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L. Santini
Instituto di Entomologia Agraria dell'Unlversita'degli Studi, Pisa, Italy

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THE HABITS AND INFLUENCE ON THE ENVIRONMENT OF THE OLD WORLD PORCUPINE *Hystrix cristata* L. IN THE NORTHERNMOST PART OF ITS RANGE

L. SANTINI, Instituto di Entomologia Agraria dell'Unlversita'degli Studi, Pisa, Italy.

ABSTRACT: The Crested porcupine (Hystrix cristata L.) has been shown to have considerably increased in numbers, and to have occupied new territories in Tuscany, which is the northernmost part of its range. New data on its ecology and biology, and the negative effects of an excessive density of these rodents on the rural and natural environment are reported. Since this species is protected by law in Italy, because of its high value from the faunistic point of view, some possible techniques, to be improved upon, for the capture and redistribution of live specimens are discussed.

INTRODUCTION

The Crested porcupine (Hystrix cristata L.) was probably introduced into Italy, from Africa, by the Romans (Niethammer 1963). It has always been relentlessly hunted as a delicacy by the human population, so for a long time its lairs were confined to the biggest forests of Central and Southern Italy and this species was included among those threatened with extinction in Europe, by the Council of Europe (Woude 1969).

As far as this country is concerned, it has only been included in the list of protected species since 1974, in view of its interest from this point of view. This, and other factors[1], has meant that the Crested porcupine has since then increased its number and continues to occupy new areas, where it had not been observed in the past.

This fact, although in itself positive, has created some unforeseen negative consequences in the natural and rural environments where this species has recently grown in number. Even though these drawbacks - mostly due to the animal's intense trophic activity - are for the moment confined to limited areas, they cause some new difficulties. Considering the importance this species has for the Italian fauna, problems have to be resolved by using suitable ecological measures and not by the traditional drastic ones, taking advantage of our knowledge of the animal's behavior and biology.

Since data from literature on the subject are very scarce, four years ago, in view of this fact, a long term investigation program was begun[2], to inquire into the various aspects of the biology, ecology and the influence on environment of this rodent in the zones of Central Italy where it is most widely diffused.

This paper put together the first results of field observations carried out in the period between June 1976 and December 1979, and illustrates the first attempts to create rational techniques for the capture of live specimens, to be removed, where necessary, and transferred to other zones of greater receptive capacity.

For some time, a group of four juvenile specimens has been under observation, in a hedged enclosure (30 x 60 in.) created for this purpose in the park next to the Entomological Institute of the University of Pisa. The aim is that of looking into the unknown aspects of trophic and reproductive behavior that are nearly impossible to observe in the natural state.

TAXONOMY

Hystrix cristata L. is an Hystricomorph rodent of the Hystricidae family; this includes about four genus and 20 species of Old World porcupines (Walker 1969), which have the common feature of a spiny cover on the body. According to Corbett and Jones (1965), the species cristata is included in the Hystrix subgenus together with only two other species, very similar to it in appearance: H. indica (Southern and Western Asia) and H. africaeaustralis (East, Central and Southern Africa).

In all the porcupines of the genus Hystrix the structure of the rattle quills in their short tail is shaken (to frighten enemies and, perhaps, in social communication) which produces a loud rattling sound as they strike against one another.

The weight of the Italian forms, which is lower than those from further South, is around 15 kg with a maximum of 18-20 kg.

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[1] In particular the absence of real natural enemies, and the fact that porcupine populations, like those of other rodents, are thought to follow cycles.

[2] Program supported by the National Council for Scientific Research, contract n.78.001539.06.

DISTRIBUTION

The range of H. cristata (see Fig. 1) includes part of Africa, North of the Congo, from Tanzania and upper Egypt to Gambia, along the South of Sahara (Corbett 1966, Kingdon 1974). The species is also present in North-Western Africa, from Morocco to Libya (Bernard 1969) and in Southern Europe, confined to Central and Southern Italy, including Sicily (Toschi 1965) and a *very* small area in the Balkans (Southern Yugoslavia, Albania and Northern Greece) (Brink 1956).

