

First record of *Elaphe quatuorlineata* (BONNATERRE, 1790), from the Island of Dugi Otok (Croatia)

Dugi Otok is the largest and westernmost island of the Archipelago of Zadar in northern Dalmatia (Croatia); it is 45 km long, 1-5 km wide and separates the other islands of the archipelago from the open Adriatic Sea. The vegetation consists of dense Mediterranean maquis (most common), open garrigue (central and south), pine forest (north) and small cultivated areas around the settlements (e. g., olive groves). A nature conservation area (Telašćica Nature Park) is located in the southern portion of the island and another one (Kornati National Park) covers various adjacent islands south-east of Dugi Otok.

The following snake species were reported from the island so far: *Xerotyphlops vermicularis* (MERRIM, 1820), *Hierophis gemonensis* (LAURENTI, 1768), *Zamenis situla* (LINNAEUS, 1758), *Telescopus fallax fallax* (FLEISCHMANN, 1831), *Natrix natrix* (LINNAEUS, 1758) ssp., *Malpolon insignitus fuscus* (FLEISCHMANN, 1831) and *Vipera ammodytes ammodytes* (LINNAEUS, 1758) (HIRTZ 1930; GRILLITSCH et al. 1999; DIECKMANN 2006; KRYŠTUFEK & KLETEČKI 2007; ŽAGAR et al. 2013). The status of *X. vermicularis* is uncertain, only a single specimen of *V. a. ammodytes* was ever observed (by Mario Schweiger, pers. comm., quoted by DIECKMANN 2006).

In the present note the author reports on the occurrence of *Elaphe quatuorlineata quatuorlineata* (BONNATERRE, 1790), on that island from where it was not known before. The following records were made:

* Juvenile individual, roadkill, village of Luka beside the sea, May 28, 2016 (Fig. 1, site 3; Fig. 2).

* Adult male, roadkill, on the main road of the island 1.5 km northwest of Luka, interior, more mountainous part of the island, May 31, 2016 (Fig. 1, site 1; Fig. 3).

* Adult female showing partial melanism, observed close to the previous site on June 1, 2016 (Fig. 1, site 2). The base color and the black longitudinal stripes were still somewhat visible, especially in the anterior

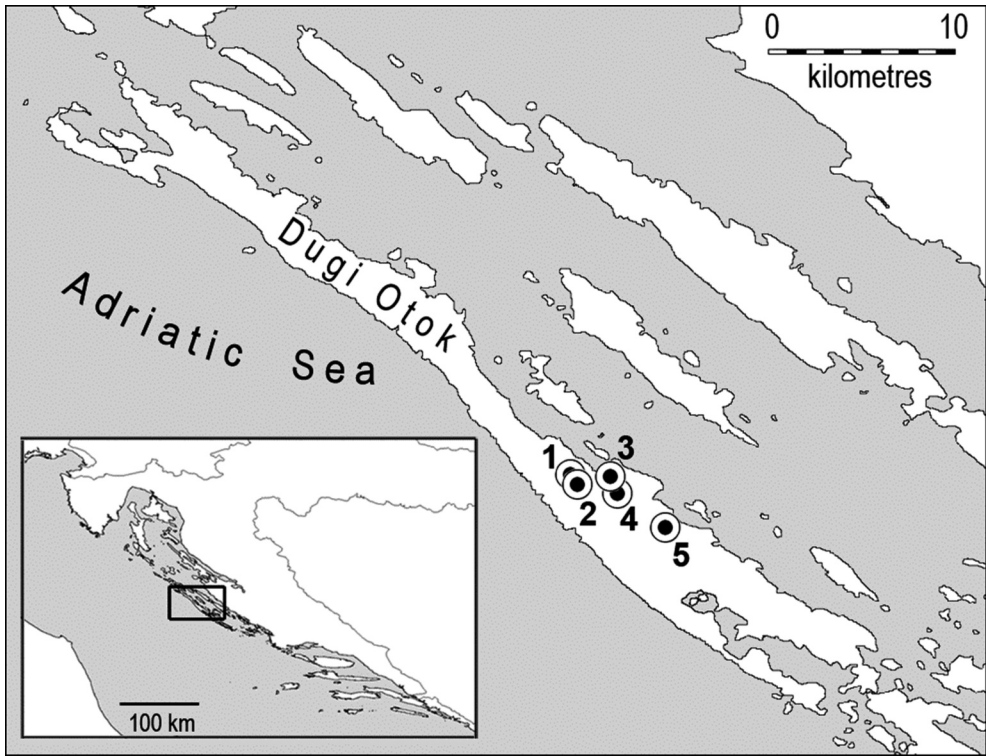


Fig. 1: Spotting sites of *E. quatuorlineata* (BONNATERRE, 1790), on Dugi Otok, Croatia (compare to Figs. 2-7).

part of the body (Fig. 4). The habitat consisted of dense maquis and pastures with single stones or stone walls (Fig. 5).

* Subadult female, observed in the yard of an abandoned house in the periphery of Luka, June 6, 2016 (Fig. 1, site 4; Fig. 6). The site was found by support of Jure Picić, a local resident, who confirmed the occurrence of *E. quatuorlineata* (called 'kravosas' in Croatian) around Luka. The area is characterized by partly overgrown vegetable gardens, bushes, small meadows and stone structures (Fig. 7).

