

New records and altitudinal data of four colubrid species in the Gran Paradiso National Park and surrounding areas

Giulia Tessa^{1,2*}, Ramona Viterbi¹, and Bruno Bassano¹

¹Centro Studi Fauna Alpina, Parco Nazionale Gran Paradiso, Frazione Jamonin 5, Noasca TO, Italy; ²Dipartimento di Scienze della Vita e Biologia dei Sistemi, Università degli Studi di Torino, via Accademia Albertina 13, 10123 Torino TO, Italy

ABSTRACT

Distribution records are the basis for conservation planning and species conservation assessments. New locality and elevation records are reported for the four colubrid snakes (*Coronella austriaca*, *Hierophis viridiflavus*, *Natrix tessellata*, and *Natrix natrix*) present in the Gran Paradiso National Park and surrounding areas. These new records represent important additions to the knowledge of the species and more generally for the alpine region.

Keywords: Colubridae, distribution, altitudinal records, Gran Paradiso National Park (GPNP)

In the alpine habitat, characterized by extreme environmental and climatic difficulties such as long winters and low air temperatures, the snake community is low in species numbers. The adaptation to altitude is still far from being fully understood, and data on distribution of species in the Alps that can act as a barrier or a refuge, depending on the case, are useful in setting up the basis for further studies (Bovero *et al.*, 2013).

The Gran Paradiso National Park (GPNP) is an Italian protected area in the Western Alps, extending from 650 m up to about 3,000 m a.s.l. (metres above sea level), that includes five different valleys located in Piedmont and Aosta Valley. In Aosta Valley, the GPNP includes a territory mainly up to 1,500 m a.s.l., two North–South exposed valleys (Rhemes and Valsavarenche) and the North–West–North and East–South–East exposed Cogne Valley. The Piedmontese part of the

* Corresponding author: Giulia Tessa, Centro Studi Fauna Alpina, Parco Nazionale Gran Paradiso, Frazione Jamonin 5, Noasca TO, Italy; email: tessagiu@libero.it

Published by the Gran Paradiso National Park.

OPEN ACCESS – Freely available on www.mountainecology.org

Park includes two valleys, the West–East exposed Orco Valley and the North–South exposed Soana Valley, with a larger extension of territory at lower elevation, from 650 m a.s.l. The main part of the considered areas is covered by alpine meadow and coniferous forest, with deciduous forest relegated mainly to lowland areas in the Piedmontese valleys.

The snake family Colubridae is represented by seven species living on the Alps, although in the GPNP only four species are present (Figure 1): the smooth snake (*Coronella austriaca*), the green whip snake (*Hierophis viridiflavus*), and two water snake species – the grass snake (*Natrix natrix*) and the dice snake (*Natrix tessellata*) (Sindaco, 2001, 2006; Seglie and Sindaco, 2013). *Coronella austriaca*, *H. viridiflavus*, and *N. tessellata* are included in Annex IV of the Habitat Directive 92/43/EEC. *Coronella austriaca* is one of the most common snakes in Central and Western Europe, where it can occupy a wide variety of habitats, and it is widespread in the Italian Peninsula from sea level up to 2,250 m a.s.l. (Cresta di Ciamosseretto, Noasca; Tortonese and Rossi, 1954). In Italy, *C. austriaca* is usually associated with high elevation sites, while *H. viridiflavus*, *N. natrix*, and *N. tessellata* are more typical of mid- to low-elevation habitats (Sindaco *et al.*, 2006). The last three species are common in Europe and in Italy, where *N. natrix*



Figure 1 Colubrid species in the GPNP: from the left *N. tessellata* (photo by T. Fiorenza) and *N. natrix* above, *H. viridiflavus* and *C. austriaca* below.

is present between sea level up to generally 1,500 m a.s.l. (with an altitude record of 2,300 m a.s.l. in the Verbano-Cusio-Ossola Province; Andreone and Sindaco, 1998), *N. tessellata* up to 1,800 m a.s.l. (both in aquatic habitat), and *H. viridiflavus* up to 1,500–1,800 m a.s.l. mainly in ecotonal wooded areas (with a record of 2,100 m a.s.l. in Southern Piedmont; Andreone and Sindaco, 1998). While *N.atrix* and *H. viridiflavus* are considered common in Piedmont, *N. tessellata* has a scattered distribution there (Seglie and Sindaco, 2013).

