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THE SPECIES COMPOSITION AND TROPHIC RELATIONSHIP OF BIRD POPULATIONS COMING TO WINTER IN GYZYLAGAJ BAY AND ADJACENT TERRESTRIAL AREAS, AZERBAIJAN

Abstract. *The species and trophic relations of bird populations coming to winter in Gyzylagaj bay and adjacent lands have been investigated in 2005-2017. It was recorded bird populations coming to winter and belonging to 12 orders, 36 families, 76 genus and 136 species. The diet of 41,2 % of them (56 species) contains animal food, of 51,5% species both animal and floral food (70 species) and of 7.3 % - only vegetal food (10 species). The food ration of 94 bird species contains water invertebrates, of 76 species - terrestrial invertebrates, of 38 species - fishes, of 22 species - amphibians, of 22 species - reptiles, of 20 species - birds, and of 21 species - mammals. The diet of 80 bird species contains seeds of plants, of 56 species vegetative parts of plants, and of 47 species – fruits.*

Key words: *trophic, wintering, sedentary, origin, biodiversity.*

Introduction. It is impossible to characterize the life of animals before knowing the importance of the food resources in their life. Exchange of matters in ecosystems, energy and information flow is only possible in a complex network of interspecific interactions. The strength and quality of interspecific food character provides the necessary level of integrity and completeness of biocenosis.

In 2000 the Strategy and Action Plan for Conservation and Sustainable Use of Biodiversity, in 2010 “Gabala declaration” on Conservation of Biodiversity have been signed in Azerbaijan. The president of Azerbaijan has also signed the order on “Conservation of Biodiversity and Genetic Fond” on 21 December 2002 (1, 2).

The Gyzylagaj bay and adjacent lands are especially important areas for investigation of the species composition, settlement level, interspecific and intraspecific and trophic interactions of wintering bird populations in Azerbaijan. The species composition, settlement level and trophic relations of wintering bird populations are almost not studied yet. However, this area has always been affected by natural (fluctuations of sea level), antropic and antropogenic factors. Trophic relations are important factors in settlements and migration of birds (12, 13). During the wintering period the species composition, settlement level and trophic relations depend on quantity and quality of their

food resources (3). Because food resources can change during the day depending on air temperature. That is why the species composition, settlement level and trophic relations of birds in wintering period have been investigated many years. The settlement of bird populations of the same species in different biotopes and their trophic relationship was considered by us (9).

The main goal is to investigate species composition and trophic relationship by identification of their diet.

Material and methods. The investigations have been carried out in 2005-2017 on transects by using also horses, vehicles, motorized and ordinary boats. The main goal was to study the species composition, settlement level and trophic relations of bird populations coming to winter. Investigations have been carried out every year in December, January and February from 9⁰⁰ to 17⁰⁰, sometimes even in night hours. For observation of birds binoculars and Carl Zeiss telescope were used. In 2005-2010 the professors and students of Vertebrates’ Zoology, High Plants’ Systematics and Biogeography department of Moscow State University have also participated in investigations. The trophic relationship of wintering birds have been studied by analyzing their food remnants, excrements, emesis in their feeding, resting and overnighing grounds by direct visual observations and based on scientific literature. The difference

in importance of these methods for different bird groups, color and smell, more or less deformation of food remnants have been considered. Evaluation of food remnants have been carried out on fodder scale of G.T. Mustafayev and N.A. Sadygova (5, 6). Investigation of food characteristic of owls and seagulls was done on their vommits. Different individuals of the same bird species from populations of sedentary wintering and birds coming to winter can get food from different places, and it is adaptation for increasing of life effect, which has reversible character.

Results and their discussion. The species composition, settlement level, trophic relations of birds coming for wintering in Gyzylagaj bay and surrounding lands are not conditioned by only species diversity, but also with abundance of food (amount of food per area unit), its stability, yearly, daily and biotopically difference, availability. Sometimes, when even the food is abundant, the other negative factors (freezing of water, solid fog, frosts, strong winds, rain etc) change the character of feeding of birds during the day. The abundance of food resources influences not only species composition, settlement and density of bird populations, but also their feeding characteristics. The main food of birds wintering in these areas are animal, vegetable and mixed feeds (Fig. 2).

When comparing the species composition of 136 bird species coming to winter in Gyzylagaj bay and adjacent lands and 367 species of birds recorded in Azerbaijan (4) the number decreases from order to species levels (66.6% - 37.0%) (Fig. 1) (7, 8).

