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Materials for the avifauna of the Democratic People's Republic of Korea. Results of the Spring Expedition '87

[with 1 text-fig.]

Materiały do fauny ptaków Koreańskiej Republiki Ludowo-Demokratycznej. Wyniki wiosennej ekspedycji '87

Abstract. The presence of 115 species and 2 taxa described as to their genus were observed between 7 April and 4 May, 1987. The material is characteristic for a transitional, unstabilized avifauna, with an important participation of migrant species (e. g. *Limosa lapponica*, *Philomachus pugnax*, *Tarsiger cyanurus*, *Carduelis spinus*, *Fringilla montifringilla*, and species of the genera *Mergus*, *Numenius*, and *Tringa*), and especially those in mating stage and occupying their breeding territories (e. g. *Ficedula zanthophygia*, *Cyanoptila cyanomelana*, *Carduelis sinica*, species of the genera *Hirundo*, *Cettia*, and *Emberiza*). Information on further 30 species were collected on the basis of stuffed birds for sale in some shops in Korea as well as from interviews. Bird communities of typical Korean habitats were described from 16 observation sites. Also, an ecological classification of water-marsh birds observed was made, and remarks on the status of some rare and peculiar Far-East species were included.

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I. INTRODUCTION

The Korean Peninsula lies on the south-eastern edge of the Palearctic, where the continental fauna of China type with an important participation of the Siberian element (STEGMANN 1938) overlaps with oceanic fauna. This region

is clearly outlined by the numerous endemic and Far East taxa (e. g. AUSTIN 1948; WON Hong Koo 1963—1965, KWAK et al. 1980; SONOBE 1982). The Peninsula, surrounded by many islands, also plays an important role in bird migrations. It constitutes the main link between the continent and the islands of Japan. Many species of birds only appear there during seasonal migrations (e. g. WON Pyong Oh 1987); the status of some other ones is unknown in more detail.

The first materials on Korean birds date back to the end of the 19th century. Of particular importance here is the ornitological collection of Jan KALINOWSKI, completed between 1885 and 1888, elaborated on and published by TACZANOWSKI (1887 and 1888). Except for the more extensive discussion of Korean bird fauna by AUSTIN (1948), only a few notes and sketches by authors of various nationalities appeared in the first half of this century (e. g. KURODA, 1918; KURODA and MORI, 1927; YAMASHINA, 1932; CUMMING, 1933; WON Hong Koo, 1934 — cited after TOMÉK, 1985). The Korean War and its later consequences halted the progress of field biological research in the region. Nevertheless, descriptions of birds from the whole of the Peninsula by the eminent ornithologist of the country, WON Hong Koo (among others, in 1958, 1964, — after TOMÉK 1985) soon appeared in the Democratic People's Republic of Korea of greatest importance was his 3-volume monograph of Korean birds, complete with valuable maps of ranges, migration routes and wintering sites (WON 1963—1965). Sadly, these publications are exclusively in the local language, practically unattainable to foreigners, the only exception being the Latin names of species. Some important original ornithological works also appeared in South Korea (e. g. GORE and WON Pyong Oh 1971; KWAK et al. 1980). Intensive research of the avifauna of North Korea has been recently developed by the Institute of Systematic and Experimental Zoology of Polish Academy of Sciences, Kraków. They have already resulted in several contributions (BOCHEŃSKI et al. 1981; TOMÉK 1984, 1985, TOMÉK and DONTCHEV 1987). The present study has been effected in agreement and collaboration with the mentioned Institute.

Its main aim was to collect detailed data on Korean avifauna in the pre-breeding period and in the early stage of its breeding stabilization, in relation with habitats characteristic of this region. This included a description of phenology of birds during migrations and the initial breeding phase, a detailed study of the character of occurrence of particular species, the determination of species composition, and — if possible — an estimate of the quantitative structure of bird communities in various habitats. An attempt at collecting data on the situation of Far-East endemites was made, especially concerning rare and disappearing species.

Preparations for the expedition and an effective realization of undertaken research were greatly enhanced by the well-developing scientific collaboration between Poland and the Democratic People's Republic of Korea. We would like to thank the Directors of the Zoological Institute of the Korean Academy of

Sciences, Pyongyang, especially the Deputy Director of the Institute, Mr PAK U II, for his great hospitality, his valuable advice, and his help in organizing our stay. We also **thank** our guides, Mrs LI Chin Kuk and CHON Sen Ryon, for their excellent care and their contribution to the organization of our research and a most interesting stay in Korea. We are also greatly indebted to Dr Teresa TOMEK for her valuable suggestions concerning our expedition.

II. STUDY AREA AND METHODS

The counting of birds was conducted in the period between 7 April and 4 May 1987. It took place in several observation areas and along some roads during drives, all situated in 5 provinces of the Democratic People's Republic of Korea (see map, Fig. 1).

The observation areas were as follows (in chronological order):

1. Pyongyang (the capital and the greatest city in North Korea) — observations on 7 and 8 April, between 14 and 16 April, on 1 May and 4—5 May 1987. Data were mainly gathered in the centre of the city on the Taedong River and its canalized right-hand tributary, the Potong River, in the Park on Moran Hill (Moranbong), in the Botanical Garden and in the Mangyongdae area.

2. Myohyang-san — mountain range with its highest peak, Piro, 1909 m a.s.l. situated between two provinces, North Pyongan and Chayang — observations between 9 and 13 April 1987.

3. Ryongak-san (Yongak-san) — hills 16 km SW of Pyongyang, covered with dry pine forest — observations on 14 April 1987.

4. Sokam artificial lake (known also as Kyonnyong Reservoir) and its vicinity N of Pyongyang in the South Pyongan province — observations on 17 April 1987.

5. The region of Nampo Dam, which separates the dammed part of the Taedong River from the Yellow Sea — observations on 18 April.

6. Wonsan — the biggest city in the Kangwon province at the Sea of Japan — observations on 19 and 24 April.

7. Sijung-ho (Siyungho) — a lake and the vicinity of a teahouse at the Sea of Japan coast between the towns of Wonsan and Kosong in the Kangwon province — observations were mainly conducted at sea, on coastal islands, and in the vicinity of the restaurant on 19 and 24 April 1987.

8. Kumgang-san ("Diamond Mts") steep mountains of medium height (Mt. Kumgan 1939 m a. s. l.) in the Taebaek Range, stretching along the N-S direction along the Sea of Japan coast — observations between 19 and 24 April 1987.

9. The surroundings of Samil Lake (Samil-po) right at the Sea of Japan coast, only a dozen or so kilometres from the Taebaek Range — observations on 21 and 23 April 1987.

