from about 20 million years ago, while cetacean remains aged 53 million years have been

found. Scientists had long lumped hippos with the Suidae family of pigs based on palaeontological finds, but DNA later suggested they were the kin of whales instead. Yet the huge age gap between hippos and cetaceans in the fossil record has left the experts stumped. "It meant that either we have never found ancestors of hippos, or we didn't recognise them among the mammal fossils we already had," said Lihoreau. Now the remains of a 28-million-year-old animal discovered in Kenya has provided an important piece of the puzzle, according to a study in the journal Nature Communications.
Named Epirigenys lokonensis ("epiri" means hippo in the Turkana language and Lokone after the discovery site), it was about the size of a sheep, weighing in at 100kg, which is about a twentieth the size of today's "common hippopotamus", a sub-Saharan giant. It may have spent much of its time immersed in water.
First mammals
E lokonensis was not a direct forefather of today's hippo, belonging instead to a side branch. But it lived much closer in time to the ancestor from which they both branched off, thus allowing for inferences to be drawn about the ancient animal. Dental analysis led the team to conclude that E lokonensis and the hippo both came from an anthracothere forefather, which migrated from Asia to Africa about 35 million years go. As Africa was then an island surrounded by water, it probably swam there. All this means the ancestors of hippos "were among the first large mammals to colonise the African continent, long before those of any of the large carnivores, giraffes or bovines," all of which arrived only about 18 million years ago, said a statement. The modern-day hippo thus evolved independently in Africa, and is a creature truly endemic to the continent, according to the research paper. "We filled a gap in the evolutionary history of the hippo, bringing us closer to the point of divergence from their modern-day sister group of cetaceans," and thus a more accurate reconstruction, said Lihoreau.

Kenyan fossils show evolution of hippos

February 24, 2015
Source: Le Centre national de la recherche scientifique (CNRS)
http://www.sciencedaily.com/releases/2015/02/150224113446.htm

Summary:
A French-Kenyan research team has just described a new fossil ancestor of today's hippo family. This discovery bridges a gap in the fossil record separating these animals from their closest modern-day cousins, the cetaceans. It also shows that some 35 million years ago, the ancestors of hippos were among the first large mammals to colonize the African continent, long before those of any of the large carnivores, giraffes or bovines.

A French-Kenyan research team has just described a new fossil ancestor of today's hippo family. This discovery bridges a gap in the fossil record separating these animals from their closest modern-day cousins, the cetaceans. It also shows that some 35 million years ago, the ancestors of hippos were among the first large mammals to colonize the African continent, long before those of any of the large carnivores, giraffes or bovines. This work, co-signed by researchers of the Institut des sciences de l'évolution de Montpellier (CNRS/Université de Montpellier/IRD/EPHE) and Institut de paléoprimatologie et paléontologie humaine : évolution et

paléo-environnements (CNRS/Université de Poitiers) is published in the journal Nature Communications. The ancestry of hippopotamuses is somewhat of an enigma. For a long time, paleontologists thought these semi-aquatic animals, with their unusual morphology (canines and incisors with continual growth, primitive skull and trifoliate tooth-wear pattern), to be related to the Suidae family, which includes pigs and peccaries. But in the 1990s and 2000s, DNA comparisons showed that the hippo's closest living relatives were the cetaceans (whales, dolphins, etc.), which disagreed with most paleontological interpretations. Moreover, the lack of fossils significantly hindered attempts to uncover the truth about hippo evolution.

New paleontological work by a group of French and Kenyan researchers has now revealed that hippos are not related to suoids but instead descend from another, now extinct, group. The new fossils studied have made it possible to build the first evolutionary scenario that is compatible with both genetic and paleontological data. By analyzing a half-jaw and several teeth discovered at Lokone (in the Lake Turkana basin, Kenya), the French-Kenyan team described a new fossil species (belonging to a new genus (2)), dating back to about 28 million years. They named it Epirigenys lokonensis, from the word "Epiri" which means hippo in the Turkana language and the site of discovery, Lokone.

By comparing the characteristics of fossil teeth with those of ruminants, suoids, hippos and fossil anthracotheres (an extinct family of ungulates), the scientists reconstructed the relationships between these groups. The results show that Epirigenys forms a kind of evolutionary transition between the oldest known hippo in the fossil record (about 20 million years ago) and an anthracothere lineage. This position in the tree of life is compatible with the genetic data, confirming that the cetaceans are the hippos' closest living cousins.

This kind of discovery may one day enable scientists to draw a picture of the common ancestor of cetaceans and hippos. Indeed, analysis of Epirigenys (28 million years old) has linked today's hippos to a lineage of anthracotheres, the oldest of which date back about 40 million years. However, until now, the earliest known ancestor of the hippos was about 20 million years old, while the first fossils of cetaceans are 53 million years old. The time gap between today's hippos and the oldest cetaceans is thereby filled by nearly 75% according to the present scenario.

Furthermore, this discovery shows the whole history of the African fauna in a new light. Africa was an isolated continent from about 110 to 18 million years ago. Most of the iconic African fauna (lions, leopards, rhinos, buffaloes, giraffes, zebras, etc.) are relatively recent arrivals on the continent (they have been there less than 20 million years). Until now, the same was believed to be true of hippos, but the discovery of Epirigenys demonstrates that their anthracothere ancestors migrated from Asia to Africa some 35 million years ago.

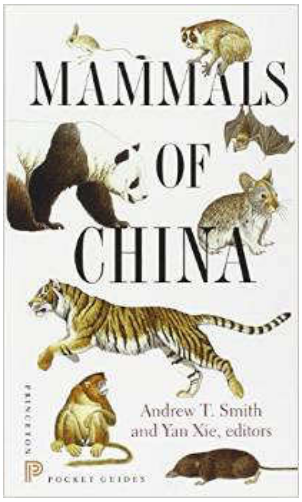
Story Source:

The above post is reprinted from materials provided by Le Centre national de la recherche scientifique (CNRS). Note: Materials may be edited for content and length.

Journal Reference:

1. Fabrice Lihoreau, Jean-Renaud Boisserie, Fredrick Kyalo Manthi, Stéphane Ducrocq. Hippos stem from the longest sequence of terrestrial cetartiodactyl evolution in Africa. Nature Communications, 2015; 6: 6264 DOI: 10.1038/ncomms7264

Mammals of China – a review

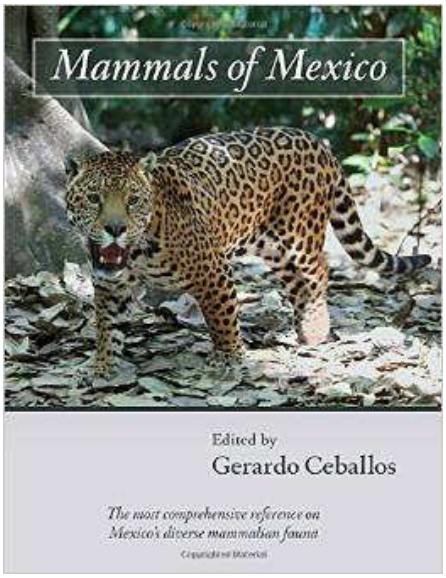


China is a "megadiversity" country and has the third highest diversity among mammals among the world after Brazil and Indonesia. This book is a field guide of the larger book "A Guide to the Mammals of China" (written by the same authors 2008). The aim of this book is to help with the identification of mammals in the field. After a short introduction in geography, biogeography and mammal conservation in China each mammal species is characterized by a picture, a distribution map, distinctive characteristics, notes on their distribution (also outside China), natural history and conservation status. The People's Republic of China harbours three different subspecies of wild boars (but see taxonomic proposals in Suiform Soundings 21(1): 26): Sus scrofa moupinensis south to Vietnam and west to Sichuan, S. s. nigripes in North-western China in Xinjian and S. s. ussuricus in the Manchurian region in North-Eastern China. A fourth subspecies (S. s. taivanus) lives on Taiwan. Unfortunately only general notes about the conservation of wild boars are mentioned. Nevertheless, this book gives a good overview about the wild boar and its characteristics and distribution in China (and similarly about many other mammal species living there).

Mammals of China
By Andrew T. Smith and Yan Xie (eds.)
395 pages
2013 by Princeton University Press
Oxford, UK

Reviewed by Thiemo Braasch

Mammals of Mexico - a review



Mexico is one of the top countries of mammal diversity harbouring 544 different species, mostly rodents and bats, but also many different species of Lagomorphs (rabbits and hares) and Soricids (shrews). Mexico is also home of two peccary species, Collared peccary and White-lipped peccary. Rafael Reyna-Hurtado, member of Peccary Specialist Group is co-author of the species account for White-lipped peccary.
After an introduction in mammal diversity and mammal conservation each mammalian family and their species are presented in detail and photos and a distribution map in Mexico are shown. The subspecies of each species in Mexico are mentioned, but unfortunately there are no details of their distribution or the separation between them. The morphological description comprises all the known facts of the species' body. Additionally external measures, weight and dental formula complete the thorough analysis. The part "Natural history and

Ecology" comprises the biggest part in the two peccary accounts including latest scientific results and comparisons between different populations in different parts of their range are done. The part "Vegetational Associations and Elevational Range" adds more information about their ecological niches. The conservation status of the two peccary species and the range and population size for protected areas and for many Mexican federal states is given wherever possible and emphasise that White-lipped peccaries are threatened with extinction in Mexico as the most northern part of their range (with extirpation in 84 % of its historical range in Mexico).
"Mammals of Mexico" is not only the best compendium for information about peccaries in Mexico but for Collared peccaries and White-lipped peccaries (and all the endemic mammal species in Mexico) this book is a valuable reference about their ecology, natural history, morphology and conservation.

Mammals of Mexico
By Gerardo Ceballo (eds.)
974 pages
2014 John Hopkins University Press
Baltimore, USA

Reviewed by Thiemo Braasch

Ecología y Manejo de Fauna Silvestre de Mexico

(Wildlife ecology and management in Mexico)
By Raul Valdez and Alfonso Ortega (eds)
557 pp
bba (Biblioteca Básica de Agricultura) and ColPos
Chapter name: Pecaríes en México (Peccaríes in México)
Authors: Rafael Reyna-Hurtado, Ignacio March, Eduardo Naranjo and Salvador Mandujano

Abstract
This chapter deals with all ecological and conservation aspects of the two species of peccaries of Mexico. Peccaries are pig-like animals that live in America continent. In Mexico there are two species the white-lipped peccary (*Tayassu pecari*) and the collared peccary (*Pecari tajacu*). Both species have specific ecological roles as seed predators and dispersers, they are prey of large carnivores and they modify the soil and water sources by wallowing in large numbers in the forest floor. Peccaries are favorite prey of subsistence hunters and have potential for trophy hunters. The conservation and management of the two species is a challenge in Mexico as the white-lipped peccary have seen a reduction in range of 84% in the last 50 years and there are very few remnant populations left in the country. White-lipped peccary requires areas 10 times larger than any other tropical ungulate to fulfill its basic requirements. The white-lipped peccary must need be protected thorough all the country. Collared peccary is an excellent candidate for some sustainable management programs. We need to gather information on population size, group size, home range, age structure and sex

ratio before apply any management on these species. The continue existence of peccaries and human together would require of conservation plans that take in consideration not only humans but wildlife needs as well.

Pig - a review

"Animal Series" published by Reaktion Books explores the relationships of different animals with humans, the historical significance and the impacts on humans. The many different books in this series range from spiders, leeches, mosquitos to eagles, chickens and wolves or rabbits (and many others).

Brett Mizelle has written the book about pigs. Pigs are one of the most important animals for humans and more than 500 breeds and varieties can be found all around the world. After a description and analysis of pig domestication and the importance of pigs in different early human settlements, the history and relations in the Old World are presented in detail: the role of pigs in Greco-Roman mythology, in ancient Greek and Roman empires. Furthermore the ambivalence of pigs in Christianity are mentioned (including the use of pig words to insult people) as well as the origin of 'non-kosher' food in Jewish laws and the Muslim prohibition of pork consumption. Additionally, the strong relations of Melanesian people to pigs and the cultural importance of pigs there are covered.

One chapter deals with hogs in the New World: first how keeping pigs influenced the early American economy, later the global origin of the industrialisation of meat production, the invention of supermarkets which were developed there and the role of pork meat for different social classes. Brett Mizelle does not only presents facts, but writes in a vivid style with surprising facts such as that free-ranging hogs were part of life in New York until 1860.

The chapter "Meat" deals with the technology of producing meat, new pig breeds, 'chickenification' of American pigs and the loss of genetic diversity in these modern breeds but also mention the turning back to old pig races and slow food that is currently happening. Different forms of spam are illustrated and, funny enough, even Monty Python's skit about spam in the year 1970 is mentioned as well as the use of 'spam' for junk e-mails. The book explains many different human-pig relationships such as pigs sniffing for truffles, searching for landmines, pigs in circuses and shows, pig races, the popularity of Vietnam pot-bellied pigs in the US, but also the use of pigs in medical trials due to their similarity to human bodies and the problem of 'swine flu' and the threats of this illness to humans. One chapter deals with pigs and the pictures and characters associated with them in different countries and the use of these associations in politics or why pigs are a symbol of luck and the invention of piggy banks.

