

## Genus *Pronolagus* Lyon 1904

<sup>1</sup>Eniko Kovacs, <sup>2,3</sup>Ioan Oroian

<sup>1</sup> Department of Economic Sciences, Faculty of Horticulture and Business for Rural Development, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Cluj-Napoca, Romania; <sup>2</sup> Department of Environmental Engineering and Protection, Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Cluj-Napoca, Romania; <sup>3</sup> Balkan Environmental Association, Thessaloniki, Greece. Corresponding author: I. Oroian, ioan.oroian@usamvcluj.ro

**Abstract.** The paper aims to present the general characteristics and representative species of the genus *Pronolagus*. The genus *Pronolagus*, commonly known as red rock hares, represents a group of lagomorphs endemic to southern Africa. Comprising several species, this genus is characterized by its distinctive reddish-brown fur and its preference for rocky habitats. The genus includes four species, each adapted to specific environmental niches. Red rock hares exhibit unique behavioral patterns, including nocturnal activity and intricate burrow systems within rocky crevices, providing them with protection from predators. These lagomorphs are herbivores, relying on a diverse diet of grasses, herbs, and shrubs. Their feeding habits contribute to seed dispersal and plant regeneration in their habitats. Populations of red rock hare appear stable. However, their populations face challenges due to habitat loss, human encroachment, and potential predation by introduced species. Efforts to protect and conserve red rock hares should prioritize habitat preservation and restoration, along with measures to mitigate the impact of invasive species. Collaborative initiatives involving local communities, conservation organizations, and governmental bodies are crucial for the effective conservation of these species.

**Key Words:** red rock hare, *crassicaudatus*, *rupestris*, *randensis*, *saundersiae*, elusive species.

**Introduction.** The genus *Pronolagus* refers to a group of rabbits commonly known as red rock hares or Natal red rock rabbits. This genus belongs to the family Leporidae, which includes hares and rabbits. This paper aims to present the general characteristics and representative species of the genus *Pronolagus*.

**Geographic range of the genus.** The genus is primarily found in southern Africa (Sen & Pickford 2022), but the species are spread to South Africa, Lesotho, Mozambique, Swaziland, Kenya, Namibia, Malawi, Rhodesia, Zimbabwe, Botswana, Zambia and Tanzania.

**Habitat.** Members of the genus *Pronolagus* are adapted to various habitats, including grasslands, shrublands, and rocky areas. They often inhabit places with suitable hiding spots and cover.

**Physical characteristics.** It is essential to mention that there are different species within the genus *Pronolagus*, and each species may have its own specific characteristics and ecological adaptations. However, a general description can be made.

**Size.** Red rock hares are generally medium-sized rabbits.

**Fur.** The fur of *Pronolagus* species is typically reddish-brown, providing camouflage in their natural rocky environments.

**Ears.** These rabbits typically have large ears, which aid in heat regulation.

**Eyes.** Their eyes are usually large, contributing to their alertness.

**Behavior.** *Pronolagus* species are known for their secretive and elusive behavior. They are often active during the night (nocturnal) or during dawn and dusk (crepuscular). They are skilled at navigating rocky terrain, using their agility to escape predators.

**Diet.** Their diet primarily consists of grasses, herbs, and other vegetation.

**Reproduction.** They have one or more litters each year and low number of kits per litter. The young are born in concealed nests.

**Conservation status.** The conservation status of *Pronolagus* species may vary depending on the specific species within the genus. Some species may face threats due to habitat loss, predation, or other environmental factors. Efforts to protect and conserve red rock hares should prioritize habitat preservation and restoration, along with measures to mitigate the impact of invasive species. Collaborative initiatives involving local communities, conservation organizations, and governmental bodies are crucial for the effective conservation of these species.

**Taxonomy and species.** *Pronolagus* is a genus within the family Leporidae, which also includes other well-known genera like *Lepus* (hares), *Oryctolagus* (the European rabbit) and *Sylvilagus* (cottontails). We will present in the followings the four member species of the genus.

***Pronolagus crassicaudatus* I. Geoffroy, 1832 - Natal red rock hare.** *P. ruddi* Thomas and Schwann 1905 is no longer considered as its own species, but rather a subspecies of *P. crassicaudatus*. However, in modern animal taxonomy there is no place for subspecies (see evolutionary species concept: Wiley & Mayden 2000; Kottelat & Freyhof 2007; Nowak et al 2009; Stoian et al 2018; Kovacs & Petrescu-Mag 2022; Papuc et al 2022).