* Adult specimen of undetermined sex, side of the main road between Žman and Zaglav, 3 km southeast of Luka, June 6, 2016 (Fig. 1, site 5).

Although Dugi Otok is not as well investigated by herpetologists as, e.g., the north Adriatic islands of the Kvarner Bay (e.g., TÓTH et al. 2006; SCHWEIGER 2012), the discovery of *E. quatuorlineata* is surprising.

There is only one unconfirmed remark in the literature (PLANINC 2002), which was later rejected (ŽAGAR et al. 2013). Sightings of reptile species in areas from where they were never reported before should always be considered with caution due to the possibility of having been introduced (comp. SCHWEIGER 2008). However, the observation of five specimens of different age and sex at different sites separated from each other by distances of several kilometers (Fig. 1) indicates that there is a reproducing population of *E. quatuorlineata* on Dugi Otok. From a zoogeographical point of view there is no reason why the occurrence on the island should not be autochthonous. The species is known from the Croatian coastal mainland and the islands – from north to south – Cres, Lošinj, Krk, Rab, Pag, Olib, Silba, Premuda, Žut, Kornat, Vis, Brač, Hvar, Korčula and Mljet (BÖHME & ŠČERBAK 1993; ČEVID 2005; SCHWEIGER 2005;



KOREN et al. 2011), so also from neighboring islands. The habitats in which *E. quatuorlineata* was found on Dugi Otok are typical for the species (STROHMAIER 1986; KREINER 2007; ORTH 2013). As these habitat types are widespread throughout the island, its range could comprise larger parts of the island than reported here. This assumption is confirmed by Jure Picić (pers. comm.), who is familiar with the species and knows it not only from Luka (at least since the 1990's, more frequent observations in recent years) and Žman but also from Savar, 10 km northwest of Luka.

The occurrence of a partially melanistic specimen (Fig. 4) is worth mentioning. Presumably, the dark color developed with increasing age of the individual (comp. EDELSTAM 1976). Pictures or data from the literature about melanism of *E. quatuorlineata* are rare. TRAPP (2007) mentions the existence of melanistic *E. quatuorlineata*



Fig. 2: Juvenile *Elaphe quatuorlineata* (BONNATERRE, 1790), from Luka, Dugi Otok, Croatia (May 28, 2016; length about 30 cm; site 3 in Fig. 1).

Fig. 3: Adult male *Elaphe quatuorlineata* (BONNATERRE, 1790), from the main road (May 31, 2016; length about 140 cm; site 1 in Fig. 1).

Fig. 4: Adult female *Elaphe quatuorlineata* (BONNATERRE, 1790), with partial melanism found near the main road (June 1, 2016; estimated length at least 150 cm; site 2 in Fig. 1).

Fig. 5: Habitat of *Elaphe quatuorlineata* (BONNATERRE, 1790), beside the main road, 1.5 km northwest of Luka (site 2 in Fig. 1).

Fig. 6: Subadult female *Elaphe quatuorlineata* (BONNATERRE, 1790), from the periphery of Luka (June 6, 2016; estimated length at least 100 cm; site 4 in Fig. 1).

Fig. 7: Habitat of *Elaphe quatuorlineata* (BONNATERRE, 1790), in the periphery of Luka (site 4 in Fig. 1).

without giving further details, while WIRTH (2009) specifies that specimens from Dalmatia are darker than those from Italy and sometimes tend to melanism. VEITH (1991) gives a report of a “deep black” specimen from Metković, southern Croatian mainland, and two “dark black-brown” specimens from Metković and Zara (today’s Zadar), respectively, that showed traces of the pattern, maybe comparable to the present specimen. VEITH (1991) supposed that *E. quatuorlineata* tends to melanism in marsh areas. Consistent with this assumption, David HEGNER shows pictures of a very dark specimen from the Bacina Lakes, about 20 km to the west of Metković (SCHWEIGER 2016). Nevertheless, in most wetland areas only normal-colored individuals are found, and there is lack of surface water on Dugi Otok.

Melanism of reptiles is discussed in the literature as a benefit for thermoregulation, a factor for selection by increased risk of predation and a phenotype being frequent in habitats close to the species’ limits of existence (EDELSTAM 1976; TANAKA 2005). There are examples of islands in the Mediterranean, which contain melanistic reptile populations (e. g., MÜLLER 1934), also explained as a result of genetic drift (EDELSTAM 1976). The single dark specimen on Dugi Otok reported here could refer to an individual variation within a population of normally colored *E. quatuorlineata*. But sightings of dark brown specimens by Jure Picić (pers. comm.), including a nearly black individual similar to the one (most likely not the same) shown here, suggest that those phenotypes are more frequent within the population on the island. In this context the observation of an unidentified black snake in the vicinity of Sali in the south of the island in September 2014 by Jörn-Peter Schröder (pers. comm.) is of interest. Of the known snake species of Dugi Otok, *M. insignitus fuscus* and *N. natrix* can express melanism as well (TÓTH et al. 2006; KREINER 2007). And in fact, a melanistic *M. insignitus fuscus* was reported from the island by HIRTZ (1930).

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AUTHOR: Robert MADL < r.madl.agar@gmx.de >, Roßdorfer Straße 28, D-60385 Frankfurt a. M., Germany.

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