Famous paintings of pigs are described along with famous pigs in literature and movies like pigs in George Orwell's Animal Farm, the well-known story of the Three Little Pigs, Christian Noon's film Babe or Miss Piggy from the Muppet Show, who recently received a feminism award (see:

http://edition.cnn.com/2015/06/05/entertainment/miss-piggy-feminism-award-feat/). In the final chapter pigs are released back to the nature and their negative impacts on native ecosystems are discussed: There are free-ranging populations of non-native wild pigs found in at least 18 states in the USA with an estimated population between one and four million pigs. The ecological impacts of wild pigs in Australia and on many islands are much worse.
The book is well illustrated with photos of pig art, historical photos of pig breeding and keeping and old advertisements. Brett Mizelle's writing style is entertaining. Reading the book one considers the way people think of and treat not only pigs but animals in general. A new view on pigs is raised this way, or, to use modern philosopher Homer Simpson's words that "such a wonderful bounty (pork meat) could only come from a "wonderful, magical animal".

Pig
By Brett Mizelle
Animal Series
224 pages
2011 Reaktion Books LTD
London, UK

Reviewed by Thiemo Braasch

New literature on Suiformes

Veterinary, Genetic and Physiological Studies

The first report of *Trichinella pseudospiralis* presence in domestic swine and *T. britovi* in wild boar in Bosnia and Herzegovina
Santrac V, Nedic DN, Maric J et al..
ACTA PARASITOLOGICA Volumen: 60 Número: 3 Páginas: 471-475 Fecha de publicación: SEP 2015

The Balkans is endemic for nematodes of the genus *Trichinella* in both domestic and wild animals. The high prevalence of these zoonotic pathogens in animals linked with the food habits to consume raw meat and meat derived products resulted in a very high prevalence of trichinellosis in humans living in this European region. In spite of numerous epidemiological investigations carried out in this region, very few information is available on the *Trichinella* species circulating in Bosnia and Herzegovina. Trichinella spp. larvae were isolated from a domesticpig reared in a backyard and from a hunted wild boar whose meat had been the source of trichinellosis in one case. Both *Trichinella pseudospiralis* and *T. spiralis* have been identified in the domestic pig, whereas, T. britovi was detected in the wild boar. While, *T. spiralis* is the *Trichinella* species most frequently detected in domestic pigs, *T. pseudospiralis* has been previously documented in domestic pigs only three times in Russia, Slovakia and Croatia. The detection of *T.*

britovi in thewild boar confirms that this nematode is the most frequent species circulating among wildlife of Europe.

A Serosurvey for Brucellosis in Wild Boar (*Sus scrofa*) in Sardinia, Italy.
Pilo C, Addis G, Deidda M, Tedde MT, Liciardi M.
J Wildl Dis. 2015 Aug 12.[Epub ahead of print]

Porcine brucellosis is a zoonotic disease caused by *Brucella suis* and hosted by pigs (*Sus scrofa*). Both domestic pigs and wild boars are affected. We measured the prevalence of antibody to *Brucella* spp. in wild boars in Sardinia, Italy. During 1 November 2009 to 31 January 2010, we collected 570 serum samples from legally hunted wild boars and tested them using a commercial competitive enzyme-linked immunosorbent assay. Sex and age class of the sampled wild boars were also recorded. Thirty-five samples were positive for an apparent antibody prevalence of 6.1%. Antibody prevalences did not differ between sexes or among age classes.

Genomic diversity and differentiation of a managed island wild boar population.
Iacolina L, Scandura M, Goedbloed DJ, Alexandri P, Crooijmans RP, Larson G, Archibald A, Apollonio M, Schook LB, Groenen MA, Megens HJ.
Heredity (Edinb). 2015 Aug 5. doi: 10.1038/hdy.2015.70. [Epub ahead of print]

The evolution of island populations in natural systems is driven by local adaptation and genetic drift. However, evolutionary pathways may be altered by humans in several ways. The wild boar (WB) (*Sus scrofa*) is an iconic game species occurring in several islands, where it has been strongly managed since prehistoric times. We examined genomic diversity at 49 803 single-nucleotide polymorphisms in 99 Sardinian WBs and compared them with 196 wild specimens from mainland Europe and 105 domestic pigs (DP; 11 breeds). High levels of genetic variation were observed in Sardinia (80.9% of the total number of polymorphisms), which can be only in part associated to recent genetic introgression. Both Principal Component Analysis and Bayesian clustering approach revealed that the Sardinian WB population is highly differentiated from the other European populations (FST=0.126-0.138), and from DP (FST=0.169). Such evidences were mostly unaffected by an uneven sample size, although clustering results in reference populations changed when the number of individuals was standardized. Runs of homozygosity (ROHs) pattern and distribution in Sardinian WB are consistent with a past expansion following a bottleneck (small ROHs) and recent population substructuring (highly homozygous individuals). The observed effect of a non-random selection of Sardinian individuals on diversity, FST and ROH estimates, stressed the importance of sampling design in the study of structured or introgressed populations. Our results support the heterogeneity and distinctiveness of the Sardinian population and prompt further investigations on its origins and conservation status.

The complete mitochondrial genome of bearded pig, *Sus barbatus*, and comparative mitochondrial genomics of Cetartiodactyla.
Zhang SC, Xu BH, Liu HC.

Mitochondrial DNA. 2015 Jun 24:1-2. [Epub ahead of print]

In this study, the complete mitochondrial genome sequence of bearded pig, *Sus barbatus*, with the total length of 16,480 bp, is determined for the first time. This mitogenome harbors 13 protein-coding genes, 22 transfer RNA genes, two ribosomal RNA genes, and one control region (D-loop). The overall base composition is A (34.80%), C (26.07%), G (13.12%), and T (26.01%), so the slight A-T bias (60.81%) was detected. Most of the genes are distributed on the H-strand, except for the ND6 subunit gene and eight tRNA genes. To obtain the phylogenetic relationship of the Cetartiodactyla, 11 mitochondrial genomes were used for phylogenetic analysis. The mitochondrial genome of *S. barbatus* presented here will contribute to a better understanding of the population genetics.

Using genome-wide measures of coancestry to maintain diversity and fitness in endangered and domestic pig populations.
Bosse M, Megens HJ, Madsen O, Crooijmans RP, Ryder OA, Austerlitz F, Groenen MA, de Cara MA.
Genome Res. 2015 Jul;25(7):970-81. doi: 10.1101/gr.187039.114. Epub 2015 Jun 10.

Conservation and breeding programs aim at maintaining the most diversity, thereby avoiding deleterious effects of inbreeding while maintaining enough variation from which traits of interest can be selected. Theoretically, the most diversity is maintained using optimal contributions based on many markers to calculate coancestries, but this can decrease fitness by maintaining linked deleterious variants. The heterogeneous patterns of coancestry displayed in pigs make them an excellent model to test these predictions. We propose methods to measure coancestry and fitness from resequencing data and use them in population management. We analyzed the resequencing data of *Sus cebifrons*, a highly endangered porcine species from the Philippines, and genotype data from the Pietrain domestic breed. By analyzing the demographic history of *Sus cebifrons*, we inferred two past bottlenecks that resulted in some inbreeding load. In Pietrain, we analyzed signatures of selection possibly associated with commercial traits. We also simulated the management of each population to assess the performance of different optimal contribution methods to maintain diversity, fitness, and selection signatures. Maximum genetic diversity was maintained using marker-by-marker coancestry, and least using genealogical coancestry. Using a measure of coancestry based on shared segments of the genome achieved the best results in terms of diversity and fitness. However, this segment-based management eliminated signatures of selection. We demonstrate that maintaining both diversity and fitness depends on the genomic distribution of deleterious variants, which is shaped by demographic and selection histories. Our findings show the importance of genomic and next-generation sequencing information in the optimal design of breeding or conservation programs.

Expansion of the HSFY gene family in pig lineages
Skinner BM, Lachani K, Sargent CA et al..
BMC GENOMICS Volumen: 16 Número de artículo: 442 Fecha de publicación:JUN 9 2015

Background: Amplified gene families on sex chromosomes can harbour genes with important

biological functions, especially relating to fertility. The Y-linked heat shock transcription factor (HSFY) family has become amplified on the Y chromosome of the domestic pig (*Sus scrofa*), in an apparently independent event to an HSFY expansion on the Y chromosome of cattle (*Bos taurus*). Although the biological functions of HSFY genes are poorly understood, they appear to be involved in gametogenesis in a number of mammalian species, and, in cattle, HSFY gene copy number may correlate with levels of fertility.
Results: We have investigated the HSFY family in domestic pig, and other suid species including warthog, bushpig, babirusa and peccaries. The domestic pig contains at least two amplified variants of HSFY, distinguished predominantly by presence or absence of a SINE within the intron. Both these variants are expressed in testis, and both are present in approximately 50 copies each in a single cluster on the short arm of the Y. The longer form has multiple nonsense mutations rendering it likely non-functional, but many of the shorter forms still have coding potential. Other suid species also have these two variants of HSFY, and estimates of copy number suggest the HSFY family may have amplified independently twice during suid evolution.
Conclusions: The HSFY genes have become amplified in multiple species lineages independently. HSFY is predominantly expressed in testis in domestic pig, a pattern conserved with cattle, in which HSFY may play a role in fertility. Further investigation of the potential associations of HSFY with fertility and testis development may be of agricultural interest.

Adaptive Evolution of Toll-Like Receptors (TLRs) in the Family Suidae
Darfour-Oduro KA Megens HJ, Roca AL et al.
PLOS ONE Volumen: 10 Número: 4 Número de artículo: UNSP e0124069 Fecha de publicación: APR 20 2015

Members of the family Suidae have diverged over extended evolutionary periods in diverse environments, suggesting that adaptation in response to endemic infectious agents may have occurred. Toll-like receptors (TLRs) comprise a multigene family that acts as the first line of defense against infectious microbes at the host-environment interface. We hypothesized that across the Suidae, positive selection mediated by infectious agents has contributed to the evolution of TLR diversity. Thus, we analyzed *Sus scrofa*, *Sus barbatus*, *Sus verrucosus*, *Sus celebensis*, *Sus scebifrons*, *Babyrousa babyrussa*, *Potamochoerus larvatus*, *Potamochoerus porcus* and *Phacochoerus africanus* genomes. Specifically, analyses were performed to identify evidence of positive selection using Maximum likelihood (ML) methods within a phylogenetic framework for bacterial and viral sensing Suidae TLR extracellular domains. Our analyses did not reveal evidence of positive selection for TLR3 and TLR7, suggesting strong functional conservation among these two genes for members of the Suidae. Positive selection was inferred for Suidae TLR1, TLR2, TLR6 and TLR8 evolution. ML methods identified amino acid sites of the bacterial sensing TLR1, TLR2, TLR6 and the viral sensing TLR8 to be under persistent positive selection. Some of these sites are in close proximity to functionally relevant sites, further strengthening the case for pathogen mediated selection for these sites. The branch leading to the genus *Sus* demonstrated evidence of episodic positive selection for TLR1, indicating selection mediated by infectious agents encountered within the specific geographic origin of the *Sus*. These results indicate that species of the Suidae have positively selected residues within functional domains of TLRs reflective of prior infections. Thus, TLR genes represent candidates

for experimental validation to determine their functional role in antibacterial and antiviral activity within members of the Suidae.

Prevalence and genetic diversity of *Rhodococcus equi* in wild boars (*Sus scrofa*), roe deer (*Capreolus capreolus*) and red deer (*Cervus elaphus*) in Poland.
Witkowski L, Rzewuska M, Cisek AA, Chrobak-Chmiel D, Kizerwetter-Świda M, Czopowicz M, Welz M, Kita J.
BMC Microbiol. 2015 May 22;15:110. doi: 10.1186/s12866-015-0445-1.

BACKGROUND:
Rhodococcus equi is now considered an emerging zoonotic pathogen. Sources and routes of human infection remain unclear but foodborne transmission seems to be the most probable way. Strains of pig or bovine type are most often isolated from human cases and moreover *R. equi* is present in submaxillary lymph nodes of apparently healthy pigs and wild boars intended for human consumption. The aim of this study was to estimate the prevalence of R. equi in submaxillary lymph nodes in wild boars, roe deer and red deer.
RESULTS:
Samples were collected from 936 animals and 27 R. equi strains were isolated, from 5.1 % of wild boars (23/452), 0.7 % of red deer (2/272) and 0.9 % of roe deer (2/212). Genetic diversity of all 27 isolates was studied using VspI-PFGE method, resulting in the detection of 25 PFGE patterns and four PFGE clusters. PFGE patterns of the isolates were compared with virulence plasmid types and no concordance was observed.
CONCLUSIONS:
R. equi was present in wild animal tissues and consumption of the game may be a potential source of *R. equi* infection for humans. To the authors' best knowledge, this is the first epidemiological report of *R. equi* prevalence in tissues of roe deer and red deer. However, risk associated with wild ruminant consumption seems marginal. Investigation of *R. equi* transmission between animals and humans based exclusively on types of virulence plasmids seems to be insufficient to identify sources of R. equi infection for people.

Caries, Periodontal Disease, Supernumerary Teeth and Other Dental Disorders in Swedish Wild Boar (*Sus scrofa*).
Malmsten A, Dalin AM, Pettersson A.
J Comp Pathol. 2015 Jul;153(1):50-7. doi: 10.1016/j.jcpa.2015.04.003. Epub 2015 May 12.

Between January and December 2013, the dental and periodontal health of 99 Swedish wild boars (*Sus scrofa*) was investigated. Sampling occurred in conjunction with routine hunting at six large estates in the southern and middle parts of Sweden. All six of the estates use supplemental feeding. The weight of the animals, their sex and their dates of death were noted. Age was estimated using tooth eruption and tooth replacement patterns. The oral cavity was inspected and abnormalities were recorded on a dental chart modified for wild boars. The findings included supernumerary teeth, absence of teeth, mild class II malocclusion, severe tooth wear, periodontitis, calculus, caries, tooth fractures and the presence of enamel defects. Swedish wild

boars suffer from different dental lesions and the impact of supplemental feeding on dental and periodontal health is still to be investigated.

