THE TERRITORIAL BEHAVIOR OF THE GREAT REED WARBLER (ACROCEPHALUS ARUNDINACEUS) IN WET ZONES OF MOLDAVIA

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Abstract. The Great Reed Warbler is one of the most common warblers populating the wet areas of Romania. At approximately 5-10 days after arriving from migration, in April or early May, the great warblers establish their nesting territories. The establishment of territories takes up to two weeks for the Great Warbler. Territoriality in warblers can be seen as a form of aggression and competition, when individuals of the same species compete for a mate, but also a competition for environmental resources, including the possibility to feed more easily, or to have good shelter from predators, wind or heavy rains.

Keywords: The Great Reed Warbler; territorial behaviour

Material and Methods

The field observations have been undertaken during 2000-2005, from April to July.

The following wet Moldavian zones were submitted to investigation: Larga Jijia-Vladieni Ponds (Iasy District); Balta Lata Lake (Botosani District); Iezar Lake (Botosani District); Carja Ponds (Vaslui District); Vladesti Ponds (Galati District); Beresti Lake (Bacau District), Natural Reservation Balatau (Iasi District); Natural Reservation Teiva (Iasi District), as well as we focused our observations at The Botanical Garden of Iasi.

The investigated habitats are relatively homogenous as regards the vegetation and human influence. The vegetation, typically paludal with reed (Phragmites australis),
bulrush (*Typha angustifolia*, *Typha latifolia*), sedge (*Carex*) and scoulingrush (*Scirpus*), is represented by vegetal associations such as: *Scirpo-Phragmitetum*, *Typhaetum angustifoliae-latifoliae*, *Caricetum acutiformis ripariae*.

The human impact in the wet zones of Moldavia is pretty insignificant and it consists of a rudimentary agriculture and fish exploitation which does not affect very much the bird populations living in the reeds beds (Ion, 2005).

For observation, we used an Exacta 10x50 binoculars and a Nikon 40x60 field scope. We have also searched some aspects of breeding biology in the reed beds by boat.

The methods employed for observation were visual and auditive transects along 1 km distance in the reed bands, as well observations taken from a fixed point (Bibby, 1998).

Our data include aspects concerning the territorial behaviour of The Great Reed Warbler (*Acrocephalus arundinaceus*).

**Results and Discussion**

At approximately 5-10 days after arrival, in April, the warblers establish their nesting territories. The female warblers (*A. arundinaceus*) appear, in general, in the nesting territories 9-11 days after the males, according to our observations. On rare cases of individuals arriving late, the establishment of territories begins in mid May.

The establishment of territories takes up to two weeks for the great reed warbler.

In general, in warbler populations there is a high fidelity for the nesting places, for both adults and juveniles (Hasselquist, 1998). On the contrary, the males with no breeding success in a territory do not return in the same place the following year (Bensch and Hasselquist, 1991, in Hasselquist, 1998).

By evaluating the body weight (Ion, 2004), the establishment of territories begins after the renewal of fat reserves necessary for flight and reproduction. Once it has established a territory, it does not leave it for a period varying from 10 to 20 days.

We observed that in the period in which it delimits its territory, the warbler is highly active during the day and even in the night. It seldom pauses from singing or moving inside the space chosen for nesting.

We noted that for the warbler, the territory is the space in which they couple and nest, but not the feeding area. Wilson, 2003, classifies the warbler territories in the B type, in which a great area is defended. Inside this area all the activities associated with mating take place, but not the feeding activities.

Territoriality in warblers can be seen as a form of aggression and competition, when individuals of the same species compete for a mate, but also a competition for environmental resources, including the possibility to feed more easily, or to have good shelter from predators, wind or heavy rains.

During the establishment of its territory, the great warbler flies and sings most often from the inside of its nesting area towards the borders, after which it returns next to the centre of its space. The centre of the territory represents in most cases the place where the future pair will install their nest. In this period, The Great Warbler, after finding a suitable place for the nest, moves from a so called “centre” of the territory towards the water or the water’s edge. At the edge of the reed bed he makes introspective flights a few minutes long (2-3), carefully assessing the borders of its territory. In all this time, the songs are short and of reduced intensity. It then returns to the centre of the territory after periods of 10-15 minutes, sometimes less, but does not show its posture nor does it sing from the top of the reed. The flights are very frequent, at approximately 2, 3 minutes the warbler moves inside its territory. We noticed, especially at the lake of the Botanical Garden in Iasi, that in the centre of their territory they move by sudden and alert jumps, emitting warning sounds, probably looking for the place of their future nest. After 10-15
minutes, however, they resume their flights to the edges of their territory. The flights, however, are very low so that the presence of The Great Warbler can barely be noticed. In all this time they have a surveillance posture, looking towards the edges of its territory or towards potential intruders, manifesting great curiosity.

