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Discovery of *Salamandra atra aurorae* (Trevisan, 1982) on the Altopiano di Vezzena, Trentino (Northeastern Italy)

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Abstract. Aurora's Alpine Salamander is a limited distributed subspecies endemic to the Altopiano di Asiago, Veneto. In the current paper the occurrence of *Salamandra atra aurorae* is described for the Altopiano di Vezzena, Trentino. The aim of this paper is to review the distribution as well as to comment on the conservational status of the subspecies in Trentino.

Keywords. *Salamandra atra aurorae*, first record, Trentino, Northeastern Italy.

Aurora's Alpine Salamander, *Salamandra atra aurorae* (Trevisan, 1982) is an endemic terrestrial salamander from the Venetian Prealps. Recent research has identified this subspecies as a relict lineage, which separated from the nominate *Salamandra atra atra* approximately 1 Myr ago, and remained isolated in a glacial *rifugium* (Bonato and Steinfartz, 2005). Although the nominate subspecies occurs at several mountainous locations within Trentino, no individuals of *S. a. aurorae* have been found within the autonomous region (Caldonazzi et al., 2002; Ommizolo et al., 2002), despite the closeness of the type locality of the latter subspecies to the regional border with Veneto. *S. a. aurorae* is an extremely small-distributed subspecies, occurring at a stretch of approximately 17 kilometres length and several kilometres wide on the Altopiano di Asiago, Veneto (Bonato and Grossenbacher, 2000). In this article we describe for the first time the presence of this subspecies for Trentino province, and present the threats for *S. a. aurorae* within this region. This research was part of the European Community LIFE program, "Project Sistema Aurora" of the University of Udine (Friuli-Venezia Giulia).

The study area on the Altopiano di Vezzena can be defined as eastwards from the Altopiano di Vezzena, to the regional border with the Veneto region. The north of this area is bordered by the Cima Vezzena and Cima Manderiolo, while the Val d'Assa acts as a barrier in the south. Within this area, from west to east Bianco, Val Pisciavacca, Val Postesina and the western part of Valle Sparavieri (Costa di Sopra), were investigated. The presence of *S. a. aurorae* was defined by means of VES (Visual Encounter Survey, Crump

and Scott, 1994), using a random walking pattern in the study areas while looking under stones, pieces of bark and logs. Each of the four above mentioned localities were visited once during one hour of intensive searching. After discovery of presence, another hour of intensive search was done to locate additional individuals. Dorsal photographs were made for individual recognition.

1. Bianco (western Altopiano di Vezzena).

This brook is situated on a relative low altitude of 1100 meters, compared with the preferences of Alpine Salamanders (Bonato and Fracasso, 2006).

2. Val Pisciavacca (western Altopiano di Vezzena).

Moist mixed forest with dominance of *Fagus sylvatica, Abies alba* and *Picea abies* is present in this area, with a comparable undergrowth to that of the habitat at the Altopiano di Asiago. Altitudes are in favour of Alpine Salamanders. No individuals of *S. a. aurorae* were located during VES.

3. Val Postesina (eastern Altopiano di Vezzena).

On the 11th of May 2007, at 09:30 in the morning, an adult male *S. a. aurorae* (Fig. 1) was found under a stone just next to the brook bed, at 1420 m a.s.l. The same individual, identified by its unique colour pattern, was recaptured on 09:27 on the 13th of May under the same shelter. The habitat was characterized by mixed forest of dominating *Picea abies* and *Abies alba,* with a lesser extent of *Fagus sylvatica.*

Fig. 1. Adult male *Salamandra atra aurorae* from Val Postesina

4. Western Valle Sparavieri (Costa di Sopra).

At the 22th of May, at 10:00 in the morning a female *S. a. aurorae* was found under a stone in dense *Picea abies* forest with several *Fagus sylvatica,* on the upper slopes of Valle Sparavieri, eastwards of Malga Costa di Sotto. Several stones and logs were present on the forest floor.

Although this is the first record for *S. a. aurorae* in Trentino, the occurrence of this subspecies could be expected due to a continuation of the habitat from Veneto. Up to now, the subspecies was known to be present in Valle Sparavieri on the regional border (Bonato and Grossenbacher, 2000), with individuals also dispersed on the western part of the valley (pers. comm.). The discovery of *S. a. aurorae* in Val Postesina is however of greater interest since this valley is well within the boundaries of Trentino. Val d'Assa is known to be a natural border for dispersal of *S. a. aurorae* (Bonato and Grossenbacher, 2000), while occurrence of this subspecies north or westwards from the study area is not likely, because of altitudinal and climatological differences, not suitable for Alpine Salamanders (Bonato and Fracasso, 2006). The elusive behaviour of this subspecies, probably enhanced by the relative dry climatic conditions and the karstic substrate (Grossenbacher, 1995), makes it impossible to deny presence in the area between Passo Vezzena and Val Postesina.

The dominant tree species in the habitat of Val Postesina is *Picea abies*. While the east slopes of the valley are replanted with *P. abies,* the west slopes consist of *Abies alba* forest mixed to open grassy spots, almost without surface structure. The dense, planted *P. abies* forest on the eastern slopes, with little surface structure, and the lack of diurnal shelters and rocky structure on the western slopes creates an unsuitable habitat for the Alpine Salamanders. Both shelters (review in Mathis et al., 1995) and sustainable humidity in the structure of the rocky surface (Duellman and Trueb, 1986) are critical for the survival of salamanders, which need shelters during dry and cold periods, and often a relative high humidity to feed and reproduce. *P. abies* is not naturally present at the Vezzena plateau (Gaffa and Pedrotti, 1998) and its presence is likely due to replanting for future logging and forest restoration, started after the First World War. Therefore, the habitat of *S. a. aurorae* seems to have changed extensively in the last decades, and only the direct vicinity of the brook provides suitable amount of shelters such as stones, open karstic formations, dead wood and relative high humidity. Construction of an unpaved road that winds several times through the brook however also threatens these last refuges, since it makes water flow impossible. At the upper source of Val Postesina, water is being extracted from the karst, resulting in a reduced water flow (pers. comm.). The final threat is due to logging just north of the suitable habitat, resulting in the subjection of direct sunlight to large areas on the eastern slope and the brook, dehydrating the forest surface and exposing it to the wind (Fig. 2).

S. a. aurorae seems to be extremely limited within the Trentino province, only occurring in the east of the Altopiano di Vezzena. The geographical barriers mentioned earlier make presence other than the study area highly unfavourable. The survival of the subspecies at least in Val Postesina seems to be in serious threat due to logging, silvicultural clear cutting of *Picea abies*, and the extraction of water from the karst. These threats are destroying the habitat, the surface structure of the forest and the humidity both in the surface and in the vicinity of the brook.

Fig. 2. Logging and dehydration of the brook in Val Postesina

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