### **Physical characteristics of *P. crassicaudatus***

**Size.** Natal red rock hares are large-sized rabbits, with a body length ranging from about 46-56 cm (18-22 inches). Their body weight 2.4-3 kg (5.3-6.6 lb) (Happold 2013; Kingdon 2015). As game, the meat is of inferior quality because it has an unpleasant smell (Schütze 2002).

**Coloration.** The fur of *P. crassicaudatus* varies in color, typically displaying a mix of brown, gray, and reddish tones. The underside is usually lighter in color than the dorsal side (Schütze 2002) (Figure 1). The dense fur is thick and rougher than other rock hares (Happold 2013; Kingdon 2015).

**Ears.** The ears are short if compared to ears of other hares, measuring 7.5-8.5 cm (3.0-3.3 inches) in length (Schütze 2002), sparsely furred, and are gray on the inner surface and whitish gray on the outer surface.

**Tail.** The tail of the Natal red rock hares is notably thick and bushy, giving rise to the species' scientific name "*crassicaudatus*," which means "thick-tailed." They have a 3.5-11 cm (1.4-4.3 inches) long, bright reddish brown tail lighter in tone than other members of the genus (Happold 2013; Kingdon 2015).

**Habitat.** Natal red rock hares are adapted to a variety of habitats within their range. They live in steep, rocky terrain like cliffs, hillsides with scattered rocks and boulders, stone outcrops, and rocky gorges with edible grass (Kingdon 2015; Child et al 2019). It takes refuge in tussock grasses or low, dense vegetation. It is found at heights of up to 1,550 metres (5,090 ft) above sea level (Kingdon 2015; Child et al 2019).



Figure 1. Illustration of *Pronolagus crassicaudatus*, described initially as *Lepus crassicaudatus* in the work of Geoffroy (1832).

**Behavior.** As nocturnal creatures, Natal red rock hares are primarily active during the night, foraging for vegetation. They are known for their agility and speed, which helps them evade predators in their natural environment. It produces grunting calls while contacting with other members of the species, and produces shrill screams and cries when alarmed. This species is known to fight against predators through kicks and bites with the hindfeet when caught. Its predators include all larger carnivores such as caracals, leopards, large snakes, African wildcats, and birds of prey (Schütze 2002; Cillié 2004). It has very good hearing and sense of smell. It also has very good vision that covers 360 degrees, so it sees everything around. If it straightens its ears, the network of veins on the inside of its ears radiates heat and helps it regulate its body temperature.

**Diet.** These hares are herbivores, feeding on a variety of grasses, herbs, and other plant materials. It gets its water from dew and succulent food. It uses metabolic water, resulting from the metabolism of carbohydrates. If it finds water, the Natal red rock hare drinks it. However, it is independent of water as such (Schütze 2002).

**Reproduction.** The reproductive behavior of *P. crassicaudatus* includes the construction of shallow nests in concealed locations to protect their offspring from potential predators. The nest is lined with plant material and female fur. Females typically give birth to a small number of young after a gestation period of one month. It breeds throughout the year, and 1-2 kits are generally born in the summer season, weighing 70-100 g (2.5-3.5 oz). It can live up to five years (Schütze 2002).

**Distribution.** Natal red rock hares are found in various parts of sub-Saharan Africa: southeastern provinces of South Africa (Eastern Cape, KwaZulu-Natal, and Mpumalanga), eastern part of Lesotho, Swaziland (in Highveld and Lumbobo), and southern part of Mozambique (in Maputo Province more exactly).

**Conservation status.** Since 1996, this hare is considered species of least concern on the IUCN Red List of Endangered Species due to the fact it is widespread on more than 20,000 square kilometres (7,700 sq mi). However, the species is protected by Provincial Nature Conservation agencies seasonally, as a game species (Child et al 2019).

***Pronolagus rupestris* A. Smith, 1834 - Smith's red rock hare.** The species was first described by Andrew Smith in 1834 (Child et al 2019; Smith 1934) as a member of the genus *Lepus*. Later, it was moved as a subspecies of *P. crassicaudatus*. It was finally reclassified as a separate species. However, this species itself includes a large number of subspecies, which in the view of today's systematics have no taxonomic value. Here are the subspecies that have been included in *P. rupestris* in the 1940s (Ellerman et al 1953):

*P. r. rupestris* (A. Smith, 1834)

*P. r. melanurus* (Rüppell, 1842)

*P. r. nyikae* (Thomas, 1902)  
*P. r. curryi* (Thomas, 1902)  
*P. r. saundersiae* Hewitt, 1927  
*P. r. australis* Roberts, 1933  
*P. r. mulleri* Roberts, 1938  
*P. r. whitei* Roberts, 1938  
*P. r. barretti* Roberts, 1949.