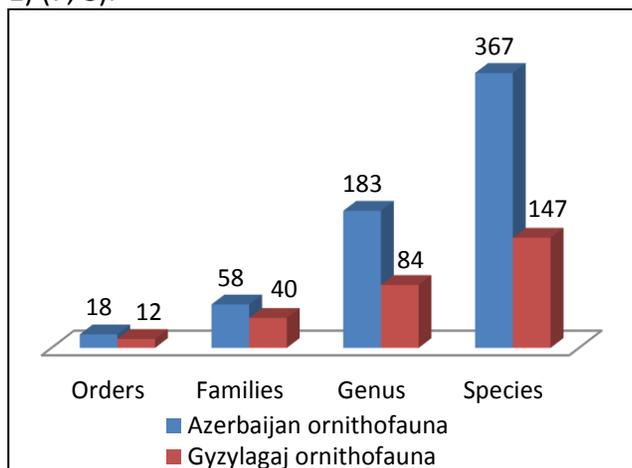


Fig. 1. The taxonomic comparison between Azerbaijan ornithofauna and bird populations coming to winter in Gyzylagaj bay and adjacent terrestrial areas

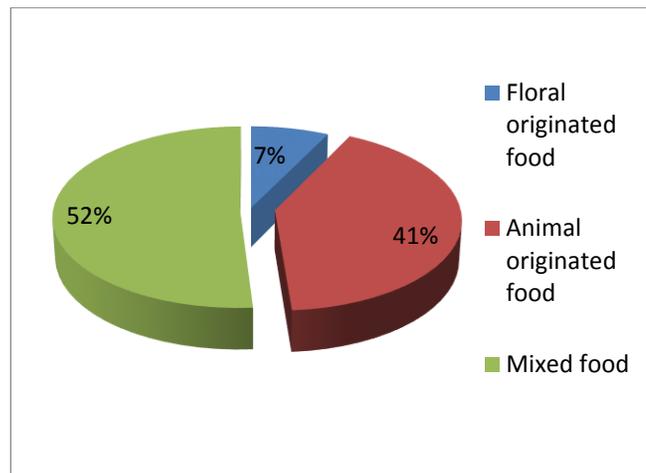


Fig. 2. Food characteristics of bird populations coming to winter in Gyzylagaj bay and surrounding lands

The diet of *Gavia stellata*, *Podiceps ruficollis*, *P.nigricollis*, *P.auritus*, *P.grisegena* coming to winter in Gyzylagaj bay and surrounding lands ~75% contains water plants, and ~25% water invertebrates. It was mainly recorded in Lesser Gyzylagaj bay, in channels connecting Lesser and Greater Gyzylagaj bays (Emergency, Fishpass, Spawning channels). *Pelecanus onocratalus*, *P.crispus*, *Palocrocorax carbo*, *Ph.pygmaeus* (~100%) feed on water invertebrates and fishes (10). *Botarus stellaris*, *Nycticorax nycticorax*, *Egretta alba*, *E. garzetta*, *Ardea cinerea*, *Ciconia ciconia* feed on water and terrestrial invertebrates (~100%). *Phoenicopterus roseus* ~75% feeds on floral, ~25% on animal food; *Rufibrenta ruficollis*, *Anser anser*, *A.albifrons*, *A.erythropus*, *Cygnus olor*, *C.cygnus*, *C.bewickii* feed on floral food (~100%). The diet of *Tadorna ferruginea*, *T.tadorna*, *Anas crecca*, *A.platyrynchos*, *A.strepera*, *A.penolope*, *A.acuta*, *A.querquedula*, *A.clypeta*, *A.anqustirostris*, *Netta rufina*, *Aythya ferina*, *A.nyroca*, *A.fuligula*, *A.marila*, *Busephala clangula* ~75% contains water plants, and ~25% water invertebrates. *Milvus miqrans*, *Melanitta fusca*, *Mergus merganser*, *M. serrator*, *Circus aeruginosus*, *Accipiter nisus*, *A.gentilis*, *Buteo buteo*, *B.laqopus*, *B.rufinus*, *Aquila clanga*, *A.chrysaetos*, *Haliaetus albicilla*, *Falco tinnunculus*, *F.cherrug*, *F.columbarius*, *F.peregrinus*, *Rallus aquaticus* (~100 %) feed on animal originated food. There are 75 % floral and 25 animal food in the diet of *Porzana porzana*, *P.pusilla*, *P.parva*, *Gallnula chloropus*, *Fulica atra*, *Otis tarda*, *Tetrax tetrax*. *Pluvialis apricaria*, *Eudromias morinellus*, *Vanellus vanellus*, *Recurvirosta avocetta*, *Tringa nebularia*, *T.*

