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DATA REGARDING THE MOVEMENTS OF THE BIG CORMORANT (*PHALACROCORAX CARBO SINENSIS*) IN THE DANUBE DELTA

Viorel Cuzic

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INTRODUCTION

The birds met on our country's territory constitute an important component part of Romania's fauna and, in the case of the migratory species, of Europe's fauna.

At none of a terrestrial or even aquatic group, the phenomenon of seasonal change of place of the populations belonging to different species isn't so obvious like at birds. The examination of this phenomenon in a place situated at half distance between the equator and pole, that is a middle point like the delta, offered a rich observation material for the elaboration of personal outlooks in this direction (RADU, 1979).

The extremely favorable reproduction conditions and the optimal feeding possibilities, especially in the warm period of the year, make the Danube Delta an attractive biocenosis for the big cormorant. Therefore, the difference between the quantity and the quality of the food from a season to another and the variable way of its accessibility, the variation of the yearly and seasonal climatic conditions, have as consequence a special aviphenological dynamics.

Following Cătuneanu et alii, 1978, the big cormorant is a migratory species – eratic, summer guest. Usually, it withdraws on the littoral. Only when the Black Sea shore freezes, it migrates to the south, as far as the Marmara Sea or the Mediterranean Sea, from where it returns early, directly after the snow melting. The samples from the south of the continent seem to be sedentary. On the Romanian territory, only 3 ringed samples were recovered and they proceeded from U.S.S.R.

MATERIAL AND METHOD

Two methods were applied in the study of the big cormorant from Danube Delta migration: **the method of the direct observation** and **the ringing method.**

The study of the cormorant migration using **the direct observation method** is enough complex and consists in the registering of the date when a big part of the population arrives and the duration of its stay in the Danube Delta.

The use of **the ringing method** was been generalized at the birds study because of its high conclusive results which furnish important data regarding the migration.

The data written on the rings put to the cormorant's young were registered, together with the place and the date of the ringing and also other necessary data.

If a ringed sample is recovered or hunted, the fact is communicated to the Romanian Ornithological Head Office. Thus, on the base of the data centralized here, the scientists can put valuable scientific conclusions about the species migration, wintering place, geographical spreading. A very useful alternative of this method is the ringing of the youngs in the nest, a little time before their first fly.

This method furnishes data referring to the brooding, the age of the bird - if it comes back to the birthplace, but also presents a big risk because the youngs death rate is higher than the adults one. From this point of view, the use of the ringing method enhances the possibility of obtaining less conclusive results. The number of the ringed birds must be enough big in order that the percentage of those recovered gives the possibility of putting valuable scientific conclusions.

The method of ringing the young samples of big cormorants was applied in the spring of 2004. 100 samples were ringed in a first phase, followed by a second phase consisting in the ringing of other 100 samples belonging to the colonies situated on the Sinoe Lake in the places named « Prundul cu păsări » and « Ceaplacele ».

RESULTS AND DISCUSSIONS

Like in the case of other species of birds, the big cormorant presents different aspects regarding the populations dynamics depending on the seasons. Thus, there are cases when, beside the population which nestled in the delta, passage populations - which in summer stay in the zones more northern than their nidification area - can appear during the spring and autumn periods. Also, due to the mild conditions of some winter seasons, a part of the population belonging to the species which nestled in the delta remains here, the possibility of its completion with a reduced number of individuals belonging to other zones being present. We note here also the fact that, in the cold period of the year, the sedentary cormorant population modifies both the biotopes and the diet

composition, adapting themselves to the phenological changes.

The changes of place of the big cormorant population are difficult to be specified for the different periods of the year, as long as massive researches regarding the mark and the recovering of a significant number of big cormorant samples are not organized at the Danube Delta level. By means of the ringings and modern techniques it could be established that the direction of the migration ways is different not only for the birds belonging to different regions but also for the various species of birds belonging to the same region.

In the case of the big cormorants from the Danube Delta we can meet changes of place for maintenance, dispersions regular migrations and invasions. The maintenance movements mean the changes of place for the food and the flights for resting which are made between the feeding and the sleeping places.

The dispersions can take place out of the birth places for the search of more favorable places to survive or they can be reproductive dispersions which happen to the adult birds which failed the reproduction in a certain place and which are obligated to move in a place more favorable from this point of view. For the cormorant, we cannot talk about the regular and strict migration, this one changing the place especially when the meteorological conditions are unfavorable and associated with the food inaccessibility. At this species, the invasion phenomenon is enough rare; it can appear only for a short period of time in the zones with abundance and accessibility at the trophic base.

It has been stated that, at this species, a tendency for the increase of the staying period in the Danube Delta is present – aprox. 300 days/year, meaning 55 days more than the period noted in the specialty literature.

