ZooNotes 85: 1-4 (2016)
www.zoonotes.bio.uni-plovdiv.bg
ISSN 1313-9916

Two Records of large specimens of Fire Salamander *Salamandra salamandra* (Linnaeus, 1758) (Amphibia: Caudata) in Bulgaria

ALEXANDER PULEV*, GEORGE MANOLEV, LIDIA SAKELARIEVA

Department of Geography, Ecology and Environmental Protection, Neofit Rilski South-West University, 66 Ivan Mihailov Str., 2700 Blagoevgrad, Bulgaria, *Corresponding author: spu@abv.bg

Abstract. Two particularly large specimens of Fire Salamander have been registered in southwestern Bulgaria in late winter/early spring. Both of them are adult females with total body length 231 mm, and 219 mm. The two specimens recorded are the largest ones found in Bulgaria so far. Their dimensions are impressive for the entire range of the species. Both specimens have been found during the day in a sunny and dry weather, which has not been registered by other researchers in the cold half of the year in Bulgaria. The winter activity of the species has been confirmed.

Key words: *Salamandra salamandra*, large, winter, diurnal, activity.

Introduction

In Bulgaria the Fire Salamander – *Salamandra salamandra* (Linnaeus, 1758) is represented by two subspecies – *Salamandra salamandra salamandra* (Linnaeus, 1758) and *Salamandra salamandra beschkovi* Obst, 1981. The nominate form is widespread in the low and medium mountain areas of the country with the exception of Strandzha Mts. and Sakar Mt. (Beshkov & Nanev 2002; Petrov 2007; Stojanov *et al.* 2011). *S. salamandra beschkovi* is known only from its type locality – the Sandanska Bistritsa river valley, north of the town of Sandanski and according to Beshkov (1993) it is with unclear taxonomic statute. Probably it is a site-modification of *S. salamandra salamandra* (Böhme *et al.* 2003).

The total body length of adults in Bulgaria is at an average of 150-170 mm to 180 mm (Stojanov *et al.* 2011). In 1941 Buresch & Zonkov reported the largest known until then specimen of Fire Salamander from Bulgaria with a length of 193 mm. Later Beshkov & Zonchev (1963) indicated 196 mm length of the largest specimen measured by them (n = 200) in a survey of Vitosha Mts. Stojanov *et al.* (2011) reported specimens larger than 200 mm, without specifying the exact size. The largest measured specimen from Bulgaria (kept in the collections of the National Museum of Natural History – Sofia) has a total length of 210 mm (Beshkov & Zonchev 1963). For the whole range of the species, the individuals in some populations (*S. salamandra crespoi* Malkmus, 1983 – in Portugal) reach up to 250 mm, but usually are substantially less than 200 mm (Arnold & Ovenden 2002).

According to Arnold & Ovenden (2002) the species as a whole is strictly nocturnal and frequently active after rain. The Fire Salamander in Bulgaria spends much time hiding beneath rocks or logs or in crevices and is mainly active at night. It is terrestrial species that comes out to the ground exclusively during rain (sometimes during slight snowfall). It is

Accepted: 05 February 2016
Published: 06 March 2016
Университетско издателство "Паисий Хилендарски"
Plovdiv University Press "Paisii Hilendarski"

usually active from April to November but in warm and rainy weather can be observed also in winter months (Beshkov & Nanev 2002; Stojanov *et al.* 2011). According to Beshkov & Zonchev (1963) the Fire Salamander in Vitosha Mt. has no rhythmic annual and diurnal cycle activity, and it is determined to a great extent by the specific meteorological conditions. In case of prolonged warm rains all individuals come to the surface. Again, according to them, during the warm half of the year, if it is cool and cloudy, individual specimens can be seen in the daytime in dry days. The species is largely cold-resistant and is registered several times during the winter in different parts of Bulgaria. Original data about winter activity (December, January or February) of adults are contained in the works of Beshkov & Zonchev (1963) and Pulev & Sakelarieva (2009), and of larvae – in the publication of Pulev *et al.* (2015).

Two particularly large specimens of Fire Salamander have been registered in southwestern Bulgaria in late winter/early spring.

A gravid adult female was recorded at 2:00 pm on 24.02.2015 at the left valley margin of Chetirka river, 1700 m W/SW of the village of Pokrovnik (N41°58′42″ E23°01′42″ alt. *ca* 415 m). The weather was sunny and comparatively warm for the end of February – the air temperature was 12.5°C. The specimen stood still on dry leaves at the edge of the shadow in a ditch (without water) in sparse oak forest (Fig. 1 A). The measured total body length (L. tot.), with the tail, was 231 mm (L. corp. 127 mm; L. cd. 104 mm) – after a methodology used by Dobrev (2007). The thickness of the body at its widest part was 46 mm (Fig. 1 B).

