

The crested porcupine, *Hystrix cristata* L., 1758, in Italy

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ABSTRACT

In this paper the evidence for the introduction of the crested porcupine (*Hystrix cristata* L. 1758) in Italy is reviewed and hypotheses concerning the timing and modalities of this event are brought forward. The crested porcupine current distribution outside Africa is limited to Sicily and the Italian Peninsula. Palaeontological data indicate that porcupines were present in Italy and other parts of Europe in the Pleistocene (possibly up to the early Holocene), but there is now broad consensus that these belonged to different species, now extinct. Apart from some unreliable prehistoric finds, there is no evidence that porcupines occurred again in Italy and the rest of Europe before historic times. This led many authors to suggest that the Romans may have been responsible for the introduction of the species in Italy, but such assumption was largely speculative. The available evidence in fact indicates that the crested porcupine does not occur in Italy before late Antique or even early medieval times and that it never spread in Europe beyond the Italian Peninsula (and Sicily). The long chronological gap existing between

KEYWORDS

Porcupine,
Italy,
Sicily,
fossils,
zooarchaeology,
introduction,
Romans,
late Antiquity.

Pleistocene and late Holocene specimens strongly suggests that the presence of the species in historic times in Italy is the result of a human-induced introduction. Variations in the morphometric and genetic characteristics of current porcupine populations in Italy and differences in the timing of the introduction between different regions suggest that the species was probably introduced as a consequence of multiple events.

RÉSUMÉ

*Le porc-épic à crête, *Hystrix cristata* L., 1758, en Italie*

Cet article met en évidence l'introduction du porc-épic à crête (*Hystrix cristata* L., 1758) en Italie et avance des hypothèses au sujet de la chronologie et des modalités de cette insertion. La répartition actuelle du porc-épic à crête en dehors de l'Afrique est limitée à la Sicile et à la Péninsule italienne. Les données paléontologiques indiquent que les porcs-épics étaient présents en l'Italie et dans d'autres parties de l'Europe au Pléistocène (probablement jusqu'à l'Holocène récent), mais tout le monde s'accorde à dire que ces espèces sont, à présent, éteintes. Mises à part quelques découvertes préhistoriques non authentifiées, il n'existe aucune preuve que les porcs-épics furent présents en l'Italie et dans le reste de l'Europe avant les périodes historiques. Ceci a amené de nombreux d'auteurs à suggérer que les Romains puissent avoir été responsables de l'introduction de ces espèces en Italie, mais cela reste largement spéculatif. En fait, les éléments à notre disposition indiquent que le porc-épic à crête n'est pas présent en Italie avant l'Antiquité tardive voire au début de la période médiévale et qu'il ne s'est jamais étendu en Europe au-delà de la Péninsule italienne (et de la Sicile). Le grand espace chronologique existant entre les spécimens du Pléistocène et de l'Holocène tardif suggère fortement que la présence de l'espèce durant les périodes historiques en Italie a été le résultat d'une introduction humaine volontaire. Les variations des caractéristiques morphométriques et génétiques des populations actuelles de porcs-épics en Italie et une chronologie différente de l'introduction de l'espèce selon régions incitent à penser que celle-ci a probablement été introduite à la suite d'événements multiples.

MOTS CLÉS

Porc-épic,
Italie,
Sicile,
fossiles,
archéozoologie,
introduction d'espèce,
Romains,
Antiquité tardive.

CURRENT DISTRIBUTION

The crested porcupine *Hystrix cristata* L., 1758, is currently present as a wild form in Italy, but its status as a genuine representative of the native European fauna is questionable and requires investigation. This rodent currently occurs in most of northern Africa and in Sub-Saharan Africa from Senegal to Ethiopia, up to northern Tanzania (Cabrera 1932; Corbet & Jones 1965; Ranck 1968; Smit & Wijngaarden 1981; Niethammer 1982). Its European distribution is limited to peninsular Italy, Sicily and the island of Elba (Lovari 1993;

Masseti 2008, 2009a) (Fig. 1). This last occurrence is the result of very recent introductions, probably dating to the first half of the 1980s (De Marinis *et al.* 1996). Despite what has been suggested by several authors (Wettstein 1942; Brink 1969; Corbet 1978; Honacki *et al.* 1982; Burton & Pearson 1987; Cheylan 1988), the species has never occurred in the Ionian and Aegean islands, the Balkans or the Iberian Peninsula in the Holocene, even in the very recent past. This erroneous suggestion has, however, become embedded in the literature to the point that even recently Gisbert *et al.* (2002) and Woods and Kilpatrick (2005) have

suggested a European distribution of the crested porcupine that extends beyond Italy, to Albania and northern Greece. Wettstein (1942) observed that local people referred to the presence of porcupines also on the Eastern Aegean islands of Icaria and Lesbos, but he added that this might have been the result of confusion with the hedgehog. The Greek term used to indicate this latter species is *skanzohiros*, which means 'spiny pig', which might easily have given rise to the confusion with the English 'porcupine' (the Italian "porcospino" and/or the French "porc-épic"). All these reports have given rise to several unproven beliefs which still persist. Cheylan (1988), for example, still erroneously quotes the occurrence of *Hystrix cristata* on the Eastern Aegean islands of Lesbos, Icaria and Rhodes, and Sarà (1998) that of the same species on Samos and Rhodes.