The majority of big cormorant population comes in the delta beginning with the third decade of February - which coincides with the beginning of the nestling period, and move to the south when a big part of the lakes freezes, generally at the end of December.

Regarding the maintenance movements, the population belonging to the species which nestles in the delta makes in only movements for the food – necessary both for the youth raising and for their own needs, movements which don't usually outrun a radius of 6 km.

The population belonging to the species which doesn't nestle in the delta, formed by immature birds or which failed the nestling in that year due to various motifs doesn't make regular movements for maintenance. This one feed in the zones with an abundant trophic base and it rest or stay overnight especially on the islets of the delta.

Regarding the population which wintered in the last three years, following the winter census made in the first half of the January of every year, effectives with the number between 3000 and 4000 samples were catalogued. When the temperature decreases and a big part of the lakes from the delta freeze, those are withdrawing to the main branches of the Danube and the complex of the lakes where, even the temperature is enough low, they find water eyes in the maritime lagoons. Also, big part of the population which winter to us, withdraws on the Black Sea shore, following the unfreezed places too.

Following the data obtained from the Romanian Ornithological Center and also the data found on the ring of the sample recovered in the complex Somova – Parches, the table 1 can be done. On the base of these centralized data, valuable scientific conclusions regarding the direction of the species migration, the wintering place and the geographical spreading can be put.

From the 17 samples of big cormorant ringed in the last years and recovered, 14 samples were ringed as youthful stage. The situation of these 17 samples is:

- seven were ringed in Ukraine and recovered in the Danube Delta;
- three were ringed in Russia and recovered in the Danube Delta;
- three were ringed in Romania. One of them was recovered in Turkey and two in the Danube Delta;
- two were ringed in Estonia and recovered in the Danube Delta;
- one ringed in Denmark and one in Finland, both were recovered in the Danube Delta.

Regarding the maximum period for a ring, this is six years and a month for the sample ringed in Finland and recovered in Romania. The minimum period was two months and 29 days for the sample ringed in Russia and recovered in the Danube Delta.

Table 1

The autumn migration at the cormorants is determined by both external and internal factors, the migartion instinct being released by the temperature decrease, the day/light decrease, low trophic resources, ice and snow appearance.

Table 1. Data from the 17 samples of big cormorant ringed and recovered

Nr. crt.	Nr. ring Metal/plastic	Ringing data	Ringing place	Geogr. coord.	Recuperation place	Geogr. coord.	Recupe-ration time	Elapsed time	Metod of recupe-ration
1.	Bucarest B 986	24.05.1960 Age pull	Delta Dunării **Romania**	?	Egridir lake **Turcia**		23.02.1965	4 y, 9 m, 2 d	
2.	Moskwa B 132013	16.05.1978 Age pull	Balzaevka **URSS**	46.50 N, 30.12 E	Delta Dunării **Romania**	45.11 N, 29.19 E	15.08.1978	2 m, 29 d	
3.	Moskwa B 165706	29.04.1979 Age pull	Crimeea **URSS**	44.55 N, 27.37 E	Delta Dunării **Romania**	44.55 N, 27.37 E	01.12.1979	7 m, 3 d	

4.	Moskwa A 126856	?	**Ucraina** ?	?	Delta Dunării **Romania**	45.03 N, 29.22 E	12.08.1985	?	
5.	216024	01.08.1986 Age pull	Braendegards, Faborg **Finlanda**	35 08 N, 10 28 E	Sulina, **Romania**	45 10 N, 29 35 E	01.09.1992	6 m, 1 d	
6.		18.05.1990 Age pull	Molochnyy Liman, Girsovka, Zaporozhye **Ukraine**	46.37 N, 35.22 E	Delta Dunării **Romania**	45.12 N, 29.27 E	11.01.1992	1 y, 7 m, 21 d	
7.	B-481358	18.05.1990 imatur	Zaporozh'ye **Ukraina**	46 37 N, 35 22 E	Danube Delta **Romania**	45 12 N, 29 27 E	31.01.1992	1 y, 7 m, 12 d	
8.	A 325574	11.06.1992 Age pull	Zaporozh'ye **Ukraina**	46 31 N, 36 10 E	Danube Delta **Romania**	45 9 N, 28 49 E	11.02.1993	9 m	
9.	A 325602	?	**URSS**	?	Periprava, **Romania**	45 24 N, 29 23 E	19.05.1993	?	
10.	A-132149	29.05.1994 Age pull	Zaporozh'ye **Ucraina**	66 38 N, 35 21 E	Danube Delta **Romania**	45 12 N, 29 40 E	01.11.1995	1 y, 4 m, 2 d	
11.	A-370483	29.05.1994 Age pull	Molochnyy liman, insl. Podkova **Ukraina**	66 38 N, 35 21 E	Danube Delta **Romania**	45 12 N, 29 40 E	01.11.1995	1 y, 4 m, 2 d	
12.	A 132292	29.05.1994 Age pull	Zaporozh'ye **Ukraina**	66 38 N, 35 21 E	Danube Delta **Romania**	45 12 N, 29 40 E	01.11.1995	1 y, 4 m, 2 d	
13.	Copenhagen 216024 + 04 C (**plastic**)	?	**Danemark**	?	Sulina **Romania**		? 1999	?	
14.	Estonia Matsalu S 4509	27.06.1997 Age pull	Häädemeeste-Kivilaid, Pärnu county, **Estonia**	58.05 N; 24.29 E	Somova **Romania**	45 11'23" N, 28 39'46"	10.11.1999	2 y, 4 m, 13 d	Dead in fishnets
15.	Estonia Matsalu S 9243.	27.06.2000 imatur	Tondirahu, Matsalu NR, **Estonia**	58° 46' 0" N, 23° 20' 0" E	Pardina , **Romania**	45° 18' 3"N, 28° 57' 8" E	05.02.2004	3 y, 7 m, 8 d	Dead in fishnets
16.	Bucarest B 9081	15.06.2003 Age pull	Sinoe, Ceaplacele **Romania**	44 37 N - 28 43 E	Grindul Lupilor **Romania**	44 37 N - 28 43 E	15.03.2004	8 m	Find dead
17.	Bucarest B 2981	03.07.2003 Age pull	Sinoe, Ceaplacele, **Romania**	44 37 N, 28 43 E	Grindul Lupilor **Romania**	44 38 N, 28 43 E	15.03.2004	8 m, 12 d	Find dead