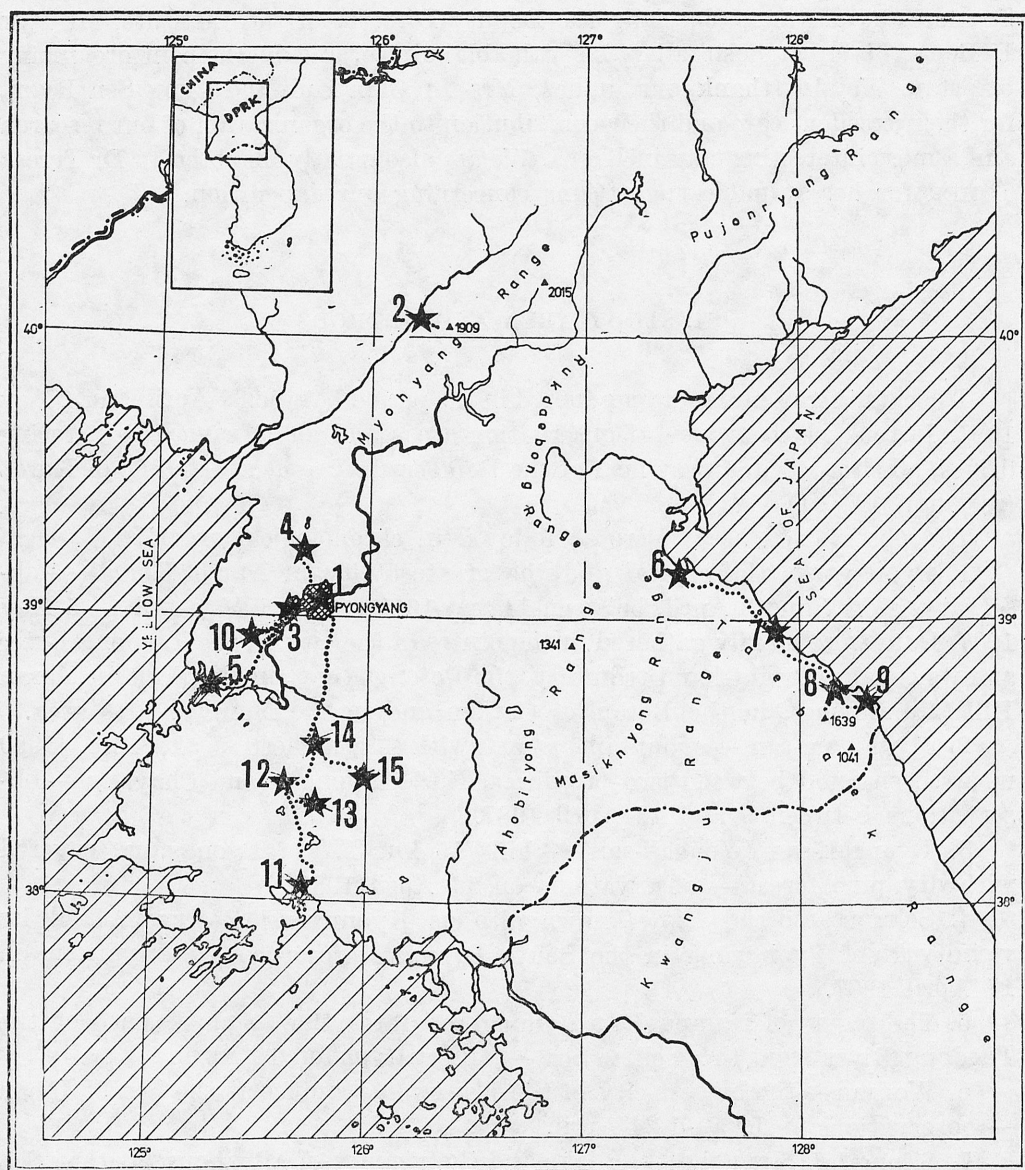


Fig. 1. Study areas in the People's Democratic Republic of Korea. Asterisks indicate main places of field observations: 1 — Pyongyang and Mangyongdae, 2 — Myohyang-san, 3 — Ryongak-san, 4 — Sokam, 5 — Nampo, 6 — Wonsan, 7 — Sijung-ho, 8 — Kumgang-san, 9 — Samil-po, 10 — Taesong-ho, 11 — Haeju, 12 — Chaeryong, 13 — Changsu, 14 — Sariwon, 15 — Sohung-ho. Dotted lines indicates routes along which the observations were made

10. Taesong-ho — storage reservoir surrounded by open and wooded hills in the South Pyongan province SW of Pyongyang — observations on 26 April 1987.

11. Haeju — the biggest city in the South Hwanghae province at a bay of

the Yellow Sea — observations mainly within the Haeju Bay and in the city's outskirts, in and around the old fortress in the wooded hills of Suyang-san between 28 and 30 April, 1987.

12. Chaeryong — a town in the South Hwanghae province — observation in the town's outskirts on 27 and 30 April 1987.

13. Changsu Lake and its surroundings at the road Haeju-Sinwon — observations on 27 and 30 April 1987.

14. Sariwon — a town in the North Hwanghae province — observations mainly on Tyonam san hill on 2 May 1987.

15. Sohung-ho — storage reservoir SE of the town of Sariwon, surrounded by wooded mountains — observations on 3 May 1987.

The landscape of Korean lowlands is largely dominated by rice-fields. Almost all flat areas, even quite small ones, are occupied by this crop together with the fields' irrigation dykes connected with the system of storage reservoirs. Such biotopes as meadows, scrubs, or wooded areas within fields are almost non-existent. The usually small villages are densely made up of small houses. Mountain slopes unavailable for farming are covered with forests.

Our material was mainly gathered by means of visual and audial observations, conducted independently but simultaneously by three observers. Research was organized in the expedition style, usually consisting in one-day car- and walking trips from local hotel bases in Pyongyang, Myohyang-san, Wonsan, Kungang-san, Haeju, and Sariwon. In those observation regions where it was possible to portion out and sufficiently control particular habitats, birds were counted along transects or in selected sections of rivers and streams (Myohyang-san, Kungang-san). Results of determining and counting were currently compared between observers. Birds were usually determined according to the Japanese field guide edited by SONOBE (1982), and by means of tape recordings of some birds' voices, especially those of *Strigiformes*, *Cuculiformes*, and the genus *Phylloscopus*. Some determinations were only possible after consulting additional sources of that kind; in such cases, detailed recording of observations was done for further analysis.

The species diversity in bird communities was calculated using the Shannon coefficient (e. g. LLOYD, ZAR, KARR, 1968):

$$H' = - \sum_{i=1}^S p_i \log_2 p_i \approx C/N \{ N \log_{10} N - \sum n_i \log_{10} n_i \};$$

where H' is the amount of information expressed in bite for individual in the community, S — the number of species, p — the fraction of individuals belonging to species "i", $p_i \approx n_i/N$, $c \approx 3.321928$, n_i — the number of individuals of each of the species present in the community, N — the pooled number of individuals of all species in the community. In order to include species represented by 1 individual into this coefficient (as $\log 1 = 0$), the numbers of all species in communities were consistently multiplied by a factor of 10.

III. RESULTS

A. The bird communities in some kinds of habitats

Species composition together with an approximative evaluation of the number of birds were determined for some biotopes in several observation regions mentioned below.

1. Wooded, deeply-cut stream valleys, eroded along the slope fall direction in the Myohyang-san range at the altitude of 600—1100 m a. s. l. (Habi-ro, Man-pok, and Sangwon valleys). Numerous high waterfalls and rocky stream beds with stones of various size are particularly characteristic for the landscape of those valleys. Mountain slopes are dominated by mixed forests (see STUCHLIK and ZARZYCKI msc.), their upper parts are covered by woods with a greater participation of deciduous trees and shrubs. Spring vegetation was already in its early stages of development in the bottom parts of the valleys, while the highest peaks of the region were still covered with snow. In some places, especially in the vicinity of old Buddhist temples, numerous in the area, blooming azaleas could be observed. The lists of species and their respective numbers are presented in Table I, columns i-iii.

The described bird community is clearly dominated by *Parus palustris*, *Aegithalos caudatus*, *Sitta europea*, and *Emberiza elegans* — sedentary species, already exhibiting signs of settling in territories and mating at the time of our research. Generally, however, the community was still unstabilized, some populations were still in course of migration or nomadism (e. g. *Carduelis spinus*). Our attention was drawn by the numerous presence of *Tetrastes bonasia* and by the fact that *Corvus corone* and *C. macrorhynchos* extend their range deep into the wooded mountain valleys.

2. Hyangsan River (Hyangsan-chon) Valley from the mouth of Habi-ro valley down to the new Myohyangsan Hotel (ca 7 km). The valley, wider and situated lower than the above-mentioned ones, is partly covered with forest and mostly cultivated; some new settlements are situated there. Vegetation is dominated by deciduous forests, planted coppice pine forests occasionally occur. Our observations were conducted at the period when the trees were just starting to send out leaves. The structure of the bird community described from there between 9 and 13 April 1987, is presented in Table I, column iv.

The described bird aggregation is much more diversified and rich than in the higher-situated mountain valleys. Synanthropic species are visibly present (e. g. *Passer montanus*, *Pica pica*), and *Phasianus colchicus* appears instead of *Tetrastes bonasia*. The optimum of occurrence on the river, already fairly wide (15—50 m), is attained by *Cinclus pallasii*, *Motacilla cinerea*, and *M. alba*, the two latter appearing together from then on. The valley constitutes an attractive feeding area for many species, e. g. *Streptopelia orientalis* or *Turdus numanni*, especially in the vicinity of such places as the old graveyard, the

mosaic-like waste lands and small cultivated fields. The composition of bird communities observed was rather accidental: the majority of populations were still migrating and wandering in groups including one or several species (e. g. *Parus palustris*, *P. ater*, *P. major*, *P. varius*, *Regulus regulus*, *Turdus naumanni*, *Motacilla cinerea*, *Emberiza elegans*).

Table I

Bird communities recorded from Myohyang-san. The numbers in columns are those of individuals recorded in transects; numbers in parantheses are those of estimated couples, breeding territories, or other information explained separately. Populations a significant part of which migrated in flocks are marked with an asterisk

No.	Valleys Species	Habiro (i) 12. IV	Manpok (ii) 10. IV	Sangwon (iii) 11. IV	Σi—iii	Hyangsan (iv) 9—13. IV
1.	<i>Accipiter gentilis</i>	—	—	1	1	—
2.	<i>A. nissus</i> or <i>A. soloensis</i>	—	1	—	1	—
3.	<i>Tetrastes bonasia</i>	1(1)	—	5(4)	6(5)	1(1)
4.	<i>Phasianus colchicus</i>	—	—	—	—	1(1)
5.	<i>Tringa hypoleucos</i>	—	—	—	—	1
6.	<i>Streptopelia orientalis</i>	—	—	—	—	6(4)
7.	<i>Upupa epops</i>	—	—	—	—	1
8.	<i>Picus canus</i>	—	—	—	—	4(2)
9.	<i>Dendrocopos major</i>	—	—	—	—	2(2)
10.	<i>Dendrocopos leucotos</i>	3(2)	—	—	3(2)	1(1)
11.	<i>Dendrocopos kizuki</i>	1(1)	—	1(1)	2(2)	2(2)
12.	<i>Motacilla cinerea</i>	1(1)	3(2)	2(1)	6(4)	40(15)*
13.	<i>Motacilla alba</i>	—	—	—	—	9(7)
14.	<i>Garrulus glandarius</i>	3(1)	—	3(1)	6(2)	—
15.	<i>Pica pica</i>	—	—	—	—	21(12)
16.	<i>Corvus macrorhynchos</i>	—	2(1)	—	2(1)	2(1)
17.	<i>Corvus corone</i>	1(1)	2(1)	6(4)	9(6)	10(6)
18.	<i>Cinclus pallasi</i>	1(1)	2(2)	—	3(3)	16(9)
19.	<i>Troglodytes troglodytes</i>	4(3)	—	4(3)	8(6)	—
20.	<i>Regulus regulus</i>	6	—	1	7	34*
21.	<i>Saxicola torquata</i>	—	—	—	—	1♂
22.	<i>Phoenicurus aureus</i>	—	—	—	—	8(5)
23.	<i>Tarsiger cyanurus</i>	2	1	1	4	—
24.	<i>Turdus naumanni</i>	—	—	—	—	7*
25.	<i>Aegithalos caudatus</i>	6(4)	—	9(3)	15(7)	7(5)
26.	<i>Parus palustris</i>	9(6)	—	10(8)	19(14)	22(13)
27.	<i>Parus ater</i>	1(1)	—	3(3)	4(4)	12(8)
28.	<i>Parus varius</i>	—	—	4(4)	4(4)	2(2)
29.	<i>Parus major</i>	1(1)	—	1(1)	2(2)	71(11)*
30.	<i>Sitta europaea</i>	9(7)	—	6(6)	15(3)	8(7)
31.	<i>Passer montanus</i>	—	—	—	—	15(10)
32.	<i>Carduelis spinus</i>	30*	—	1	31	—
33.	<i>Emberiza elegans</i>	6(4)	1(1)	5(3)	12(8)	23(9)*
	Total	82	12	63	160	327
	H'	3.23	2.69	3.70	3.87	3.88