As the territoriality becomes more evident, the posture seems more imposing, and the tail opens slightly as a fan, in the moment in which it shows the surveillance posture.

Literature data (Cramp, 1992) show that the first to arrive in the nesting territories are the individuals older than 2, 3 years, which, in many cases, are polygamous. The young individuals arrive later, and occupy habitats that are less favourable in terms of feeding and nesting sites. They generally remain monogamous. Most often they can not find a mate to reproduce, because their territories are in areas with difficult access to food or high predation risk. In other words, the older warblers have a higher rate of reproduction success than young ones.

Sometimes, just before the arrival of the females, as we could observe, the males begin constructing a nest, which will be one of the means to attract the attention of the female. In all this time, the warbler descends inside the reed bed to continue construction or moves to collect material for the nest. However, from time to time he flies to the top of the reed and makes its presence felt, announcing that he is the owner of that territory.

The nesting areas are seldom established in the centre of the reed beds, as they offer no advantages in finding food or escaping from predators. The first to arrive, according to our data, always occupy the reed beds that have an opening both to the water front and to the banks. The latter try to recuperate the lost territory by loud singing and large movements, meant to attract attention: Flying with their flight feathers spread apart, the tail open in a fan, and slightly raised, raised feathers. The territories that they occupy are inside the reed beds, or in shaded places, where feeding opportunities are poor, because the number of insects is very small. Also, their territories are placed near woods, or in scarce reed beds, where the risk of predation very high. Usually, these individuals begin after a while to fly over the territories established by the first arrivals, but only in their absence, in the hope of finding a better place. Most often they will not be able to establish a territory.

If, at the edge of the reed beds, the territories have an irregular shape, towards the interior, and especially between neighbours, the territories follow an imaginary line, almost straight or in a semicircle. Nevertheless, the territories must not be imagined as areas with fixed borders. Their surface can change in time and depends on the territorial behaviour of their owner.

Otherwise, there are factors affecting territoriality: the quality of resources, their distribution in space and time and the competition for resources (McFarland, 1999). Wet areas such as: The Botanical Garden, Beresti, where the reed beds are small or poor in resources offer the conditions for a strong intraspecific competition for food resources. In this case the territories are small and their borders suffer modifications.

After choosing the place of the future nest, we observed that the warbler sings sometimes for long periods of time, over 10 minutes, almost without stopping. To sing, the males stand on the top of the reed plants. The songs are made of a series of motives which repeat themselves and alternate in rapid succession. The song not only warns other males to the presence of the territory’s owner, but also attracts females for reproduction. The song represents in this case a mean of acoustical marking, and it is a display of strength. By singing the rivals are informed whether it is the case or not to engage in a territorial confrontation. The song of the Great Warbler, in the period of territory delimitation, is of great importance, an argument being the fact that on very windy days, sometimes with rain, they do not stop singing, on the contrary, the intensity of the sounds
increases, and they try to climb to the top of the reed plants, mostly without success, because the wind makes them come down. In our opinion, this is further proof of their commitment to the occupied space.

The Great Warbler marks its territory not only acoustically, but also visually. The visual marking of the territory takes place by showing a posture that makes it look bigger than it really is: Raised feathers, tail and wings slightly spread or stuck to the body. The contrast between the white of the crop, the red of the mouth and the red-brown of the head can be observed very well. The feathers on the head and neck are slightly raised. The activity becomes more intense, in this period, at the edge of the reed and slightly inwards.

Many times, The Great Warblers stop at the edge of their territory and sing. In all this time, they are orientated with the head towards the interior of their territory in order to see possible intruders. Territory surveillance flights are circular, or in the shape of a square, which makes us consider that the territories established by the great warbler (A. arundinaceus) are proximately in the shape of a circle or square. Sometimes singing is interrupted because the bird is grooming. This gesture probably is a mean to distract the attention of possible trespassers.

After establishing their territories, The Great Warblers fly over I, or near the surface of the water, scanning the area. The flights are executed in all directions and are very alert. In all this time, they maintain their tail spread out, as a warning sign, and emit sounds.

When an intruder appears, it is immediately chased out, and followed outside the territory, sometimes over quite long distances of 50-100 m. We have noticed that in all this time the owner of the territory assumes a threatening pose. The feathers on its head and sometimes those on its back are slightly raised. The head is bent forward, in line with the body, the wings are spread and point towards the back. The intruder has slightly raised feather, and renounces quickly at the fighting pose, assuming a submission pose, where the feathers are almost smooth and the body slightly bent. In rare occasions, we observed physical contacts between the owner and the intruder. We noticed that there are situations when the owner of a territory, when an intruder appears in its space, executes vertical flights, emits loud warning sounds, the tail and wings slightly lowered, and from 3-4 m launches at he warbler. The feet are tense, and it is in any moment ready to fly towards the newcomer.