It is also worth mentioning that the crested porcupine currently occurs also off the north-western Libyan coast, on the island of Farwa (Bashir 2009). In addition, the Indian crested porcupine, *H. indica* Kerr, 1792, is found on the Turkish islet of Domuz, in the gulf of Fethiye, as part of a fauna almost entirely comprised of anthropochorous species. The latter is the species of porcupine occurring in Asia Minor and the Middle East (cf. Corbet & Jones 1965; Woods & Kilpatrick 2005). Since porcupines are not competent swimmers, it is fairly certain that they were brought to these islands by people, which indicates a propensity by humans to transport these animals. An additional consideration is that both islands occur within the boundaries of Islamic countries, which raises the possibility of a special interest in the species by people with these cultural and religious backgrounds.

STATE OF THE ART

The suggestion that the porcupine was introduced into Italy from Barbary (*i.e.* North Africa) had already been raised by the late 18th C (Minà Palumbo 1868). At about the same time Cornalia (1871-72) also claimed that the animal had been introduced from Africa, and he also specified that the species had not expanded beyond the regions of Calabria and Abruzzo. Early in the 20th C, Miller (1912)

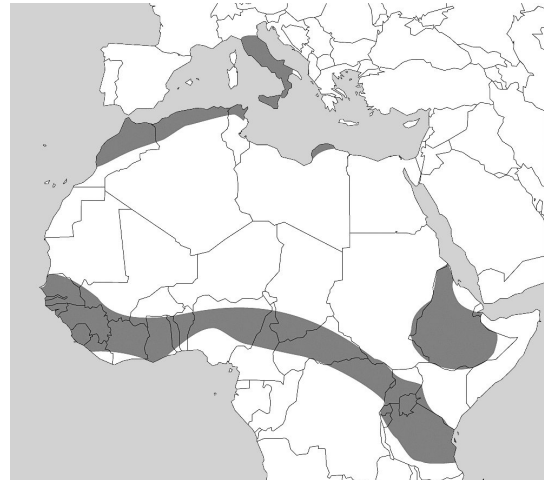


FIG. 1. — Current distribution of the crested porcupine *Hystrix cristata* Linnaeus, 1758. Modified from the IUCN Red List of threatened species (<http://www.iucnredlist.org/apps/redlist/details/10746/0>) (prepared by Angela Trentacoste).

further remarked that the limited geographic distribution of the species in Europe could be the result of an artificial introduction. Brehm (1916) also thought that the origins of this rodent had to be found in North Africa, and that the Romans were responsible for its introduction into Italy. This suggestion eventually became common place in the literature, but was never fully explained or indeed disproved, and many later authors, such as Ghigi (1959), Niethammer (1963, 1982), Corbet & Jones (1965), Toschi (1965), Brink (1969), Kingdom (1974), Pratesi and Tassi (1974), Corbet (1978) and Santini (1980) have dogmatically accepted it. Such widespread consensus is surprising if we consider that nobody so far has been able to indicate the time and place of such hypothetical introduction, or attribute it to specific people or events (Masseti 2008). Orsomando and Pedrotti (1976) remarked at the time that there was neither palaeontological or archaeozoological evidence that allowed us to suggest with any certainty an introduction of the crested porcupine in Italy in Roman times. In this respect it may be worth pointing out the absence of the porcupine in both the iconography and the archaeology of Pompeii, despite the attested occurrence of a large variety of animal species, many of them exotic

(see King 2002). In addition, in his *Naturalis Historia* (VIII, 125), Pliny the Elder claims that “*Hystrices generat India et Africa*” [porcupines occur in India and Africa], which indicates that he had no knowledge of their existence in Italy. The hypothesis that the porcupine may have been introduced by the Phoenicians (as claimed by Trucchi & Sbordoni 2007) is also completely unfounded. This people have often — but arbitrarily — been made responsible for the movement of several other animal species outside their natural distribution (Masseti 1996, 2008).

ARCHAEOLOGICAL AND PALAEOONTOLOGICAL EVIDENCE – PREHISTORY

According to Riquelme Cantal and Morales Muñoz (1997), there is no occurrence of the crested porcupine in Europe before historic times, and even then, no evidence of its presence outside Italy, but they are, of course, referring to the Holocene. Several archaeological sites, dated to the Middle and Upper Pleistocene and ranging from the Lessini Mountains in north-eastern Italy to Sicily, have attested the occurrence of porcupines in the past of Italy. Bartolomei (1969, 1980) regards the genus *Hystrix* to be characteristic of the Interglacial periods in central Europe. Palaeontological data from continental Italy indicate the occurrence of these rodents in the Upper Pleistocene, though no further chronologically definition could be provided (Esu & Kotsakis 1986). An odd discovery is represented by the occurrence of animal bones that are thought to have been gnawed by porcupines at the Neolithic site of Grotta Zachito in Campania (Regalia 1903). In view of the identification of other unlikely species, such as camel and rat, at this site, this finding must, however, be treated sceptically.