The species is well represented in Italy, although not uniformly distributed (see Fig. 2); it is found along the whole western slope of the peninsula, west of the Apennines, that is to say in Tuscany, Umbria, Latium, Campania and Calabria. It is also frequent in Apulia and Basilicata, and abundant in Sicily.

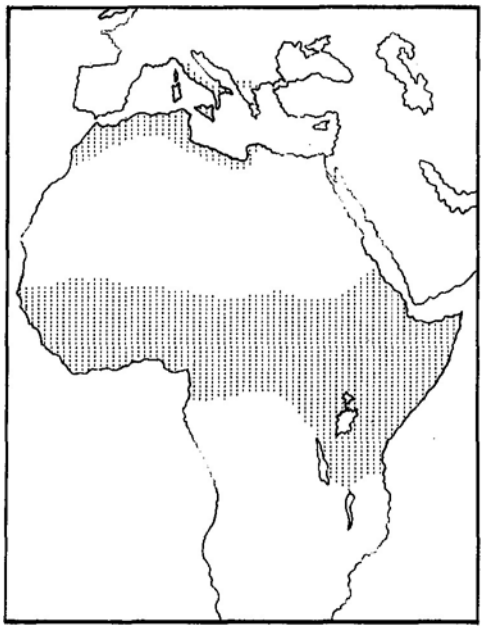

Fig. 1. The range of the Crested porcupine, Hystrix cristata L.

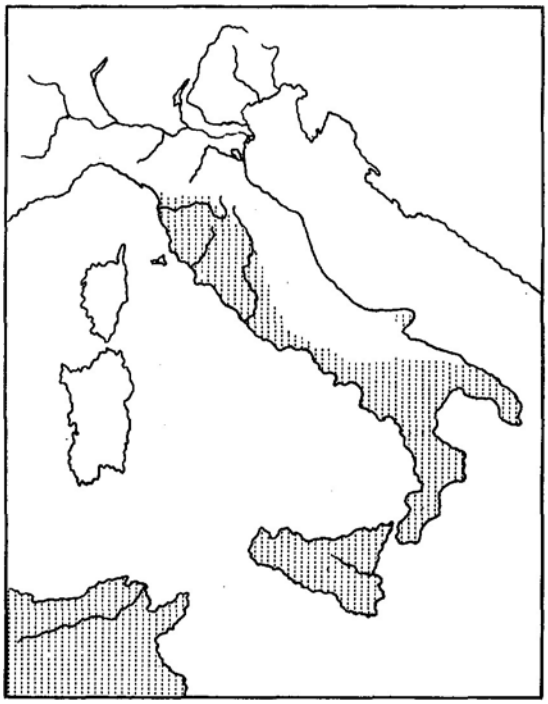

Fig. 2. The range of the Crested porcupine, Hystrix cristata L., in the Italian territory.

According to statements by Tomei and Cavalli (1976) and Tassi (1979), the species is now extending its range northward and eastward, onto other slopes of Central Apennines[3]. Personal, more recent observations, made in the north of Tuscany, confirm this trend. In particular, we can observe the natural tendency of the Crested porcupine penetrating new territories and occupying new biotopes, to the north of the river Arno and westward on the plain near the Tyrrenian Sea.

In the northernmost part of its range, H. cristata is particularly abundant in the hills of the Arno and its tributary valleys. Here the species likes to install itself in tufaceous soils, well exposed and at low altitudes (not more than 600 meters above sea level), where areas of promiscuous cultivations are interspersed with woodlands, and there are many almost inaccessible gorges. This environment has an abundance of those spontaneous herbaceous plants which constitute the porcupine's staple diet. The thick layer of earth here is of a loose consistency, which is ideal for burrowing. This species is, however, able to adapt itself to less promising environments, for instance, coastal woodland and bush, and open cultivated plains. In the latter case, it builds its burrows along the banks of rivers and canals, where vegetation offers adequate cover (see Fig. 3).

