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Some of the results of ornithological investigations in the Soviet Union for the past fifty years

Yu. A. Isakov

I am grateful to the British Ornithologists' Club for their kind offer to familiarize British ornithologists with investigations being conducted in the Soviet Union in this field. This is not a simple task since I am to give in a concise form the results of investigations carried out on the vast territory of our country for the period of half a century. Survey of even the most essential ornithological research in this period would inevitably become a bare enumeration of themes and performers. Therefore I shall dwell only on a few aspects, with just a few examples, which I think of most interest.

Russian and Soviet ornithology has an old history. Great and distinctive scientists such as N. A. Severtsov, M. A. Menzbier, P. P. Sushkin and others started that history and much of what follows has been carried out by their pupils and by pupils of their pupils.

Avifaunistics occupies a special place in ornithological investigation, since it is a relevant base for the development of other scientific trends. The degree of faunistic knowledge of any country serves as an index of the general level of development of ornithology there. By the end of the first quarter of the twentieth century, many country regions had been investigated by ornithologists and for some of them faunistic reviews had been published. However, M. A. Menzbier's monograph covered only the European part of the country, while many regions of Siberia, the Far East and Soviet Central Asia were still "blank". A species list for the whole country was still lacking.

For the past 50 years practically the whole of the Soviet territory has been covered by ornithological investigations, with the "blanks" or regions on the periphery drawing most of the attentions of scientists. The appearance of a wide network of ornithological collectives based on institutes of the Academy of Sciences of the USSR and Academies in each Republic and of their regional scientific centres, of Universities and of other higher educational institutions, as well as the creation of State nature reserves, have all

played an essential role in the progress of faunistic investigations. Now there are local ornithological bodies throughout almost the whole country, from the Baltic Republics in the west to the Amur Territory in the east, from the Transcaucasian Area and Middle Asia in the south to the Taimir, Yakutia and Wrangel Island in the north. Now as a result, short-term expeditions are gradually replaced by long term local research schemes.

As a consequence of the surveys carried out a great number of papers with avifaunistic content and a number of monographs have been published. Among the latter should be noted substantial reviews on the fauna of birds of the Kazakhstan, Kirgizia, Tajikistan, Pamirs-Alai, Turkmenia, the Altai, Yakutia, the Ussuri Territory, the Kolyma Highlands, the Chukotsk peninsula and Wrangel Island. The European part of the country has attracted much less attention and monographic descriptions of the fauna have been published only for Lithuania, the Moscow Region and Moldavia. Publication for the first time of a complete definitive key to the birds of the whole territory of the USSR by Buturlin and by Dementiev (1935–1941) played an important role in the development of avifaunistics, about which the following figures are of interest. In the first list of birds of the USSR (Dementiev 1941) 672 species were mentioned; in the checklist (Ivanov & Stegmann 1965) 723 species; and in the latest catalogue (Ivanov 1976 and Stepanyan 1975, 1978) 765 and 798 species are included respectively. The difference in totals of species in the latter two lists is due mainly to the fact that Stepanyan considers some subspecies from the list of Ivanov as full species.

Ornithofaunistic investigations have not been limited merely to discovering the species composition in the Soviet Union; it has also tried to determine distribution, general and seasonal, regions of high and low density of species and their relationship with distinct habitats, as well as the historical derivation of regional faunas. Many of such investigations have been published in articles and monographs, and as a result B. K. Stegmann (1938) formulated the principle of ornithogeographical analysis of a territory on the basis of the singling out of types of the fauna. Using this principal he composed a map of the avifaunistic divisions of the extratropical part of Eurasia.

A 6-volume monograph "Birds of the Soviet Union" (1951–1954) prepared under the general editorship of G. P. Dementiev & N. A. Gladkov was an important synthesis of all the accumulated data. Translated into English it is well known to British ornithologists. It should be noted, however, that even while the monograph was in process of preparation, the newest data in taxonomy, distribution and the way of life of birds was accumulating so rapidly that the contents of separate volumes were substantially "obsolete" by the time of their publication. Now, 25 years after its appearance, the monograph does not represent the contemporary level of ornithological knowledge. Therefore, preparations have been started for publication of a new 10-volume monograph, differing from the preceding one not only in completeness of data but also in its lay-out. A great number of experts is involved in this work.