In some specialist’s opinion (McFarland, 1998), such a threatening pose is an advantage in the fights between individuals of the same species. In many occasions, we saw then approaching each other to very short distances of only 2-3 m. In all this time, their song increases in frequency and intensity as they approach each other. Their position is a threatening one, with raised external feathers, raised wings, spread tail. Their voice tone can suffer modifications in such situations. The fighters emit fragments of songs composed of a small number of vocal motives. Physical contact sometimes takes place between the two, for a short time, as they push each other with their chest. After this, each warbler returns to its territory. In other situations, the stronger male remains on top of the reed, and the weaker retreats inside the reed. In other occasions, intruders are attacked not only with the chest, but also with beak or foot strikes by the owner of the territory.

In the moment of the attack, however, in most cases the intruder does not respond, but retreats to the edge of the territory.

The fight for a territory is reduced, in general, to visual and audio statements of supremacy. In flight, when he chases off the intruder, the owner of the territory has its tail very unfolded, the wings have ample movements and often are very much lowered, in a threatening pose.

The warblers in contiguous territories make in hot days introspective flights at the base of the reed, after which they return to the top of the reed, and sing songs a few
seconds long, with very short breaks and high intensity. In the moment in which one of the warblers rises on top of the reed, the one in the neighbouring territory will also rise and sing on top of the reed plants. The songs are not emitted simultaneously, but alternatively, first one, then the other.

As for the delimitation of territories (Ion, 2005), we can state the following: at The Great Warbler (*A. arundinaceus*), the territories can be contiguous, or there can be buffer space between them. We observed that territories that have an opening both to grassland, where they catch insects and to the open water where they take shelter, favour the reproductive success. In the years 2003, 2004, 2005, we kept under observation the breeding site in the area of the lake of the Botanical Garden in Iasi. We observed that the nesting pairs number 1, 2 and 6 (Fig. 1) had the highest reproductive success. They had the territories placed in such a manner, as to have facile access both to the grassland and to the open water. Also, we noticed that in the case of the nesting pair number 3, the nest was done later then the other cases, and the mail had occupied this territory in 2005, could not find a female to mate. As for the nesting pair 5, in none of these years did we see any chicks in the nest, which makes us believe that the reproductive success of this pair was 0, because of the very poor access to food.

**Figure 1.** The sketch of the great warbler nesting sites in the Iasi Botanical Garden lake area, between 2003 and 2005 – original sketch.

The risk of predation is another factor of great importance which influences reproductive success. In the case of nesting pair 4, as it was very close to the wood, the nest was infested by a Cuckoo, and they had no young. The vicinity of the forest allows the female cuckoo to better observe the potential places in which the warbler could install their nest.

The establishment of the warbler territory is closely connected with the meteorological conditions of the environment in which they live. Small territories are established in very hot and quite rainy springs, when in May (years 2003, 2004, 2005, temperatures exceed 20 °C. In years with low temperatures (spring of 2000, 2001), there
are cases in which in small areas (such as the Botanical Garden of Iasi), the warbler appear late, at the end of May and nest in very large territories, of almost 1000 m². In our opinion, high temperatures, the lack of precipitations are unfavourable factors for the nesting of the great warbler. Also, very low temperatures delay the establishment of territories and the forming of pairs. In 2001, a year with low temperatures in the Botanical Garden, at the end of the nesting season, we observed very few juveniles (to 7 nesting pairs 10 juveniles), which means that the rate of reproductive success was low.

Drycz, 1995, states that The Great Warbler subspecies present in Eastern Europe (ssp. arundinaceus) tolerates only a narrow spectrum of environmental and areal conditions, considerations which complete our statements.

Conclusions
At approximately 5-10 days after arriving from migration, in April or early May, The Great Warblers establish their nesting territories. The establishment of territories takes up to two weeks for The Great Warbler. The nesting territories cover in general a surface between 100 m² and 250 m². Territoriality behaviour in The Great Reed Warbler can be seen as a form of aggression and competition, when individuals of the same species compete for a mate, but also a competition for environmental resources, including the possibility to feed more easily, or to have good shelter from predators, wind or heavy rains. The supremacy of one warbler or another, during the defining of territories is reduced to emitting complex songs and showing an intimidating pose. The territories can be contiguous form one warbler to another, or buffer spaces may exist between them. We observed that territories that have an opening both to grassland, where they catch insects, and to the open water where they take shelter, favor the reproductive success.

The establishment of the warbler territory is closely connected with the meteorological conditions of the environment in which they live. Rain or low temperatures are the main factors detrimental to the establishment of territories.

References