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The amphibians of the Colli Albani (Latium, Central Italy): breeding sites and some ecological notes

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Abstract - The authors surveyed 70 potential breeding sites of amphibians on the Colli Albani (=Albani Hills), SE of Rome, and recorded the occurence of the following species: *Salamandrina terdigitata*, *Triturus carnifex*, *Triturus vulgaris*, *Bufo bufo*, *Hyla intermedia*, *Rana dalmatina*, *Rana* synkl. *hispanica*. Oviposition was observed in 31 sites out of 70 (44.3%): 3 troughs (13% out of all troughs), 7 (63.6%) groups of temporary or ephemeral ponds, 6 (54.5%) spring ponds, 5 (41.7%) tunnel-springs, 4 (57.1%) streams and all the pools (4) and lakes (2).

Key words: Amphibia, ecology, cave-breeding, Castelli Romani Regional Park, Pantani della Doganella.

Riassunto - Gli anfibi dei Colli Albani (Lazio): siti riproduttivi e alcune note ecologiche.

L'investigazione di 70 potenziali siti riproduttivi di anfibi nell'area dei Colli Albani, a SE di Roma, ha permesso di rilevare la presenza delle seguenti specie: *Salamandrina terdigitata*, *Triturus carnifex*, *Triturus vulgaris*, *Bufo bufo*, *Hyla intermedia*, *Rana dalmatina*, *Rana* synkl. *hispanica*. L'ovideposizione è stata osservata in 31 (44,3%) dei siti investigati: 3 fontanili (13% sul totale dei fontanili), 7 (63,6%) gruppi di pozze temporanee o effimere, 6 (54,5%) pozze di risorgiva, 5 (41,7%) sorgenti in cunicoli scavati nel tufo, 4 (57,1%) torrenti e in tutti gli stagni (4) e i laghi (2).

Parole chiave: Amphibia, ecologia, riproduzione in grotta, Parco Regionale dei Castelli Romani, Pantani della Doganella.

Introduction

The Colli Albani (=Albani Hills), although very close to Rome, have never been the target of an herpetological inventory. The current information on the amphibians occuring in this area was scarce and limited to narrow territories (Duranti, 1980; Bologna *et al.*, 2000). Accepting a proposal by the authors, the Castelli Romani Regional Park (which includes almost entirely the Colli Albani) supported the field research on the amphibians of the area. In this paper we expose the early results of this research.

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Materials and methods

The Colli Albani are SE of Rome and coincide with the extinct complex of Latium Volcano, which was active since middle-upper Pleistocene until about 20,000 years ago. Volcanic activity especially consisted in explosive phenomena with the production of pyroclastic rocks, and subordinate basaltic lavaflows. These geological features facilitate the formation of superficial water-bodies as well as of numerous springs. In the area also two lakes are present: Albano and Nemi. The vegetation is widely represented by chestnut coppices that replaced the original phytocenosis, such as mixed deciduous forest and beech forest, in wide areas. Altitude ranges between 150 m a.s.l. (S of Velletri) and 956 m a.s.l. ("Maschio delle Faete" mountain). At present, large part of the Colli Albani is included in a protected area, the Castelli Romani Regional Park, established in 1984, which covers about 12,000 ha.

The data herewith reported are the early results of field researches systematically carried out from June 2001 to December 2003 within the park boundaries and in its neighbourhood. We searched into 70 potential breeding sites, located by previous cartographic reconnaissance or by information obtained by local people. The surveys have been carried out during the whole year, on average at least once a week from November to June and once a month from July to October, for an amount of 160 field-days, mainly in day-time. During each field survey we recorded: general weather condition, air and water temperatures, water's quantity in the water-bodies by recording its maximum depth, occurrence of adults and their reproductive conditions (absence/presence of features as toe-pads, nuptial crests, vocalizations and so on), occurrence and developmental degree of larvae and eggs. Repeated surveys in each site allowed the authors to outline the phenology of each species in the whole study area.

Results and discussion

In the study area the presence of *Salamandrina terdigitata, Triturus carnifex, Triturus vulgaris, Bufo bufo, Hyla intermedia, Rana dalmatina* and *Rana* synkl. *hispanica* have been recorded.