Special note should also be made of the current editions of "Fauna of the USSR" being prepared by the Zoological Institute of the Academy of Sciences of the USSR. Eight volumes devoted to birds have already been published in this series.

The basis for developing the study of functional morphology of birds was

created in our country by the works of P. P. Sushkin. His followers, E. V. Kozlova, B. K. Stegmann and especially A. K. Yudin, continued investigations in that direction and they significantly developed the importance of ecology for such research. Work of this sort begins from direct observations in nature, which help establish those peculiarities in the life histories of birds (obtaining food, making of nests, and so on) which require specific attention. In studying morphology questions arise which require additional ecological data, so that significant progress is only possible on the basis of thorough and diversified study of the life history of individual species. Comparatively few such works are being carried out. The book by A. S. Malchevsky "The Breeding Life of Song Birds" (1959) can be considered as one of the most detailed.

In this paper I can only dwell on one prime investigation, namely the book by K. A. Yudin (1965) on phylogenetics and the classification of the Charadriiformes. Yudin attempts to represent their phylogenesis as an adaptive process occurring in relation to natural surroundings. It has been established that the Charadriiformes evolved as the result of leaving forests and of mastering open spaces. This occurred not later than the second half of the Cretaceous and adaptation to new diversified conditions led to differentiation in a previously rather homogeneous forest group in several directions simultaneously. Birds that mastered the banks of wetlands, meadows and swamps formed the initial predecessors of the present-day orders of Gruiformes and Charadriiformes.

Formation of the Charadriiformes themselves was the result of adaptation of an early group to the sea coasts. This favoured development of a propatagial apparatus which allowed flight over extensive areas of water and also the development of large nasal glands of the para- and supra-orbital types. Other anatomical adaptations connected with variations in the manner of feeding and the evolution of apparatus for swimming were also important acquisitions at an early stage. Some were not capable of swallowing large food items, explaining why some of them, such as the Laro-Limicolae, evolved special morphological characters on this account. Formation of the Vanellinae is related to adaptation to live on meadows, of the Tringinae to mastering freshwater basins, of the Scolopacinae and Limosinae to adapting to grass swamps, while the sea coastal habitats brought to life the Calidridinae, many species of the Charadriinae and most of the Haemotopodinae, as well as some others. Inside the Laro-Limicolae group the Glareolidae gradually lost their adaptation to water, whereas for the other species of that group flight and swimming became the leading modes of search for their new prey, fish and water invertebrates, while the ancestors of the Alcidae began to master sea depths and the ancestors of the gulls adapted to life on coastal low-waters.

Such an analytical approach to the formation of contemporary morphological characters in the Charadriiformes attempted to explain the evolution of a large and complex order of birds, to construct its phylogenetic tree, to show relations with neighbouring orders and also to make its classification more precise. Works close to Yudin's were carried out by B. K. Stegmann (1958) for Columbidae and Pteroclidae, by E. V. Kozlova (1955, 1957) for Limicolae and by others. In some of the faunistic investigations (e.g. Kozlova 1975), morphological data have been used to characterise ecological and

faunistic groups of species composing the fauna of the territories under study.

The study of bioacoustics has begun to develop only of late. Work is being conducted by a team guided by V. D. Ilyichev. They have proved that the organs of hearing of different species of birds are characterised by simplified structures giving a high functional effect and that adaptations optimising sound perception have especially been singled out. They have also established that the mosaic character of the appearance of ecological correlates occurring independently within various systematic groups is due to parallel development in species with similar ecological needs. V. D. Ilyichev has published "Bioacoustics of Birds" (1972) and "Acoustic Location by Birds" (1975).