This paper increases the known distribution and provides new altitudinal records of the species with new data from the GPNP and surrounding areas, taking into consideration historical publications (Festa in AA.VV, 1951; Tortonese, 1942, 1953; Tortonese and Rossi, 1954), previous surveys in the Park (Sindaco, 2001), regional publications (Sindaco, 2006; Seglie and Sindaco, 2013, 2015), national and regional atlases (Andreone and Sindaco, 1998; Sindaco *et al.*, 2006), data collected by Park researchers and rangers, and personal surveys carried out in 2014 and 2015 within a more extensive project of alpine herpetofauna monitoring in the Park (Figure 2). Data were collected in all the five valleys of GPNP. Snakes were searched for by visual encounter surveying carried out from April to October or found dead on the roads or hiking trails.

Coronella austriaca is uncommon but it is widespread across the Park. In Aosta Valley, the finding in Cogne Valley (Sindaco, 2001) was confirmed in Valnontey Valley (at 1,715 m a.s.l.), and a new finding in Rhemes Valley is provided close to the Park borders in Proussaz, 1,474 m a.s.l. This species seems to be more common in the Piedmontese part of the Park, with nine presence sites for the Orco Valley: Vallone del Broglio 2,450 m a.s.l. (Noasca); locality (loc.) upper and lower Chiapili at 1,743–1,813 m a.s.l. (Ceresole Reale); loc. Villa 1,600 m a.s.l. (Ceresole Reale); loc. Ca Bianca 1,640 m a.s.l. (Ceresole Reale); loc. Vallone di Pertica 2,140 m a.s.l. (Ceresole Reale); loc. Muracce 1,540 m a.s.l. (Noasca); loc. Fornello 642 m a.s.l. (Locana); and loc. Boschietto 600 m a.s.l. (Locana). There are also seven presence sites for the Soana Valley: loc. Nivolastro 1,390 m a.s.l. (Ronco Canavese); loc. Tiglietto 1,300 m a.s.l. (Ronco Canavese); loc. Andorina 1,280 m a.s.l. (Ronco Canavese); loc. Mulino di Forzo 1,165 m a.s.l. (Ronco Canavese); loc. Boschietto 1,435 m a.s.l. (Ronco Canavese); Ronco Canavese municipality 880 m a.s.l.; and the track to S. Besso 1,500 m a.s.l. (Valprato Soana).

Natrix natrix, *N. tessellata* and *H. viridiflavus* are apparently present only in the Piedmontese part of the Park. *Natrix natrix* is recorded in both the Orco and Soana valleys. The presence of this snake in the Park was unknown until 26th June 1995, when it was recorded by A. Chiariglione in the locality of Gran Piano, Noasca, 2,223 m a.s.l. (Sindaco, 2001, 2006), and two recent records from Soana Valley (Seglie and Sindaco, 2015). Currently, the species is present in seven localities in Orco Valley: loc. Gran Piano 2,232 m a.s.l. (Noasca); Gran Prà at 1,975 m a.s.l. (Noasca); Noasca municipality 1,120 m a.s.l.; close to Ciamosseretto drainage, Vallone del Roc at 1,542 m a.s.l. (Noasca); loc. Grusiner at 900 m a.s.l. (Noasca); Casette 1,225 m a.s.l. (Piantonetto Valley, Locana); and Sparone at 602 m a.s.l. It is also present in four localities in Soana Valley: loc. Lasinetto at 1,030 m a.s.l. (Ronco Canavese); Alpetta at 950 m a.s.l. (Ronco Canavese); loc.