Here are the subspecies that have been included in *P. rupestris* in the 1980s (Meester et al 1986b):

*P. r. rupestris* (A. Smith, 1834)  
*P. r. melanurus* (Rüppell, 1842)  
*P. r. curryi* (Thomas, 1902)  
*P. r. saundersiae* Hewitt, 1927  
*P. r. australis* Roberts, 1933  
*P. r. fitzsimonsi* Roberts, 1938  
*P. r. barbetti* Roberts, 1949.

### Physical characteristics of the species

**Size.** It is the smallest representative of the genus measuring 43-65 cm (17-26 inches) in length from head to tail (Sekine 2000), having a 5-11 cm (2.0-4.3 inches) long tail (Sekine 2000), and weighing 1.3-2 kg (2.9-4.4 lb) (Sekine 2000). The claws and digits are short and broad (Sekine 2000).

**Coloration.** Tail is dark to reddish brown with a black tip. The fur of *P. rupestris* exhibits a reddish-brown coloration, blending with the rocky environments in which they are often found. The underside may be lighter in color.

**Ears.** The ears are grey in color, like their face, and measure 6-10 cm (2.4-3.9 inches) in length (Sekine 2000) (Figure 2).



Figure 2. Smith's Red Rockhare (*Pronolagus rupestris*). Source: Kevin Murray (<https://www.inaturalist.org/photos/31473492>).

**Habitat.** Smith's red rock hares are adapted to rocky environments, including hillsides, cliffs, and rocky outcrops. They are well-suited to habitats where their coloration provides effective camouflage among the rocks.

**Behavior.** These hares are likely to be crepuscular or nocturnal, being most active during the dawn and dusk hours when they forage for vegetation. Their behavior may include utilizing the natural cover provided by rocks for protection against predators. When pursued by canid species, they are capable of rapid and surprising changes of direction (Sekine 2000). They are also known to produce specific screams when running, possibly to scare away predators or warn other individuals of danger (Sekine 2000).

Although red rock hares are known to be solitary species, they are very closely associated with hyrax. They can benefit from the vigilance of the hyrax and also take refuge in the same burrows as the hyrax (Sekine 2000).

**Diet.** As herbivores, Smith's red rock hares likely feed on a variety of vegetation, including grasses, herbs, and other plant materials found in their rocky habitats.

**Reproduction.** Like other members of the genus *Pronolagus*, the reproductive behavior of *P. rupestris* may involve the construction of nests in concealed locations to protect their young from potential predators. Females likely give birth to a small number of offspring (1-2 kits) after a gestation period of one month. Young are altricial, they have very little hair, their eyes are closed, and their movement limited to the confines of the nest (Sekine 2000).

**Distribution.** *P. rupestris* is known to be found in specific regions of South Africa, particularly in rocky landscapes. It is distributed in Kenya (Rift Valley), Lesotho, Namibia, Malawi, Rhodesia, South Africa (Northern Cape, Free State, and North West), Zambia and Tanzania.

**Conservation status.** The conservation status of Smith's red rock hares may vary across their range. Populations of red rock hare appear stable (Sekine 2000). However, the populations face challenges due to habitat loss, human encroachment, and potential predation by introduced species.

### ***Pronolagus randensis* Jameson, 1907 - Jameson's red rock hare**

#### **Physical characteristics**

**Size.** Jameson's red rock hare is a medium-sized rabbit, with a body length ranging from approximately 40 to 50 centimeters (16 to 20 inches). Its weight is about 2-2.5 kg (4.4-5.5 lbs).

**Coloration.** This hare has a fine, silky fur that is grizzled rufous-brown on the upper portion of its body. The species has a whitish chin and slightly lighter fur on the ventral part. The sides of the neck, lower jaw and cheeks have a light grey coloration. The tail is large reddish-brown and black tipped (Figure 3).

**Ears.** Similar to other members of the genus *Pronolagus*, they have relatively long and erect ears, which are sparsely haired and can be tipped with black.



Figure 3. Jameson's red rock hare (*Pronolagus randensis*), a picture made in Namibia. Source: Klaus Rudloff (wikipedia.org).