Amori and Angelici (1992, 1999) have suggested that in the Upper Pleistocene *H. cristata* occurred in the Central and Eastern Mediterranean (Italy and Balkans) but periodically expanded into Central Europe. The same authors believe that the current absence of the species in the Balkans may be the result of a recent extinction. This is, however, almost

certainly based on a misunderstanding of the palaeontological evidence, as there are no reliable European records of porcupines between the early Holocene and early historic times (Riquelme Cantal & Morales Muñoz 1997). As Kurtèn (1968) had already remarked at the time, the crested porcupine currently living in Italy is unlikely to be at all related with the Pleistocene animals. To provide support for this hypothesis there is the consideration that almost all findings of Pleistocene porcupines from continental Italy and Sicily have recently been regarded as contamination from upper layers or re-identified as different species of the genus *Hystrix*, such as *H. refossa* Gervais, 1852, and/or *H. vinogradovi* Argyropulo, 1941 (Kotsakis *et al.* 2003; Bonfiglio *et al.* 2004; Salari & Sardella 2008, 2009; Masseti 2008). In previous years Rustioni *et al.* (1999) had already identified a porcupine right mandible from Monte Tignoso (Northern Apennines) as a likely *H. vinogradovi*. *H. refossa* is a larger species and has been attested in Europe since the Upper Pliocene, but, like *H. vinogradovi*, was still present in the Pleistocene (Weers 1994, 2005).

THE SICILIAN CASE

As in the rest of Italy, in Sicily the genus *Hystrix* was present in the Upper Pleistocene but seems to disappear in the early Holocene (Kotsakis 1979; Burgio & Di Patti 1990; Burgio 1997; Burgio *et al.* 2002, 2005). In Eastern Sicily porcupine remains have been found at the San Teodoro Cave (Acquedolci, Messina) (Anca 1860a, 1860b). More findings derive from the early Holocene of Grotticella di Porto Palo (Villari 1995), and these probably represent the latest known occurrence of a representative of this genus in Sicily before historic times. Of interest is the absence of porcupine remains from the Upper Pleistocene and early Holocene levels of Uzzo Cave (Tagliacozzo 1993), one of the most carefully investigated animal remain assemblages from Sicily. If we accept that the genus *Hystrix* became extinct on the island in the early Holocene, then it follows that the current occurrence of the crested porcupine must be a consequence of an introduction (Burgio *et al.* 2005), almost certainly caused by humans.

The analysis of the documentary evidence may help in clarifying this issue. According to the Persian traveller Zakariâ ibn Muhammad ibn Mahmûd, al-Qazwîni, in 13th C Sicily there were no animals that "... attacked humans using teeth, claws or quills" (cf. Ruta 2007). It is only centuries later, in 1743, that the erudite Antonino Mongitore (1663-1743) writes that in the Sicily of his times there were three different kinds of swines: "[...] *domestici, che si nudriscono nella città e nelle campagne, intiere mandrie, per vendersi in nutrimento degli abitatori; selvaggi, detti cignali: e questi sono diletto dei cacciatori, de' quali fa menzione Fazello; e spinosi, armati di spine, che scagliano contro quei, che intendono d'accostarsi per molestarli, ed ucciderli [...]*" [domestic, whose herds feed in town and country, and are then sold for food; wild, also known as wild boar: these are the entertainment of the hunters mentioned by Fazello; and prickly, which have quills as weapons, which they throw against those who mean to bother or kill them [...]], finally making a clear reference to the presence of the porcupine. The occurrence of the crested porcupine in Sicily was later attested by other authors, such as Ghisio (1779) and Ortolani and Rafinesque Schmaltz (1810).

DOCUMENTARY AND ICONOGRAPHIC EVIDENCE

Well before Minà Palumbo (1868), Cornalia (1871-72), Miller (1912) and Brehm (1916), other authors had suggested that the crested porcupine was not a native species in Europe. Among these, the first modern author was Georgius Agricola (1490-1555) — in the world Georg Bauer — who, following up from the passage by Pliny the Elder already referred to, remarked in his *De Animantibus Subterraneis* [On Underground Animals] published in Basel in 1548, that: "*L'India e l'Africa produce quest'animale, e poco ha che fra noi ne fu portato uno*" [India and Africa have got this animal, and recently one has been brought to us]. It is noteworthy that this 16th C author, in line with the scientific knowledge of the time, did not make any distinction between the species *H. cristata*, living in Italy and most of Africa, and the already mentioned Indian crested porcupine. In a posthumous edition of the

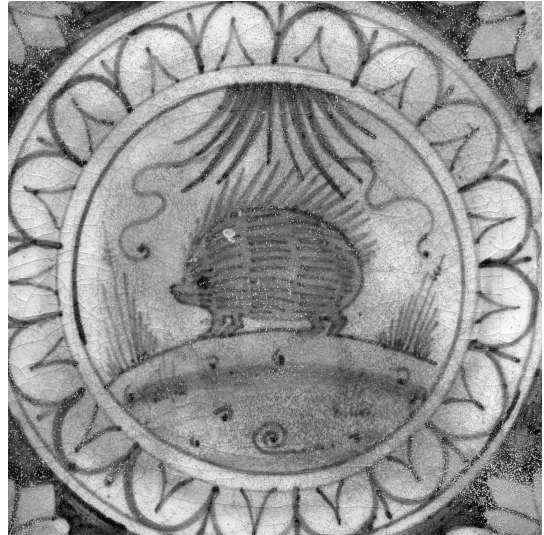


FIG. 2. — Early 16th C tile from Faenza (Ravenna, north-central Italy), with the representation of a crested porcupine (Florence, private collection).