Mitochondrial DNA diversity of feral pigs from Karukinka Natural Park, Tierra del Fuego Island, Chile.
Aravena P, Skewes O, Gouin N.
Genet Mol Res. 2015 Apr 28;14(2):4245-57. doi: 10.4238/2015.April.28.6.

Control or eradication of exotic species is one of the greatest challenges facing biodiversity and ecosystem conservation. Domestic pigs (*Sus scrofa domestica*) were released and became feral in the southern region of Chilean Tierra del Fuego Island in the 1900s. Currently, they inhabit part of Karukinka Natural Park, an area of global conservation concern. To gain insight into the control of this invasive species, we analyzed genetic variation in the mitochondrial DNA control region to determine the origin and population subdivision of feral pigs in Tierra del Fuego. Sequences from a sample of 42 feral pigs, 10 domestic pigs from local farms, and references from other countries and commercial breeds revealed 2 highly differentiated populations, 1 in the western and the other in the eastern area of the park, each harboring a different haplotype, suggesting no connectivity between populations. Comparison of these haplotypes with reference sequences from other countries and commercial breeds indicated that feral pigs from Chilean Tierra del Fuego are of European origin, very likely from 2 separate introduction events. The haplotype found in the western feral population was also identified in domestic pigs from a farm. This raises concerns regarding the possible connectivity between stocks from local farms and the wild population. Based on these results, we recommend the development of strategies for controlling the population of this invasive species in Karukinka Natural Park.

A 38-year study on *Trichinella* spp. in wild boar (*Sus scrofa*) of Latvia shows a stable incidence with an increased parasite biomass in the last decade.
Kirjušina M, Deksne G, Marucci G, Bakasejevs E, Jahundoviča I, Daukšte A, Zdankovska A, Bērziņa Z, Esīte Z, Bella A, Galati F, Krūmiņa A, Pozio E
Parasit Vectors. 2015 Mar 1;8:137. doi: 10.1186/s13071-015-0753-1.

BACKGROUND:
Trichinella spp. are zoonotic parasites transmitted to humans by the consumption of raw or insufficiently cooked meat of different animal species. The most common source of infection for humans is meat from pigs and wild boar (*Sus scrofa*). The aim of the present work was to evaluate the incidence of *Trichinella* spp. infections in wild boar hunted in Latvia over a 38 year interval (1976 to 2013).
METHODS:
A total 120,609 wild boars were individually tested for *Trichinella* spp. by trichinoscopy and, in case of negativity, by artificial digestion of 25 g muscles, in the 1976-2005 period, and by artificial digestion of 25-50 g muscles in the 2006-2013 period. *Trichinella* spp. larvae were identified at the species level by multiplex PCR.

RESULTS:
In the study period, the overall prevalence of infected wild boar was 2.5%. *Trichinella britovi* was the predominant (90%) species. The incidence of *Trichinella* spp. infection in wild boar exhibited two different trends. From 1976 to 1987, the incidence of infected/hunted wild boar increased from 0.23% to 2.56%, then it decreased to 0.19 in 1994. Thereafter, the incidence fluctuated between 0.05% and 0.37%. A statistically significant ($P < 0.05$) correlation ($r = 0.54$; $p = 0.0199$) was found between the trend of *Trichinella* spp. incidence in hunted wild boar and the number of snow cover days from 1976 to 1993. From 1997 to 2013, the estimated wild boar population of Latvia increased by 4.9 times and the hunting bag by 9.7 times, with a stable incidence of *Trichinella* spp. in the population. It follows that the biomass of *Trichinella* spp. larvae and of T. britovi, in particular, increased.
CONCLUSIONS:
The incidence trends of *Trichinella* spp. in wild boar could be related to the role played by the snow in reducing the thermal shock and muscle putrefaction which increases the survival of the larvae in muscle tissues of carrion in the 1976-1993 period; and, in the 1997-2013 period, to the increased biomass of *Trichinella* spp. due to the increased carnivore populations, which are the main reservoirs of these parasites.

Genome-wide association analyses reveal significant loci and strong candidate genes for growth and fatness traits in two pig populations.
Qiao R, Gao J, Zhang Z, Li L, Xie X, Fan Y, Cui L, Ma J, Ai H, Ren J, Huang L.
Genet Sel Evol. 2015 Mar 14;47:17. doi: 10.1186/s12711-015-0089-5.

BACKGROUND:
Recently, genome-wide association studies (GWAS) have been reported on various pig traits. We performed a GWAS to analyze 22 traits related to growth and fatness on two pig populations: a White Duroc × Erhualian F2 intercross population and a Chinese Sutai half-sib population.
RESULTS:
We identified 14 and 39 loci that displayed significant associations with growth and fatness traits at the genome-wide level and chromosome-wide level, respectively. The strongest association was between a 750 kb region on SSC7 (SSC for Sus scrofa) and backfat thickness at the first rib. This region had pleiotropic effects on both fatness and growth traits in F2 animals and contained a promising candidate gene HMGA1 (high mobility group AT-hook 1). Unexpectedly, population genetic analysis revealed that the allele at this locus that reduces fatness and increases growth is derived from Chinese indigenous pigs and segregates in multiple Chinese breeds. The second strongest association was between the region around 82.85 Mb on SSC4 and average backfat thickness. PLAG1 (pleiomorphic adenoma gene 1), a gene under strong selection in European domestic pigs, is proximal to the top SNP and stands out as a strong candidate gene. On SSC2, a locus that significantly affects fatness traits mapped to the region around the IGF2 (insulin-like growth factor 2) gene but its non-imprinting inheritance excluded IGF2 as a candidate gene. A significant locus was also detected within a recombination cold spot that spans more than 30 Mb on SSCX, which hampered the identification of plausible candidate genes. Notably, no genome-wide significant locus was shared by the two experimental populations; different loci were observed that had both constant and time-specific effects on growth traits at different stages,

which illustrates the complex genetic architecture of these traits.
CONCLUSIONS:
We confirm several previously reported QTL and provide a list of novel loci for porcine growth and fatness traits in two experimental populations with Chinese Taihu and Western pigs as common founders. We showed that distinct loci exist for these traits in the two populations and identified HMGA1 and PLAG1 as strong candidate genes on SSC7 and SSC4, respectively.

Exposure of feral swine (*Sus scrofa*) in the United States to selected pathogens.
Baroch JA, Gagnon CA, Lacouture S, Gottschalk M.
Can J Vet Res. 2015 Jan;79(1):74-8.

Feral swine (*Sus scrofa*) are widely distributed in the United States. In 2011 and 2012, serum samples and tonsils were recovered from 162 and 37 feral swine, respectively, in the US to evaluate exposure to important swine endemic pathogens. Antibodies against porcine reproductive and respiratory syndrome virus (PRRSV) and porcine circovirus type 2 (PCV2) were found in 2.5% and 25.3% of tested sera, respectively. Positive serological reactions against *Mycoplasma hyopneumoniae* and *Actinobacillus pleuropneumoniae* have been detected in 19.7% and 69.7% of animals. More than 15% of animals presented antibodies against these 2 pathogens simultaneously. Most animals were also seropositive for *Lawsonia intracellularis*. Feral swine can also be involved in transmission of zoonotic agents. Almost 50% of animals possessed antibodies against Salmonella. In addition, 94.4% of animals were carriers of *Streptococcus suis* in their tonsils. In conclusion, feral swine may be considered as a potential reservoir for different endemic diseases in domestic pigs, as well as for important zoonotic agents.

Yersinia enterocolitica Isolates from Wild Boars Hunted in Lower Saxony, Germany
von Altrock A, Seinige D, Kehrenberg C
APPLIED AND ENVIRONMENTAL MICROBIOLOGY Volumen: 81 Número: 14 Páginas: 4835-4840 Fecha de publicación: JUL 2015

Yersiniosis is strongly associated with the consumption of pork contaminated with enteropathogenic *Yersinia enterocolitica*, which is harbored by domestic pigs without showing clinical signs of disease. In contrast to data on *Y. enterocolitica* isolated from conventionally reared swine, investigations into the occurrence of *Y. enterocolitica* in wild boars in Germany are rare. The objectives of the study were to get knowledge about these bacteria and their occurrence in wild boars hunted in northern Germany by isolation of the bacteria from the tonsils, identification of the bioserotypes, determination of selected virulence factors, macrorestriction analysis, multilocus sequence typing (MLST), and testing of antimicrobial susceptibility. Altogether, tonsils from 17.1% of 111 tested wild boars were positive for *Y. enterocolitica* by culture methods. All but two isolates belonged to biotype (BT) 1A, with the majority of isolates bearing a ystB nucleotide sequence which was revealed to have 85% identity to internal regions of *Y. enterocolitica* heat-stable enterotoxin type B genes. The remaining Y. enterocolitica isolates were identified to be BT 1B and did not carry the virulence plasmid. However, two BT 1A isolates carried the ail gene. Macrorestriction analysis and results from MLST showed a high degree of

genetic diversity of the isolates, although the region where the samples were taken was restricted to Lower Saxony, Germany, and wildboars were shot during one hunting season. In conclusion, most *Y. enterocolitica* isolates from wild boars investigated in this study belonged to biotype 1A. Enteropathogenic *Y. enterocolitica* bioserotypes 4/O:3 and 2/O:9, usually harbored by commercially raised pigs in Europe, could not be identified.

Toxoplasma gondii seroprevalence in wild boars (*Sus scrofa*) in Sweden and evaluation of ELISA test performance
Wallander C, Frossling J, Vagsholm I et al..
EPIDEMIOLOGY AND INFECTION Volumen: 143 Número: 9 Páginas: 1913-1921 Fecha de publicación: JUL 2015

Toxoplasma gondii is a zoonotic protozoan parasite, infecting a wide range of warm-blooded animals. The Swedish wild boar population is expanding and increased hunting provides its meat to a growing group of consumers. We performed a spatio-temporal investigation of T*. gondii* seroprevalence in Swedishwild boars. An ELISA was set up and evaluated against a commercial direct agglutination test, using Bayesian latent class analysis. The ELISA sensitivity and specificity were estimated to 79% and 85%, respectively. Of 1327 serum samples, 50% were positive. Thirty-four per cent of young wild boars and 55% of adults were positive ($P < 0.001$). The total seroprevalence ranged from 72% in 2005 to 38% in 2011 ($P < 0.001$), suggesting a declining trend. The highest seroprevalence, 65%, was recorded in South Sweden. In other regions it varied from 29% in Stockholm to 46% in East Middle Sweden.

Prevalence of *Leptospira* antibodies in wild boars (*Sus scrofa*) from Northern Portugal: risk factor analysis
Vale-Goncalves HM, Cabral JA, Faria MC, et al..
EPIDEMIOLOGY AND INFECTION Volumen: 143 Número: 10 Número especial:SI Páginas: 2126-2130 Fecha de publicación: JUL 2015

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 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 Tras-os-Montes region.

Detection and molecular analysis of Pseudorabies virus strains isolated from dogs and a wild boar in Italy
Moreno A, Sozzi E, Grilli G, et al..
VETERINARY MICROBIOLOGY Volumen: 177 Número: 3-4 Páginas: 359-365 Fecha de publicación: JUN 12 2015

Aujeszky's disease (AD) is one of the most economically important diseases of farmed pigs. Wild boars can act as reservoirs and might represent a potential threat for domestic animals, including dogs. The aim of this study was to report the results of an AD survey based on the Pseudorabies virus (PRV) genome detection in samples of dogs clinically suspected of AD and of wild boars collected during four consecutive hunting seasons in the period 2010-2014. Genomic characterization was based on the partial gC sequence of the Italian strains and the comparison with those from domestic pigs and European PRV strains circulating in wild boars. The Italian PRV strains were mainly distributed into three different clusters and revealed two interesting findings. First, there was a clear distinction between the viral strains that were isolated from dogs used for hunting and subsequently traced back to wild boars and the strains that were isolated from working dogs and subsequently found to be closely related to domestic pigs. Second, the Italian epidemiological situation was found to be different from those of European countries in that the Italian situation was characterized by the presence of both the typical Italian clades 1 and 2 and supported by new patterns of aa deletions/insertions. Italian clade 1 included strains from hunting dogs and two Italian wild boars, and Italian clade 2 grouped with recent strains from dogs that were unable to hunt and domestic pigs that were related to one old reference strain (S66) and not included elsewhere. Molecular and phylogenetic analyses of PRV strains are therefore necessary to improve the understanding of the distribution of the PRV clusters and their evolution.

Trichinellosis in Vietnam
Nguyen Van De; Vu Thi Nga; Dorny P, et al..
AMERICAN JOURNAL OF TROPICAL MEDICINE AND HYGIENE Volumen: 92 Número: 6 Páginas: 1265-1270 Fecha de publicación: JUN 2015

Trichinellosis is a zoonotic parasitic disease with a worldwide distribution. The aim of this work was to describe the epidemiological and clinical data of five outbreaks of trichinellosis, which affected ethnic minorities living in remote mountainous areas of northwestern Vietnam from 1970 to 2012. Trichinellosis was diagnosed in 126 patients, of which 11 (8.7%) were hospitalized and 8 (6.3%) died. All infected people had consumed raw pork from backyard and roaming pigs or wild boar at wedding, funeral, or New Year parties. The short incubation period (average of 9.5 days), the severity of the symptoms, which were characterized by diarrhea, abdominal pain, fever, myalgia, edema, weight loss, itch, and lisping, and the high mortality, suggest that patients had ingested a high number of larvae. The larval burden in pigs examined in one of the outbreaks ranged from 70 to 879 larvae/g. These larvae and those collected from a muscle biopsy taken from a patient from the 2012 outbreak were identified as Trichinella spiralis. Data presented in this work show that the northern regions of Vietnam are endemic areas for *Trichinella* infections in domestic pigs and humans.