Egg laying was recorded in 31 sites (44.3% out of the surveyed potential breeding sites): 3 troughs (13% out of all troughs), 7 (63.6%) temporary or ephemeral pond groups, 6 (54.5%) spring ponds, 5 (41.7%) tunnel-springs, 4 (57.1%) streams and all the pools (4) and lakes (2).

The breeding sites of the Spectacled Salamander *Salamandrina terdigitata* (Lacépède, 1788) range in altitude between 440 and 810 m a.s.l.. Oviposition was observed in five tunnel-springs and in five spring ponds. Previously, only Razzetti *et al.* (2001) documented the reproduction of this species in caves. All those breeding sites have still or, at the most, weakly flowing water. Ovipositions can already start at least in the first half of December, while the latest ovipositions was observed in the first decade of May. We recorded larvae since mid January. Usually larvae were observed up to July, when most of the breeding sites of this species dried up, but, if the water persisted, the larvae sometimes were also present until September. In two tunnels several larvae overwintered.

Triturus carnifex (Laurenti, 1768) is present at "Pantani della Doganella" (="Doganella Bogs", 529 m a.s.l.), an area where there are one pool and several temporary ponds, and also at "Torretta" (310 m a.s.l.), a locality near Genzano. In the first place, the Italian Crested Newt breeds both in the pool and in temporary ponds. Adult were observed in water from March to May. Larvae appeared in the last decade of April and are present, in the pool, until July. The record at "Torretta" (April 1990) is referred to three specimens come out from an underground water pipe linked to an artesian well, during hydraulic works. Such peculiar finding did not allow to locate exactly the breeding site. However, the well and the underground water pipe are the only water-bodies in the neighbourhood. According to M. Bologna (*in verbis*), until about 30 years ago another population occurred in an area near to "Pantani della Doganella". Nevertheless, by some recent surveys we recorded the high degree of urbanisation of that area and the apparent disappearance of the suitable biotopes for this species.

Triturus vulgaris (Linnaeus, 1758) was so far found only at "Pantani della Doganella". In this area the Smooth Newt, like the Italian Crested Newt, breeds both in the pool and in temporary ponds. Adult were observed in water from the end of January to May. The larvae appeared in March and are present, in the pool, until July.

Bufo bufo (Linnaeus, 1758) is the most common amphibian of the Latium Volcano. The breeding sites of the species (altitude ranges between 175 and 810 m a.s.l.) are: temporary and ephemeral ponds (7), streams (4), pools (3), troughs (3), the two lakes, one spring pond and one tunnel-spring. The Common Toad is active throughout the year, but the oviposition occurs between the end of January and May; however, two important breeding periods were noticed: the first between January and February and the second one in April. The tadpoles were observed from the second half of February to June. In the tunnel, on November, 2003, we found tadpoles from eggs probably laid in September.

The Italian Tree Frog *Hyla intermedia* (Boulenger, 1882) spawns both in the pool and in the ponds at "Pantani della Doganella", in a trough and in a stream south of Velletri (175 m a.s.l.). Breeding activity concentrated from the first half of April to the first half of May; tadpoles were observed from the beginning of May to July.

Rana dalmatina (Bonaparte, 1840) was found in reproduction only in the NE sector of the study area so far, between 400 and 810 m a.s.l.. The oviposition was observed both in the pool and in the ponds at "Pantani della Doganella", in other two groups of temporary ponds, in two troughs, in two streams and in another pool. Oviposition occurred between February and March. The tadpoles appeared at the beginning of March and could be found until July. Some metamorphs have been found in October and November even in places much far from the closest known breeding site (e.g. in SE sector).

The "green frogs", *Rana* synklepton *hispanica*, breed in eight biotopes ranging in altitude between 175 and 529 m a.s.l.: at "Pantani della Doganella", in two pools, in two troughs, in a stream, in the Albano Lake and in a group of temporary ponds. The "green frogs" were active since May; tadpoles appeared in June.

Table 1 reports the values of Sørensen (1948) coefficient. Except the Spectacled

Salamander, which is in sintopy only with the Common Toad in a tunnel, all the other species coexist with each of the others in at least one breeding site. In particular, all the species, but the Spectacled Salamander, breed at "Pantani della Doganella". The Agile Frog and the "green frogs" are the species most associate and both of them always share their breeding sites with the Common Toad.