work of Agricola, published in 1614, the introduction of the porcupine into Europe is suggested to have occurred at the time the book was written (Cabrera 1932). According to Agricola, therefore, the introduction of the species represented a relatively late phenomenon, probably of the 16th C or only slightly earlier. This view was later accepted by several other authors (e.g. Buffon 1766; Lacepède 1830; Costa 1839; Minà Palumbo 1868; Cornalia 1871-1872) who also agreed that the porcupine was an alien species to the European fauna, thus contributing to the current perception of the species. The porcupine is also known from the Italian iconography of the early 16th C (Fig. 2). As a captive animal, the crested porcupine was, according to literary accounts, kept in England, in the menagerie of Henry I (1068-1135) at Woodstock (Plot 1705; Rybot 1972; Ververs 1976; Landsberg 1998), where it could have been supplied by William of Montepellier (Hahn 2003). In France, knowledge of the species is demonstrated by the occurrence of its image in the device of Louis of Orléans (1372-1407), which was a few decades later again used by his grandson, the king Louis XII (1462-1515) (see Hochner 2001) (Fig. 3).

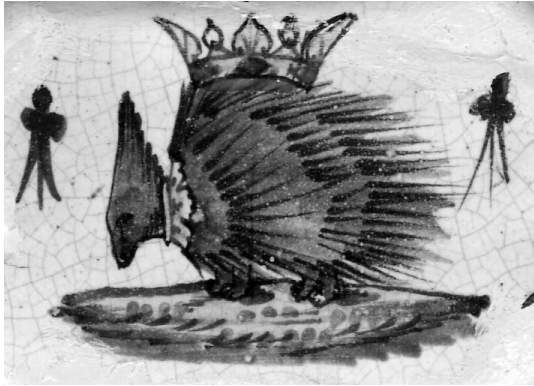


FIG. 3. — The emblem of the porcupine inherited by Louis XII, king of France (1462-1515), from his grandfather, Louis of Orleans (Florence, private collection).

To better understand the influence that the work of Giorgius Agricola had on western thought, it is worth pointing out the existence of two polychrome pictures, attributed to the painter Vincenzo Leonardi

(1590 - after 1646), which have as their subject a crested porcupine and were produced for the 16th C 'paper museum' of Cassiano dal Pozzo (Masetti 2008). Currently one of these pictures is kept at the Royal Library of Windsor Castle, England, while the other belongs to a private collection (Freedberg 2002; Attenborough *et al.* 2007). One picture portrays an adult specimen (Fig. 4), while in the other an ear, the paws, the snout (with a special attention to the representation of the incisors) and some quills are very finely represented (Fig. 5). It is likely that the reproduction of these details did not happen by chance but it can rather be explained by the interest that the animal must have risen in the intellectual circles of the time. They were clearly influenced by the careful description of the crested porcupine that had been provided by Agricola (1548): "... *hora dirò de' l'Histrice... Alcuni de Greci lo chiamano Arathochiron, per ciò che egli ha somiglianza, e forma d'un porcellin di due mesi, & è irsuto, e pien di spine come lo spinoso: la sua testa però ha più somiglianza con la lepre, gl'orecchi*



FIG. 4. — Representation of an adult specimen of crested porcupine attributed to the painter Vincenzo Leonardi (1590 – after 1646), produced for the 16th C "paper museum" of Cassiano dal Pozzo (London, collection Sven Gahlin, NRC CDP 60).