Hematologic and biochemical reference intervals for Wild Boar (*Sus scrofa*) captured by cage trap
Casas-Diaz E, Closa-Sebastia F, Marco I, et al..
VETERINARY CLINICAL PATHOLOGY Volumen: 44 Número: 2 Páginas: 215-222 Fecha de publicación: JUN 2015

Background
Establishing reference intervals (RI) for hematologic and biochemical variables in wild animals presents great challenges because capture stress or anesthesia during sampling can affect blood variables.
Objectives
The aims of this study were to establish RI for hematologic and blood biochemistry variables for Wild Boar (*Sus scrofa*) caught using cage traps, and provide information on the studied variables for different age groups.
Methods Blood samples were obtained from 89 Wild Boars captured by cage trap between 2005 and 2013 in northeastern Spain. Piglets were handled without anesthesia, while juvenile and adult animals were anesthetized using a combination of tiletamine and zolazepam. Blood samples were collected from the anterior vena cava and were placed into plain and EDTA tubes. Thirteen hematologic and 21 biochemical variables were determined. Reference intervals for piglets and juvenile and adult groups were determined, and differences between these groups were statistically analyzed.
Results
Adults had higher HGB, PCV, MCH, MCHC, neutrophil count, and total protein, albumin, creatinine, and chloride concentrations than juveniles; in contrast, juveniles had higher values for lymphocyte count, cholesterol concentration, and ALP activity.
Conclusions
Reference intervals determined in this study provide a baseline for interpreting hematologic and biochemical results in Wild Boar at different age stages, and contribute to optimization of the management of this species.

Assessing the Risk of African Swine Fever Introduction into the European Union by Wild Boar
De la Torre A, Bosch J, Iglesias I, et al..
TRANSBOUNDARY AND EMERGING DISEASES Volumen: 62 Número: 3 Páginas: 272-279 Fecha de publicación: JUN 2015

The presence of African swine fever (ASF) in the Caucasus region and Russian Federation has increased concerns that wild boars may introduce the ASF virus into the European Union (EU). This study describes a semi-quantitative approach for evaluating the risk of ASF introduction into the EU by wild boar movements based on the following risk estimators: the susceptible population of (1) wild boars and (2) domestic pigs in the country of origin; the outbreak density in (3) wild boars and (4) domestic pigs in the countries of origin, the (5) suitable habitat for wildboars along the EU border; and the distance between the EU border and the nearest ASF outbreak in (6) wild boars or (7) domestic pigs. Sensitivity analysis was performed to identify the most

influential risk estimators. The highest risk was found to be concentrated in Finland, Romania, Latvia and Poland, and wild boar habitat and outbreak density were the two most important risk estimators. Animal health authorities in at-risk countries should be aware of these risk estimators and should communicate closely with wild boar hunters and pig farmers to rapidly detect and control ASF.

First detection of sarcoptic mange in free-ranging wild boar (*Sus scrofa*) in Switzerland
Haas C, Origgi FC, Akdesir E, et al.
SCHWEIZER ARCHIV FUR TIERHEILKUNDE Volumen: 157 Número: 5 Páginas: 269-275
Fecha de publicación: MAY 2015

In Switzerland sarcoptic mange is frequent in free-ranging wild carnivores but until recent years no cases had been recorded in wild ungulates. Since 2010, cases have been observed in wild boar in the cantons of Solothurn, Tessin and Thurgau. Here, we report the detection of mange-like skin lesions in wild boars by photo-trapping and the post-mortem findings in 6 culled animals presenting different stages of the disease. Potential sources of infection include mangy red foxes, outdoor domestic pigs and wild boars from surrounding countries. Disease spread in the wild boar population may become relevant not only for wildlife but also for domestic pig health in the future if piggeries' biosecurity is insufficient to prevent interactions with wild boar.

West Nile virus serosurveillance in pigs, wild boars, and roe deer in Serbia
Escribano-Romero E, Lupulovic D, Merino-Ramos T, et al..
VETERINARY MICROBIOLOGY Volumen: 176 Número: 3-4 Páginas: 365-369 Fecha de publicación: APR 17 2015

West Nile virus (WNV) is maintained in nature in an enzootic transmission cycle between birds and mosquitoes, but it also infects many other vertebrates, including humans and horses, in which it can induce severe neurological diseases; however, data about virus circulation in other mammals is scarce. WNV has a history of recent outbreaks in Europe, including Serbia, where it was identified for the first time in 2010 in mosquitoes and in 2012 in birds and humans, being responsible for over 300 confirmed human cases and 35 deaths there along 2013. To assess WNV circulation among mammals in the country, 688 samples obtained from 279 farm pigs, 318 wild boars, and 91 roe deer were investigated for the presence of antibodies to WNV by enzyme-linked immunosorbent assay (ELISA) and viral neutralization test (VNT), and the specificity of their reactivity was assayed against Usutu virus (USUV). ELISA-reactive sera were identified in 43 (15.4%) pigs, 56(17.6%) wild boars, and 17(18.7%) roe deer. Of these, 6 (14%), 33 (59%), and 4(23.5%) respectively, neutralized WNV. One out of the 45 ELISA negative sera tested, from a roe deer, neutralized WNV. Cross-reactivity neutralization test indicated that all deer and pigs neutralizing sera were WNV specific, while in 5 (15.2%) of the wild boar samples the specificity could not be established. Four wildboar sera showed USUV specificity. All these data confirm the circulation of both flaviviruses in Serbia, and highlight the need for the implementation of global coordinated surveillance programs in the region.

Serological prevalence of viral agents that induce reproductive failure in South Korean wild boar
Jeoung HY, Lim SI, Kim JJ et al..
BMC VETERINARY RESEARCH Volumen: 11 Número de artículo: 78 Fecha de publicación: MAR 26 2015

Background: Viral agents associated with reproductive failure such as Aujeszky's disease virus (ADV), encephalomyocarditis virus (EMCV), and porcine parvovirus (PPV) have also been identified in European wild boar. To screen for the presence of antibodies against ADV, EMCV, and PPV from wild boar (*Sus scrofa*) in South Korea, 481 serum samples were collected from wild boar hunted between December 2010 and May 2011.
Results: Of the 481 serum samples tested, 47 (9.8%) and 37 (7.7%) were seropositive for ADV and EMCV antibodies, respectively, based on a neutralization test (VNT), and 142 (29.5%) were seropositive for PPV antibodies based on a hemagglutination inhibition (HI) test.
Conclusions: This was the first survey to identify the seroprevalence of the three major viruses associated with reproductive failure in the wild boar population of South Korea. Wild boar may act as a reservoir for many viruses that cause infectious diseases in domestic pigs. Thus, strict prevention and control measures, such as continuous wildlife disease surveillance and strategic methods of downsizing the population density, should be implemented to prevent disease transmission from wild boar to domestic pigs.

Investigating the Role of Free-Ranging Wild Boar (*Sus scrofa*) in the Re-Emergence of Enzootic Pneumonia in Domestic Pig Herds: A Pathological, Prevalence and Risk-Factor Study
Linhares MB, Belloy L, Origgi FC al..
PLOS ONE Volumen: 10 Número: 3 Número de artículo: e0119060 Fecha de publicación: MAR 6 2015

Enzootic pneumonia (EP) caused by *Mycoplasma hyopneumoniae* has a significant economic impact on domestic pig production. A control program carried out from 1999 to 2003 successfully reduced disease occurrence in domestic pigs in Switzerland, but recurrent outbreaks suggested a potential role of free-rangingwild boar (*Sus scrofa*) as a source of reinfection. Since little is known on the epidemiology of EP in wild boar populations, our aims were: (1) to estimate the prevalence of *M. hyopneumoniae* infections in wild boar in Switzerland; (2) to identify risk factors for infection in wild boar; and (3) to assess whether infection inwild boar is associated with the same gross and microscopic lesions typical of EP in domestic pigs. Nasal swabs, bronchial swabs and lung samples were collected from 978 wild boar from five study areas in Switzerland between October 2011 and May 2013. Swabs were analyzed by qualitative real time PCR and a histopathological study was conducted on lung tissues. Risk factor analysis was performed using multivariable logistic regression modeling. Overall prevalence in nasal swabs was 26.2% (95% CI 23.3-29.3%) but significant geographical differences were observed. Wild boar density, occurrence of EP outbreaks in domestic pigs and young age were identified as risk factors for infection. There was a significant association between infection and lesions consistent with EP in domestic pigs. We have concluded that *M. hyopneumoniae* is widespread in the Swiss wild boar population, that the same risk factors for infection of domestic pigs also act as risk factors for infection of wild boar,

and that infected wild boar develop lesions similar to those found in domestic pigs. However, based on our data and the outbreak pattern in domestic pigs, we propose that spillover from domestic pigs to wild boar is more likely than transmission from wild boar to pigs.

Importance of wild boar in the spread of African Swine Fever, particularly in relation to Europe
Truszczynski M Pejsak Z
MEDYCYNA WETERYNARYJNA-VETERINARY MEDICINE-SCIENCE AND PRACTICE
Volumen: 71 Número: 2 Páginas: 71-74 Fecha de publicación: FEB 2015

After a short characterisation of the biology and behaviour of wild boar the role of this species (*Sus scrofa*) in the spread of African Swine Fever Virus (ASFV) and ASF epidemiology was characterized in relation to the introduction of this virus to the Russian Federation, starting in 2007 and to the Ukraine in 2012. It has to be underlined that the primary source of infection of the wild boar is the pig (*Sus domestica*) and particularly the contaminated swill from domestic slaughter removed to the environment. However infected wild boar can transmit the ASFV secondarily to domestic pigs. This was proved by the transmission by the wild boar to domestic swine of ASFV in Lithuania in 2013 and Poland in the beginning 2014. The definition of endemic focuses of ASFV infection is given in this paper, indicating a year round transmission cycle through spring to the next generation. It is indicated that a considerable number of administrative units in the Russian Federation are either endemic or on the way to becoming endemic. This is particularly the case in connection with the high wild boar densities. Since such high densities of wild boar are also found in other parts of Europe, going to the West and South from the Russian Federation, there is a growing possibility of the transfer of ASFV to these parts of Europe. Since wild boar may transfer this infection, procedures how to restrict the number of wild boar in this territory are also discussed in this article. It is stated that neither by hunting or trapping the density of wild boar populations can be drastically reduced. Fencing can restrictwild boar movement, however further knowledge of the ASF epidemiology and spatial distribution of wild boar are required to identify the area were fencing could be used. Taking the above mentioned difficulties into account the most effective procedure to prevent wild boar from the infection by the ASFV is to contract its transmission from domestic swine to wild boar and into areas where the ASFV is not existing, from areas where infected wild boar are present.

Genome sequencing reveals fine scale diversification and reticulation history during speciation in *Sus*
Frantz LAF, Schraiber JG, Madsen O, Megens HJ, Bosse M, Paudel Y, Semiadi G, Meijaard E, Li N, Crooijmans RPMA, Archibald AL, Slatkin M, Schook LB, Larson G, Groenen MAM
Genome Biology 2013, 14:R107

Background:
Elucidating the process of speciation requires an in-depth understanding of the evolutionary history of the species in question. Studies that rely upon a limited number of genetic loci do not always reveal actual evolutionary history, and often confuse inferences related to phylogeny and speciation. Whole-genome data, however, can overcome this issue by providing a nearly unbiased window into the patterns and processes of speciation. In order to reveal the complexity

of the speciation process, we sequenced and analyzed the genomes of 10 wild pigs, representing morphologically or geographically well-defined species and subspecies of the genus Sus from insular and mainland Southeast Asia, and one African common warthog.
Results:
Our data highlight the importance of past cyclical climatic fluctuations in facilitating the dispersal and isolation of populations, thus leading to the diversification of suids in one of the most species-rich regions of the world. Moreover, admixture analyses revealed extensive, intra- and inter-specific gene-flow that explains previous conflicting results obtained from a limited number of loci. We show that these multiple episodes of gene-flow resulted from both natural and human-mediated dispersal.
Conclusions:
Our results demonstrate the importance of past climatic fluctuations and human mediated translocations in driving and complicating the process of speciation in island Southeast Asia. This case study demonstrates that genomics is a powerful tool to decipher the evolutionary history of a genus, and reveals the complexity of the process of speciation.

Estrous Synchronization in Captive Collared Peccaries (*Pecari tajacu*) Using a Prostaglandin F2 alpha Analog
Maia KM, Xavier P, Gislayne CX, Campos LB et al..
ZOOLOGICAL SCIENCE Volumen: 31 Número: 12 Páginas: 836-839 Fecha de publicación: DEC 2014

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 mu 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 +/- 0.05 x 0.32 +/- 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.