ochropus, T. erythropus, Turdus ilicus ~100% feed on animal food. The food ration of *Tringa totanus, T. stangnatis, Calidris minuta, C. temminski, C. alpina, C. canutus, Calidris alba, Lymnocyptes minimus, Scolopax rusticola, Limosa limosa, Galerida cristata, Calandrella cinerea, C. rufescens, Melanocorypha calandra, M. leucoptera, M. yeltonensis, Alauda arvensis, Anthus pratensis, Sturnus vulgaris, Garrulus glandarius, Corvus frugilegus, Troglodytes troglodytes, Regulus regulus, Erithacus rubecula, Turdus ruficollis, T. atrogularis, T. pilaris, T. merula, T. vescovorus, Parus major, P. caeruleus, Sitta europea, S. neumayer, Passer hispaniolensis, P. montanus, Fringilla coeleps, F. montifringilla, Serinus pusillus, Chlorus chlorus, Emberiza calandra, E. schoeniculus* contains ~75% vegetal, and ~25% animal food; the diet of *Gallinago gallinago, Numenius arquata, Larus ichthyæetus, L. minutus, L. ridibundus, L. genei, L. argentatus, L. canus, Tuto alba, Asio flammeus, Motasilla flava, M. alba, Lanius exubitor* is ~100% animal food. *Pterocles orientalis, Columba livia* are ~100% vegetarians. The diet of *Pica pica, Corvus cornix* ~25% contains plants, and ~75% animals (8, 9).

There are 10 species of birds coming to winter in Gyzylagaj bay and surrounding lands which mainly feed on floral food (~100%) (*Rufibrenta ruficollis, Anser anser, Anser albifrons, Anser erythropus, Cygnus olor, C. cygnus, C. bewickii,*

Pterocles orientalis, Columba livia, Bombycilla garrulus). And 56 species of birds coming to winter, feed on animal food (Fig. 3).

The percentage of floral or animal food in the diet of these bird species coming to winter in Gyzylagaj bay and surrounding lands changes depending of air temperature and availability of food (11). In sunny days with high temperature

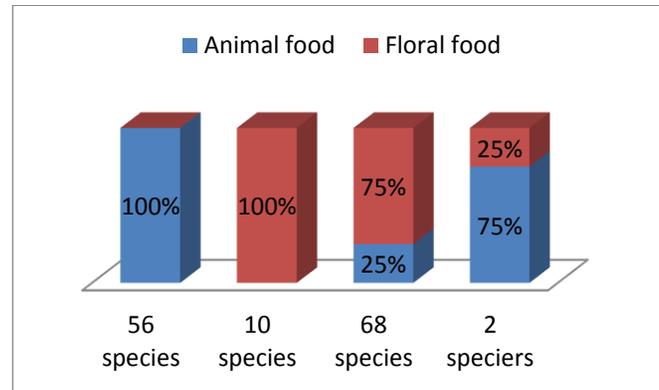


Fig 3. The percentage of floral and animal food in a diet of bird populations coming to winter in Gyzylagaj bay and surrounding terrestrial areas (~%)

birds coming to winter feed mainly 75% on animal food, in cold days floral food dominates (75%). 69 species of birds coming to winter feed on mixed food.

93 species of bird populations coming to winter in Gyzylagaj bay and adjacent lands have in their diet water invertebrates, 77 species – terrestrial invertebrates, 36 species – fishes (Fig. 4).