Table II

Bird communities recorded from Kumgang-san. Explanation as in Table I

No.	Localities Species	Okryu- Singye —chon Valley (i) 20. IV	Manmul- sang (ii) 22. IV	1 km above Kum- gangs- san hotels (iii) 22. IV	Σi—iii	Complex of Kumgang- san hotels (iv) 19—23. IV
1	2	3	4	5	6	7
1.	<i>Butorides striatus</i>	—	—	—	—	1
2.	<i>Accipiter</i> sp.	1	—	—	1	—
3.	<i>Falco tinnunculus</i>	1♂	—	—	1	1♂
4.	<i>Phasianus colchicus</i>	—	—	1♂	1	3
5.	<i>Streptopelia orientalis</i>	—	—	1(1)	1(1)	4(2)
6.	<i>Otus scops</i>	—	—	—	—	1♂
7.	<i>Picus canus</i>	—	1♂	1♂	2	3(2)
8.	<i>Dendrocopos major</i>	—	—	—	—	4(2)
9.	<i>Dendrocopos kizuki</i>	1♀ (nest)	—	1(1)	2(2)	—
10.	<i>Hirundo rustica</i>	—	—	—	—	6
11.	<i>Hirundo daurica</i>	—	—	—	—	12
12.	<i>Anthus hodgsoni</i>	—	—	—	—	7
13.	<i>Motacilla cinerea</i>	6(5)	—	2(2)	8(7)	1
14.	<i>Motacilla alba</i>	—	—	—	—	2(1)
15.	<i>Oriolus chinensis</i>	—	—	—	—	2(1)
16.	<i>Garrulus glandarius</i>	—	1	—	1	5—6*
17.	<i>Pica pica</i>	—	—	—	—	10(6)
18.	<i>Corvus macrorhynchos</i>	3(1)	3	—	6(1)	6
19.	<i>Corvus corone</i>	—	—	2	2	4—8
20.	<i>Microscelis amaurotis</i>	—	—	—	—	1♂
21.	<i>Cinclus pallasii</i>	1	—	—	1	—
22.	<i>Troglodytes troglodytes</i>	33	1	1	5(3)	—
23.	<i>Cettia squameiceps</i>	—	—	—	—	2(1)
24.	<i>Cettia diphone</i>	—	—	—	—	3
25.	<i>Phylloscopus borealis</i>	—	1	—	1	1
26.	<i>Phylloscopus coronatus</i>	2♂♂	—	1	3	3♂♂
27.	<i>Regulus regulus</i>	2(1)	—	2(2)	4(3)	2
28.	<i>Cyanoptila cyanomelana</i>	—	—	1	1	3♂♂
29.	<i>Phoenicurus aureoreus</i>	—	2♂♂	1♀	3	2(1)
30.	<i>Tarsiger cyanurus</i>	—	1	—	1	3*
31.	<i>Erithacus cyane</i>	—	—	2(1)	2(1)	1
32.	<i>Turdus chrysolaus</i>	—	—	—	—	1♂
33.	<i>Turdus pallidus</i>	—	—	1	1	4—5*
34.	<i>Turdus naumanni</i>	—	—	1	1	25*
35.	<i>Zoothera dauma</i>	—	—	—	—	1
36.	<i>Aegithalos caudatus</i>	—	—	—	—	2(1)
37.	<i>Parus palustris</i>	5(4)	2	7(4—5)	14(8—9)	6
38.	<i>Parus ater</i>	3	5(3)	28(12)*	36(12)	≈20(5)
39.	<i>Parus varius</i>	5(4)	—	14(8)*	19(9)	4(2)

1	2	3	4	5	6	7
40.	<i>Parus major</i>	4(2)	—	4(2)	8(4)	—
41.	<i>Sitta europaea</i>	5(1)	1	2	8(1)(4)	2(2)
42.	<i>Passer montanus</i>	—	—	—	—	16(8)
43.	<i>Fringilla montifringilla</i>	—	—	10*	10*	≈ 30*
44.	<i>Carduelis sinica</i>	—	—	—	—	11(7)
45.	<i>Carduelis spinus</i>	—	—	≈ 320*	≈ 320	≈ 200*
46.	<i>Loxia curvirostra</i>	—	—	2(1)	2(1)	—
47.	<i>Coccothraustes coccothraustes</i>	—	—	—	—	2(1)
48.	<i>Emberiza elegans</i>	—	1♀	11(7)	12(7)	4(2)
49.	<i>Emberiza spodocephala</i>	—	—	—	—	1♂
Total		42	19	416	477	421—428
H'		3.62	3.18	1.58		3.47

3. Wooded stream valleys and groups of steep, partly uncovered rocks in the coastal part of Kumgang-san (the so-called Outer Kumgang) at the altitude of 400—950 m a. s. l. This includes: (i) stream valley from the new restaurant at the site of Singye Temple to Kuryon Falls (distance of about 5 km, about 4 hours of observation), (ii) the mountain region of Manmulsang (distance: ab. 3.5 km, 4 hours of observation), and (iii) the lower sections of the valley (transect — about 2 km, 3 hours of observation in the morning and in the afternoon), some kilometres above Onjongri. The research area was dominated by multiple-species natural deciduous forests (see STUCHLIK and ZARZYCKI msc.) with a large participation of old hollow trees. The rapid streams form numerous waterfalls of great and medium height (e. g. Kuryong — ab. 80 m); they are particularly numerous along the route from Okryu to Kuryon Valley. The time of our research coincided with the period of tree and shrub budding in the lower parts of the mountains, and with the height of blooming period of rhododendrons and azaleas, so characteristic for Korean mountains. The highest peaks, including Piro Peak, were sprinkled with snow. Species composition and relative number of here-described bird communities is presented in Table II — columns i-iii.

Bird communities described in the high valleys of Kumgang-san are dominated by *Paridae* and big passing flocks of *Carduelis spinus* and *Fringilla montifringilla*. The community in the upper regions of Kumgang-san is distinctly richer in species (ab. 25%) than in a similar and comparable environment described in Myohyang-san. It included species still absent in the more northern mountains of Myohyang, remaining in an earlier phenological phase; those of the genus *Phylloscopus*, *Erithacus cynae*, and *Cyanoptila cyanomelana*. On the other hand, the presence of *Tetrastes bonasia* has not been recorded.

4. The village and hotel grounds of Kumgangsán, together with the park and adjoining forest. The Hotel grounds are traversed by a stony creek. Some

of the grounds are planted with fruit trees dominated by cherry trees. Our observations coincided with a period of advanced and culminating florescence of the cherry and the apricot. This area was repeatedly controlled, each time along the practically identical winding route of 2—3 km during 1—2 hours. The described bird community is presented in Table II, column iv.

As expected, the avifauna at the foot of Kumgang-san is markedly richer in species and number than that in higher parts of the mountains. It included, apart from some synanthropic species (*Hirudo daurica*, *H. rustica*, and *Passer montanus*), species preferring the naturally more convenient ecological conditions of regions situated at a lower altitude, especially those just returning from their wintering areas and in migration in the narrow strip of lowland between the Sea of Japan and the Taebaek Range running parallel to the coast (e. g. *Butorides*

Table III

Bird communities recorded from the region of Lake Samil (Samil-po).
Explanation as in Table I

No.	Species	Vicinity of Samil Lake 21 and 23 IV
1.	<i>Butorides striatus</i>	6
2.	<i>Egretta alba</i>	3 (in flight)
3.	<i>Phasianus colchicus</i>	4 (2)
4.	<i>Streptopelia orientalis</i>	1
5.	<i>Alcedo atthis</i>	1
6.	<i>Upupa epops</i>	2
7.	<i>Hirundo rustica</i>	2 (in flight)
8.	<i>Anthus hodgsoni</i>	3
9.	<i>Motacilla alba</i>	2 (2)
10.	<i>Garrulus glandarius</i>	23* (in flight)
11.	<i>Pica pica</i>	10—12 (5 nests)
12.	<i>Corvus macrorhynchos</i>	2 (1)
13.	<i>Corvus corone</i>	2
14.	<i>Saxicola torquata</i>	3 ♂♂
15.	<i>Monticola solitarius</i>	1 ♂
16.	<i>Phoenicurus auroreus</i>	2 ♀♂
17.	<i>Tarsiger cyanurus</i>	2
18.	<i>Turdus naumanni</i>	1 (intermediate colour phase)
19.	<i>Aegithalos caudatus</i>	1 (black eyestripe phase)
20.	<i>Parus palustris</i>	4(3)
21.	<i>Parus ater</i>	3(2)
22.	<i>Parus major</i>	2(1)
23.	<i>Passer montanus</i>	12(6)
24.	<i>Carduelis sinica</i>	5(4)
25.	<i>Carduelis spinus</i>	3
26.	<i>Loxia curvirostra</i>	60* (in flight)
27.	<i>Emberiza elegans</i>	6(4)
Total		166—168
H'		3.56

striatus, *Anthus hodgsoni*, *Cyanoptila cyanomelana*, *Coccothraustes coccothraustes*, *Oriolus chinensis*, species of the genus *Cettia*). Similarly as in Myohyang-san, *Turdus naumanni* was observed in migration here; in this case, however, together with three other species of thrushes. Of interest is the small number of mountain stream birds — *Cinclus pallasii* and *Motacilla cinerea* — in comparison to the situation in the Hyangsan-chon valley.