On the other side, the spring migration is generally determined by internal factors such as the intensification of the gonads' activity, factor which determines the birds to occupy the nestling territory and the beginning of the reproduction period.

CONCLUSIONS

A part of the population of big cormorant from the Danube Delta doesn't make regular changes of place, but only when the climatic conditions change suddenly or the food lessen. In these cases, they make movements to other zones, sometimes real individuals concentrations being formed.

Following the winter census made in the first half of January of the last years, population varying between 3000 and 4000 samples were catalogued.

This species presents the tendency of growing the staying duration in the Danube Delta to a year average of over 300 days.

On the base of the data centralized following the recovering of ringed cormorants, some valuable scientific conclusions referring to the species migration direction, to the wintering places and to the geographical extent.

There are some cases when, during he spring and autumn, beside the population which nestled in the delta, passage populations which in summer occupy the more northern zones of their nestling specific spreading area appear.

The data, meaning only the rings recovered on the cormorants found in delta in this period, are not sufficient to affirm that a big part of the population which winters in the delta comes from the north of the continent.

The displacements of the big cormorant's population from the delta in different periods of the year are difficult to be specified, in the absence of massive researches regarding the marking and recovery of a significant number of big cormorant's samples at the Danube Delta level and also in the absence of other methods of following these displacements.

REZUMAT

Condiţiile deosebit de favorabile de reproducere şi posibilităţile optime de hrănire, în special în

perioada caldă a anului, fac din Delta Dunării un comlex biocenotic atractiv pentru cormoranul mare. Producerea diferită cantitativă şi calitativă a hranei de la un sezon la altul şi modul variabil de accesibilitate a acesteia, variaţia condiţiilor climatice anuale şi sezoniere, au ca efect o deosebită dinamică avifenologică.

O parte a populaţiei de cormoran mare din Delta Dunării nu intreprinde deplasări regulate, ci numai atunci când condiţiile de climă se schimbă brusc sau hrana se împuţinează. În aceste cazuri au loc deplasări spre alte zone, uneori formându-se adevarate concentrări de indivizi.

În urma recensămintelor de iarnă efectuate în prima jumătate a lunii ianuarie a ultimilor ani, au fost inventariate efective care au fluctuat ca număr între 3000 şi 4000 de exemplare.

La această specie există tendiţa de mărire a duratei de staţionare în Delta Dunării, respectiv, de la circa 245 de zile la circa 300 de zile pe an.

Pe baza datelor centralizate în urma regăsirilor de cormorani inelaţi, se pot trage concluzii ştiinţifice valoroase referitoare la direcţia migraţiei speciei, locul de iernare, răspândirea geografică.

Sunt cazuri când pe lângă populaţia care a cuibărit în deltă să apară în perioadele de primăvară şi toamnă populaţii de pasaj, care vara ocupă ţinuturile mai nordice ale arealului lor de nidificare.

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AUTHOR'S ADDRESS

VIOREL CUZIC – Institutul de Cercetări Eco-Muzeale Tulcea, 14 Noiembrie Street, No 3, 820009 Tulcea, Romania, phone 0040-0240-515866, e-mail: cuzvio@yahoo.com