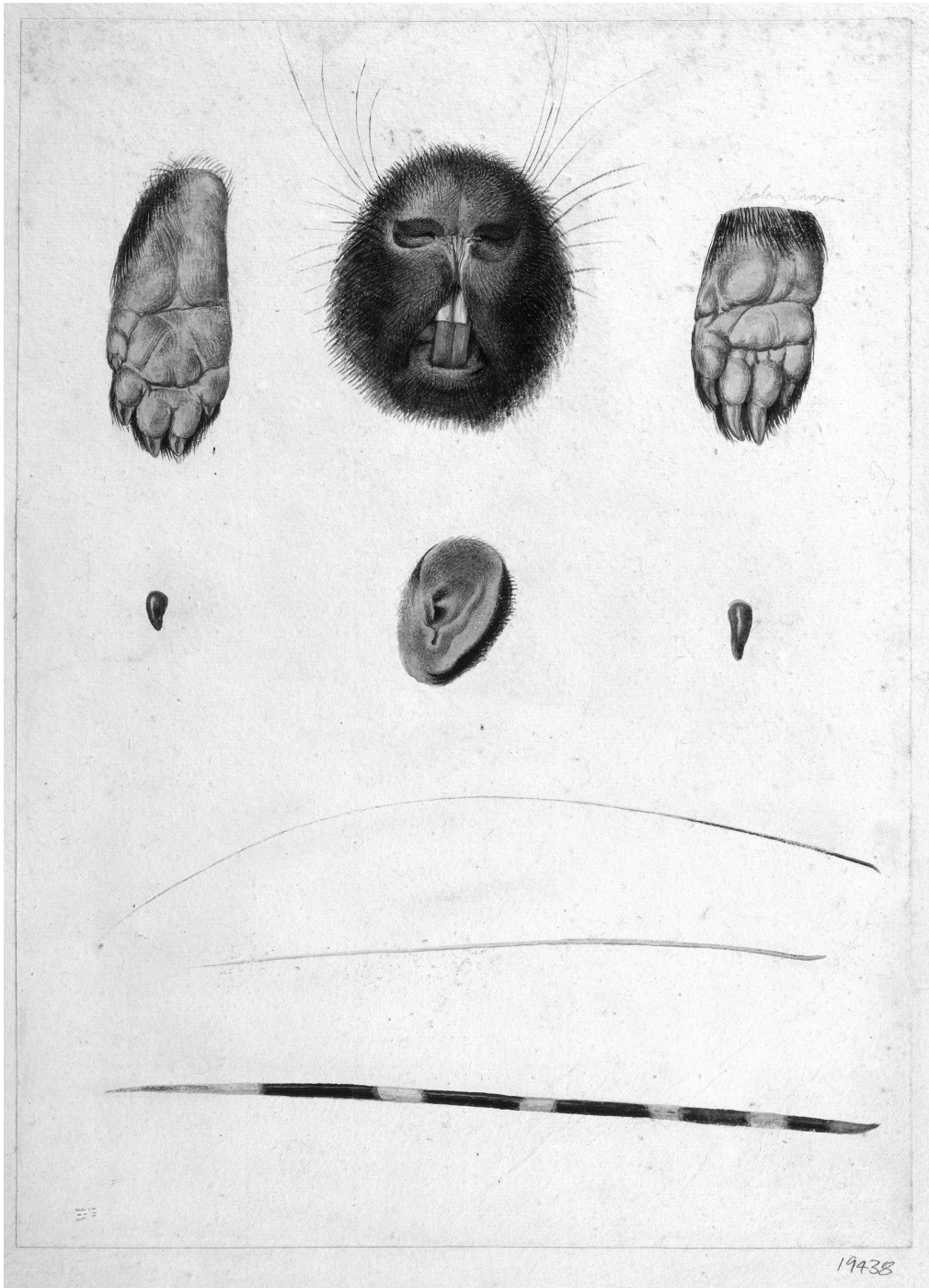


FIG. 5. — Drawing attributed to the painter Vincenzo Leonardi, produced for the “paper museum” of Cassiano dal Pozzo, portraying the ear, the snout with a special attention to the representation of the incisors, and some quills of *H. cristata* (Royal Collection, RL 19438 © 2009 HM Queen Elisabeth II).

a quei de l'huomo, & i piedi a quei de l'orso [...] Le prime spine nascon dal manto del dosso, e da le latora, ma lunghissime l'ha dai lati, e piu di tutte lunghissime son quelle che ha da la parte di sopra di detti lati. Ciascuna di dette spine in parte è nera, & in parte bianca. Lunghie sono due o tre, o quattro palmi, le quali spine quando gli piace, come il pavon la coda, lieva in alto, e dovendo entrar ne la tana l'abbassa, quando provato ad ira, egli si distende la cotenna, e la tira ne la bocca de' gl'abbaianti cani che l'attizzano, e non giungendo con esse i cani, con tanto impeto le tira, ch'èlle si ficcano ne legni. Ha i denti come la lepre, quattro n'ha lunghi, due di sopra, e due di sotto..." [... now I will tell of the porcupine [...]] some Greeks call it Arathochiron, for what it resembles, it has the shape of a two month piglet, it is hirsute and full of quills: its head, however, resembles more a hare, its ears a human, and its feet a bear [...]. The first quills come out from the back, but they are very long on the sides, particularly in the upper part. The quills are black and white. They are between two and four hands long, and can be raised, like the feathers of the peacock tail, but when the animal enters its den they are lowered. When it is threatened the porcupine can raise its quills and throw them towards the mouth of barking dogs that chase it. If it misses its target the quills are still expelled with such energy that they thrust themselves in wood. Its teeth are like hare's, four of them are long, two in the upper and two in the lower jaw...]. The belief that porcupines could throw their quills can already be found in the treatise *Sulla Caccia* [On Hunting] by Oppiano di Apamea (III, 391-406). This is an entirely fantastic belief, not at all supported by scientific observations. Among others, Pseudo-Aristotle (623a), Aristotle (*De Natura animalium*, IX, 39, 7), Pliny the Elder (*Naturalis Historia*, VIII, 125), Aelian (*De Nat. Anim.*, 31), Claudian (*De hystrice*, 17) and Isidore of Seville (XII, 2, 35), all contributed to this conviction, which is in fact still held in large parts of the rural world. This myth is also attested in the popular English tradition of the 12th C AD. William of Malmesbury (c. 1080/1095-c. 1143) describes the porcupine as a wild beast, which is: "... hispidis setis coopertam, quas in Canes insectantes naturaliter emittunt" [covered in quills, which are instinctively thrown against chasing dogs] (Plot 1705).