5. Samil Lake — surrounded with wooded forests, sheer rocks, and coastal dunes. A village, rice and bamboo plantations are situated nearby. The length of the shoreline of the lake is 5.8 km, its depth is 9—13 m. Two or three islets can be seen in the middle of the lake. This picturesque area is open and adapted for tourism. It is situated in the area of sand storms. The overall length of the observation line amounted to about 5 km, during 6 hours. The described bird community is presented in Table III.

The bird community described in the vicinity of Samil Lake is clearly transitional in character, a number of species (*Turdus naumanni*, *Butorides striatus*, *Anthus hodgsoni*, *Tarsiger cyanurus*, *Saxicola torquata*, *Loxia curvirostra*) occurred in migrations. Both at the Samil Lake and in the nearby Kungang Mts, birds of eg. the family *Sturnidae* and the whole order *Cuculiformes* have not yet appeared. Of some interest is the lack, in the vicinity of the lake, of the gulls *Laridae* and other water birds; the more so as Samil-po almost adjoins to the sea. However, our Korean guides ventured information to the effect that smaller and bigger groups of ducks could be sometimes observed in the area, though it is difficult to determine whether any species breed on the lake. The tourist penetration of the shores and waters of the lake — (boat trips) might, to some extent, explain the absence of water-birds on Samil Lake.

6. Sokam artificial lake (shoreline length 8—10 km) is situated between gentle, partly wooded hills. The reservoir is deprived of lakeside water vegetation; marsh associations, dominated by reeds, so important for bird fauna, formed locally in deeply-cut, slimy bays. Observation was conducted in the area of a Young Pioneer organization centre and nearby fishing villages. The region is dominated by deciduous forests; rice and vegetable plantations dominate in the vicinity of the villages. Birds were counted along a transect of 4.5 km in length, during 5 hours.

The bird community described in this region (Table IV) concerns a habitat mosaic, mainly the surface of the lake (*Anatinae*, *Tachybaptus ruficollis*, *Mergus merganser*, and others), forests and groves (*Parinae*, *Dendrocopos leucotos*, *Tarsiger cyanurus*, and others), and waterside ecotones (*Alcedo atthis*, *Tringa hypoleucos*, *Egretta alba*, and others). Thus, this community reflects a structural and quantitative composition of the avifauna of a landscape unit, and not that of a homogeneous habitat. It exhibits a relatively high species diversity ($H' = 4.2$) and number ($N = 195\text{--}205$ individuals). Most of species in populations observed occurred in pair bonds (e. g. *Saxicola torquata*, *Carduelis sinica*, *Passer montanus*, *Emberiza elegans*). Some other species were clearly in migration (e. g. *Phylloscopus coronatus*, *Sturnus cineraceus*).

Table IV

Bird communities at Sokam, Taesong, Changsu, and Sohung reservoirs. Explanation as in Table I

No.	Species	Sokam 17. IV	Taesong 26. IV	Changsu 27 and 30. IV	Sohung 3. V
1	2	3	3	4	5
1.	<i>Tachybaptus ruficollis</i>	2	1	—	—
2.	<i>Podiceps cristatus</i>	16	—	—	—
3.	<i>Butorides striatus</i>	1	—	—	—
4.	<i>Egretta alba</i>	3	—	11	—
5.	<i>Egretta intermedia</i>	—	—	3	—
6.	<i>Egretta garzetta</i>	—	—	1	3
7.	<i>Ardea cinerea</i>	—	—	1	—
8.	<i>Anas platyrhynchos</i>	22(11)	—	—	—
9.	<i>Anas poecilorhyncha</i>	—	2(1)	32(15)	2(1)
10.	<i>Anas crecca</i>	34(17)	—	—	—
11.	<i>Anas querquedula</i>	4(2)	—	—	—
12.	<i>Aythya ferina</i>	11(4 ♂♂ + ♀♀)	—	—	—
13.	<i>Aythya fuligula</i>	—	7(4)	—	—
14.	<i>Melanitta fusca</i>	1	—	—	—
15.	<i>Mergus merganser</i>	4(1 ♂ + 3 ♀♀)	—	—	—
16.	<i>Phasianus colchicus</i>	4(3)	3 ♂♂	3 ♂♂	1 ♂
17.	<i>Charadrius</i> sp.	—	—	1	—
18.	<i>Tringa glareola</i>	—	—	2	—
19.	<i>Tringa hypoleucos</i>	2(1)	—	—	—
20.	<i>Larus canus</i>	1(imm.)	—	—	—
21.	<i>Streptopelia orientalis</i>	2(1)	3(2)	5(3)	8(6)
22.	<i>Asio otus</i>	?(pellets)	—	—	—
23.	<i>Apus pacificus</i>	—	—	2	—
24.	<i>Alcedo atthis</i>	1	—	—	1
25.	<i>Upupa epops</i>	2(1)	—	1	—
26.	<i>Picus canus</i>	1 ♂	1(1)	—	3(2)
27.	<i>Dendrocopos major</i>	—	—	—	3(3)
28.	<i>Dendrocopos leucotos</i> (?)	1(voice)	—	—	—
29.	<i>Dendrocopos kizuki</i>	—	—	—	4(3)
30.	<i>Hirundo rustica</i>	1	25	6	5
31.	<i>Hirundo daurica</i>	—	2	—	—
32.	<i>Alauda arvensis</i>	—	—	2	15(8)
33.	<i>Anthus hodgsoni</i>	—	4*	—	—
34.	<i>Motacilla cinerea</i>	—	—	—	2(1)
35.	<i>Motacilla alba</i>	2(2)	1(1)	3(2)	3(2)
36.	<i>Sturnus cineraceus</i>	—	—	6(3)	—
37.	<i>Garrulus glandarius</i>	—	—	—	6
38.	<i>Pica pica</i>	7(5)	6(3)	8(6)	8—10(4)
39.	<i>Corvus macrorhynchos</i>	4(2)	2	2	15(8)
40.	<i>Corvus corone</i>	6—8	—	6	2—5
	<i>Corvus corone</i> & <i>C. macrorhynchos</i>				35—40 (in flocks)

Table IV cont.

1	2	3	4	5	6
41.	<i>Microscelis amaurotis</i>	—	—	—	4(2)
42.	<i>Cettia squameiceps</i>	—	—	—	5♂♂
43.	<i>Cettia diphone</i>	—	2♂♂	2♂♂	2♂♂
44.	<i>Phylloscopus coronatus</i>	1	—	—	1♂
45.	<i>Regulus regulus</i>	—	—	—	1
46.	<i>Ficedula zanthopygia</i>	—	—	—	3♂♂
47.	<i>Cyanoptila cyanomelana</i>	—	—	—	5♂♂
48.	<i>Saxicola torquata</i>	2(1)	4(2)	4(2)	6(4)
49.	<i>Phoenicurus auroreus</i>	—	—	—	2(1)
50.	<i>Tarsiger cyanurus</i>	2	—	—	—
51.	<i>Turdus pallidus</i>	—	—	—	1
52.	<i>Turdus naumanni</i>	—	2	—	—
53.	<i>Aegithalos caudatus</i>	—	—	—	8(4)
54.	<i>Parus palustris</i>	1	2(1)	—	3(3)
55.	<i>Parus ater</i>	13(10)	1(1)	—	4(3)
56.	<i>Parus major</i>	3(2)	2(2)	—	5(4)
57.	<i>Sitta europea</i>	2(2)	—	—	—
58.	<i>Passer montanus</i>	25—35(≈ 15)	6	10—12	10(5—7)
59.	<i>Carduelis sinica</i>	6(3)	3(2)	—	6(5)
60.	<i>Eophona migratoria</i>	—	—	12(1)	—
61.	<i>Emberiza cioides</i>	—	2(1)	1♂	3♂♂
62.	<i>Emberiza fucata</i>	—	2(1)	1♂	—
63.	<i>Emberiza elegans</i>	6(3)	2(2)	—	3(2)
64.	<i>Emberiza tristrami</i>	—	—	—	1♂
Total		195—205	85	195—127	175—185
H'		4.17	3.86	3.86	4.50

7. Taesong is yet another of typical artificial lakes deprived of thick shore vegetation and good nesting places for water-marsh birds. The lake is situated among half-open hills with occasional country settlements, small plantations, and orchards. Our observation coincided with the period of initial vegetation along a route of 2 km, during 3 hours.

The described bird community (Table IV) might serve as a "sample" landscape unit avifauna highly influenced by human activity. The bird fauna in the observed part of the water reservoir (ca. 100 ha) is very poor (3 species common in Korea, only 10 individuals). The composition of the bird community in the surroundings of the reservoir is interesting, typical for mosaic anthropogenic habitats. A half of the species is made up of inhabitants of East Asia, with as much as 3 species of buntings (*Emberiza cioides*, *E. fucata*, *E. elegans*).