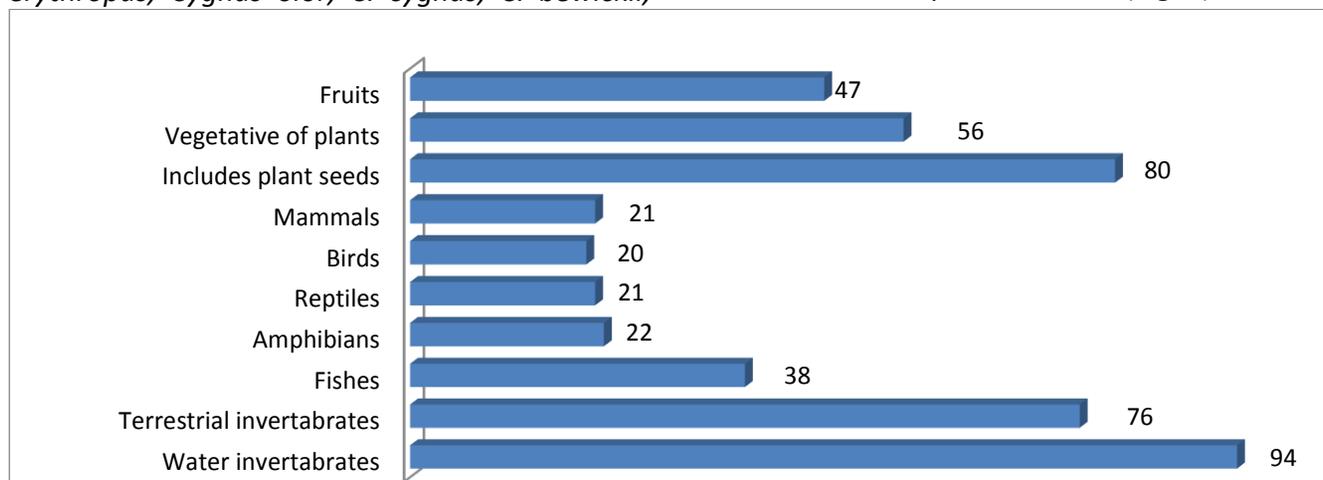


Fig. 4 The diet content of bird populations coming to winter in Gyzylagaj bay and surrounding lands

Predominance of water invertebrates is associated with abundance of these species in biocenosis and being easily available fodder for birds. Plant seeds dominate in the diet of 79 bird species. 55 birds species consume mainly vegetative parts of plants.

Conculision. The species composition and trophic relationship of bird populations coming to winter in Gyzylagaj bay and adjacent terrestrial areas are depending on several factors:

- 1) the intensive poaching in surrounding areas
- 2) grazing by livestock of local population

- 3) amount of annual precipitations
- 4) severe climatic conditions
- 5) changing of fauna and flora species in Greater Gyzylagaj bay after connecting it with Lesser Gyzylagaj bay which has freshwater
- 6) decreasing of plant species Zoosfera minor which is the main food of phytophagous bird species coming to winter

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CONTENT:

Ilashchuk T.O., Mikulets L.V. Simulating learning in studying propaedeutics of internal diseases	3
Khomenko I.V., Bumeyster V.I. Histological structure of the thyroid gland of rats under conditions of general dehydration	6
Proniayev D.V., Tymchuk K.Yu., Shandro K.D. Perinatal anatomy of the iliocecal transition under conditions of intestinal obstruction	9
Sluhenska R.V. Healthy life-style as the basis for personality formation	14
Gushcha S.G., Bondar Yu.P., Babova I.K., Balashova I.V., Plakida O.L. Investigation of the effect of natural chloride-magnesium solution on the functional state of kidneys with experimental arthrosis	16
Yerohova A.A. Pedagogical aspects of psycho-physical training	21
Tovkach Yu.V., Stefak L.Ya., Sapunkov O.D. Morphogenesis of the human gastroesophageal segment	23
Huseynova L.S., Rasulov E.M., Aliyeva K.A., Khalilov R.I. Two new mutations identified in azerbaijan: the gene BCKDHB 508 (C-T) and the gene DBT 1199 (A-G) in a homozygous state in two families with msud diagnosis	26
Monastirskiy V.M., Pivtorak V.I., Fedotov V.A. Modeling of possible movements of a single human kidney	31
Kryvko Y., Voitsenko K. Morphology of bones in the posterior limbs of rats in the norm	34
Jaskiv G.I. Peculiarities of changes of behavioural reactions in mature rats with intranasal introduction of nitroxoline in various doses	38
Hresko N.I. Changes of colon angioarchitectonics under conditions of 2-4-week opioid effect in the experiment	42
Mateshuk-Vatseba L.R., Savka I.I. Ultrastructural organization of testicular blood vessels under conditions of streptozotocin-induced diabetes mellitus	49
Dragomyretska N.V., Zabolotna I.B., Gushcha S.G., Nasibullin B.A. The possibilities to reduce cardiometabolic risk of patients with non-alcoholic fatty liver disease. Are drugs always essential?	54
Logash M.V., Dzhililova E.A., Pokotylo P.B., Hnidyk J.V., Kefeli-Yanovska O.I., Morphological changes of the rat's liver in case of long administration of nalbuphine	61



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