BEHAVIOR

Crested porcupines are active throughout the year, and are strictly nocturnal animals. Daylight hours are spent in a den dug out by themselves, or in one made by other animals, such as badgers (Meles meles), which they adapt for their own use. Dens are usually burrowed in sloping ground, which is covered with thick vegetation, and occupied by families of 4-6 members. Entrances are easily seen, but the burrows themselves often reach a length of over 10 meters, terminating in a chamber of little more than a meter in diameter. During hot weather adults may stay outside in daylight hours, lying on the ground under thick undergrowth or piles of hay or straw.

[3]It is interesting to note that Zangheri (1946, l.c.) had reported 35 years ago the capture of an adult specimen of Hystrix cristata L. in the northern part of the Adriatic slope of the Apennines (Romagna).

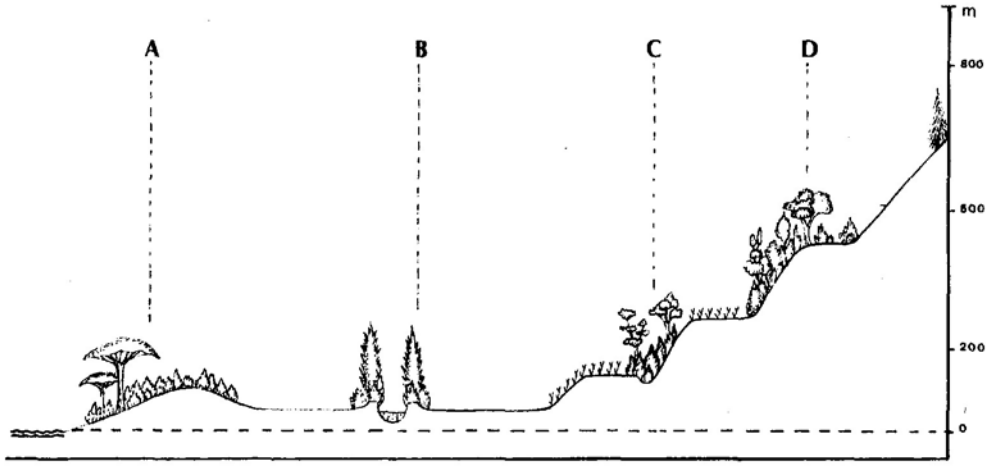

Fig. 3. A diagram indicating the different habitats of Hystrix cristata L. in the northernmost part of its range (Tuscany). A: litoranean forest or bush; B: wooded banks of rivers or channels on cultivated plains; C: wooded gullies on cultivated hillsides; D: woodlands near cultivations or cleared areas.

The Crested porcupine forages singly, except when the young (up 6-8 months) are accompanied by the mother, or both parents, or in the mating season (one male together with one or two females). When foraging, they may cover a distance of over 10-12 km from their lair. Each time they follow the same path and visit the same biotopes. According to recent observations in the litoranean hills of South Tuscany, this animal seems to carry out a sort of real seasonal migration, going further afield, from one territory to another nearby, in search for food and a more hospitable environment.

The species is unable to manage trees and climbs with difficulty over any unevenness.

The Crested porcupine is poliphagous, but strictly vegetarian, with a marked fondness for the hypogeal parts (tap roots, bulbs, tubers and rhizomes) of many wild and cultivated herbaceous plants (see Table 1).

Table 1. List of plants usually eaten by the Crested porcupine (Hystrix cristata L.) in the North of Tuscany (Prov. of Pisa, Leghorn and Siena).