Estrus cycle monitoring of captive collared peccaries (*Pecari tajacu*) in semiarid conditions
Maia KM, Peixoto X, Gislayne CX.; Campos LB et al..
PESQUISA VETERINARIA BRASILEIRA Volumen: 34 Número: 11 Páginas:1115-1120 Fecha de publicación: NOV 2014

Collared peccaries (*Peccary tajacu*) are among the most hunted species in Latin America due the

appreciation of their pelt and meat. In order to optimize breeding management of captive born collared peccaries in semiarid conditions, the objective was to describe and correlate the changes in the ovarian ultrasonographic pattern, hormonal profile, vulvar appearance, and vaginal cytology during the estrus cycle in this species. During 45 days, females (n= 4) were subjected each three days to blood collection destined to hormonal dosage by enzyme immunoassay (EIA). In the same occasions, evaluation of external genitalia, ovarian ultrasonography and vaginal cytology were conducted. Results are presented as means and standard deviations. According to hormonal dosage, six estrous cycles were identified as lasting 21.0 +/- 5.7 days, being on average 6 days for the estrogenic phase and 15 days for the progesterone phase. Estrogen presented mean peak values of 55.6 +/- 20.5 pg/mL. During the luteal phase, the high values for progesterone were 35.3 +/- 4.4 ng/ mL. The presence of vaginal mucus, a reddish vaginal mucosa and the separation of the vulvar lips were verified in all animals during the estrogenic peak. Through ultrasonography, ovarian follicles measuring 0.2 +/- 0.1 cm were visualized during the estrogen peak. Corpora lutea presented hyperechoic regions measuring 0.4 +/- 0.2 cm identified during luteal phase. No significant differences (P> 0.05) between proportions of vaginal epithelial cells were identified when comparing estrogenic and progesterone phases. In conclusion, female collared peccaries, captive born in semiarid conditions, have an estral cycle that lasts 21.0 +/- 5.7 days, with estrous signs characterized by vulvar lips edema and hyperemic vaginal mucosa, coinciding with developed follicles and high estrogen levels.

Gastrointestinal and ectoparasites in wildlife-ungulates under captive and free-living conditions in the Mexican tropic
Manuel MYJ, del Rosario Zapata-Escobedo M, Cornelio Montes-Perez R et áal..
REVISTA MEXICANA DE CIENCIAS PECUARIAS Volumen: 5 Número: 4 Páginas: 459-469
Fecha de publicación: OCT-DEC 2014

Gastrointestinal parasites and ectoparasites were identified in white-tailed deer (*Odocoileus virginianus*), collared peccary (*Pecari tajacu*) and brocket deer (*Mazama americana*) in free-living conditions and captivity in the Mexican tropics. Twelve free-living ungulates were hunted (four white-tailed deer, three brocket deer and five collared peccaries) to obtain samples of faeces and ectoparasites. Fifty-five captive ungulates (14 white-tail deer, 16 brocket deer and 35 collared peccaries) were sampled to obtain faeces and ectoparasites. To identify the genera and order of parasites, faecal samples were analyzed by Flotation and McMaster techniques. Egg and oocyst per gram of faeces were also calculated. Ectoparasites collected from ungulates were classified to genera and species level using specific identification keys. Positive samples of nematode of the order strongylida and protozoos of the order Eucoccidiorida were cultivated and classified. In white-tailed and brocket deer the following genera of parasites were identified: *Strongyloides*, *Trichuris*, *Capillaria*, *Mammomonogamus* and *Eimeria*. In collared peccaries the genera *Oesophagostomun*, *Eimeria* and *Isospora* were identified. The flea *Pulex irritans* and the louse *Gliricola porcelli* infested brocket deer and collared peccary, while the fly *Lipoptena* sp was collected from white-tailed deer. The tick *Amblyomma cajennese* was found parasitizing the three ungulate species studied. It is concluded that wild ungulates are parasitized with gastrointestinal nematodes, protozoa of the order Eucoccidiorida, fleas, lice, flies and ticks.

Inbreeding and Offspring Sex Ratio in the Pygmy Hippopotamus (*Cheoropsis liberiensis*) Population Kept in Zoological Gardens.
Graczyk M, Cwiertnia P, Borowska A, Barczak E, Szwaczkowski T.
Folia Biol (Krakow). 2015;63(1):35-42.

The aim of this study was to estimate the inbreeding level and its impact on offspring sex ratio in the pygmy hippopotamus population kept in zoological gardens. Records of pygmy hippopotamus born between 1873-2013 were extracted from the international studbook. Totally, 1357 individuals originating from 148 breeding units were included (individuals with unknown sex were omitted). The offspring sex ratio is defined as the number of sons to the total number of progeny of each dam and sire. Spearman's rank correlation was employed to examine the relationships between the inbreeding level and offspring sex ratio. Inbreeding coefficients and individual increase in inbreeding coefficients (included as a linear co-variable) were examined as well as the geographic region and birth period using general linear models. The average inbreeding coefficient was 5.39%. The following sex proportion was observed for the inbred population: 57% and 43% for females and males, respectively. A significant relationship between inbreeding level of parents and their offspring sex ratio were estimated for European zoological gardens, whereas in others geographic regions the dependencies were insignificant.

Genetic consequences of population expansions and contractions in the common hippopotamus (*Hippopotamus amphibius*) since the Late Pleistocene.
Stoffel C, Dufresnes C, Okello JB, Noirard C, Joly P, Nyakaana S, Muwanika VB, Alcala N, Vuilleumier S, Siegismund HR, Fumagalli L.
Mol Ecol. 2015 May;24(10):2507-20. doi: 10.1111/mec.13179. Epub 2015 Apr 22.

Over the past two decades, an increasing amount of phylogeographic work has substantially improved our understanding of African biogeography, in particular the role played by Pleistocene pluvial-drought cycles on terrestrial vertebrates. However, still little is known on the evolutionary history of semi-aquatic animals, which faced tremendous challenges imposed by unpredictable availability of water resources. In this study, we investigate the Late Pleistocene history of the common hippopotamus (*Hippopotamus amphibius*), using mitochondrial and nuclear DNA sequence variation and range-wide sampling. We documented a global demographic and spatial expansion approximately 0.1-0.3 Myr ago, most likely associated with an episode of massive drainage overflow. These events presumably enabled a historical continent-wide gene flow among hippopotamus populations, and hence, no clear continental-scale genetic structuring remains. Nevertheless, present-day hippopotamus populations are genetically disconnected, probably as a result of the mid-Holocene aridification and contemporary anthropogenic pressures. This unique pattern contrasts with the biogeographic paradigms established for savannah-adapted ungulate mammals and should be further investigated in other water-associated taxa. Our study has important consequences for the conservation of the hippo, an emblematic but threatened species that requires specific protection to curtail its long-term decline.

Taxonomic, Morphological, Biogeographic and Evolutionary Studies

Potamochoerus porcus (Artiodactyla: Suidae)
Leslie DM, Huffman BA
Mammalian Species, Volume 47, Issue 919, Pp. 15 – 31, DOI:
http://dx.doi.org/10.1093/mspecies/sev002

Potamochoerus porcus (Linnaeus, 1758) is a monotypic suid commonly known as the red river hog. It is 1 of 2 species in the genus *Potamochoerus* and among the smallest and most plesiomorphic (ancestral) of the 8 African suids. This is the brightest colored wild pig species and is identified by its rufous coat and white dorsal crest; spectacled black-and-white facemask; and elongated, leaf-shaped ears that end in terminally drooping tufts of hair. *P. porcus* lives in damp forests throughout the rainforest belt of western and central Africa; it never ranges far from thick vegetative cover, soft soils, and water. Although *P. porcus* is commonly harvested for subsistence and urban bushmeat markets, it is considered of “Least Concern” by the International Union for Conservation of Nature and Natural Resources.

Modeling and Mapping the Probability of Occurrence of Invasive Wild Pigs across the Contiguous United States.
McClure ML, Burdett CL, Farnsworth ML, Lutman MW, Theobald DM, Riggs PD, Grear DA, Miller RS.
PLoS One. 2015 Aug 12;10(8):e0133771. doi: 10.1371/journal.pone.0133771. eCollection 2015.

Wild pigs (*Sus scrofa*), also known as wild swine, feral pigs, or feral hogs, are one of the most widespread and successful invasive species around the world. Wild pigs have been linked to extensive and costly agricultural damage and present a serious threat to plant and animal communities due to their rooting behavior and omnivorous diet. We modeled the current distribution of wild pigs in the United States to better understand the physiological and ecological factors that may determine their invasive potential and to guide future study and eradication efforts. Using national-scale wild pig occurrence data reported between 1982 and 2012 by wildlife management professionals, we estimated the probability of wild pig occurrence across the United States using a logistic discrimination function and environmental covariates hypothesized to influence the distribution of the species. Our results suggest the distribution of wild pigs in the U.S. was most strongly limited by cold temperatures and availability of water, and that they were most likely to occur where potential home ranges had higher habitat heterogeneity, providing access to multiple key resources including water, forage, and cover. High probability of occurrence was also associated with frequent high temperatures, up to a high threshold. However, this pattern is driven by pigs' historic distribution in warm climates of the southern U.S. Further study of pigs' ability to persist in cold northern climates is needed to better understand whether low temperatures actually limit their distribution. Our model highlights areas at risk of invasion as those with habitat conditions similar to those found in pigs' current range that are also near current populations. This study provides a macro-scale approach to generalist species

distribution modeling that is applicable to other generalist and invasive species.

Three-dimensional dental microwear texture analysis and diet in extant Suidae (Mammalia: Cetartiodactyla)
Souron A, Merceron G, Blondel C et al..
MAMMALIA Volumen: 79 Número: 3 Páginas: 279-291 Fecha de publicación:AUG 2015

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 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 rootling behavior.

Invasive wild boar in Argentina: using protected areas as a research platform to determine distribution, impacts and management
Ballari SA, Cuevas M, Fernanda C, Cirignoli S et al..
BIOLOGICAL INVASIONS Volumen: 17 Número: 6 Páginas: 1595-1602 Fecha de publicación: JUN 2015

The wild boar is an invasive ecosystem engineer in Argentina that has lacked sufficient basic information to determine applied actions. The current distribution, impacts and management of this species were analyzed using the expert opinion surveys of protected area managers. The boar is widely distributed and occupies most of Argentina's terrestrial ecoregions. Moreover, its populations are common, and its abundance is growing in most of the protected areas. Boars were recorded mostly in wetlands, forest and shrublands. Managers also reported a wide range of negative impacts, which included soil disturbance, vegetation damage and animal predation. Several control method types are used and in most protected areas, more than one are applied, but hunting was the most used technique. However, the effectiveness of control methods was low, suggesting the need of an urgent plan to define coordinated management actions to minimize the negative impacts of this species and also to prevent its expansion into new areas.

From north to south and back: the role of the Balkans and other southern peninsulas in the recolonization of Europe by wild boar
Velickovic N, Djan M, Ferreira E et al..
JOURNAL OF BIOGEOGRAPHY Volumen: 42 Número: 4 Páginas: 716-728 Fecha de publicación: APR 2015

Aim We analysed mitochondrial DNA (mtDNA) variation in wild boar (*Sus scrofa*) in the Balkans, including individuals from the northern Dinaric Balkans, an area that had not previously been characterized. Our aims were: (1) to reveal the level of genetic diversity and structuring and examine the demographic expansion of wildboar populations in the Balkans and Europe; (2) to examine the role of the Balkan gene pool in the post-LGM (Last Glacial Maximum) recolonization of Europe; and (3) to elucidate the phylogenetic position of European and Balkan wild boar in a Eurasian context by comparing sequences of wild boar worldwide.
Location Balkan Peninsula.
Methods A fragment of the mtDNA control region (443bp) was sequenced in 163wild boar from the Balkans. Phylogenetic analyses, using MrBayes and network, were carried out together with 188 previously published sequences from the Balkan Peninsula. Phylogenetic analyses were also performed with an additional 876 wild boar sequences from around the world.
Results Sixteen haplotypes were found in the new samples, including 11 not previously reported in the Balkans. Phylogenetic analyses based on all known Balkan haplotypes indicated the existence of population structuring, revealing two groups: Continental Balkans and South Balkans. The analysis of the complete dataset, comprising 1227 mtDNA sequences from wild boar sampled worldwide, revealed the presence of 168 different haplotypes. All Balkan haplotypes fell into the E1 haplogroup, except one sample that possessed an Asian haplotype. Within the E1 haplogroup, 50% of the haplotypes were unique to the Balkan Peninsula.
Main conclusions Wild boar from the Balkans exhibited high genetic diversity. Similar phylogeographical patterns emerge in all southern European peninsulas, arising from post-LGM expansion, and all three peninsulas played a similar role in the post-glacial recolonization of Europe by wild boar. This supports a leading-edge colonization hypothesis for all three peninsulas.

Phenotype and animal domestication: A study of dental variation between domestic, wild, captive, hybrid and insular *Sus scrofa*
Evin A, Dobney K, Schafberg R et al..
BMC EVOLUTIONARY BIOLOGY Volumen: 15 Número de artículo: 6 Fecha de publicación: FEB 4 2015

Background: Identifying the phenotypic responses to domestication remains a long-standing and important question for researchers studying its early history. The great diversity in domestic animals and plants that exists today bears testament to the profound changes that domestication has induced in their ancestral wild forms over the last millennia. Domestication is a complex evolutionary process in which wild organisms are moved to new anthropogenic environments. Although modern genetics are significantly improving our understanding of domestication and breed formation, little is still known about the associated morphological changes linked to the process itself. In order to explore phenotypic variation induced by different levels of human control, we analysed the diversity of dental size, shape and allometry in modern free-living and captive wild,wild x domestic hybrid, domestic and insular Sus scrofa populations.
Results: We show that domestication has created completely new dental phenotypes not found in wild boar (although the amount of variation amongst domestic pigs does not exceed that found in

the wild). Wild boar tooth shape also appears to be biogeographically structured, likely the result of post-glacial recolonisation history. Furthermore, distinct dental phenotypes were also observed among domestic breeds, probably the result of differing types and intensity of past and present husbandry practices. Captivity also appears to impact tooth shape.Wild x domestic hybrids possess second molars that are strictly intermediate in shape between wild boar and domestic pigs (third molars, however, showing greater shape similarity with wild boar) while their size is more similar to domestic pigs. The dental phenotypes of insular Sus scrofa populations found on Corsica and Sardinia today (originally introduced by Neolithic settlers to the islands) can be explained either by feralization of the original introduced domestic swine or that the founding population maintained a wild boar phenotype through time.
Conclusions: Domestication has driven significant phenotypic diversification in Sus scrofa. Captivity (environmental control), hybridization (genome admixture), and introduction to islands all correspond to differing levels of human control and may be considered different stages of the domestication process. The relatively well-known genetic evolutionary history of pigs shows a similar complexity at the phenotypic level.