8. Changsu is a fairly large (5 km in length) artificial lake, situated among hills in an agricultural landscape. Large stretches of the lake along its shores, especially in bays, are occupied by shallows. Observations were done from the

side of the Haeju-Sinwon highway, in a section of ab. 2 km in the overall time of ab. 1 hour. Sighting encompassed some 1/3 of the lake.

An interesting and relatively diverse bird community was noted here (Table IV). It included water birds, water-marsh birds (e. g. 3 species of the genus *Egretta* and *Tringa glareola*) and those of agriculturally utilized shores (e. g. *Alauda arvensis*, *Saxicola torquata*, *Emberiza fucata*, *E. cioides*, *Eophona migratoria*). The trophic abundance of the lake might be the reason of the fairly great concentration of ducks *Anas poecilorhyncha* and herons in its area.

9. Sohung lake is a large storage reservoir, picturesquely situated among small mountains (200—300 m a. s. l.), usually covered with a multiple-species forest. Several tourist centres, country settlements, small gardens and orchards

Table V

Bird community recorded from wooded hills near Haeju.
Explanation as in Table I

No.	Species	Haeju Hills 27—28. IV
1.	<i>Phasianus colchicus</i>	4(3)
2.	<i>Streptopelia orientalis</i>	16(8)
3.	<i>Picus canus</i>	4(2)
4.	<i>Dendrocopos major</i>	4(2)
5.	<i>Dendrocopos kizuki</i>	4(4)
6.	<i>Hirundo rustica</i>	3(in flight)
7.	<i>Anthus hodgsoni</i>	14*
8.	<i>Motacilla cinerea</i>	2(1)
9.	<i>Motacilla alba</i>	4(in flight)
10.	<i>Garrulus glandarius</i>	7(4)
11.	<i>Cyanopica cyanus</i>	15(2)
12.	<i>Corvus macrorhynchos</i>	13
13.	<i>Microscelis amaurotis</i>	2(2)
14.	<i>Cettia squameiceps</i>	8♂♂
15.	<i>Phylloscopus coronatus</i>	2♂♂
16.	<i>Cyanoptila cyanomelana</i>	21(16♂♂+5♀♀)*
17.	<i>Saxicola torquata</i>	8(4)
18.	<i>Phoenicurus auroreus</i>	3(2)
19.	<i>Erithacus cyane</i>	2♂♂
20.	<i>Turdus pallidus</i>	4(2)
21.	<i>Turdus naumanni</i>	1
22.	<i>Zoothera dauma</i>	1
23.	<i>Aegithalos caudatus</i>	2(2)
24.	<i>Parus palustris</i>	11(9)
25.	<i>Parus ater</i>	12(6)
26.	<i>Parus varius</i>	5(3)
27.	<i>Parus major</i>	6(5)
28.	<i>Emberiza elegans</i>	24(15)
Total		196
H'		4.34

are situated at the lake. Observations were conducted along a route of about 5 km during 5—6 hrs.

The relatively big size of the described bird community (35 species represented by 175—185 individuals), its diversity ($H' = 4.5$) (Table IV) might partly result from the fact that observations were effected along a fairly long route, more than twice as long as those of Taesong and Changsu; the fact that it took place in an area attractive faunistically, was even of more importance here. The community was dominated by forest and ecotone species (e. g. *Streptopelia orientalis*, *Dendrocopus major*, *D. kizuki*, the genera *Cettia* and *Emberiza*, the families *Paridae* and *Corvidae*). The participation of water and waterside birds was small (*Anas poecilorhyncha*, *Butorides striatus*, *Tringa hypoleucos*, *Alcedo atthis*). A part of observed populations were migrating *Cettia squameiceps*, *Phylloscopus coronatus*, *Cyanoptila cyanomelana*, *Ficedula zanthopygia*).

10. The wooded hills near Haeju (Suyang-san) are situated about 3 km N of the town. The observation area encompassed the ruins of a medieval fortress surrounded with a still-preserved rampart, and a wooded mountain slope outside the fortress, from the great waterfall to the Haeju-Sinwon highway. A stream flows in the valley between the rampart and the hills; the valley is mostly wooded, partly cultivated. Its vegetation is dominated by mixed coppice forests. The observation route was 4 km long, time of observation amounted to ab. 6 hours.

The described bird community (Table V) includes 28 species characteristic of this season in Korean forests and half-open areas. A significant part of its populations was clearly in migration at the time (e. g. *Anthus hodgsoni*, *Erithacus cyane*, *Cettia squameiceps*, *Phylloscopus coronatus*, *Cyanoptila cyanomelana*). A number of species, except those typically sedentary (e. g. *Dendrocopus kizuki*, *Microscelis amaurotis*, species of the genus *Parus*) already occurred in pair bonds (e. g. *Streptopelia orientalis*, *Phoenicurus aureus*, *Saxicola torquata*). *Emberiza elegans* males were commonly fighting in defence of their territories. The presence of a relatively large concentration of *Cyanopica cyana*, earlier discovered in this observation region by TOMEK (1984), is also worth noting. The majority of representatives of this species occurred in artificially-planted coppice pine woods on the eastern slopes of hills.

11. The observation area in Chongwan-san included stream valleys at the edge of small (200—500 m a. s. l.) mountains, within the boundaries of a village adjacent to an old yet still-used fortress. The hills were mostly covered with coppice forests dominated by pine, terrains in lower altitudes were utilized by agriculture. A large part of the valley leading to the fortress belongs to a park. Observations was carried out along a route of about 3 km, during ca. 3 hrs.

The bird community described (Table VI) constitutes a mixture of species of various habitats, mostly those of anthropogenic ecotones (e. g. *Streptopelia orientalis*, *Carduelis sinica*), open and semi-open landscape (e. g. *Emberiza cioides*, *E. elegans*, *Motacilla alba*). A large participation of synanthropic species was noted (*Hirundo rustica*, *Sturnus cineraceus*, *Passer montanus*). Of some interest

Table VI

Bird communities described from Chonwan-san near Sariwon city.
Explanation as in Table I

No	Species	Chongwan-san 2 V
1.	<i>Accipiter</i> sp.	1
2.	<i>Phasianus colchicus</i>	5 ♂♂
3.	<i>Streptopelia orientalis</i>	4(3)
4.	<i>Alcedo atthis</i>	4(3)
5.	<i>Upupa epops</i>	1(1 nest)
6.	<i>Hirundo rustica</i>	4(in flight)
7.	<i>Anthus hodgsoni</i>	2
8.	<i>Motacilla cinerea</i>	3(2)
9.	<i>Motacilla alba</i>	3(3)
10.	<i>Sturnus cineraceus</i>	2(1)
11.	<i>Cyanopica cyana</i>	9(in local aggregation)
12.	<i>Pica pica</i>	8(4)
13.	<i>Corvus macrorhynchos</i>	6
14.	<i>Corvus corone</i>	8
	<i>Corvus</i> sp. (No. 13 or/and 14)	22(in flock)
15.	<i>Cettia squameiceps</i>	4 ♂♂
16.	<i>Ficedula zanthopygia</i>	4(2)
17.	<i>Phoenicurus auroreus</i>	4(3)
18.	<i>Parus ater</i>	3(3)
19.	<i>Passer montanus</i>	15
20.	<i>Carduelis sinica</i>	5(3)
21.	<i>Eophona migratoria</i>	2(1)
22.	<i>Emberiza cioides</i>	4(2)
23.	<i>Emberiza elegans</i>	4(4)
	Total	127
	H'	4.18

is the relatively numerous presence of *Alcedo atthis*, *Cyanopica cyana* and *Phasianus colchicus*. Some species (e. g. *Ficedula zanthopygia*, *Cettia squameiceps*, *Anthus hodgsoni*) were in migration.

12. The observation region of Nampo encompassed the area of a 8-km dam with locks separating the dammed waters of the Taedong river from The Yellow Sea. Observations were conducted on the north edge of the Taedong dam, between the dam itself and the town of Nampo, along a section of 3 km, during the time of about 1 hour, and at sea on the other side of the dam, along a route of 4—5 km, during 1 hour. The bay of the Yellow Sea encompassed several islets occupied by cormorans *Phalacrocorax* sp. The biggest islet containing an observation site for tourists was inhabited by several common land birds: *Carduelis sinica*, *Passer montanus*, *Pica pica*, and *Corvus corone*.

The described bird community of this area is presented in Table VII. Only 5 species ($H' = 1.7$) occurred in the bay within the range of observation with binoculars; of those observed, most worthwhile noting were fairly numerous

Table VII

Bird communities recorded from Nampo Dam at the Yellow Sea. Explanation as in Table I

No.	Species	Taedong reservoir above the dam 18. IV	Sea side of the dam 18. IV
1.	<i>Podiceps cristatus</i>	—	15
2.	<i>Phalacrocorax carbo</i> or/and <i>Ph. filamentosus</i>	—	≈ 50
3.	<i>Ardea cinerea</i>	2	—
4.	<i>Anas poecilorhyncha</i>	2(1)	—
5.	<i>Anas penelope</i>	3(1)	—
6.	<i>Aythya ferina</i>	2(1)	—
7.	<i>Aythya fuligula</i>	38(18)*	—
8.	<i>Anas</i> sp. and <i>Aythya</i> sp.	≈ 100	—
9.	<i>Mergus merganser</i>	—	1 ♂
10.	<i>Fulica atra</i>	16	—
11.	<i>Haematopus ostralegus</i>	3	—
12.	<i>Charadrius</i> sp.	3	—
13.	<i>Philomachus pugnax</i>	16	—
14.	<i>Limosa lapponica</i>	14*	—
15.	<i>Numenius madagascariensis</i>	22*	—
16.	<i>Numenius phaeopus</i>	52*	—
17.	<i>Larus argentatus</i>	7(4 ad.+3 imm.)	5 ad.
18.	<i>Larus crassirostris</i>	42(ad. & imm.)	20(ad. & imm.)
19.	<i>Larus saundersi</i>	3	—
20.	<i>Motacilla alba</i>	2	—
Total		327	91
H'		3.11	1.68

the cormorants, *Ph. carbo*/*Ph. filamentosus* — the distance did not permit a more precise identification. The reservoir gathered a much higher numbered of species ($S = 17$, $H' = 3.1$). The concentration of wading birds in slimy shores near the dam was very interesting faunistically; particular attention was drawn by the migrating curlews *Numenius madagascariensis*, *N. phaeopus*, and by *Limosa lapponica*, *Haematopus ostralegus* and *Philomachus pugnax*. The reservoir above the dam was also preferred by *Anatidae*.