	SPONTANEOUS	
Scientific name	Family	Part eaten
Arum maculatum L.	Araceae	rhizome
Tamus communis L.	Discoreaceae	tuber
Iris germanica L.	Iridaceae	rhizome
Allium ursinum L.	Liliaceae	bulb
Asparagus officinalis L.	Liliaceae	rhizome, sprout
Rumex crispus L.	Poligonaceae	tap-root
Cyclamen europaeus L.	Primulaceae	tuber
Fraxinus ornus L.	Oleaaceae	bark
	CULTIVATED	
Common name	Family	Part eaten
Maize	Graminaceae	seeds
Potato	Solanaceae	tuber
Beet	Chenopodiaceae	tap-root
White cabbage	Cruciferae	central sprout
Chick-pea	Leguminosae	seeds
Watermelon	Cucurbitaceae	fruit, seeds
Pumpkin	Cucurbitaceae	fruit, seeds
Onion	Liliaceae	bulb
Vine	Ampelidaceae	fruit

They seek and consume above all the root-system of plants such as Arum spp., Tamus communis, Iris germanica and Cyclamen europaeum with no apparent ill effects, although these plants contain various caustic, diuretic, emetic and laxative substances, as well as their high percentage of starch. In the same way, members of this species living in Sicily usually feed on bulbs of Red squill (Uriginea maritima), which is known to have raticide properties (Mineo, in litt. 1979). Seeds, fallen and ground-level fruits, young sprouts and green vegetation are also eaten, and in the winter months even the bark of saplings (in particular of Fraxinus ornus) is often attacked at the base of the trunk.

The captive specimens were seen to drink regularly, but it does not seem that they are dependent on a constant source of water.

BIOLOGICAL NOTES

Although most aspects of the reproductive biology are still not well known, from observation of captured pregnant and lactating females in the field (see Table 2), we may assume that Hystrix cristata tends to breed throughout the year, that the gestation period is not less than 90 days and that two litters can be produced in a year.

Table 2. Breeding period and prolificacy of Hystrix cristata L. in North of Tuscany.

No. of female	Body weight (Kg)	Status	Litter size	Date
1	16.5	pregnant	2	2 . II . 78
2	15.4	pregnant	2	6 . III . 78
3	12.1	pregnant	1	10 . IV . 78
4	16.8	lactating	2	12 . IV . 78
5	14.3	pregnant	2	5 . V . 77
6	15.7	lactating	2	20 . VI . 77
7	14.5	lactating	2	1 . VII . 78
8	13.2	pregnant	2	6 .VIII . 77
9	11.8	lactating	1	30 . IX . 77
10	11.6	lactating	1	8 . X . 78
11	12.8	lactating	2	6 . XI . 79
12	13.6	lactating	2	8 . XII . 78

We have more precise data, however, on the number of young per litter (see Table 2), which is two or, more rarely, one, as noted also by Mohr (1965) and Asdell (1964) in their studies of captive animals (the former at Leipzig and the latter in London) and fewer than was indicated by Weir (1974).

We also observed that the young are well developed at birth, with their eyes open, and are weaned at about 40-50 days, by which time they are able to feed on solid foods. Maturity is reached at about 9 months, when body weight is about 8-9 kg.

Although we have no data on life-span in the wild, we know that captive specimens can reach an age of 20 years.

INFLUENCE ON ENVIRONMENT

Trophic activity of the Crested porcupine in Central Italy chiefly causes damage to crops in cultivated areas, due to this animal's preference for certain crops, such as maize, potatoes and chickpeas (see Table 1).

They can also have detrimental effects on the natural environment. The worst effects in this direction may be seen in the wooded hills of Northwestern Tuscany, where an over-large number has established itself.

Their intense rooting activity, when foraging in the search for hypogeal parts of such plants as Arum maculatum, Tamus communis and Cyclamen europaeus, damages their immediate environment and surrounding area. As well as reducing the number of these plants, their activity destroys the whole association of vegetable life which is the characteristic facies of the local undergrowth, which is moist and rich in humus.

The progressive increase in numbers of the porcupine is also related to a decrease of the badger (Meles meles) in the same biotope, whose burrows it tends to take over, as already recorded.

POSSIBLE CONTROL TECHNIQUES

The problems of the Old World porcupines (genus Hystrix) as a pest, and their control, have recently been reviewed by Greaves and Aziz Khan (1978), with special reference to H. indica as a forest pest in Pakistan. In this and similar cases, the very heavy damage inflicted by this species and its high numbers, justify drastic control measures, for instance poison baiting, burrow fumigation, snares and snap-traps.