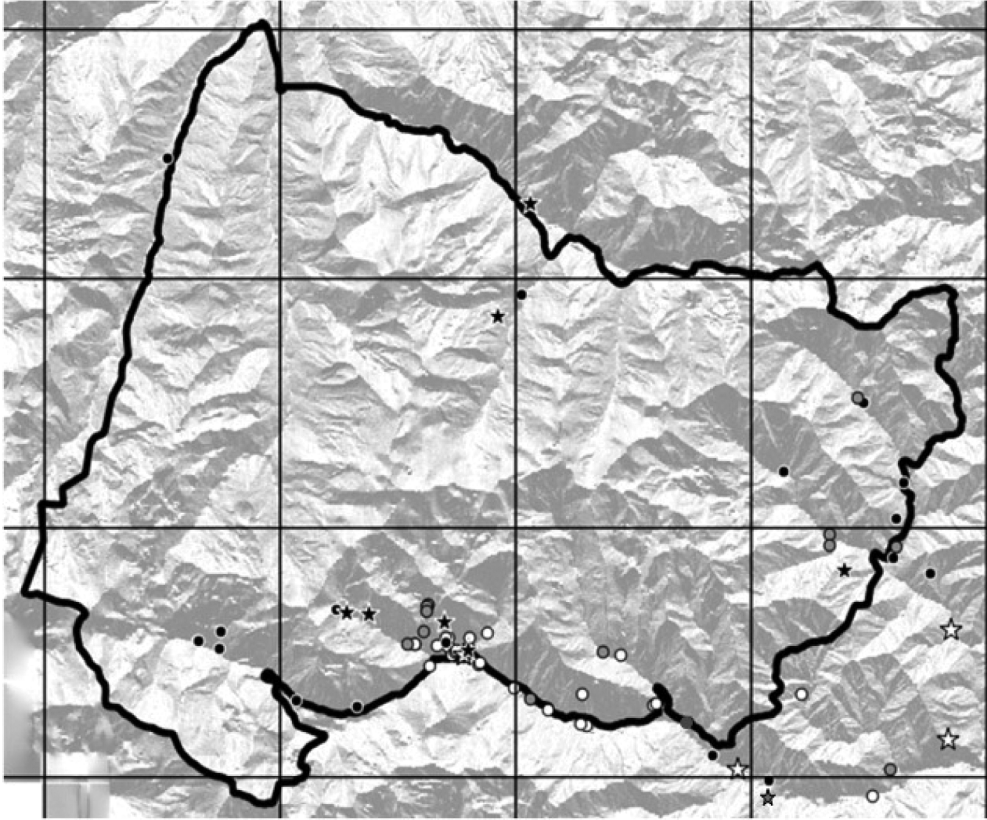


Figure 2 Recent data (<10 years) on *N. natrix* (grey dots), *N. tessellata* (dark grey dot), *H. viridiflavus* (white dots), and *C. austriaca* (black dots) and previous data (>10 years) on *N. tessellata* (dark grey star), *H. viridiflavus* (white stars), and *C. austriaca* (black stars) in GNP and surrounding areas.

Convento at 905 m a.s.l. (Ronco Canavese); and Piano dell'Azaria at 1,520 m a.s.l. (Valprato Soana).

Natrix tessellata is known inside the GNP on the basis of a single finding in loc. Casetti at 680 m a.s.l. (Locana), confirming the old data of Locana municipality in the vicinity of the Park, in Orco Valley (Seglie and Sindaco, 2013).

Hierophis viridiflavus seems to be common and widespread all along the Orco Valley: loc. Pianchette at 1,220 m a.s.l. (Noasca); loc. Gran Piano at 2,253 m a.s.l. (Noasca); loc. Muracce at 1,620–1,647 m a.s.l. (Noasca); loc. Fragno at 1,430 m a.s.l. (Noasca); loc. Varda-Maison at 1,550 m a.s.l. (Noasca); loc. Cappelle at 1,565 m a.s.l. (Noasca); loc. Balmarossa at 1,255–1,270 m a.s.l. (Noasca); loc. Jamonin at 1,035 m a.s.l. (Noasca); loc. Sengie 1,260 m a.s.l. (Noasca); loc. Sassa at 1,150 m a.s.l. (Noasca); Noaschetta refuge 1,510 m a.s.l. (Noasca); 'Strada Reale' to Noaschetta at 1,420 m a.s.l. (Noasca); loc. Gera at 948 m a.s.l. (Noasca); loc. Zaubere at 800 m a.s.l. (Noasca); loc. Fey 802 m a.s.l. (Noasca); loc. Frera

superiore at 876 m a.s.l. (Noasca); S. Anna Sanctuary at 1,465 m a.s.l. (Noasca); loc. Costabugni at 960–982 m a.s.l. (Piantonetto Valley, Locana); loc. S. Giacomo at 1,164 m a.s.l. (Piantonetto Valley, Locana); loc. Appare' at 550 m a.s.l. (Sparone); and loc. Talosio at 1,220 m a.s.l. (Ribordone).

The current work expands the distribution of that already known for *Coronella austriaca* (Seglie and Sindaco, 2013), adding to the species' presence in the national UTM squares LR53, LR55, LR73, LR74, and LR83; of *N. natrix* (Seglie and Sindaco, 2015) in the UTM squares LR73, and LR84; and of *N. tessellata* (Seglie and Sindaco, 2013) in the UTM square LR73. Even if the presence of *H. viridiflavus* was not reported for additional UTM squares, new sites were discovered in the already-known area.

Coronella austriaca is the only colubrid species present in the Valle d'Aosta side, where it seems to be uncommon and localized. Despite the current lack of data, its presence in Valsavaranche Valley may be presumed. *Hierophis viridiflavus* seems to be widespread and abundant along the Orco Valley. *Natrix natrix* is more sporadic and linked to the main stream drainages with abundant *Rana temporaria* populations. *Natrix tessellata* is the rarest species in the area, reflecting the scattered regional distribution.

Coronella austriaca seems to be well distributed both at low and high elevations, and in the Orco Valley it reaches the altitudinal record in Italy (Table 1). *Hierophis viridiflavus* and *N. natrix* ascend the Orco Valley to the Noasca municipality, and the relatively warm locality of Gran Piano allows them to reach exceptional high elevation sites, with the altitudinal record in Italy for the former (Table 1). *Natrix tessellata* was recorded only at a low elevation site.