Molecular phylogenetics of the white-lipped peccary (*Tayassu pecari*) did not confirm morphological subspecies in northwestern South America.
Ruiz-García M, Pinedo-Castro M, Luengas-Villamil K, Vergara C, Rodriguez JA, Shostell JM.
Genet Mol Res. 2015 May 22;14(2):5355-78. doi: 10.4238/2015.May.22.6.

We sequenced the mitochondrial DNA (mtDNA) control region of 59 peccaries (44 white-lipped peccaries, *Tayassu pecari*, and 15 collared peccaries, *Pecari tajacu*). We also genotyped 3 DNA microsatellites from 78 white-lipped peccaries representing the 4 putative morphological subspecies (i.e., *spiradens*, *aequatoris*, *pecari*, and *albirostris*) present in northwestern South America (i.e., Colombia, Ecuador, Peru, and Bolivia). Our results showed: 1) the estimated diversity of the mtDNA control region in the *T. pecari* population was extremely high, whereas the average genetic diversity for the microsatellites was medium to high and similar to that observed in European pig breeds; 2) there was no significant genetic heterogeneity among the quoted putative morphological subspecies at the mitochondrial marker, but we did detect significant (although relatively small) genetic heterogeneity using microsatellites, indicating that *T. pecari albirostris* is a uniquely differentiated group; and 3) the phylogenetic mtDNA trees showed that haplotypes were intermixed independent of their "a priori" subspecies classification. In addition, the microsatellite assignation analyses yielded low percentages of well-classified individuals when the analysis considered the geographic morphology of the subspecies. Thus, the molecular results do not support the putative morphological subspecies of *T. pecari* in northwestern South America. Finally, our results did not detect clear historical demographic changes using the mtDNA control region sequences. These genetic results are discussed in the context of the ecological and social characteristics of *T. pecari*.

A new species of the suid genus *Kolpochoerus* from Ethiopia
Souron A, Boisserie JR, White TD
ACTA PALAEONTOLOGICA POLONICA Volumen: 60 Número: 1 Páginas: 79-96 Fecha de publicación: MAR 2015

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 *Kolpochoerus phillipi* sp. nov., based on a fairly complete skull and the remains of additional individuals from similar to 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. likely represents a potential ancestor of *K. majus*, based on its morphology and stratigraphic position.

Dietary changes of large herbivores in the Turkana Basin, Kenya from 4 to 1 Ma.
Cerling TE, Andanje SA, Blumenthal SA, Brown FH, Chritz KL, Harris JM, Hart JA, Kirera FM, Kaleme P, Leakey LN, Leakey MG, Levin NE, Manthi FK, Passey BH, Uno KT.
Proc Natl Acad Sci U S A. 2015 Aug 3. pii: 201513075. [Epub ahead of print]

A large stable isotope dataset from East and Central Africa from ca. 30 regional collection sites that range from forest to grassland shows that most extant East and Central African large herbivore taxa have diets dominated by C4 grazing or C3 browsing. Comparison with the fossil record shows that faunal assemblages from ca. 4.1-2.35 Ma in the Turkana Basin had a greater diversity of C3-C4 mixed feeding taxa than is presently found in modern East and Central African environments. In contrast, the period from 2.35 to 1.0 Ma had more C4-grazing taxa, especially nonruminant C4-grazing taxa, than are found in modern environments in East and Central Africa. Many nonbovid C4 grazers became extinct in Africa, notably the suid *Notochoerus*, the hipparion equid *Eurygnathohippus*, the giraffid *Sivatherium*, and the elephantid *Elephas*. Other important nonruminant C4-grazing taxa switched to browsing, including suids in the lineage *Kolpochoerus-Hylochoerus* and the elephant *Loxodonta*. Many modern herbivore taxa in Africa have diets that differ significantly from their fossil relatives. Elephants and tragelaphin bovids are two groups often used for paleoecological insight, yet their fossil diets were very different from their modern closest relatives; therefore, their taxonomic presence in a fossil assemblage does not indicate they had a similar ecological function in the past as they do at present. Overall, we find ecological assemblages of C3-browsing, C3-C4-mixed feeding, and C4-grazing taxa in the Turkana Basin fossil record that are different from any modern ecosystem in East or Central Africa.

Direct Dating and Physico-Chemical Analyses Cast Doubts on the Coexistence of Humans and Dwarf Hippos in Cyprus.
Zazzo A, Lebon M, Quiles A, Reiche I, Vigne JD.
PLoS One. 2015 Aug 18;10(8):e0134429. doi: 10.1371/journal.pone.0134429.

In the Mediterranean, the island dwarf megafaunas became extinct around the end of the Pleistocene, during a period of rapid and global climate change. In Cyprus, this coincided with the first human presence on the island, as attested by the rock shelter of Akrotiri-Aetokremnos where an Epipaleolithic anthropogenic layer (stratum 2) was found overlying a massive accumulation of pygmy hippopotamus (*Phanourios minor* (Desmarest, 1822)) [Boekschoten and Sondaar, 1972] bones (stratum 4). The relationship between the two layers is highly controversial and the role played by humans in hippo extinction remains fiercely debated. Here, we provide new, direct radiocarbon and physico-chemical analyses on calcined bones which elucidates the complex depositional history of the assemblage. Bone turquoise was identified using micro-PIXE analysis and depth-profiling together with Vis spectroscopy, demonstrating that these bones were not freshly burned. Bayesian modeling of the radiocarbon dates indicates that stratum 4 accumulated during the first half of the 13th mill cal BP and that calcination occurred several hundred years later. We conclude that accumulation occurred naturally during the beginning of the Younger Dryas and that Epipalaeolithic visitors subsequently used the bones as fuel, starting from the mid-13th mill cal BP. At that time, dwarf hippos were probably already extinct or at least highly endangered. Our results shed new light on the possible causes of hippo extinction, on the subsequent introduction of the wild boar and on the earliest occupation of the island by humans.

Ecological, Behavioural and Conservation Studies

Collapse of the world's largest herbivores
Ripple WJ, Newsome TM, Wolf C, Dirzo R, Everatt KT, Galetti M, Hayward MW, Kerley GIH, Levi T, Lindsey PA,, Macdonald DW, Malhi Y, Painter LE, Sandom CJ, Terborgh J,Van Valkenburgh B
Sci. Adv. 2015;1:e1400103

Large wild herbivores are crucial to ecosystems and human societies. We highlight the 74 largest terrestrial herbivore species on Earth (body mass>– 100 kg), the threats they face, their important and often overlooked ecosystem effects, and the conservation efforts needed to save them and their predators from extinction. Large herbivores are generally facing dramatic population declines and range contractions, such that ~60% are threatened with extinction. Nearly all threatened species are in developing countries, where major threats include hunting, land-use change, and resource depression by livestock. Loss of large herbivores can have cascading effects on other species including large carnivores, scavengers, mesoherbivores, small mammals, and ecological processes involving vegetation,
hydrology, nutrient cycling, and fire regimes. The rate of large herbivore decline suggests that ever-larger swaths of the world will soon lack many of the vital ecological services these animals provide, resulting in enormousecological and social costs.

Temporal dynamics of seed excretion by wild ungulates: implications for plant dispersal.
Picard M, Papaïx J, Gosselin F, Picot D, Bideau E, Baltzinger C.
Ecol Evol. 2015 Jul;5(13):2621-32. doi: 10.1002/ece3.1512. Epub 2015 Jun 6.

Dispersal is a key process in metapopulation dynamics as it conditions species' spatial responses to gradients of abiotic and biotic conditions and triggers individual and gene flows. In the numerous plants that are dispersed through seed consumption by herbivores (endozoochory), the distance and effectiveness of dispersal is determined by the combined effects of seed retention time in the vector's digestive system, the spatial extent of its movements, and the ability of the seeds to germinate once released. Estimating these three parameters from experimental data is therefore crucial to calibrate mechanistic metacommunity models of plant-herbivore interactions. In this study, we jointly estimated the retention time and germination probability of six herbaceous plants transported by roe deer (*Capreolus capreolus*), red deer (*Cervus elaphus*), and wild boar (*Sus scrofa*) through feeding experiments and a Bayesian dynamic model. Retention time was longer in the nonruminant wild boar (>36 h) than in the two ruminant species (roe deer: 18-36 h, red deer: 3-36 h). In the two ruminants, but not in wild boar, small and round seeds were excreted faster than large ones. Low germination probabilities of the excreted seeds reflected the high cost imposed by endozoochory on plant survival. Trait-mediated variations in retention time and germination probability among animal and plant species may impact plant dispersal distances and interact with biotic and abiotic conditions at the release site to shape the spatial patterns of dispersed plant species.

What Is a Mild Winter? Regional Differences in Within-Species Responses to Climate Change.
Vetter SG, Ruf T, Bieber C, Arnold W.
PLoS One. 2015 Jul 9;10(7):e0132178. doi: 10.1371/journal.pone.0132178. eCollection 2015.

Climate change is known to affect ecosystems globally, but our knowledge of its impact on large and widespread mammals, and possibly population-specific responses is still sparse. We investigated large-scale and long-term effects of climate change on local population dynamics using the wild boar (*Sus scrofa* L.) as a model species. Our results show that population increases across Europe are strongly associated with increasingly mild winters, yet with region-specific threshold temperatures for the onset of exponential growth. Additionally, we found that abundant availability of critical food resources, e.g. beech nuts, can outweigh the negative effects of cold winters on population growth of wild boar. Availability of beech nuts is highly variable and highest in years of beech mast which increased in frequency since 1980, according to our data. We conclude that climate change drives population growth of wild boar directly by relaxing the negative effect of cold winters on survival and reproduction, and indirectly by increasing food availability. However, region-specific responses need to be considered in order to fully understand a species' demographic response to climate change.

Availability of large seed-dispersers for restoration of degraded tropical forest
Lindsell JA, David CL, Powell VJ, Gemita E
Tropical Conservation Science Vol.8 (1): 17-27, 2015

An estimated 63% of Southeast Asian forests are classed as disturbed and secondary as a result of human activity. Many of these forests remain important for biodiversity conservation and

ecosystem services so there is much interest in their capacity for restoration. The role of larger animals as seed dispersers in natural regeneration is well-attested since they are often the only agent by which large-seeded trees can effectively disperse. This is especially important for late successional shade-tolerant species which might otherwise be excluded from disturbed sites. However, many larger animals are sensitive to habitat degradation so may be lost from the very areas that require them. We investigated the persistence of a suite of large mammals that are known seed-dispersers and are also threatened species, in a degraded site in lowland south-central Sumatra. We used camera traps and field observations to relate their distributions to prevailing vegetation conditions. Although most species were more frequently detected in the more intact areas, most were able to occupy habitats with high levels of disturbance and population densities were relatively high. It is clear that severe habitat degradation does not necessarily lead to the immediate loss of large-bodied seed dispersers, so ensuring adequate protection for these species from external threats, such as hunting, must be built into management plans for restoration concessions.

African ungulates recognize a locally extinct native predator
Dalerum F, Belton L
BEHAVIORAL ECOLOGY Volumen: 26 Número: 1 Páginas: 215-222 Fecha de publicación: JAN-FEB 2015

Large carnivores are important ecosystem components but frequently suffer local extinctions. However, reintroductions and shifting conservation attitudes have lead to some population repatriations. Since the ecological consequences of predation may relate to indirect effects of predation risk, reconstruction of carnivore ecosystem function could depend on adequate predator recognition by prey. We evaluated behavioral responses in naive and lion exposed impala (*Aepyceros melampus*), blue wildebeest (*Connochaetes taurinus*), and warthogs (*Phacochoerus africanus*) to audio calls of a native (African lion *Panthera leo*) and an alien (grey wolf *Canis lupus*) predator as well as to unfamiliar (music) and familiar (running water) neutral controls. Our results demonstrated stronger behavioral responses to lions than to any of the other calls, even in naive populations, and suggest that retained predator recognition may enable rapid reconstruction of carnivore ecosystem function throughout Africa. However, since recognition may be lost in large increments, we urge that carnivore repatriations should be a prioritized component of African ecosystem conservation.