Investigations into the behaviour of birds are connected, in the first instance, with works by A. N. Promptov, a gifted naturalist and experimentor. His conception of stereotyped specific behaviour in birds differs substantially from that of K. Lorenz (1935, 1939). Where Lorenz regards the behaviour of birds as innate stereotyped schemes of reaction starting automatically in definite biological situations, then Promptov (1940) considers behaviour as a complex of inherited evolutionally formed reactions connected with anatomic structures and of reactions acquired during the process of individual development. Promptov's (1956) conception regards the complex forms of behaviour of birds, usually referred to categories of "instincts", as biocomplexes which combine congenital and conditional reflexes. The former do not always take the leading role, but they serve as a basis for combining with the latter and so acquire biological adaptive content. Birds do not possess instinctive activities in the sense of a bonded system of innate reactions only.

It has been experimentally shown that the nervous system of birds as it develops possesses most plasticity in the early fledgling stage. This period is of special importance for imitation learning as well as for re-inforcing stable coordinated systems which exert considerable influence upon the consequent life of a species. Specific locomotory coordination which is determined morphologically is not strengthened by imitation. Syringial and some other systems, being younger evolutionally, are more liable and are capable of re-inforcement under the influence of imprint and learning.

An interesting example of imitational re-inforcement of sound communication has been studied by K. A. & E. K. Viks. They found in the forest a male Pied Flycatcher *Ficedula hypoleuca* which imitated the song of the Wood-Warbler *Phylloscopus sibilatrix*, and it proved to be a bird which had been reared experimentally in the nest of *P. sibilatrix*. Experiments have been repeated on a larger scale by tape recording the songs of "fostered" birds, some of them for several years in succession. It has been established that during the second year of independent life only separate strophes characteristic of the foster species remain in their songs, and during the third year the song becomes stereotypical of its own species. Of special interest is the fact that in a few nests of *F. hypoleuca* discovered to have a song uncharacteristic of the species the females have also appeared to have been fostered in the nest of a Wood-Warbler. Another example of the same deep violation of a species' stereotyped behaviour has been noted in the Darwin Nature Reserve during experiments on rearing Sand Martins *Riparia riparia* in the nests of House Martins *Delichon urbica*. During the first days after fledging, the fostered

young flew back into the nest more than once and on returning the following spring again tried to occupy the House Martin's nests, but were driven away by the occupants. E .K. Viks (1965) buried in the earth nest boxes containing nests of Pied Flycatchers, leaving open only the entrance hole. In the following year many of the birds reared under such conditions occupied similar nest boxes.

On the other hand, stereotyped nesting behaviour was used by ornithologists at the Darwin Nature Reserve to space out the distribution of many species of nesting birds. Having studied the specific requirements of breeding plots and the conditions needed for nest building, these were artificially created, sometimes within a habitat which was not characteristic of the species. In such a way a breeding colony of Grey Herons *Ardea cinerea* was founded near the laboratory of the Reserve, located about 20 km away from their main colony. Breeding colonies of Common Gulls *Larus canus* and Common Terns *Sterna hirundo* have been established in pre-planned places, and Goldeneyes *Bucephala clangula*, Oystercatchers *Haematopus ostralegus*, Whitethroats *Sylvia communis* and some other species have been caused to breed in unlikely areas. The phenomena of "imprinting" and getting accustomed to a natural situation, characteristic of nestlings, were used for the creation of breeding populations in places new to the species; Greylag Geese *Anser anser* from the Volga delta were moved to the Rybinsk storage lake and Pied Flycatchers from the Moscow Region into the steppe oak groves of the Kursk Region (Isakov 1955, 1956, 1957).

The application of banding and of other methods of marking birds has helped to work out the answers to two basic scientific problems. The first entails the degree of independence and constancy of large geographical populations of birds of various systematic groups. This problem was worked out most fully by T. P. Shevareva (1968, 1970) using as examples of seasonal distribution a number of species of ducks. Definite breeding, migration and wintering areas are typical of populations which do not possess clear cut morphological differences. Overlap with areas of neighbouring populations is only partial. This conception was used as a basis for planning international measures for the protection of migrating birds (Isakov 1967) and also for introducing actual measures to protect individual species, for instance the Snow Goose *Anser caerulescens* nesting on Wrangel Island and wintering in western regions of the USA (Kistchinski, Sladen). The second problem involved investigation of the structure and dynamics of "elementary" (simple) local populations of birds (Isakov 1948, 1949). With some of the behavioural reactions of birds taken into account, experiments were made on the introduction of a number of the species mentioned above.