The species are not considered as globally threatened within the protected area, even if the reforestation due to the abandonment of mountain pastures, an activity widely practised until a few decades ago, may cause a loss of suitable habitat; on the contrary the few areas where the pasture is still used may suffer from overgrazing (Jofré and Reading, 2012). An accurate management of mountain pasture may help the conservation of these species and their habitat, especially in an area where the habitat is optimal and they can reach exceptional altitudinal limits. Moreover, the roadkill and the killing by local people, tourists and fishermen can cause a local decrease of populations and have to be prevented by sensitization programmes, particularly for *N. tessellata*, considered rare and in decline in Piedmont.

Table 1 Highest altitudinal records and localities of colubrid species, with observation period.

Species	Altitudinal limits and locality	Observation period
<i>Natrix natrix</i>	2,223 m Gran Piano (Noasca)	April–September
<i>Natrix tessellata</i>	680 m Casetti (Locana)	June
<i>Hierophis viridiflavus</i>	2,253 m Gran Piano (Noasca)	February–October
<i>Coronella austriaca</i>	2,450 m Vallone del Broglio (Ceresole Reale)	April–October

ACKNOWLEDGEMENTS

We want to thank all the rangers and colleagues who contributed to this study with dead-body collections and photographic evidence: Andrea Battisti, Valerio Bertoglio, Cristiana Cerrato, Piero Chabot, Lorenzo Costanzo, Angelo Dan, Paolo DeBernardi, Roberto Gaglietto, Silvia Ghidotti, Davide Giuliano, Marco Grosa, Paolo Guglielmetti, Rocco Iacobuzio, Chiara Lorenzetti, Raffaella Miravalle, Emiliano Mori, Enio Pacher, Elena Patriarca, Dario Rigaldo, and Rocco Tiberti. Data were collected within the project “Monitoraggio della Biodiversità Animale in Ambiente Alpino” funded by the Ministero dell’Ambiente Italiano.

REFERENCES

- Andreone, F. and Sindaco, R. (1998) *Erpetologia del Piemonte e della Valle d’Aosta: atlante degli anfibi e dei rettili*. Monografie XXVI Museo Regionale di Scienze Naturali di Torino.
- Bovero, S., Canalis, L., and Corsetto, S. (2013) *Gli anfibi e i rettili delle Alpi. Come riconoscerli, dove e quando osservarli*. Blu Edizioni.
- Festa, E. In: AA.VV. (1951) *Il Parco nazionale del Gran Paradiso*. Reprinted by Ente Parco Nazionale Gran Paradiso, Torino, pp. 171, 294 and 295.
- Jofré, G.M. and Reading, C.J. (2012) An assessment of the impact of conservation grazing on reptile populations. *ARC Research Report*, 12/01.
- Seglie, D. and Sindaco, R. (2013) Segnalazioni Faunistiche Piemontesi e Valdostane, VI (Reptilia, Colubridae). *Rivista Piemontese di Storia Naturale*, 34: 439–452.
- Seglie, D. and Sindaco, R. (2015) Segnalazioni Faunistiche Piemontesi e Valdostane, VII (Amphibia, Reptilia). *Rivista Piemontese di Storia Naturale*, 36: 341–360.
- Sindaco, R. (2001) Anfibi e Rettili del Parco Nazionale del Gran Paradiso. *Rivista Piemontese di Storia Naturale*, 22: 251–259.
- Sindaco R. (ed.) (2006) Segnalazioni Faunistiche Piemontesi e Valdostane (Amphibia, Reptilia, Mammalia). *Rivista Piemontese di Storia Naturale*, 27: 443–460.
- Sindaco, R., Doria, G., Razzett, E., and Bernini, E. (eds) (2006) *Atlante degli Anfibi e dei Rettili d’Italia* ‘Atlas of Italian Amphibians and Reptiles’. Societas Herpetologica Italica, Edizioni Polistampa, Firenze.
- Tortonese, E. (1942) Gli Anfibi e i Rettili italiani del R. Museo Zoologico di Torino. *Bollettino del Museo di Zoologia e Anatomia Comparata dell’Università di Torino*, 127: 203–222.
- Tortonese, E. (1953) *Spigolature di erpetologia pedemontana*. *Natura*. Milano, 44: 24–34.
- Tortonese, E. and Rossi, I. (1954) Contributo allo studio biologico del Parco Nazionale del Gran Paradiso (Alpi Piemontesi). Gran Piano di Noasca e dintorni. *Atti Soc. Ital. Sci. Nat.*, 93: 437–488.