

weather; occupied with bathing, cleaning, courthip etc., fighting, territory; social position, moulting, changes of biotop etc.

Three different manners of behaviour of the moorhens have been observed concerning their calls: 1. calling before or during their approach after having remarked the signal; 2. calling as before but without approaching; 3. spontaneous calling without any signal given by the observer who neither looks at them nor even remarks them but only passes by. — The behaviour of these moorhens allows the supposition of a companionian-relation between Moorhen and Man.

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## Notes on the Spring Migration of Storks and Raptors in Bulgaria

By Roger Gyllin

### Introduction

While in recent years the migration of raptors and storks at the Bosphorus has been studied fairly well, particularly in autumn (see e. g. PORTER & WILLIS 1968 and the Ornithological Society of Turkey: Annual report 1966–1967) but also in spring (e. g. COLLMAN & CROXALL 1967), very little attention has been paid to the migration of these birds in Bulgaria. PATEV (1950), in his book on the birds of Bulgaria, gives rough notes on the time of migration but no further details. BOEV, GEORGIEV & DONČEV (1964), who deal in detail with the birds of Thrace, the lowland in south Bulgaria, only give scattered phenological data. The results of the ringing of White Stork (*Ciconia ciconia*) in Bulgaria, showing that in autumn birds from the western part of Bulgaria move south-east and birds from the eastern part move south, have been published by PASPALEVA-ANTONOVA (1962a, 1962b), but nothing is said about the vast numbers of non-Bulgarian storks which pass the country. BOEV & PASPALEVA-ANTONOVA (1964) have written a paper on the Black Stork (*Ciconia nigra*), including notes on migration and a map showing that on migration this species has been seen both in east and west Bulgaria. MOUNTFORT & FERGUSON-

LEES (1961) saw only very scanty migration, being too late in the season for noting any migrating storks and raptors at all. The same applies also to MAUERSBERGER (1960a, 1960b) and to BAUMGART (1970). It seems as if only LAMBERT (1961) has given any attention to the raptor and stork migration in Bulgaria. He puts forward the interesting possibility that many spring migrants, instead of following the Black Sea coast northwards, may turn west at the Gulf of Burgas, to cross Bulgaria to the south of the west-east running Balkan Range (Stara Planina).

#### Observations in 1969

In the spring of 1969 I had the opportunity to watch migration on four days at different places in Bulgaria together with PENTTI KINNUNEN, BO RUNESSON, and BO THYSELIUS. On 30 March we watched at Bistrica some 10 kms to the south-east of Sofia between 08.00 and 12.00. On 1 April 07.30 to 10.00 were spent on the southern slope of the central Balkan Range 2 kms west of the town of Kalofer (42.38 N 24.58 E). On the following day, 2 April, we watched migration between 08.00 and 13.40 at the Gulf of Burgas at the southwestern outskirts of the town. On 3 April we spent two morning hours, 07.30 to 09.30, watching in the agricultural countryside close to the town of Sliven (42.42 N 26.17 E), about halfway between Kalofer and Burgas. Occasional observations were also made elsewhere.

With the exception of 2 April at the Black Sea coast not much migration was seen. At Bistrica on 30 March the weather was not very suitable for soaring migrants; cloudy, + 4° C, almost calm. No storks were recorded and of raptors only 1 unidentified spotted eagle (*Aquila clanga/pomarina*) and 2 Kestrels (*Falco tinnunculus*) flew NW. Other migrant species were a flock of 13 Herons (*Ardea cinerea*) and small numbers of Alpine Swift (*Apus melba*), Swallow (*Hirundo rustica*), Skylark (*Alauda arvensis*), Hooded Crow (*Corvus cornix*), Meadow Pipit (*Anthus pratensis*), White Wagtail (*Motacilla alba*), Starling (*Sturnus vulgaris*), Greenfinch (*Carduelis chloris*), Linnet (*Carduelis cannabina*), and Chaffinch (*Fringilla coelebs*). All birds flew NW.

At Kalofer on 1 April the weather was clear, calm, and fairly cold with a few degrees below zero at sunrise. No migration whatever was seen. At noon, however, 15 White Storks, 2 Black Storks, and 1 immature Golden Eagle (*Aquila chrysaetos*) were seen migrating almost due north straight across the at this point fairly high but narrow Balkan Range at Tvărdica (42.43 N 25.54 E) further east. In the afternoon at Venec (42.40 N 26.44 E) three flocks of altogether 350 Lapwings (*Vanellus vanellus*) were seen to leave their resting-place, a flooded field, and migrate NNE.

On 2 April at Burgas the weather was calm and clear, towards noon with haze and clouds inland and a northwesterly breeze blowing. Fairly impressive migration of particularly White Storks but also several species of raptors was seen. All birds were migrating NW or NNW. The migration probably took place on a rather broad front, many passing just overhead where we were standing on the shore, while others were seen far out over the gulf and others just as far inland. The following numbers of storks and raptors were counted: 946 White Storks, 19 Black Storks, 44 Buzzards (*Buteo buteo*), 21 Honey Buzzards (*Pernis apivorus*), 42 unidentified buzzards (*Buteo/Pernis*), 11 Booted Eagles (*Hieraetus pennatus*), 39 Short-toed Eagles (*Circetus gallicus*), 123 spotted eagles (*Aquila clanga/pomarina*), 3 Red Kites (*Milvus milvus*), 13 Sparrowhawks or Levant Sparrowhawks (*Accipiter nisus/brevipes*), 1 Marsh Harrier (*Circus aeruginosus*), and 1 Osprey (*Pandion haliaetus*). Other species seen on migration this morning were Pygmy Cormorant (*Phalacrocorax pygmaeus*), Glossy Ibis (*Plegadis falcinellus*), Wood Pigeon (*Columba palumbus*), Stock Dove (*Columba oenas*), Swallow, Starling, and Linnet.

