

## Is there a need for another type of studies on reptiles in Romania? An argument for research on ticks parasitizing reptiles

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**Abstract.** The present paper is intended to be an impulse for achievement of some studies on ticks that parasitize different reptile species in Romania. Such reports have increased lately in Europe, in the context of increased frequency of diseases that ticks can spread. In Romania there are currently very few data on this subject. However, recent information both on the distribution of reptiles and ticks in the country should represent support and argument for conducting some research to clarify tick species distribution on different reptile species depending on geographical region. Such studies can provide the basis for further investigations on the role of ticks which parasitize reptiles in the transmission of some diseases.

**Key words:** ticks, reptiles, diseases, geographical distribution, Romania, studies, perspectives.

The study of reptiles has been progressing in Romania for the last few years, expressed both by the large number of published papers and the novelty of some of presented data (e.g. Ghira 2007a, Strugariu & Gherghel 2007, Ţibu & Strugariu 2007, Covaciu-Marcov et al. 2012, Sos et al. 2012). However, the recent studies are focused only on a few directions, being mostly dedicated to the conservation side, very current due to the high importance of reptiles in Romanian environmental legislation (O.U.G. 57/2007). Thus, studies on reptiles in Romania have lately been dedicated either to the report of some species in new regions (e.g. Ghira 2007a, Strugariu & Gherghel 2007, Ţibu & Strugariu 2007, Strugariu et al. 2009, Covaciu-Marcov & David 2010, Sahlean et al. 2010, Ferenti et al. 2011, Covaciu-Marcov et al. 2012, Sos et al. 2012) or to the inventory of reptiles from some natural protected areas, together with the amphibians from them (e.g. Iftime 2005a; Ghira 2007b; Cogălniceanu et al. 2008; Covaciu-Marcov et al. 2008, 2009a,b; Ghira et al. 2012). Although these studies are extremely important from the conservation perspective, they cover only in a small extent the types of studies related to reptiles, as there are also other directions, insufficiently addressed in Romania. Of these, an extremely important direction, in terms of practical implications, is the studies of ticks that parasitize different reptile species (e.g. Bauwens et al. 1983, Široký et al. 2006, Gryczyńska-Siemiątkowska et al. 2007, Tjisse-Klasen et al. 2010, Václav et al. 2010). Usefulness of these studies is provided by the fact that

ticks are transmitting different pathogenic agents (e.g. Kjemtrup & Conrad 2000; Parola & Raoult 2001a,b; Parola et al. 2005; Mansfield et al. 2009) and the reptiles parasitized by ticks have therefore importance in transmission of some pathogenic agents (see in: Majláthová et al. 2008).

At present, diseases caused by pathogenic agents transmitted by ticks are increasingly discussed in the scientific literature, being a current topic (e.g. Kjemtrup & Conrad 2000; Parola & Raoult 2001a,b; Parola et al. 2005; Mansfield et al. 2009). Recently, in Romania, there have also emerged data on the role of ticks as vectors of some pathogenic agents (e.g. Coipan 2010, Coipan & Vladimirescu 2010). Knowledge of tick-transmitted illnesses is very important, because ticks are able to transmit many pathogenic agents to humans, four species of ticks being recently identified in Romania on humans (see in: Briciu et al. 2011). The recent increase in incidence of these diseases appears to have multiple reasons, including climate changes seem to favour the spreading of ticks (see in: Süss et al. 2008, Gray et al. 2009). Also, due to importance of ticks as vectors of some diseases dangerous to humans (see in: Coipan et al. 2011), several attempts have lately been made in Romania to establish the exact distribution of tick species (Coipan, et al. 2011; Mihalca et al. 2012a,b). These studies are important both from applied and zoogeographic perspectives, given the fact that previous data from Romania were collected almost 50 years ago (Feider 1965). The most common tick species in Romania seems to be

*Ixodes ricinus* (Mihalca et al. 2012b). This species is also the most widespread on European terrestrial vertebrates and the main vector of Lyme borreliosis (Lindgren & Jaenson 2006). Despite this fact, in Romania the impact of this species on the public health is considered to be underestimated (see in: Paduraru et al. 2012).

With new data on the distribution of ticks in Romania (Coipan et al. 2011, Mihalca et al. 2012a,b), information on different vertebrates which are hosts for ticks has also started to appear (e.g. Dumitrache et al. 2012, 2013, Mihalca et al. 2012b). Among these vertebrates, reptiles, represented by lizards and turtles, have occasionally been mentioned as well (Široký et al. 2006, Majláthová et al. 2008). However, despite the fact that such data began to be published in Romania, reports of reptile species parasitized by ticks seem to be fewer than in other European areas. Thus, in Europe there are numerous studies on reptiles parasitized by ticks (e.g. Bauwens et al. 1983; Matuschka et al. 1992; Široký et al. 2006; Amore et al. 2007; Majláthová et al. 2008, 2010; Földvári et al. 2009; Tjisse-Klasen et al. 2010; Václav et al. 2010), some of these being quite old (e.g. Grulich et al. 1957, Shilova & Obabovsky 1960, Rageau & Mouchet 1967, Fedorov 1970). The scarcity of reports of reptiles parasitized by ticks in Romania is probably not due to rarity of reptiles in the country, but rather to reduced number of studies on this topic. Such studies are acutely needed, because some reptiles and the ticks collected from them were found to be carriers of *Borrelia* (e.g. Majláthová et al. 2006, Richter & Matuschka 2006, Amore et al. 2007), including in Romania (Majláthová et al. 2008).