**Habitat.** *P. randensis* is adapted to rocky habitats, including hillsides, cliffs, and other rocky outcrops. These environments provide natural cover and camouflage for the hares.

**Behavior.** These hares are likely to be crepuscular or nocturnal, being most active during the dawn and dusk hours when they forage for vegetation. Their behavior may include using the rocky terrain for protection against predators.

**Diet.** As herbivores, Jameson's red rock hares likely feed on a variety of vegetation, including grasses, herbs, and other plant materials found in their rocky habitats.

**Reproduction.** Like other members of the genus *Pronolagus*, the reproductive behavior of *P. randensis* may involve the construction of nests in concealed locations to protect their young from potential predators. Females likely give birth to 1-3 kits per litter after a gestation period.

**Distribution.** *P. randensis* is known to be found in specific regions of southern Africa, particularly in rocky landscapes of Zimbabwe, Namibia, Botswana (in the Tswapong Hills), and northwestern South Africa.

**Conservation status.** Smith's red rock hare is not endangered or threatened. However, the populations face challenges due to habitat loss, human encroachment, and potential predation by introduced species.

***Pronolagus saundersiae* Hewitt, 1927 - Hewitt's red rock hare**

This species was included by some authors in *P. rupestris* (Meester et al 1986a; Duthie & Robinson 1990), but is now regarded as separate species due to morphological differences and genetic differences in cytochrome b sequence, and 12S rRNA (Robinson & Matthee 2005).

**Physical characteristics.** The exterior of the body is similar to that of the *P. rupestris* species, the morphological differences being difficult to observe with the naked eye (Figure 4).



Figure 4. Hewitt's red rock hare (*Pronolagus saundersiae*). Source: Tony Rebelo, <https://www.inaturalist.org/photos/19182031>

**Behavior.** The behavior of this species has not been studied in detail after the separation of this species from *P. rupestris*.

**Diet.** Hewitt's red rock hare feeds on a variety of vegetation, including grasses, herbs, and other plant materials found in its rocky habitats.

**Reproduction.** Like other members of the genus *Pronolagus*, the reproductive behavior of *P. saundersiae* may involve the construction of nests in concealed locations to protect their young from potential predators. Females likely give birth to a small number of offspring (1-2 kits) after a gestation period of one month. Young are altricial, they have very little hair, their eyes are closed, and their movement limited to the confines of the nest.

**Habitat and distribution.** The species is known to be found in specific regions of South Africa.

**Conservation status.** Hewitt's red rock hare has been assessed for The IUCN Red List of Threatened Species in 2018. *P. saundersiae* is listed as Least Concern (Robinson et al 2019). However, the populations face challenges due to habitat loss, human encroachment, and potential predation by introduced species.

**Conclusions.** The genus *Pronolagus*, commonly known as red rock hares, represents a group of lagomorphs endemic to southern Africa. Comprising several species, this genus is characterized by its distinctive reddish-brown fur and its preference for rocky habitats. Despite their elusive nature, these rabbits play a vital role in the ecosystem as herbivores, contributing to the delicate balance of their respective ecosystems. *Pronolagus* species are primarily found in South Africa, Lesotho, and Swaziland, where they inhabit rocky outcrops, cliffs, and mountainous regions. The genus includes four species, each adapted to specific environmental niches. Red rock hares exhibit unique behavioral patterns, including nocturnal activity and intricate burrow systems within rocky crevices, providing them with protection from predators. These lagomorphs are herbivores, relying on a diverse diet of grasses, herbs, and shrubs. Their feeding habits contribute to seed dispersal and plant regeneration in their habitats. Populations of red rock hare appear stable. However, their populations face challenges due to habitat loss, human encroachment, and potential predation by introduced species. Efforts to protect and conserve red rock hares should prioritize habitat preservation and restoration, along with measures to mitigate the impact of invasive species. Collaborative initiatives involving local communities, conservation organizations, and governmental bodies are crucial for the effective conservation of these species.

**Conflict of interest.** The authors declare no conflict of interest.

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Authors:

Eniko Kovacs, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Horticulture and Business for Rural Development, Department of Economic Sciences, 3-5 Calea Mănăştur Street, 400372 Cluj-Napoca, Romania, e-mail: [eniko.kovacs@usamvcluj.ro](mailto:eniko.kovacs@usamvcluj.ro)

Ioan Oroian, Department of Environmental Engineering and Protection, Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Cluj-Napoca, Romania, e-mail: [ioan.oroian@usamvcluj.ro](mailto:ioan.oroian@usamvcluj.ro)

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