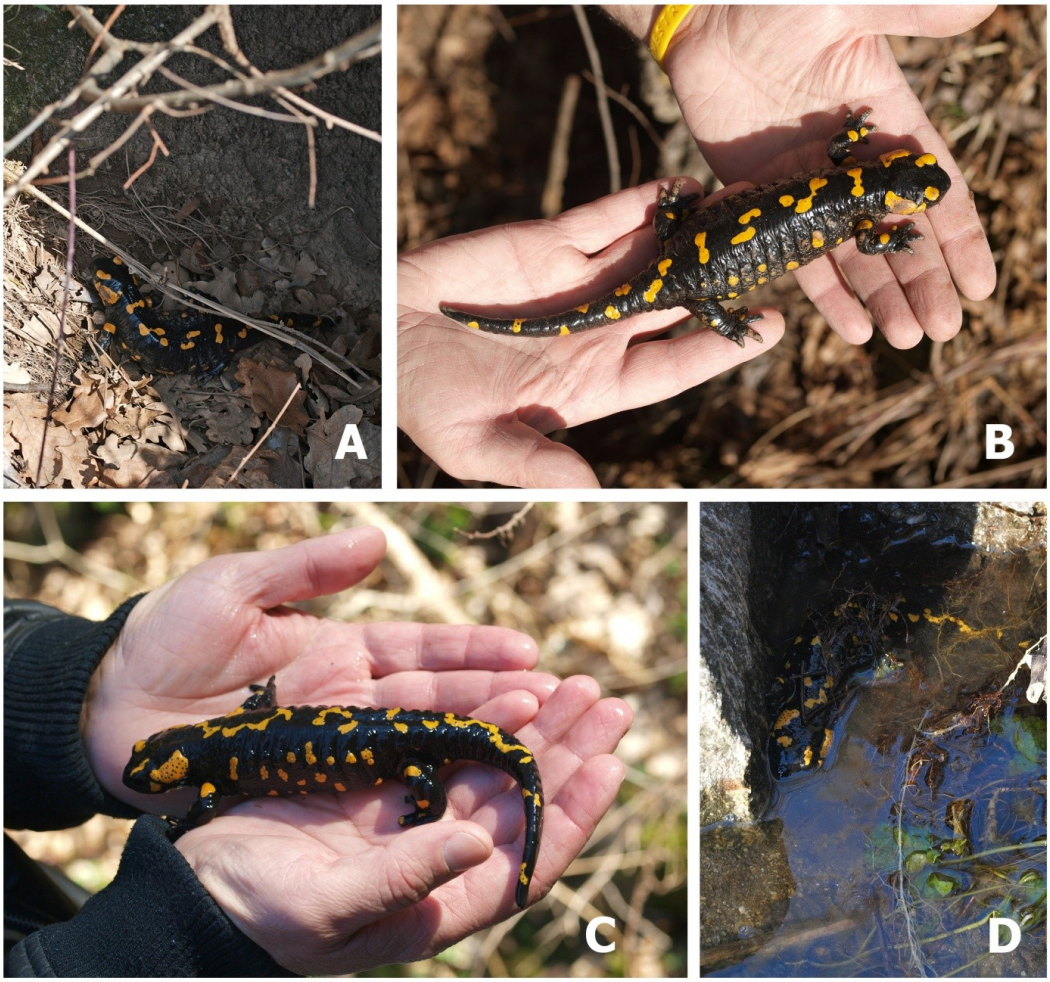

Fig. 1. The observed adult female specimens of Fire Salamander (*Salamandra salamandra*) and their microhabitats. A&B – Chetirka River, 24.02.2015; C&D – Sheytanski Andak Stream, 03.03.2015.

Another large gravid female was found at 5:15 pm on 03.03.2015 in Sheytanski Andak (Dyavolski Dol) stream, 850 m away from its mouth (N42°02′16″ E23°07′12″ alt. *ca* 518 m) in a sunny windy and warm weather, air temperature 10.5°C, and water temperature 5.5°C. The specimen stood still, almost completely submerged in the water, in a shady spot in broad-leaved mixed forest (Fig. 1 D). Probably the specimen registered in this micro-habitat (shallow small pool with a width of about 40 cm, slow water flow and aquatic plants) had prepared for the birth of larvae. The total body length (L. tot.) was 219 mm (L. corp. 117 mm; L. cd. 102 mm), and its thickness - 41 mm (Fig. 1 C).

The two specimens recorded are the largest ones found in Bulgaria so far. Their dimensions are impressive for the entire range of the species. Most likely reaching such and larger sizes in *Salamandra salamandra* is possible in the southern periphery of the range, due to the better conditions for individual development (and hence a longer period of activity).

It is confirmed the winter activity of the species in Bulgaria in a little warmer weather than usual in the days the specimens have been recorded. This activity can be associated with the great cold tolerance of the species - the lowest air temperatures when active salamanders have been registered are 6-7°C (Beshkov & Zonchev 1963; Pulev & Sakelarieva 2009).

Both specimens have been found during the day in a sunny and dry weather, which has not been registered by other researchers in the cold half of the year in Bulgaria. Another record of daily activity in a sunny and dry weather in the late autumn has already been reported by Pulev & Sakelarieva (2009). This gives us reason to suppose that during the late autumn, winter and early spring the salamanders are active mainly during the day if the daytime temperatures are higher, regardless of humidity and rainfall. Another representative of the Bulgarian herpetofauna that is with typical nocturnal activity (the Kotschy's Gecko) was also registered in winter only during the day (Mollov *et al.* 2015).

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