The occurrence of hibernating *Pipistrellus pipistrellus* (Schreber, 1774) in caves of the Carpathian Basin

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**INTRODUCTION**

The pipistrelle *Pipistrellus pipistrellus* (Schreber, 1774) is one of the most widespread and abundant bat species in Europe (Mitchell-Jones *et al.*, 1999). Some studies have even inferred recent population increases or expansions in some Central and Western European countries (Arlettaz *et al.*, 2000). *Pipistrellus pipistrellus* forms large nursery colonies in summer, sometimes up to several hundred females, typically located in houses, tree holes or bat boxes (Gerell and Lundberg, 1985). In winter both sexes congregate, forming large hibernating colonies. They have been reported from tree holes (Kepka, 1976), underground cavities (Haensel, 1992; Lustrat and Julien, 1993; Kretzschmar and Heinz, 1995), church and house attics (Racey, 1973; Gjerde, 1994), and caves (Dumitrescu and Orghidan, 1963; Uhrin, 1995).

Dumitrescu and Orghidan (1963) reported the first large hibernating colony in Sura Mare cave (Sebes Mountains, Southern Carpathians), Romania, numbering up to 60,000 individuals. Individuals and sporadic colonies were also found in Lilieciilor and Meziad caves (Dumitrescu *et al.*, 1963). One group of *P. pipistrellus* was located hibernating in deep and dry crevices in the Drienovec cave in former Czechoslovakia (Gaisler and Hanák, 1962; see also Matis, 2000). Uhrin (1995) reviewed the winter distribution of *P. pipistrellus* in underground shelters in the Slovak Republic, remarking on the presence in three caves in South Slovakia, one of which contained ca. 10,000 individuals. In addition, 2,100 *P. pipistrellus* were found hibernating together with a large number of *Barbastella barbastellus* in mine gallery in the Muranska Plain Protected Landscape Area. In France 800–900 *P. pipistrellus* were reported during the winter of 1990 in a 600 metre tunnel near Paris (Lustrat and Julien, 1993) and in South West Germany about 1,000 *P. pipistrellus* were also discovered in a mine (Kretzschmar and Heinz, 1995).

Other records in European countries during the winter months show a sporadic occurrence of *P. pipistrellus* in underground shelters, including caves in Spain (Alcalde and Escala, 1999), Austria (Bernd, 1994), Hungary (Paulovics *et al.*, 1996), Poland (Krzanowski, 1959; Bagrowska-Urbańczyk and Urbańczyk, 1983), Ukraine (Krochko, 1964), Bulgaria (Pandruska and Beshkov, 1998) and Switzerland (Aellen, 1965).

In view of the fact that the Sura Mare cave was reported to contain the largest number of hibernating *P. pipistrellus* throughout the range of this species, it was of interest to repeat and extend the original survey of Dumitrescu *et al.* (1963) 40 years later.

**MATERIAL AND METHODS**

From 1999–2002 we mapped the location and size of winter and summer colonies of *P. pipistrellus* in 50 caves in the Western and Southern Carpathians, and Dobrogea, Romania. In addition, potential roosts, i.e., those displaying adequate habitat parameters but not known to harbour *P. pipistrellus*, were also