Impact of land use on occupancy and abundance of terrestrial mammals in the Drakensberg Midlands, South Africa
Ramesh T, Downs CT
JOURNAL FOR NATURE CONSERVATION Volumen: 23 Páginas: 9-18 Fecha de publicación: FEB 2015

Better management and knowledge regarding the effect of land use intensification on mammal abundance and occupancy is crucial for species conservation. This is particularly true in dynamic forest-farmland mosaics subjected to rapid human-induced habitat alterations for agricultural

practices. We conducted camera-trap surveys at 44 locations across farmland use gradients between October 2012 and January 2013. We estimated occupancy and relative abundance of 10 terrestrial mammals in response to farmland use in the Drakensberg Midlands, South Africa. Occupancy modelling revealed the importance of available forest and wetland to several mammals. Occupancy estimates for Leptailurus serval were lower in cropland than for Herpestes ichneumon, *Atilax paludinosus* and *Potamochoerus larvatus*. Occupancy of *Leptailurus serval* and *Redunca rundinu* increased with relative human abundance while the relationship was inverse for *Hystrix cristata* and Potamochoerus larvatus. Livestock-related activity influenced occupancy of *Po tamochoerus* larvatus positively and Hystrix cristata negatively. Pesticide usage had a negative impact on detection of several mammals, and occupancy of *Atilax paludinosus*. Commercial plantation influenced occupancy of *Tragelaphus scriptus* and *Potamochoerus larvatus* positively. Plantation supported the abundance of five species positively. Wetland influenced relative abundance of Leptailurus serval positively. Pesticide use significantly decreased relative abundance of *Leptailurus serval* and *Atilax paludinosus*. Livestock and human relative abundance were positively associated with relative abundance of Leptailurus serval and *Canis mesomelas* and negatively for other species. Our models proved the sensitivity of some mammals towards the natural habitat loss due to agricultural practices while others appeared to be tolerant to such human-modified habitats. We suggest feasible management implications for conserving diverse mammalian assemblages in farmland mosaics.

Bushmeat consumption among rural and urban children from Province Orientale, Democratic Republic of Congo
van Vliet N, Nebesse C, Nasi R
ORYX Volumen: 49 Número: 1 Páginas: 165-174 Fecha de publicación: JAN 2015

Understanding the importance of bushmeat consumption for household nutrition, both in rural and urban settings, is critical to developing politically acceptable ways to reduce unsustainable exploitation. This study provides insights into bushmeat consumption patterns relative to the consumption of other meat (from the wild, such as fish and caterpillars, or from domestic sources, such as beef, chicken, pork, goat and mutton) among children from Province Orientale, Democratic Republic of Congo. Our results show that urban and rural households consume more meat from the wild than from domestic sources. Of the various types of wild meat, bushmeat and fish are the most frequently consumed by children from Kisangani and fish is the most frequently consumed in villages. Poorer urban households eat meat less frequently but consume bushmeat more frequently than wealthier households. In urban areas poorer households consume common bushmeat species more frequently and wealthier households eat meat from larger, threatened species more frequently. Urban children eat more bushmeat from larger species (duiker *Cephalophus* spp. and red river hog *Potamochoerus porcus*) than rural children (rodents, small monkeys), probably because rural households tend to consume the less marketable species or the smaller animals. We show that despite the tendency towards more urbanized population profiles and increased livelihood opportunities away from forest and farms, wildlife harvest remains a critical component of nutritional security and diversity in both rural and urban areas of the Democratic Republic of Congo.

The wild boar attack--a case report of a wild boar inflicted injury and treatment.
Sprem N, Skavić P, Dezdek D, Keros T.
Coll Antropol. 2014 Dec;38(4):1211-2.

Croatia is a relatively safe country in regards to wild animal attacks and trauma to humans, even though there are a few reported cases of wild animal attacks on humans almost every year. As a biodiversity hot-spot it is inhabited by a few wild animal species that are known to attack humans and cause serious, sometimes even fatal injuriCs to humans throughout the world, such as wolves, brown bears and wild boars. We present a case of a recent wild boar attack on a human--a hunter that occurred in central Croatia in the year 2012. The injured person was a part of a group of hunters involved in a drive hunt on wild boars. He sustained a 4 cm long laceration of the left knee by a wounded male wild boar. After the surgical and antibiotic treatment he recovered completely and without any complications.

Domestic pigs' (*Sus scrofa domestica*) use of direct and indirect visual and auditory cues in an object choice task.
Nawroth C, von Borell E.
Anim Cogn. 2015 May;18(3):757-66. doi: 10.1007/s10071-015-0842-8. Epub 2015 Feb 4.

Recently, foraging strategies have been linked to the ability to use indirect visual information. More selective feeders should express a higher aversion against losses compared to non-selective feeders and should therefore be more prone to avoid empty food locations. To extend these findings, in this study, we present a series of studies investigating the use of direct and indirect visual and auditory information by an omnivorous but selective feeder-the domestic pig. Subjects had to choose between two buckets, with only one containing a reward. Before making a choice, the subjects in Experiment 1 (N = 8) received full information regarding both the baited and non-baited location, either in a visual or auditory domain. In this experiment, the subjects were able to use visual but not auditory cues to infer the location of the reward spontaneously. Additionally, four individuals learned to use auditory cues after a period of training. In Experiment 2 (N = 8), the pigs were given different amounts of visual information about the content of the buckets-lifting either both of the buckets (full information), the baited bucket (direct information), the empty bucket (indirect information) or no bucket at all (no information). The subjects as a group were able to use direct and indirect visual cues. However, over the course of the experiment, the performance dropped to chance level when indirect information was provided. A final experiment (N = 3) provided preliminary results for pigs' use of indirect auditory information to infer the location of a reward. We conclude that pigs at a very young age are able to make decisions based on indirect information in the visual domain, whereas their performance in the use of indirect auditory information warrants further investigation.

An Individual-based Model For Feral Hogs In Great Smoky Mountains National Park
Salinas RA, Stiver WH, Corn JL, et al..
NATURAL RESOURCE MODELING Volumen: 28 Número: 1 Páginas: 18-36 Fecha de publicación: FEB 2015

The expansion of feral hog (*Sus scrofa*) populations in the United States has resulted in increased efforts to develop and implement control strategies designed to minimize the impacts done by this invasive species. We describe an individual-based model for feral hogs in Great Smoky Mountains National Park (GSMNP). The objectives of the model are to provide an understanding of the population dynamics of this feral hog population and to determine the efficacy of the annual harvest as a population control method. Results suggest that the dynamics of the population are driven by fall hard mast production and the GSMNP harvests currently limit growth of the population, but these control efforts have not reduced the population.

Integrating analyses of population genetics and space-time information for wildlife management: an empirical study on Japanese wild boar populations
Murase K,; Horie R, Saito M, et al..
MAMMAL STUDY Volumen: 40 Número: 2 Páginas: 61-78 Fecha de publicación: JUN 2015

This study is a "model study" of how to apply the findings of molecular ecological studies to wildlife management, aimed at showing the importance of analyses integrating population genetics, space-time information and bioinformatics methods. We chose the Japanese wild boar (*Sus scrofa leucomystax*) in Tochigi Prefecture, Japan, because its captured area has been spreading in recent years. We used 72 adult individuals gathered by hunters in 2010. Three putative sub-populations were estimated using microsatellite DNA. Our study indicated that the individuals newly found in the northern area originated from other prefectures, not from different areas within the same prefecture, and no inobuta (crossbreeding with pigs) in the maternal line were found. Comparing the number of mutations obtained by a coalescent simulation with that obtained by mitochondrial DNA, suggested that an assumed native population in the eastern area of Tochigi Prefecture was actually not native. Habitat preferences of the putative sub-populations, estimated by a generalized linear model, were different from each other, which also suggested that the boar could adjust its habitat based on the characteristics of the local environment. Risk maps, estimated using MaxEnt, based on past questionnaire surveys and those based on microsatellite DNA were different from each other.

Temporal and Spatial Patterns of Defecation in Wild Boar
Ferretti F, Storer K, Coats J, et al..
WILDLIFE SOCIETY BULLETIN Volumen: 39 Número: 1 Páginas: 65-69 Fecha de publicación: MAR 2015

Worldwide, wild boar (*Sus scrofa*) and feral pigs are involved in environmental damage and disease transmission. These impacts are often associated with relatively high local densities of pigs, so the monitoring of population trends is important. Dung counts can be used to estimate population trends, but knowledge of daily defecation rates (DDRs) is needed to estimate absolute numbers. To address this issue, we calculated the DDRs of 18 captive, adult wild boar in July 2005 and November 2007. The mean DDR was 3.8-4.3 dung/boar/day, depending on the trial. We discuss the results by comparing the DDR of wild boar to that of other ungulates and

omnivores, and we consider the implications of these results for estimating feral pig and wild boar density through dung counts.

Implications of climatic seasonality on activity patterns and resource use by sympatric peccaries in northern Pantanal.
Hofmann GS, Coelho IP, Bastazini VA, Cordeiro JL, de Oliveira LF.
Int J Biometeorol. 2015 Jul 29. [Epub ahead of print]

We evaluated the effects of climate seasonality from a thermal and water availability perspective on the activity patterns and resource use of *Pecari tajacu* and *Tayassu pecari* during wet and dry seasons in the northeastern Brazilian Pantanal. We used camera traps and temperature sensors to record species activity patterns in relation to temperature, established five habitat categories based on flooding intensity and local vegetation characteristics, assessed the activity patterns of each species in dry and wet periods and in artificial water bodies using circular statistical metrics, and calculated niche amplitude and overlap on three axes (temperature, time, and habitat) in both periods. Peccaries shared a strong resemblance in resource use and in their responses to seasonal variations in the tested gradients. The activity patterns of both species exhibited a significant correlation with air temperature on all the evaluated measures, and both species strongly reduced their activity when the air temperature exceeded 35 °C. High temperatures associated with low water availability were most likely responsible for the changes in species activity patterns, which resulted in an increased temporal overlap in habitat use throughout the dry season. However, the peccaries avoided intensively flooded habitats; therefore, the habitat gradient overlap was greater during the wet period. Our results show that an increase in niche overlap on the environmental gradient as a result of climatic seasonality may be partially compensated by a reduction in other niche dimensions. In this case, temporal partitioning appears to be an important, viable mechanism to reduce competition by potentially competing species.

Does Trapping Influence Decision-Making under Ambiguity in White-Lipped Peccary (*Tayassu pecari*)?
Nogueira SS, Fernandes IK, Costa TS, Nogueira-Filho SL, Mendl M.
PLoS One. 2015 Jun 10;10(6):e0127868. doi: 10.1371/journal.pone.0127868. eCollection 2015.
The white-lipped peccary (*Tayassu pecari*) is an endangered species whose bold anti-predator behaviour in comparison to related species may increase its vulnerability to hunting and predation. We used a judgement bias test to investigate whether captive peccaries that had recently experienced a trapping event made more 'pessimistic' decisions under ambiguity. If so, this would indicate (i) that the procedure may induce a negative affective state and hence have welfare implications, and (ii) that the species is able to adopt a cautious response style despite its bold phenotype. Eight individuals were trained to 'go' to a baited food bowl when a positive auditory cue (whistle; CS+) was given and to 'no-go' when a negative cue (horn A; CS-) was sounded to avoid a loud sound and empty food bowl. An 'ambiguous' auditory cue (bell; CSA) was presented to probe decision-making under ambiguity. Individuals were subjected to three tests in the order: T1 (control-no trap), T2 (24h after-trap procedure), and T3 (control-no trap). In

each test, each animal was exposed to 10 judgement bias trials of each of the three cue types: CS+,CS-,CSA. We recorded whether animals reached the food bowl within 60s ('go' response) and their response speed (m/s). The animals varied in their responses to the CSA cue depending on test type. In all tests, animals made more 'go' responses to CS+ than CSA. During control tests (T1 and T3), the peccaries showed higher proportions of 'go' responses to CSA than to CS-. In T2, however, the animals showed similar proportions of 'go' responses to CSA and CS-, treating the ambiguous cue similarly to the negative cue. There were differences in their response speed according to cue type: peccaries were faster to respond to CS+ than to CS- and CSA. Trapping thus appeared to cause a 'pessimistic' judgement bias in peccaries, which may reflect a negative affective state with implications for the welfare and management of captive individuals, and also function to increase caution and survival chances following such an event in the wild environment.

Wildlife damage mitigation in agricultural crops in a Bolivian montane forest
Perez E, Pacheco LF.
Rev Biol Trop. 2014 Dec;62(4):1495-507.

Wildlife is often blamed for causing damage to human activities, including agricultural practices and the result may be a conflict between human interests and species conservation. A formal assessment of the magnitude of damage is necessary to adequately conduct management practices and an assessment of the efficiency of different management practices is necessary to enable managers to mitigate the conflict with rural people. This study was carried out to evaluate the effectiveness of agricultural management practices and controlled hunting in reducing damage to subsistence annual crops at the Cotapata National Park and Natural Area of Integrated Management. The design included seven fields with modified agricultural practices, four fields subjected to control hunting, and five fields held as controls. We registered cultivar type, density, frequency of visiting species to the field, crops lost to wildlife, species responsible for damage, and crop biomass. Most frequent species in the fields were *Dasyprocta punctata* and *Dasypus novemcinctus*. Hunted plots were visited 1.6 times more frequently than agriculturally managed plots. Crop lost to wildlife averaged 7.28% at agriculturally managed plots, 4.59% in plots subjected to hunting, and 27.61% in control plots. Species mainly responsible for damage were *Pecari tajacu*, *D. punctata*, and *Sapajus apella*. We concluded that both management strategies were effective to reduce damage by >50% as compared to unmanaged crop plots.

Diversity, relative abundance and activity patterns of medium and large mammals in a tropical deciduous forest in the Isthmus of Tehuantepec, Oaxaca, Mexico
Cortés-Marcial M, Briones-Salas M.
Rev Biol Trop. 2014 Dec;62(4):1433-48.