ARCHAEOLOGICAL EVIDENCE – HISTORICAL PERIOD

The archaeological evidence confirms Agricola's observations that the porcupine had already been introduced into Italy by the 16th C, and in fact points out to an earlier occurrence. Modern zooarchaeological research has documented the certain presence of the species at Settefinestre (Grosseto) (King *et al.* 1985), Farnese (Viterbo) (Wilkins 1991; Colonnelli & De Grossi Mazzorin 2000) and Formello (Rome) (Minniti 2005). In all three sites the earliest occurrence of the porcupine can be dated to a period broadly encompassing the 15th and 16th C. At Settefinestre several remains of the animal were found in destruction and re-occupation levels dated from the 15th C onwards, whereas at Farnese and Formello the bones of the porcupine occurred in urban wells used as dumps. The species has also turned up in mid 16th to mid 17th C levels of the urban site of San Salvo (Chieti, Abruzzo) (De Grossi Mazzorin & De Venuto 2006). Much earlier remains derive from the baptistery of Santa Cecilia (12th-13th C AD) (De Grossi Mazzorin & Minniti 2004) and, particularly, the *Crypta Balbi* exedra (from both 7th and 8th C AD), both in Rome (De Grossi Mazzorin & Minniti 2001; Minniti 2005). Outside Rome two medieval porcupine remains — one dated to the 9th-mid 13th C AD and the other to 1350-1415 AD — were found at Cencelle (Civitavecchia), in northern Latium (Minniti 2009). It must also be mentioned that a 7th C AD fragment of distal humerus from the *Crypta Balbi* has clear cut marks (Fig. 6), indicating the exploitation of this species by humans, probably as food. Other porcupine remains derive from the late Roman site of San Giovanni di Ruoti in Basilicata (MacKinnon 2002) and these have been dated through cal C¹⁴ analysis to 560-720 AD (94,2% probability) (Small 2005), and are therefore approximately contemporary with the specimens from the *Crypta Balbi*. A few years ago we also identified some teeth, cranial and postcranial bones (representing at least one adult and one juvenile) in an Iron Age context at Capanna Pelli (Cavallino, Lecce) (Fig. 7) (a discovery mentioned by Riquelme Cantal & Morales Muñoz 1997). Subsequently, however, these remains were dated to a later period,

according to a cal C¹⁴ analysis which attributed them to 770-980 AD (95,4% probability, CeDAD Laboratory of the University of Salento) (Fig. 8). Their occurrence in an apparently earlier context at Capanna Pelli may be explained with the burrowing habits of this species. On the basis of the evidence illustrated above the remains of San Giovanni di Ruoti and *Crypta Balbi* therefore represent the earliest evidence of the post-glacial presence of the porcupine in Italy that is currently available (Masetti 2008). On this basis De Grossi Mazzorin and Minniti (2001) and Minniti (2005) concluded that the most likely hypothesis is that the species was introduced into Italy between Late Antiquity and the early Middle Ages. The evidence presented in this paper confirms such suggestion and also indicates an element of likely chronological continuity between the late Roman and late medieval animals (see Fig. 9 for distribution map of sites mentioned in this section).

THE HISTORICAL CONTEXT

The introduction of the crested porcupine in this period makes sense when we look at the more general historical context. In Late Antiquity and for most of the early Middle Ages there was an increase in trade between North Africa, the Italian Peninsula and Sicily (Amari 1935; Brown 1989; Bresc 2003; Gioia & D'Angelo 2007), which is also attested by the abundance of pottery of African origin that has been found, for instance, at the *Crypta Balbi* in Rome (Saguì 2001). Exotic animals, such as the dromedary (*Camelus dromedarius* L. 1758) are also commonly found in these periods (Wilkens 2003; De Grossi Mazzorin 2006). The introduction of exotic species is likely to have occurred, at least in some cases, for pharmaceutical reasons as is for instance the case for the remains of catfish of the family Clariidae, found in Rome in the area of the *Tenuta di Vallerano* and *Passaggio di Commodo* in the Flavian Amphitheatre (De Grossi Mazzorin *et al.* 2005). The porcupine is also described by Pliny the Elder as having been used pharmaceutically. In particular he claims that it was useful in dealing with diseases of the scalp: "*Alopecias cinis e murium capitibus caudique et totius muris emendat,*



FIG. 6. — Porcupine distal humerus with cut marks from the *Crypta Balbi* exedra, Rome (7th C AD) (photo by Jacopo De Grossi Mazzorin).

praecipue si veneficio acciderit haec iniuria, item irenacei cinis cum melle aut corium combustum cum pice liquida. Caput quidem eius ustum per se etiam cicatricibus pilos reddit, alopecias autem in ea curatione praeparari oportet novacula; ex sinapi quidam et aceto uti maluerunt. Quae de irenaceo dicentur, omnia tanto magis valebunt in hystrice" [The ashes of the head, tail and in fact the whole body of the mouse can be used to treat alopecia, especially when the problem was generated by somebody having being bewitched; another remedy is represented by mixing hedgehog ashes with honey, or its calcined skin with liquified pitch. The burnt head of a hedgehog, used on its own, also allows the re-growth of hair on scars, but to do so it is necessary to shave the hairless areas fully with a razor; some like to



FIG. 7. — Porcupine skull from Capanna Pelli (Cavallino, Lecce) (8th-9th C AD). Dorsal and ventral views of two fragments belonging to the same specimen (photo by Jacopo De Grossi Mazzorin).

add mustard or vinegar. All the properties of the hedgehog also apply to the porcupine, and in fact even more so] (*Nat. Hist.*, XXIX, 107). Another use was in taking care of the oral area (*Nat. Hist.*, XXX, 27): “*Pinna vulturis si scalpantur dentes,*

acidum halitum faciunt. Hoc idem hystricis spina fecisse ad firmitatem pertinet” [Teeth scratched with a vulture feather generate a bad breath but if the same is done with a porcupine quill, this consolidates the teeth]. Finally the porcupine was used to

prevent premature births (*Nat. Hist.*, XXX, 123): “*Partus conceptos hystricum cinis potus continent...*” [porcupine ashes used in a potion keep the foetus in the uterus].