In light of the above, the need becomes extremely obvious for carrying out some studies on the relationship between reptiles and ticks in Romania, more so as in the country there are more reptile species compared to countries located further north (see in: Gasc et al. 1997). Some of the reptile species from Romania are widespread in the country, while others are limited to certain regions of the country and to certain habitat types (e.g. Fuhn & Vancea 1961, Iftime 2005b). Most of the reptile species from the country are protected by law, as well as many of their habitats (O.U.G. 57/2007). However, although protected, the reptiles are often affected by various anthropogenic activities (see in: Iftime 2005b), a fact that may even facilitate contact between ticks that parasitize reptiles and humans. Thus, even in Romania it has

been noted that forest workers are more exposed to contact with pathogenic agents transmitted by ticks than other categories of persons (Hristea et al. 2001). The phenomenon can only increase, as in Romania deforestations are continuing also in the present in a fast rate including in protected areas (see in: Knorn et al. 2012). It is obvious that these anthropogenic activities ultimately will be felt by humans, including by the increase of contact between them and ticks, mediated also by reptiles. Direct anthropogenic activities are less experienced by lizards, due to their smaller size, these often inhabiting road or railway sides (e.g. Gherghel et al. 2009, Covaciu-Marcov et al. 2006, 2009b), which brings them in contact with humans.

Probably, due to their lifestyle generally related to natural areas, reptiles are not among the most important tick vectors for humans, the human-reptile contact occurring probably more rarely than human-mammal contact. In Romania, the most reptile species are present in Dobrogea and in the south-western region of the country, in southern Banat and western Oltenia regions (see in: Fuhn & Vancea 1961, Iftime 2005b, Covaciu-Marcov et al. 2009c). However, it seems that seroprevalence of *Borrelia burgdorferi* in the human population from Romania is higher in the northern part of the country (Maramures) and for forest workers is greater in the western part (Arad County) (Hristea et al. 2001). Thus, so far it seems difficult to determine a link between reptile species distribution in Romania and borreliosis incidence in humans.

Despite the fact that in Romania there are relatively many reptile species (see in: Gasc et al. 1997), according to our knowledge to date pathogenic agents transmitted by ticks have been identified only in few occurrences (e.g. Majláthová et al. 2008), though presence of ticks on reptiles from the country had been reported for a long time (Fuhn & Vancea 1961). Thus, research in this field is highly needed in Romania. Accordingly, we intended to bring into attention a research direction which is practically extremely useful and little studied in terms of reptiles from the country. To be able to make real correlations between the incidence of some illnesses transmitted by ticks and the distribution of some reptile species and their number in certain regions of the country, studies have to be carried out on reptile species that are parasitized by ticks, their incidence and then the regions where the phenomenon occurs depending

on species. It is assumed that the number of reptile species affected by ticks will be higher in the southern part of the country. However, this depends on the matching of ecological requirements of different reptile and tick species and particularly of the most common tick species from Romania, *Ixodes ricinus* (Mihalca et al. 2012b). Thus, detailed studies will have to be conducted on the entire distribution area from Romania of the reptile species present in the country in order to clarify these issues. Also, it would be expected that in southern Romania, besides the higher number of parasitized reptile species, there would also be identified more tick species, some of which have been identified only in these areas of the country (Coipan et al. 2011).

Thus, there are many both applied and theoretical arguments which plead for achievement of a new type of studies on reptiles in Romania. Therefore, it is expected that these studies will be conducted in the following years, according to the European research direction from this field (e.g. Bauwens et al. 1983, Široký et al. 2006, Gryczyńska-Siemiątkowska et al. 2007, Tjisse-Klasen et al. 2010, Václav et al. 2010). The abundant recent information on distribution of some reptile species in Romania (e.g. Ghira 2007a, Strugariu & Gherghel 2007, Țibu & Strugariu 2007, Strugariu et al. 2009, Covaciu-Marcov et al. 2012, Sos et al. 2012) has indirectly prepared the ground for applied research. Thus, it is desirable that in the following period to arise also data on the parasites of reptiles and on their way of action on reptiles. In this way, studies on reptiles will be able to achieve a new applicability, along with that on their conservation importance and distribution, which has an extreme importance and remains a priority. Such studies will also contribute to the protection of both humans and reptiles, indicating a new type of consequences of disturbance of habitats.

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