Tab. 1 - Sørensen coefficients of amphibian population of the Colli Albani (*S. t.=Salamandrina terdigitata*, *T. c.=Triturus carnifex*, *T. v.=Triturus vulgaris*, *B. b.=Bufo bufo*, *H. i.=Hyla intermedia*, *R. d.=Rana dalmatina*, *R.* synkl. *h.=Rana* synklepton *hispanica*).
Tab. 1 - Coefficienti di Sørensen per il popolamento ad anfibi dei Colli Albani (*S. t.=Salamandrina terdigitata*, *T. c.=Triturus carnifex*, *T. v.=Triturus vulgaris*, *B. b.=Bufo bufo*, *H. i.=Hyla intermedia*, *R. d.=Rana dalmatina*, *R.* synkl. *h.=Rana* synklepton *hispanica*).

	S. t.	***T. c.***	***T. v.***	***B. b.***	***H. i.***	***R. d.***
T. c.	0					
T. v.	0	1				
B. b.	0.07	0.09	0.09			
H. i.	0	0.50	0.50	0.25		
R. d.	0	0.22	0.22	0.55	0.36	
R.* synkl. *h.	0	0.22	0.22	0.55	0.54	0.62

Conclusion

The findings of *S. terdigitata* are the most important records of this research, because it was no more found in the Colli Albani since the first half of the XIX century: previously, only Bonaparte (1832-1841) found this species on Colli Albani, but its occurrence has never been confirmed (Corsetti & Angelini, 2000). Furthermore, in the study area some populations start oviposition at least in the first half of December. This recalls to autumnal ovipositions, which are known, until now, only in the Volsci Mountain Chain (Corsetti, 1994a; 1994b; 1999a; 1999b; Corsetti & Angelini, 2000; Angelini *et al.*, 2001).

We cannot confirm the presence of three species previously found in the study area: *Salamandra salamandra* (Linnaeus, 1758), *Bombina pachypus* (*=B. variegata pachypus*) (Bonaparte, 1838) and *Rana italica* (Dubois, 1987). These species were respectively reported of the study area in Bologna (2000), Sarrocco & Bologna (2000) and Zapparoli (2000).

It is possible that these species have been suffered even more negatively the important urbanisation that in the last decades concerned the study area (e. g. this happened for *T. carnifex*, as said above). Very important are also some other alterations due to various human activities, like those linked to the timbering activities.

Even the very scarce utilisation of troughs (3 out of 23) may be linked to environmental alterations, being much of the troughs now in urbanised areas or near roads. These factors likely favour water pollution and induce general environmental stress. Frequent cleaning, empting and deep restoring of the troughs, if not made

correctly, may also be detrimental to small fauna which lives or breeds in the troughs, like amphibians.

The springs which are in the tunnels excavated in the tuff are a particularly interesting kind of breeding site. These tunnels were made mostly at the beginning of the XX century, to shelter already existent springs or to facilitate the water utilization. In five tunnel-springs (41.7%) the Spectacled Salamander reproduces, in one case together with the Common Toad (one of few known cases in which the two species cohabit in Latium). The fact that the Spectacled Salamander oviposits in these particular breeding sites shows, moreover, the good adaptability of this species, including the possibility of reproduction even in relatively recent caves.

In terms of enviromental conservation, a special attention is due to "Pantani della Doganella" (529 m a.s.l.), an area about 1 km^2 wide at once inside the eastern part of "Tuscolano-Artemisio" volcanic crater. Except the Spectacled Salamander, all the amphibians of the Colli Albani are present and they breed both in the only pool, which dries up in very drought summers, and in temporary and ephemeral ponds in a marshy zone, whose extension and persistence depend on the precipitation. In the study area, this biotope is also the only breeding site of the Smooth Newt and is the most important breeding site for the Common Toad and Agile Frog. For these reasons, this area (that is already included in the proposed Site of Community Importance IT6030018) might be suggested as an "Area di Rilevanza Erpetologica Nazionale" (=National Significance Herpetological Area), according to the initiative of the Societas Herpetologica Italica that aims to protect areas important for the amphibians and reptiles which live there.

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