13. Haeju bay was mainly studied from the Ongjin Peninsula, partly from a ship, partly from the rocky islet of Hyongche-san and long sandy shallows at low tide. The observation area encompassed a 3-km stretch of the bay during 4 hours. The shore of Ongjin Peninsula and the nearby shallows constituted a feeding area highly attractive to birds because of its numerous molluscs, snails, crabs, small fish, and many dead organisms.

The bird community of the bay includes 29 species (Table VIII), most of which were then in the course of migration (e. g. representatives of *Charadriiformes*: *Haematopus ostralegus*, *Tringa nebularia*, *Limosa lapponica*, species of the

Table VIII

Bird communities recorded from Haeju Bay near the Ongjin Peninsula. Explanation as in Table I

No.	Species	Haeju Bay 29. IV
1.	<i>Podiceps cristatus</i>	1
2.	<i>Phalacrocorax carbo</i>	2
3.	<i>Phalacrocorax filamentosus</i>	10 (2 imm.)
—	<i>Phalacrocorax</i> sp. (No. 2 or/and 3)	20—30
4.	<i>Egretta eulophotes</i>	5
5.	<i>Anas poecilorhyncha</i>	4(2)
6.	<i>Anas crecca</i>	2(1)
7.	<i>Mergus serrator</i>	2(1)
8.	<i>Mergus merganser</i>	2(1)
9.	<i>Falco tinnunculus</i>	10 ♂♂
10.	<i>Phasianus colchicus</i>	2 ♂♂ (on the coast)
11.	<i>Haematopus ostralegus</i>	7
12.	<i>Calidris</i> sp.	10*
13.	<i>Tringa nebularia</i>	6
14.	<i>Limosa lapponica</i>	12*
15.	<i>Numenius arquata</i>	2
16.	<i>Numenius madagascariensis</i>	5
17.	<i>Numenius tenuirostris</i> or/and <i>N. phaeopus</i>	≈ 100
18.	<i>Larus argentatus</i>	≈ 15
19.	<i>Larus crassirostris</i>	≈ 200 (ad. & imm.)
20.	<i>Sterna</i> sp.	2
21 ₂	<i>Streptopelia orientalis</i>	2(on the coast)
22.	<i>Hirundo rustica</i>	2(in flight)
23.	<i>Motacilla alba</i>	2(2)
24.	<i>Phylloscopus inornatus</i>	1(on the isle)
25.	<i>Monticola solitarius</i>	2(1)
26.	<i>Carduelis sinica</i>	1(on the isle)
27.	<i>Emberiza spodocephala</i>	2(1) (on the isle)
Total		431—441
H'		2.82

genus *Numenius*). Several species inhabited the shores of the bay (e. g. *Phasianus colchicus*) and adjacent rocky islands (e. g. *Monticola solitarius*). The low value of the species diversity coefficient ($H' = 2.8$) of this community, relatively rich in species, results from its big quantitative differentiation.

14. Ryongak-san (294 m a. s. l.) is the highest hill in the vicinity of Pyongyang it is situated in the Mangyongdae district. The area is covered by a multiple-species tree stand dominated by the pine and the chestnut. Village settlements and a youth camp is situated at the foot of the hill. Observation was carried out along a winding route during 2 hours.

The described bird community (Table IX) is relatively poor, uninteresting from a faunistic point of view. Its species and quantitative composition is fairly

Table IX

Bird communities described from Ryongak-san hill near Pyongyang and from Tyonam-san hill near Sariwon. Explanation as in Table I

No.	Species	Ryongak-san 14. IV	Tyonam-san 2. V
1.	<i>Falco tinnunculus</i> ♀?	1	—
2.	<i>Streptopelia orientalis</i>	6 (in flight)	2(1)
3.	<i>Picus canus</i>	2 ♂♂	—
4.	<i>Dendrocopos major</i>	—	2(1)
5.	<i>Hirundo rustica</i>	1(in flight)	—
6.	<i>Dendronanthus indicus</i>	—	1 ♂
7.	<i>Pica pica</i>	2(2 nests)	12(6 nests)
8.	<i>Corvus corone</i>	3	2(1)
9.	<i>Cyanoptila cyanomelana</i>	—	2(1)
10.	<i>Phoenicurus auroreus</i>	1	—
11.	<i>Parus palustris</i>	1	—
12.	<i>Parus ater</i>	6(3)	1
13.	<i>Parus varius</i>	1	—
14.	<i>Parus major</i>	4(2)	4(2)
15.	<i>Passer montanus</i>	—	25(10—15)
16.	<i>Carduelis sinica</i>	1	4(2)
17.	<i>Eophona migratoria</i>	—	6(3)
18.	<i>Emberiza elegans</i>	—	2(1)
19.	<i>Emberiza tristrami</i>	—	2(1)
Total		29	63
H'		3.21	2.86

typical for similar habitats in the Mangyongdae region. The community is dominated by forest species (e. g. *Picus canus*, *Parus ater*) and those of habitats transformed by man (e. g. *Pica pica*, *Corvus corone*).

15. Tyonam-san — a small hill (ab. 200 m a. s. l.) at the edge of the city of Sariwon, covered with parkland vegetation, rising above the town and the wide Chaeryong river valley. Observation was carried out along spiral roads and paths of total length 1 km, during 2 hours.

13 species, including *Dendronanthus indicus*, were noted from this area (Table IX). This avifauna, poor yet characteristic for Far East parkland associations, already exhibited an advanced stage of breeding stabilization. The majority of populations had already formed pair bonds; they showed a territorial behaviour.

16. 3 types habitats could be differentiated within the Pyongyang city area. They are respectively characterized by the Botanical Garden, the park area at Moran Hill, and the city centre near Changgwangsan Hotel. It is only in this latter place that observations were repeated after an interval of up to ten days.

The Botanical Garden is situated at the edge of the city. It consists of an over 100 ha-area of vegetation, fairly typically organized for this sort of terrain. Observations were conducted along a winding route of 1.5—2 km, during about 2 hours.

Bird counting on Moran Hill was mainly carried out within the city park and in the old fortress adjoining to the Taedong river. It was effected following a route of 2.5—3 km during about 3 hours.

Observations in the city centre concerned the vicinity of Changgwangsan Hotel and boulevards along the canalized Potong river. They were repeated several times in sessions of 1—2 hours along a route of 0.5—1.5 km. The area

Table X

Bird communities recorded from main habitats within Pyongyang city. Explanation as in Table I

No.	Species	Botanical Garden 26. IV	Moran Hill 15. IV	Central part of City			
				8. IV	18. IV	26. IV	1—2. V
1.	<i>Accipiter nisus?</i>	—	—	—	1	—	—
2.	<i>Falco tinnunculus</i>	—	—	—	—	1♂	2(1)
3.	<i>Phasianus colchicus</i>	1♂	1♂	—	—	—	—
4.	<i>Larus argentatus</i>	—	—	—	1	—	—
5.	<i>Larus crassirostris</i>	—	—	—	5	—	—
6.	<i>Columba livia domestica</i>	—	—	?	?	?	≈ 15
7.	<i>Streptopelia orientalis</i>	1	—	—	—	—	—
8.	<i>Ninox scutulata</i>	—	—	—	—	—	2(1)
9.	<i>Alcedo atthis</i>	—	—	—	—	—	1
10.	<i>Picus canus</i>	2(1)	—	—	1♂	—	10
11.	<i>Dendrocopos major</i>	1♀	1♀	—	—	—	—
12.	<i>Hirundo rustica</i>	—	—	—	—	6(5)	6(5)
13.	<i>Motacilla alba</i>	1	—	—	—	—	—
14.	<i>Sturnus cineraceus</i>	—	—	2(1)	6(3)	—	24(12)
15.	<i>Pica pica</i>	16(8)	6	?	8—10(5)	—	14(7)
16.	<i>Corvus corone</i>	—	2(1)	—	—	—	—
17.	<i>Microscelis amaurotis</i>	3	2(1)	2(1)	2(1)	2(1)	2(1)
18.	<i>Phylloscopus</i> sp.	—	—	—	—	—	2♂♂
19.	<i>Ficedula zanthopygia</i>	—	—	—	—	—	—
20.	<i>Cyanoptila cyanomelana</i>	—	—	—	—	—	—
21.	<i>Tarsiger cyanurus</i>	4(1♂ ad)	3	—	—	—	—
22.	<i>Turdus pallidus</i>	2	—	—	—	—	—
23.	<i>Aegithalos caudatus</i>	1	—	—	—	—	—
24.	<i>Parus palustris</i>	2(2)	3(3)	—	—	—	—
25.	<i>Parus ater</i>	3	5	—	—	—	—
26.	<i>Parus major</i>	5(4)	5(3)	—	—	—	1♂
27.	<i>Passer montanus</i>	20	≈ 45	80—100	80—100	80—100	80—100
28.	<i>Carduelis sinica</i>	2(1)	3(2)	1♂	—	—	—
29.	<i>Eophona migratoria</i>	—	—	—	—	—	9*
30.	<i>Coccothraustes coccothraustes</i>	4(2)	2(1)	—	—	—	—
31.	<i>Emberiza spodocephala</i>	—	—	—	—	—	2(1)
Total		76	79	85—105	105—127	89—109	161—181
H'		3.43	2.39	1.50	1.27	1.22	2.30

is almost totally covered with buildings, with occasional trees here and there; compact rows of shrubbery and deciduous trees are only lined along the river.