DISCUSSION

Although we can now — on the basis of recent archaeological findings — for the first time identify the approximate period of the introduction of the porcupine to Italy, it is still difficult to attribute this introduction to a specific historic event. We cannot rule out the possibility that this was caused by migrating tribes in Late Antiquity, but these are unlikely to have been the Vandals or the Arabs as literary sources, such as the already mentioned al-Qazwīnī, state that porcupines were still unknown in 13th C Sicily, and therefore that the introduction into the island occurred at a later date.

Recent genetic analysis seems to confirm the suggestion of a relatively recent history of the Italian porcupine, as indicated by a low and simplified level of genetic variability of the populations living in this country (Trucchi & Sbordoni 2007). In addition, research on cranial morphometric variability undertaken by Angelici *et al.* (2003), has raised the suggestion that the porcupines living in continental Italy have characteristics that are distinct from the animals living in Sicily and North Africa, which, conversely, seem to be related to each other. We must, however, not ignore the possibility of a ‘founder effect’, which may be at the origin of the loss of heterozygosis of the Sicilian population. Nevertheless, Angelici *et al.* (2003) believe that the morphometric differences between the Italian continental porcupines on the one hand and the Sicilian and African ones on the other are too large to have developed in the last few millennia. If this is the case we should therefore conclude that the introduction of the porcupine into Italy occurred as part of two or more independent events, whose geographic origins were also different, at least as far Sicily and continental Italy are concerned. Although it has now been proven that the species was present in continental Italy at least from late Antique/early medieval times, we cannot be sure that this

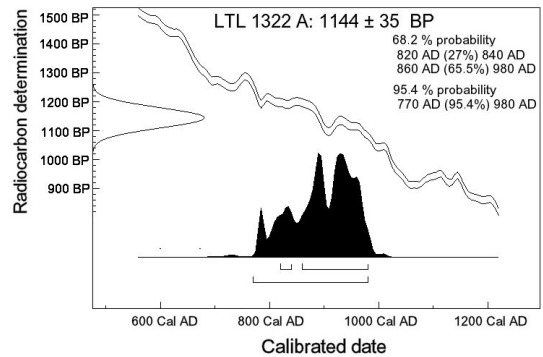


Fig. 8. — Capanna Pelli (Cavallino, Lecce): calibrated C¹⁴ curve, which attributes the porcupine remains to 770–980 AD (95.4% probability, CeDAD Laboratory of the University of Salento).

occurrence amounts to a genuine introduction of the species in the Italian countryside with stable and self-sufficient populations.

More recent genetic work by Trucchi and Sbordoni (2009) supports the morphological evidence and implies that the Italian porcupine is characterised by a more complex pattern than a simple demographic exponential growth from a single propagule. The attempted correlation between the molecular clock and the archaeo-historical evidence proposed by Trucchi and Sbordoni (2009) is far less convincing. They suggest that the porcupine was introduced sometime between the early colonisation of Sicily by the Phoenicians and the first continental sub-fossil record that, citing Angelici *et al.* (2003), they consider to be a specimen from Basilicata dated to c. 1,500 years BP. There are several problems with this assumption, one of which concerns the date of the early Phoenician colonisation of Sicily, which was regarded by Trucchi and Sbordoni (2009), citing Leighton (1999), as having occurred c. 2,500 BP, when it should in fact be dated to several centuries earlier, between the 13th and 11th C BC (Tusa 1973; Camerata Scovazzo 2000). In addition, Trucchi and Sbordoni (2009) are incorrect in citing Angelici *et al.* (2003) in reference to the specimen from Basilicata, which these latter authors do not mention at all in their work. The nature of this find from Basilicata is therefore doubtful, though it seems reasonable to assume that they are referring to the above mentioned