The Italian situation is widely different. Besides the problem of having to protect an environment or a cultivation, we must preserve residual faunistic patrimony. It follows that problems caused locally by porcupines must be resolved by special interventions, which does not endanger the animals.

The line we intend to follow and develop in the near future is that of moving surplus specimens to a more receptive biotope. The first experiments carried out in this direction suggest that nets, used together with trained dogs, and special cage-traps (baited or unbaited) can be effective, if properly used.

The former technique[4] is favored by the fact that the Crested porcupine is not a particularly fast animal; when sensing danger, it breaks into a jog-trot or a rather heavy gallop from its normal planti-grade walk.

What is more difficult is to induce it to leave its burrows, but this can be done with the help of small dogs, trained for the purpose.

For the moment the live-traps present more drawbacks. To date we have tried for only 30 nights, using a French type of cage-trap, originally intended for coypu, with some modifications. The porcupines were careful to avoid the baited ones placed along their usual runs. One young specimen was captured, however, when the trap (baited with carrots) was placed in the entrance of a den, after careful stopping-up of any other exits.

In the next months we intend to assess the possibilities of both techniques more thoroughly, attempting to improve on them in the light of any new knowledge on the biology and habits of these large rodents that we may acquire in the process.

LITERATURE CITED

ASDELL, S.A. 1964. Patterns of mammalian reproduction. Cornell Univ. Press, N.Y. 670 pp.
BERNARD, J. 1969. Les mammiféres de Tunisie et des regions voisines. Bull. Fac. Agron. Univ. Tunis, n. 24-25. pp. 134-135.
BRINK (Van Der), F.H. 1969. Guida dei Mammiferi d'Europa, Ed. Labor, Milano. pp. 130-131.
CORBETT, G.B. and L.A. JONES. 1965. The specific characters of the Crested porcupines, subgenus Hystrix. Proc. Zool. Soc. London 144:285-300.
_____. 1966. The terrestrial mammals of Western Europe, Foul is & Co Ltd, London, 200 pp.
GREAVES, J.H. and AZIZ KHAN. 1978. The status and control of procupines, genus Hystrix, as forest pests. Commnw. For. Rev. 57, 1:25-32.
KINGDON, J. 1974. East African mammals. Vol. II, part B. (Hares and Rodents). Acad. Press, London. pp. 687-695.
MOHR, E. 1965. Altweltliche Stachelschweine. Neue Brehm Buch. No. 350.
NIETHAMMER, G. 1963. Die Einburgerung von Saugetieren und Vogeln in Europa. Rodentia. P. Parey (Ed.), Hamburg, Berlin, pp. 69-71.
TASSI, F. 1979. Fauna Appenninica - Documentazione sul Parco Nazionale d'Abruzzo. Ed. Cai, Roma. pp. 14-15.
TOMEI, P.E. and CAVALLI, S. 1976. L'areale dell'Istrice (Hystrix cristata L.) a Nord dell'Arno. Atti Soc. Tosc. Sc. Nat., Mem., ser. B, 83:42-48.
TOSCHI, A. 1965. Fauna d'ltalia. Vol. VII. Mammalia: Lagomorpha, Rodentia, Carnivora, Ungulata, Cetacea. Calderini Ed., Bologna, pp. 240-246.
WALKER, E.P. 1964. Mammals of the World. Vol.11. J. Hopkins Press, Baltimore. 1004-1009.
WEIR, B.J. 1974. Reproductive characteristics of Hystricomorph Rodents. Symp. Zool. Soc. London, No. 34:265-301.
WOUDE, (Van Der) et al. 1969. Animals in danger. Nature and Environment Series, Council of Europe.
ZANGHERI, P. 1946. L'Istrice (Hystrix cristata L.) nel versante romagnolo dell'Appennino. Natura, XXXVII:l-3.

[4]The porcupines, after being forced to leave their dens by specially trained small dogs, are caught in a long-handled purse-shaped net.