Bird communities recorded from Pyongyang are listed in Table X. Of some interest is the similarity of the avifaunas (11 species in common) of the Botanical Garden ($S = 18$, $N = 76$) and of Moran Hill ($S = 12$, $N = 79$), although, it is true, observations were carried out at different dates. Nevertheless, a higher number of synanthropic birds (e. g. the absolute dominant *Passer montanus*, a greater participation of representatives of *Corvidae*) was observed in the park, more urbanized and more frequently visited by man. The avifauna of the Botanical Garden includes more species associated with natural, forest habitats (e. g. *Cyanoptila cyanomelana*, *Picus canus*, *Aegithalos caudatus*). It is also characterized by a higher species diversity ($H' = 3.4$) than that in Moranbong Park ($H' = 2.4$). The community recorded from the city centre is visibly dominated by *Passer montanus*, and other typically synanthropic species, *Hirundo rustica* and *Sturnus cineraceus*, and, finally, by those more or less preferring anthropogenic habitats (e. g. *Microscelis amaurotis*, *Pica pica*, *Ninox scutulata*). The fact that Pyongyang is situated on a great river flowing from the North to the South results in the occurrence of clearly migrating species in various habitats in the city (e. g. *Tarsiger cyanurus*, *Phylloscopus* sp., *Ficedula zanthopygia*, *Eophona migratoria*). Observations in Pyongyang were begun in an early phenological phase during cool days ($10-15^{\circ}\text{C}$), when no signs of leaves could be seen on trees, and their end coincided with a period of a strong development of vegetation and leaves on trees. The expected increase of the number of species in the centre of the city did occur (S rising from 6 to 14), as did the increase in species diversity (H' : from 1.3 to 2.3).

The described bird communities are not always comparable, as they differ in quality (e. g. birds of water and land habitats); additionally, they are based on observations carried out in unequal counting routes and at different times. The scale of this difference, however, permits some cautious general assumptions. It seems that the most differentiated bird communities are those from the area of great water reservoirs ($H' = 3.9-4.5$, $S = 23-35$), wooded hills (Suyang-san: $H' = 4.3$, $S = 28$) and mountain river valleys ($H' = 3.5-4.2$, $S = 24-32$). A lower value of the Shannon coefficient was attained by the bird community of habitat-differentiated bay near Haeju ($H' = 2.8$, $S = 28$). Still poorer in this respect are the anthropogenic habitats, e. g. pleasure grounds in cities (Sariwon, Pyongyang), and particularly the area of the sea bay at Nampo ($H' = 1.7$, $S = 5$). Other bird communities are remarkable for their number of individuals; they include: Haeju Bay ($N = 431-441$), river valleys at the foot of mountains, e. g. Kumgang-san ($N = 416-428$), and some artificial reservoirs, e. g. those near Nampo ($N = 327$) and Sokam ($N \approx 200$). The high value of this index is usually conditioned by some dominant species, e. g. *Carduelis spinus*, *Larus crassirostris*, *Passer montanus*, species of the genera *Numenius*, *Anas*, and *Aythya*.

Table XI

Communities of water-and-marsh birds of various habitats observed in Korea in April and May 1987. Explanations: RMB — mountain rivers and streams, R-me — large rivers in middle course, R-de — large rivers in lower course, CW — sea coasts and coastal waters, L — lakes and reservoirs, RF — rice fields. Numbers in columns are those of recordings, those parenthesized present the number of individuals

No.	Species	Type/ form morph./ ecol.*	Kind of biotops					
			RMB	R-me	R-de	CW	L	RF
1.	<i>Tachybaptus ruficollis</i>	I/4	—	1(3)	—	2(4)	2(3)	—
2.	<i>Podiceps nigricollis</i>	I/4	—	—	—	2(6)	—	—
3.	<i>Podiceps cristatus</i>	I/4	—	2(10)	—	6(32)	1(16)	—
4.	<i>Phalacrocorax carbo</i>	I/4	—	—	—	1(2)	—	—
5.	<i>Phalacrocorax filamentosus</i>	I/4	—	—	—	1(10)	—	—
6.	<i>Phalacrocorax</i> sp. (No. 4 and/or 5.)	I/4	—	—	—	6(108)	—	—
7.	<i>Butorides striatus</i>	III/3	1(1)	—	—	—	4(14)	—
8.	<i>Bubulcus ibis</i>	III/3	—	—	—	—	—	1(2)
9.	<i>Egretta alba</i>	III/3	—	—	—	—	5(13)	15(89)
10.	<i>Egretta intermedia</i>	III/3	—	—	—	—	1(1)	1(1)
11.	<i>Egretta garzetta</i>	III/3	—	—	—	—	—	3(17)
12.	<i>Egretta eulophotes</i>	III/3	—	—	—	—	—	—
13.	<i>Ardea cinerea</i>	III/3	—	—	—	1(5)	—	—
14.	<i>Anas platyrhynchos</i>	I/1	—	—	1(2)	—	1(2)	3(7)
15.	<i>Anas poecilorhyncha</i>	I/1	—	2(15)	—	—	1(22)	1(2)
16.	<i>Anas crecca</i>	I/1	—	2(10)	2(102)	1(2)	12(89)	4(33)
17.	<i>Anas strepera</i>	I/1	—	1(4)	—	1(2)	1(34)	—
18.	<i>Anas penelope</i>	I/1	—	1(8)	1(3)	—	—	—
19.	<i>Anas querquedula</i>	I/1	—	—	—	—	—	—
20.	<i>Anas clypeata</i>	I/1	—	2(8)	—	—	1(2)	—
			—	1(12)	—	—	—	—

		50	6	17	15	20	22	14
21.	<i>Aythya ferina</i>	I/2	—	—	1(2)	—	2(17)+	—
22.	<i>Aythya fuligula</i>	I/2	—	1(35)	1(38)	—	2(8)	—
23.	<i>Melanitta fusca</i>	I/2	—	—	—	3(45)	1(1)	—
24.	<i>Bucephala clangula</i>	I/2	—	—	—	1(1)	—	—
25.	<i>Mergus serrator</i>	I/4	—	—	—	1(2)	—	—
26.	<i>Mergus merganser</i>	I/4	—	3(7)	—	2(3)	1(1)	—
27.	<i>Fulica atra</i>	I/3	—	—	1(16)	—	—	—
28.	<i>Hematopus ostralegus</i>	III/2	—	—	1(3)	1(5)	—	—
29.	<i>Charadrius dubius</i>	III/1	—	2(3)	—	—	—	—
30.	<i>Charadrius</i> sp.	III/1	—	—	—	—	—	1(1)
31.	<i>Philomachus pugnax</i>	III/2	—	—	1(16)	—	—	—
32.	<i>Tringa nebularia</i>	III/2	—	—	—	1(6)	—	—
33.	<i>Tringa glareola</i>	III/2	—	—	—	—	1(2)	—
34.	<i>Tringa hypoleucos</i>	III/2	1(1)	1(1)	—	—	1(2)	—
35.	<i>Limosa lapponica</i>	V/3	—	—	1(14)	—	—	—
36.	<i>Numenius arquata</i>	V/3	—	—	—	1(2)	1(1)	1(2)
37.	<i>Numenius madagascariensis</i>	V/3	—	—	1(22)	1(1)	—	—
38.	<i>Numenius phaeopus</i>	V/3	—	—	1(52)	—	—	—
39.	<i>Numenius minutus</i>	V/3	—	—	—	—	—	1(2)
40.	<i>Gallinago</i> sp.	V/3	—	—	—	—	—	1(1)
41.	<i>Himantopus himantopus</i>	III/2	—	—	—	—	—	—
42.	<i>Larus argentatus</i>	II/3	—	5(12)	1(7)	4(27)	—	—
43.	<i>Larus schistisagus</i>	II/3	—	1(1)	—	—	—	—
44.	<i>Larus canus</i>	II/3	—	—	—	—	1(2)	—
45.	<i>Larus crassirostris</i>	II/3	—	1(5)	1(42)	4(140)	1(2)	—
46.	<i>Larus saundersi</i>	II/3	—	—	1(3)	—	—	—
47.	<i>Sterna</i> sp.	II/2	—	—	—	1(1)	—	—
48.	<i>Alcedo athys</i>	III/3	1(1)	4(7)	—	—	3(5)	2(2)
49.	<i>Motacilla cinerea</i>	III/1	31(61)	—	—	—	1(2)	—
50.	<i>Motacilla alba</i>	III/1	12(18)	4(6)	1(2)	2(3)	12(14)	1(2)
51.	<i>Cinclus pallasi</i>	III/4	17(25)	—	—	—	—	—
Number of species		50	6	17	15	20	22	14

* according to Table XII.