Long term, highly difficult and labour-consuming investigations by the Latvian ornithologists conducted under the guidance of H. A. Mikhelsons provided an opening for a thorough study of the dynamics of local populations of ducks at the experimental Lake Engures. During more than 15 years they had banded over 1300 brooding females and over 23,000 of their one-day ducklings. For the first time such data provided an objective estimate of the composition and dynamics of local populations of the Shoveler *Anas clypeata* and Tufted Duck *Aythya fuligula* at the experimental lake. On the average long term aspect it seems that in any one year adult female Shovelers formerly banded on the lake comprise 45%, young birds

reared on this lake and nesting for the first time 44%, and females never seen before, possibly immigrants, 11%. The corresponding figures for the Tufted Duck were 70%, 21% and 9%. Further, they have found out that in the comparatively stable biological capacity of the lake in question, both the above species of ducks maintain their populations by homeostatic regulation. Increase or decrease in mortality of young ducks depends on the density of a population in a given breeding season and this serves as the main regulating mechanism. This situation is confirmed by a reliable negative correlation between the number of nesting Tufted Duck females on the lake or the number of Shoveler ducklings bred related to the total survival of young ducks at the end of the first calendar year. Together with shooting mortality, mortality of young ducks from other causes is of not insignificant importance. The latter causes increase noticeably during years of increased density. Banding data show that during such years fewer numbers of Tufted Duck reach their winter quarters than during years of average or even below average breeding numbers (Mikhelsons 1975, 1976). These observations are of great importance for resolving conservation problems, for the protection of birds and for regulating shooting.

There are many other aspects of scientific and practical activity related with the study, protection and the use of birds in our country which I am not able to touch on in this paper.

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50 Years of Ornithology in North-west Africa 1930-1980

by J. D. R. Vernon

Northwest Africa, consisting basically of the Maghreb countries of Algeria, Morocco and Tunisia, is an important wintering area for many Palaearctic species. Within it's boundaries it includes substantial areas of the Central and Western Sahara, including most of Rio de Oro and Mauritania, which the bulk of West Palaearctic migrants traverse to winter in the tropics.

Before 1930, much of the area was relatively unexplored. Though a good deal was known about the distribution of birds in Tunisia (Whitaker 1905, Bannerman 1927) and to some extent of those in Algeria (Malherbe 1855, Loche 1858, and others), virtually nothing was known of the Western Sahara and little about Morocco except for the coastal Atlantic fringe (Irby 1875, Hartert 1901, 1926, Jourdain 1921, Lynes 1925, Meade-Waldo 1903, 1905), since access inland was difficult, at least by Europeans, until important contributions to the ornithology of the Algerian and Tunisian Sahara were made by Heim de Balsac (1924).

In the 1930's, Heim de Balsac published a series of papers on winter expeditions to southern Algeria and Morocco, including the discovery by Pivain of Dunn's Lark *Eremalauda dunni* in the Western Sahara. Later (1936) he published an important biography on the birds of the Maghreb and the Sahara, establishing for the first time that the Maghreb consisted of a Mediterranean Palaearctic fauna adjacent to a Saharan Ethiopian fauna and defining the ecological factors responsible for restricting the northern boundary of the desert to the 200 mm isohyet. Other important contributions were by Bouet (1938) on the migration routes of White Stork *Ciconia ciconia* in the Maghreb and an expedition to the Hoggar by Meinertzhagen (1934). For Morocco important studies included papers on the birds of Azilal (Lynes 1933), on the High Atlas (Chaworth-Musters 1939) and a paper by Meinertzhagen (1940) on a journey in southwest Morocco and the Middle Atlas describing a number of new races of birds.