Some of these figures deserve further mention. It is surprising that while 3 Red Kites were noted, no Black Kite (*Milvus migrans*) was seen. Considering the time of

the year it is remarkable that the Honey Buzzard was not really uncommon. In easternmost Turkey ten days later we noted heavy migration of Buzzards towards the Caucasus, but in that area not a single Honey Buzzard was seen. Admittedly, in that mountainous and cold part of Turkey conditions were entirely unsuitable for Honey Buzzards at that time of the year, while along the Black Sea coast of Bulgaria the weather was comparatively warm. No less than 44 Buzzards were positively identified, a considerable number in view of the fact that, according to published sources, none ever seems to have been recorded in spring at the Bosphorus. PORTER & WILLIS (1968), however, recorded almost 13 000 in the autumn of 1966, so the lack of spring records probably depends on misidentification.

On 3 April outside Sliven the weather was more or less cloudy with moderate and later rather strong ENE winds. No migration was seen. When watching for somewhat less than an hour around noon on the same day at Banja (42.37 N 25.59 E) in the Sredna mountains, between Tvărdica and Nova Zagora, a flock of 6 White Storks was recorded on migration NNW.

### Discussion and conclusions

Since Sofia is situated at almost the same latitude as Burgas, Tvărdica, and Banja, it is obvious that the migrating storks and raptors seen by us could never have reached Sofia as they were heading NW and NNW. There also seems to be little reason why they should ever follow the Balkan Range westwards, since this range is much lower in its eastern than its western parts. Any storks or raptors heading towards Sofia would, in the long run, meet either higher mountains or at least equally high but considerably wider mountains than they would in east Bulgaria, where, east of Sliven, the height a. s. l. never exceeds 1 200 metres and for the most part is much less. There is, however, a possibility that those storks and raptors which come across the central Balkan Range, rising very steeply up to more than 2 000 metres and with peaks of almost 2 400 metres north of the Thracian plain, sometimes prefer to head westwards, thus passing the Sofia basin. These birds may be such which have crossed the Sea of Marmora instead of the Bosphorus, since a slight but regular migration seems to occur over that sea (personal observations and R. F. PORTER in litt.). On the other hand, there is hardly any reason to believe that the Balkan Range anywhere would be an unsurpassable barrier to any migrants, and the recoveries of White Storks, ringed in the Danube Valley and recovered in the same year further south in Bulgaria (PASPALOVA-ANTONOVA 1962a, 1962b), seem to support this view.

Thus, the small evidence there is suggests that the storks and raptors which pass the Bosphorus in spring fly NW and NNW and cross the Balkan Range at its eastern, lowest part. It should also be added that in September 1968 I saw large flocks of White Storks migrating southwards at Preslav, the former Bulgarian capital on the northern slope of the Balkan Range less than 100 kms from the Black Sea, why the birds may pass there also in autumn.

### S u m m a r y

Observations carried out in Bulgaria on four days in spring 1969 lend little support to LAMBERT's (1961) theory that many migrants in spring move westwards south of the Balkan Range. The bulk of storks and raptors probably pass the Balkan Range at its lower, eastern part.

### Z u s a m m e n f a s s u n g

Beobachtungen Anfang April und kurz vorher (1969) im Bereich des Hohen Balkans und seinem südlichen Vorlande etwa von Sofia bis Burgas sprechen dafür, daß ein großer Teil des Zuges, besonders ein Störchen und Greifvögeln, diesen Gebirgstrakt im Frühjahr in seinen niedrigeren östlichen Teilen überquert.

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## Einige Bemerkungen über die Form des Vogel-Eies

Von Lars von Haartman

## Einführung

Die Form des Vogel-Eies wurde mathematisch von SZIELASKO (1905) und PRESTON (1953) definiert. Nachdem SZIELASKO gezeigt hat, daß der Umriss des Eies ein sogenanntes Cartesisches Oval ist, d. h. eine Kurve vierten Grades, die von drei Konstanten abhängt, bemerkt SZIELASKO freilich, daß „das Operieren mit solchen Gleichungen nicht eines Jeden Sache ist“ Man hat auch Meßmethoden entwickelt, die die genauere Erfassung des Ei-Umrisses erleichtern (JAKAB, 1962). Die erhaltenen Ei-Umrisse wurden vor allem für Art-Identifizierungen verwendet. Die biologischen Eigenschaften der verschiedenen Ei-Gestalten wurden meistens nur nebenbei berücksichtigt.

Im Folgenden werde ich mich lediglich mit den allereinfachsten Kriterien der Gestalt und Größe der Eier begnügen, d. h. das Verhältnis zwischen deren Länge und Breite (hier relative Länge oder rL genannt, und in Prozent angegeben) sowie deren Gewicht (in Gramm). Man sollte glauben, daß nach mehr als 200 Jahren Eier-sammeln, um nicht Eierräuberei zu sagen, nichts neues über so einfache Verhältnisse zu sagen sei. Und doch scheint es, als wäre eine grundsätzliche Gesetzmäßigkeit der relativen Länge des Vogeleies bisher übersehen worden, auf die hier anfänglich aufmerksam gemacht werden soll. Ein paar Beispiele zeigen, wovon die Rede ist.

## Ergebnisse, Beispiele

(1) Im Handbuch der Vögel Mitteleuropas (BAUER & GLUTZ, 1966) ist über *Podiceps auritus*, *nigricollis* und *ruficollis* gesagt, daß die Form ihrer Eier an diejenigen der anderen *Podiceps*-Arten erinnere. Das stimmt wohl, wenn die Form mit Augenmaß beurteilt wird. Errechnen wir aber die relative Länge der Eier, so finden wir,

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