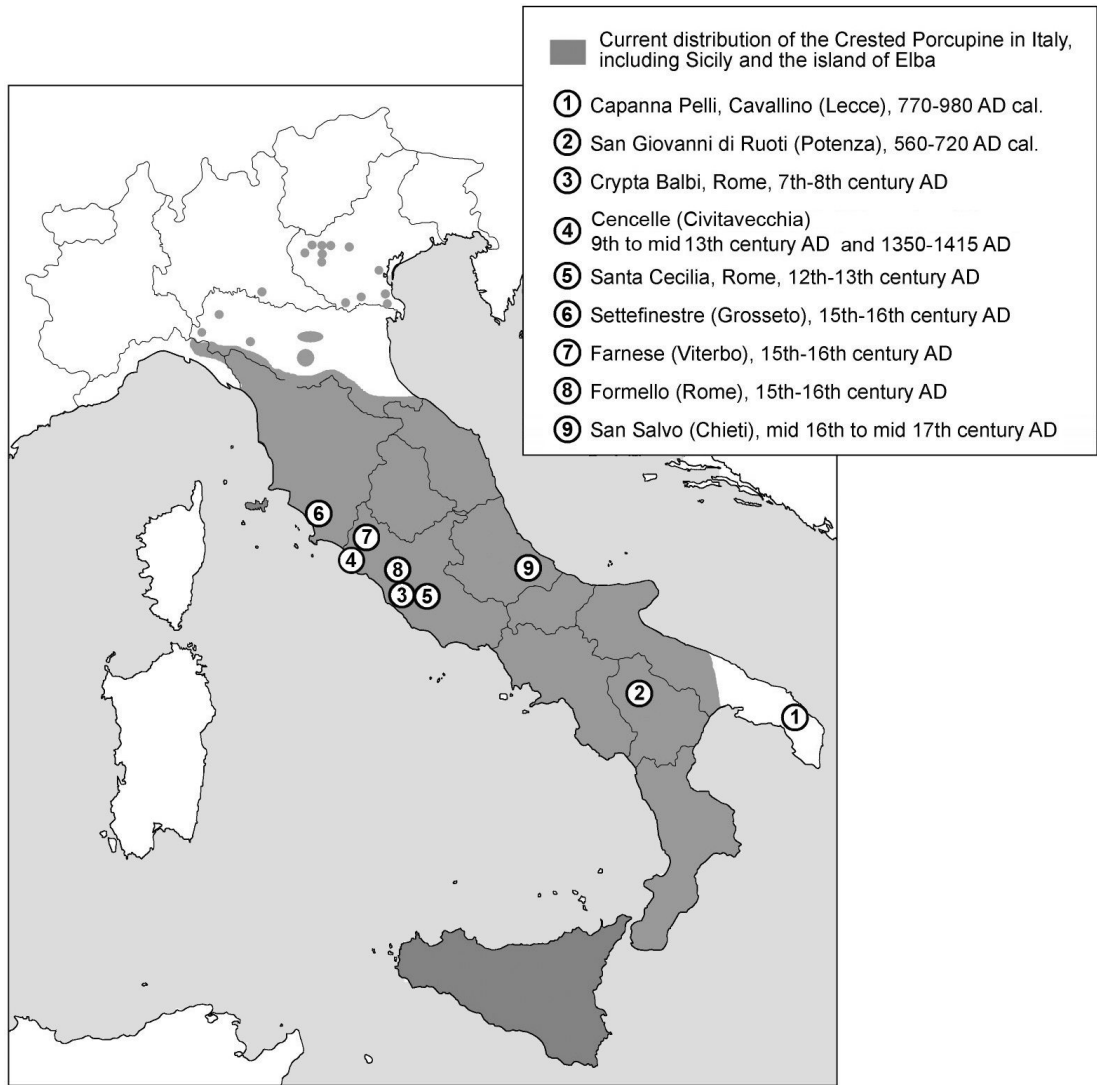


FIG. 9. — Location of Italian post-glacial archaeological sites, which have produced remains of *Hystrix cristata* Linnaeus, 1758 (modified from Masseti 2008) (prepared by Marco Masseti).

porcupine specimen from San Giovanni di Ruoti, whose dating (Small 2005) was published two years after the work by Angelici *et al.* (2003), and therefore could not have been mentioned by these latter. Rather odd, and inconsistent with the timeframe they suggest elsewhere in the paper, is also the suggestion by Trucchi and Sbordonì (2009) that Pliny the Elder's words (*Naturalis historia* VIII, 53), indicate that the species was not introduced into Italy

before the late Roman Empire. Although this suggestion is consistent with our evidence, it certainly cannot be based on Pliny, whose work dates back to 79 AD, therefore much earlier than the late Roman Empire. It is also hard to understand why they regard the crested porcupine to be at the same time an invasive species on the one hand, and a game species, which could have also been kept as an exotic ornament "in rich Roman country

homes” (Trucchi & Sbordoni 2009, 6) on the other. Definitely unlikely is also the suggestion that the porcupine could have been used as a circus animal.

In general it seems that Trucchi and Sbordoni (2009) have tried to adapt the notoriously wayward evidence of the molecular clock to an archaeo-historical context that they have insufficiently researched and inconsistently adopted. This seems to fit with a general trend towards accepting the genetic evidence uncritically and without sufficient care in integrating it with the results of other lines of investigation (see Masseti 2009b).

CONCLUDING REMARKS

In conclusion, historical and archaeological evidence point out to an initial introduction of the crested porcupine in Italy in the Late Antique/early medieval period. Morphological and genetic evidence indicate that there may have been several introduction events, possibly originating from different geographic areas. It is also important to emphasise that, although the chronological continuity of porcupine findings between late Antique and medieval times must not be ignored, we cannot discount the possibility that the crested porcupine only became an integral part of the Italian fauna — with viable and self-sufficient populations — in later times. On the basis of the evidence currently available this seems to be the case in Sicily where we have so far no evidence of the presence of the species before early modern times. Future research will no doubt contribute to provide further details to this intriguing story.

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