The use of camera traps and mammal track search are complementary methods to monitoring species of which is not well documented their natural history, as in the case of medium and large mammals. To ensure its conservation and good management, it is necessary to generate information about the structure of the community and their populations. The objective of the

present study was to estimate the diversity, relative abundance and activity patterns of medium and large mammals in a tropical deciduous forest located in the Isthmus of Tehuantepec, Oaxaca, Mexico. Samplings were conducted in three month intervals, from September 2011 to May 2013. We used photographic-sampling and track search, two complementary sampling methods. For photographic-sampling, 12 camera traps were placed covering an area of 60 km2, while for the tracks search a monthly tour of four line-transect surveys of three kilometers length each was undertaken. We obtained a total of 344 pictures with 5292 trap-days total sampling effort; in addition, 187 track records in a total of 144 km. With both methods we registered 21 species of mammals, in 13 families and seven orders, and five species resulted in new records to the area. The diversity index of Shannon-Wiener obtained with the method of tracks was H' = 2.41, while the most abundant species were *Urocyon cinereoargenteus* (IAR = 0.23) and *Pecari tajacu* (IAR = 0.20). By the method of trap the most abundant species were P. tajacu (IAR = 2.62) and *Nasua narica* (IAR = 1.28). In terms of patterns of activity *P. tajacu*, *N. narica* and *Odocoileus virginianus* were primarily diurnal species; *Canis latrans* and *Leopardus pardalis* did not show preference for any schedule in particular, and *Didelphis virginiana* and D*asypus novemcinctus* preferred to have nocturnal activity. This information can be of help to the creation of programs of management and conservation of mam- mals of medium and large in the Isthmus of Tehuantepec, Oaxaca, México.

Food Habits of Jaguar and Puma in a Protected Area and Adjacent Fragmented Landscape of Northeastern Mexico
Hernandez-SaintMartin AD; Rosas-Rosas OC, Palacio-Nunez J, et al..
NATURAL AREAS JOURNAL Volumen: 35 Número: 2 Páginas: 308-317 Fecha de publicación: APR 2015

We analyzed the food habits of the jaguar (*Panthera onca*) and puma (*Puma concolor*) in a protected area surrounded by a fragmented landscape in northeastern Mexico. We estimated relative biomass of each prey species consumed; by analysis of 43 and 22 scat samples of jaguar and puma collected during 2010-2012. The diet of both felids was comprised mainly of wild artiodactyls; the collared peccary contributed 35.2% to the biomass of jaguar diets and white-tailed deer contributed 51.9% to puma diets. Diet composition of both felids showed moderate overlap (Pianka index = 0.57; Morisita index = 0.58), but use of the primary prey differed between species ($P < 0.001$). The diet of both felids included almost exclusively wild species, suggesting the presence of a good prey base that allows the coexistence of jaguars and pumas. Despite its small size and surrounding fragmentation, the Biosphere Reserve Sierra del Abra-Tanchipa is still an important refuge for large felids and their prey in northeastern Mexico.

Populations, pools, and peccaries: simulating the impact of ecosystem engineers on rainforest frogs
Ringler M, Hoedl W, Ringler E
BEHAVIORAL ECOLOGY Volumen: 26 Número: 2 Páginas: 340-349 Fecha de publicación: MAR-APR 2015

"Ecosystem engineering" describes habitat alteration by an organism that affects another organism; such nontrophic interactions between organisms are a current focus in ecological

research. Our study quantifies the actual impact an ecosystem engineer can have on another species by using a previously identified model system-peccaries and rainforest frogs. In a 4-year experiment, we simulated the impact of peccaries on a population of *Allobates femoralis* (Dendrobatidae) by installing an array of artificial pools to mimic a forest patch modified by peccaries. The data were analyzed using a gradual before-after control-impact (gBACI) model. Following the supplementation, population size almost doubled as a result of increased autochthonous recruitment driven by a higher per-capita reproduction of males and a higher proportion of reproducing females. The effect was evenly distributed across the population. The differential response of males and females reflects the reproductive behavior of *A. femoralis*, as only the males use the aquatic sites for tadpole deposition. Our study shows that management and conservation must consider nontrophic relationships and that human "ecosystem engineering" can play a vital role in efforts against the "global amphibian decline."

Effects of reduced-impact logging on medium and large-bodied forest vertebrates in eastern Amazonia
Laufer J, Michalski F, Peres C A.
BIOTA NEOTROPICA Volumen: 15 Número: 2 Número de artículo: 11 Fecha de publicación: 2015

Standard line-transect census techniques were deployed to generate a checklist and quantify the abundance of medium and large-bodied vertebrate species in forest areas of eastern Amazonia with and without a history of reduced-impact logging (RIL). Three areas were allocated a total of 1,196.9 km of line-transect census effort. Sampling was conducted from April to June 2012 and from April to August 2013, and detected 29 forest vertebrate species considered in this study belonging to 15 orders, 20 families and 28 genera. Additionally, eight species were recorded outside census walks through direct and indirect observations. Of this total, six species are considered vulnerable according to IUCN (*Ateles paniscus, Myrmecophaga tridactyla, Priodontes maximus, Tapirus terrestris, Tayassupeccary, Chelonoidis denticulata*). Observed species richness ranged from 21 to 24 species in logged and unlogged areas, and encounter rates along transects were highly variable between treatments. However, the relative abundance of species per transect did not differ between transects in logged and unlogged forests. Of the species detected during censuses, only three showed different relative abundance between the two treatments (*Saguinus midas, Tinamus* spp. and *Dasyprocta leporina*). Our results show that the effect of RIL forest management was a relatively unimportant determinant of population abundance for most medium and large vertebrates over the time period of the survey.

Social structure of collared peccaries (P*ecan tajacu*): Does relatedness matter?
Biondo C, Izar P, Miyaki CY et al..
BEHAVIOURAL PROCESSES Volumen: 109 Número especial: SI Páginas: 70-78
Subdivisión: A Fecha de publicación: NOV 2014
Texto completo de la editorial

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.

Habitat preferences and relative abundance of *Tayassu pecari* in an area with hunting in the region of Calakmul, Campeche, Mexico
Briceno-Mendez M, Reyna-Hurtado R, Calme S et ál..
REVISTA MEXICANA DE BIODIVERSIDAD Volumen: 85 Número: 1 Páginas: 242-250
Fecha de publicación: MAR 2014

Investigating the habitat preferences and relative abundance of wild mammals provides basic information for conservation or management programs. The white-lipped peccary (*Tayassu pecari*, 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. Brosimun 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.

Local perceptions of wildlife use in Los Petenes Biosphere Reserve, Mexico: Maya subsistence hunting in a conservation conflict context
Oliva M, Montiel S, García A, Vidal L
Tropical Conservation Science Vol.7 (4):781-795, 2014

Conservation conflicts can arise in biosphere reserves when local people face restrictions on resource use and access, mainly in terms of subsistence. We studied the potential conservation conflict with subsistence hunting in two Maya communities (Los Petenes and El Remate) located in the zone of influence of Los Petenes Biosphere Reserve, Mexico. Perceptions, interests and

expectations of stakeholders regarding subsistence hunting in the reserve were recorded through semi-structured and in-depth interviews of peasant-hunters and reserve authorities, and participant observation was carried out in both communities. A total of 66 peasant-hunters were identified in Los Petenes (62%) and El Remate (38%). Overall, peasant-hunters acknowledged hunting for family subsistence and expressed the conviction to continue hunting in the region. They mentioned their enthusiasm for hunting, mainly individually and aimed at obtaining white-tailed deer (*Odocoileus virginianus*) and perceived a recent reduction in potential prey locally. Although the law in Mexico does not prohibit subsistence hunting, external authorities stated that they have announced a generalized ban on hunting based on the precautionary principle to simplify enforcement both inside and outside the reserve. The de facto restriction on wildlife use, even for subsistence purposes, which was mentioned by external actors, conflicted with the local need and expectation of the contemporary Maya hunters to continue subsistence hunting in the region. Our study confirms the existence of a conservation conflict associated with this traditional practice in the reserve and provides necessary information for managing such conflict.

Local awareness of and attitudes towards the pygmy hippopotamus *Choeropsis liberiensis* in the Moa River Island Complex, Sierra Leone
Conway AL, Hernandez SM, Carroll J et al..
ORYX Volumen: 49 Número: 3 Páginas: 550-558 Fecha de publicación: JUL 2015

The pygmy hippopotamus *Choeropsis liberiensis* is an Endangered species found only in the Upper Guinea rainforests of West Africa. Using a two-phase approach, with initial semi-structured interviews followed by more extensive questionnaires, we examined local residents' awareness of and attitudes towards the pygmy hippopotamus along the Moa River near Tiwai Island Wildlife Sanctuary in Sierra Leone. The interviews and questionnaires addressed human-hippopotamusinteractions, local knowledge and awareness of pygmy hippopotamus ecology and behaviour, and public attitudes towards hippopotamus conservation. Overall, 22% of questionnaire respondents acknowledged benefits related to hippopotamusconservation; factors affecting the perception of benefits included age, livestock ownership, distance from Tiwai Island and exposure to conservation programmes. The results of this study could be used to inform the conservation of the pygmyhippopotamus and highlight the critical role of local support in the management of threatened species in biodiversity hotspots.

Different Sex Allocations in Two Related Species: The Case of the Extant Hippopotamus
Pluhacek J Jan, Steck BL.
ETHOLOGY Volumen: 121 Número: 5 Páginas: 462-471 Fecha de publicación:MAY 2015

Social and reproductive systems remain among the main predictors affecting mammalian birth sex ratio. The two extant hippopotamus species differ in their social and reproductive systems. While common hippopotamus (*Hippopotamus amphibius*) form herds and tend to be polygynous, solitary living pygmyhippopotamus (*Choeropsis liberiensis*) are promiscuous. Although it is one of the most studied topics, only few empirical studies using large sample sizes have reported distorted birth sex ratio. We examined the birth sex ratio in bothhippopotamus species using

international studbooks including large data sets exceeding a thousand individuals (1138 for common hippopotamus and 1161 for pygmy ones). In both species, the birth sex ratio differed from 1:1. Whereas more males than females were recorded in common hippopotamus (53.9% males), the opposite was found in pygmy hippopotamus (41.5% males). We also found that the birth sex ratio was affected by individual dams in common hippopotamus, and by individual sires in pygmy hippopotamus. The most plausible explanation for differentially skewed birth sex ratios in both species may be related to differences in social and reproductive systems. Whereas the polygynous, sexually dimorphic common hippopotamus biased the birth sex ratio towards males, the promiscuous and sexually monomorphic pygmy hippopotamus skewed the sex ratio in favour of females. Our results are in line with recent studies showing that not only manipulation by the mother (in common hippopotamus), but also by the father (in pygmy hippopotamus), may be responsible for the birth sex ratio in different species.

Hunting and trading bushmeat in the Kilombero Valley, Tanzania: motivations, cost-benefit ratios and meat prices
Nielsen MR, Meilby H
ENVIRONMENTAL CONSERVATION Volumen: 42 Número: 1 Páginas: 61-72 Fecha de publicación: MAR 2015

Bushmeat hunting in the savannah biomes of East Africa is often considered to be subsistence oriented and undertaken as a gap-filler in the lean agricultural season. The price of bushmeat is furthermore often thought uniform regardless of species, but if hunting is commercially oriented and price premiums are paid for particular species this needs to be considered. This paper investigates these issues in the Kilombero Valley of Tanzania, based on one year of market data and interviews with 80 hunters, 169 traders and 67 retailers. Motivations were overwhelmingly commercial and the bushmeat trade constituted a year-round income generating activity. Monte Carlo simulations based on the deterrence model revealed average cost-benefit ratios of 0.15-0.43 for hunters, 0.56-0.62 for traders and 0.88 for retailers, and a 12-401 fold increase in likelihood of apprehension may be required to render the trade unprofitable. Willingness-to-pay data showed that elephant, buffalo, hippopotamus, puku, bushpig and warthog meat were preferred. Enhanced enforcement may thus drive prices for these species higher, encouraging hunters to seek ways around constraints. Community-based wildlife management and improved firearms control may be the most pragmatic ways to regulate the trade.

Carbon stable isotopes suggest that hippopotamus-vectored nutrients subsidize aquatic consumers in an East African river
McCauley DJ, Dawson TE, Power M et al..
ECOSPHERE Volumen: 6 Número: 4 Número de artículo: 52 Fecha de publicación: APR 2015

The common hippopotamus, *Hippopotamus amphibius*, transports millions of tons of organic matter annually from its terrestrial feeding grounds into aquatic habitats. We evaluated whether carbon stable isotopes (delta C-13) can be used as tracers for determining whether H. amphibius-


vectored allochthonous material is utilized by aquatic consumers. Two approaches were employed to make this determination: (1) lab-based feeding trials where omnivorous river fish were fed a H. amphibius dung diet and (2) field sampling of fish and aquatic insects in pools with and without *H. amphibius*. Lab trials revealed that fish fed exclusively *H. amphibius* dung exhibited significantly more positive delta C-13 values than fish not fed dung. Fish and aquatic insects sampled in a river pool used for decades by H. amphibius also exhibited more positive delta C-13 values at the end of the dry season than fish and insects sampled from an upstream *H. amphibius*-free reference pool. Fish sampled in these same pools at the end of the wet season (high flow) showed no significant differences in delta C-13 values, suggesting that higher flows reduced retention and use of H. amphibius subsidies. These data provide preliminary evidence that delta C-13 values may be useful, in certain contexts, for quantifying the importance *H. amphibius* organic matter.

The IUCN/SSC Wild Pigs, Peccaries and Hippos Specialist Groups (WPSG, PSG and HSG) are three of several Specialist Groups of the Species Survival Commission (SSC) developed by the IUCN to foster conservation, research and dissemination of information for species of conservation concern.

These groups consist of technical experts focusing on the conservation and management of wild pigs, peccaries and hippos.

The broad aim of the these groups is to promote the long-term conservation of wild pigs, peccaries and hippos and, where pos-sible, 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.