B. Water-marsh birds of various biotopes

The analysis of the occurrence of water-marsh birds in Korea permitted to differentiate 6 types of biotopes, which included a total of 49 species (Table XI).

Mountain streams and rivers (marked RMB) were inhabited by a small number of species; *Cinclus pallasii* was recorded in this biotope only, and *Motacilla cinerea* exhibited a significant preference for it. Flocks were not observed here, and the majority of birds was in pair bonds and occupied territories at the time of our research. The determination of boundaries between sections of water courses mountain and lowland in character was very difficult because of the steep incline of river valleys and the frequent direct contact of the sea and the mountain slopes.

Great lowland rivers in their middle course (R-mc) saw the presence of 17 species. Ducks of the genus *Anas* were represented the most fully (5 species) in this biotope, while the occurrence of *Anas strepera* and *A. clypeata* was limited to this biotope only. Large single-species flocks have not been observed in this association, the only exception being a flock of 35 individuals of *Aythya fuligula* on the Taedong river near Mangyongdae (cf. p. 467).

Great lowland rivers in their lower course (R-dc) were inhabited by the small number of 15 species; this, however, might result from the short period of observation (cf. p. 454). It is worthwhile noting that large flocks were observed, of such species as *Anas poecilorhyncha*, *Numenius pheopus*, *N. madagascariensis*, and *Larus crassirostris*. The occurrence of *Fulica atra* was limited to this biotope — suite in agreement with data from TOMEK (1984). The absence of this species in lakes might be explained by feeding factors.

Sea coast and coastal waters (CW) were inhabited by 20 species of bird, as much as 8 of these occurred in this environment only. *Phalacrocorax carbo*, *Ph. filamentosus*, and *Melanitta fusca*, recorded at several instances, seemed to exhibit a definite preference of coastal waters. Other species, recorded once or twice, might have appeared accidentally.

Artificial lakes and reservoirs (L) were also inhabited by 22 species. Among those, the ducks of genera *Anas* and *Aythya* were represented in the greatest numbers, and *Anas poecilorhyncha* was the most numerous species to occur in this biotope.

Rice fields (RF), ready for rice planting and thus covered by water in 20% of their area only, at the time of our observation, yielded the presence of 14 bird species. This biotope saw the most numerous representation of herons: *Ardea cinerea*, *Bubulcus ibis*, and 3 species of *Egretta*. The species *Egretta garzetta*, *Bubulcus ibis*, *Himantopus himantopus*, *Numenius minutus*, and *Gallinago* sp. were observed in this biotope exclusively. It should be noted, however, that, with the the exception of *E. garzetta*, those species were observed but once.

Characteristic species can be enumerated for each of the mentioned communities. Mountain streams and rivers differ from other biotopes by the presence of *Cinclus pallasii* and *Motacilla cinerea*. Lowland open waters are characterized

Table XII

Distribution of morpho-ecological types and forms of water-and-marsh birds in various habitats in Korea between 07.04. and 04.05. 1987. Explanations: RMB, R-mc, R-dc, CW, L, RF — types of biotope (see Table XI), S — number of species, N — overall number of individuals observed (=100%), PP — percentage participation of individuals observed

Type	Form	Kind of biotops												Total	
		RMB		R-mc		R-dc		CW		L		RF			
		S	PP	S	PP	S	PP	S	PP	S	PP	S	PP	S	N = 100%
I. Swimmers	1. filtering benthophags	—	—	6	16.3	2	30.2	2	1.1	4	42.2	2	10.1	7	348
	2. diving benthophags	—	—	1	23.8	2	27.2	2	31.3	3	17.7	—	—	4	147
	3. aquatic phytophags	—	—	—	—	1	100,0	—	—	—	—	—	—	1	16
	4. diving ichthyophags	—	—	3	9,7	—	—	7	80.7	3	9.7	—	—	7	207
II. Flight feeders	2. pelagial ichthyophags	—	—	—	—	—	—	1	100.0	—	—	—	—	1	1
	3. predators and necrophags	—	—	3	7.5	3	21,6	2	69.3	2	1.7	—	—	5	241
III. Semi-aquatic waders	1. beach entomophags	2	70.5	2	8.0	1	1.8	1	2.7	2	14.3	2	2.7	3	112
	2. shore entomophags	1	2.7	1	2.7	2	51.3	2	29.7	2	10.8	1	2.7	6	37
	3. shore ichthyophags	2	1.2	1	4.2	1	1.2	1	0.6	5	21.2	6	71.2	8	165
	4. diving entomophags	1	100,0	—	—	—	—	—	—	—	—	—	—	1	25
V. Grassland birds	3. entomophags of swamp grasslands	—	—	—	—	—	90.7	—	—	—	—	—	—	—	—
	Total of types	1	—	3	3	4	4	—	4	4	4	3	3	—	4
	Total of forms	4	—	7	7	8	8	—	9	8	8	5	5	—	11
	Total of species	6	—	17	17	15	15	—	20	22	22	14	14	—	50

by the full representation of swimming ducks. Swampy rice fields might be differentiated by the almost-full representation of *Ardeidae*. Sea coastal waters are chiefly characterized by the presence of cormorants. Two species must be counted among eurytopic ones. One of them, *Motacilla alba*, inhabited all mentioned biotopes, though it visibly preferred mountain streams and rivers, and lake shores. The other of those species, *Anas poecilorhyncha*, inhabited 5 biotopes with a distinct preference for lakes and rice fields.

The analysis of the occurrence of water-marsh birds was carried out on the basis of differentiated morphological and ecological types and forms (JAKUBIEC, 1978). The participation of particular types is highly differentiated (Table XII). Swimming birds and flight feeders were basically limited to lowland rivers, sea coasts, and lakes. Semi-aquatic waders were numerous in all discussed biotopes, while grassland birds did not occur at mountain rivers and in middle courses of lowland rivers. The importance of particular biotopes is not uniform.

Mountain rivers and streams saw the occurrence of 6 species representing 4 morphological-ecological forms. These solely included semi-aquatic waders, with their highest percentage attained there by beach entomophags and diving entomophags. 17 species and 7 forms occurred in middle courses of lowland rivers, none of them exhibiting a particular preference for this biotope. Lower courses of lowland rivers were inhabited by 15 species and 8 forms; aquatic phytophags, shore benthophags, and entomophags of swamp grassland were distinctly associated with this biotope. Sea coastal waters were used by 21 species and 9 forms; this biotope was clearly preferred by diving ichthyophags and flight feeders (pelagial ichthyophags, and predators and necrophags). Artificial lakes and reservoirs were inhabited by 21 species and 8 forms, and only filtering benthophags exhibited any preference for this biotope. Rice fields were used by 15 species and 5 forms; of those, shore ichthyophags showed a strong attachment to this biotope.

The presented results point out that the greatest number of water-and-marsh birds gathers around sea coastal waters and lakes in April. Less birds occur at big rivers in their middle and lower courses. Rice fields, and particularly mountain water courses, are relatively poor in this respect.

C. Survey of species observed

During almost month-long observations in Korea, 115 bird species were met and identified, and two further taxa were determined as to their genus. Systematics and Latin names were basically adopted after VAURIE (1959, 1965); taxonomic names (e. g. *Tachybaptus ruficollis*) introduced in contemporary European works (e. g. CRAMP et al. 1977; GLUTZ and BAUER 1980, 1982) were used in isolated cases.

1. *Tachybaptus ruficollis* (LINNAEUS, 1758) — Recorded 5 times in the overall number of 10 individuals. 3 individuals were observed at the Taedong river at

the level of Mangyongdae, on 16.04. 2 specimens were present on Sokam artificial lake, on 17.04., and one was seen on the Taesong reservoir on 24.04. 1 bird was seen in coastal waters of the Sea of Japan of Sijung Lake on 19.04., and 3 further individuals were observed near Kosong on 24.04.

2. *Podiceps nigricollis* (C. L. BREHM, 1831) — Recorded twice in coastal waters of the Sea of Japan: 19.04. — 2 birds of Sijung Lake, 24.04. — 4 birds in breeding moult of the beach in Wosan.

3. *Podiceps cristatus* (LINNAEUS, 1758) — The most frequently — and most numerous — observed species of grebes. It was recorded 9 times in the total number of 67 individuals. The greatest number of those birds at one time was observed on Sokam Lake on 17.04. (16 individuals), and in coastal waters of the Yellow Sea, where 15 birds were sighted below the Nampo lock on 18.04. Two several-minutes' observations of the Sea of Japan between Sea Kungang Gate and Sijung Lake on 24.04. yielded respective numbers of 8 and 1 bird and two birds were present on Sijung Lake. 5 birds were seen on coastal waters off Wonsan on 19.04., and 9 on 24.04., including one still in transitional moult (more similar to winter moult than to breeding moult). On 8. and 16. 04., 1 and 9 birds, respectively, were sighted on the Taedong river near Mangyongdae. None of the birds exhibited courtship behaviour. One bird was seen in Haeju Bay on 24.04.

4. *Phalacrocorax carbo* (LINNAEUS, 1758) — Two adult individuals, seen from near and in good lighting conditions, were present in Haeju Bay, on 29.04.

5. *Phalacrocorax filamentosus* (TEMMINCK and SCHLEGEL, 1850) — 8 adult birds and 2 immature ones were recognized in Haeju Bay on 29.04.

Phalacrocorax carbo and/or *Phalacrocorax filamentosus* — The species identity of about 100—110 birds at high seas or rocky islands far off the coast could not be recognized. About 50 birds were seen below the Nampo Dam on the Yellow Sea on 19. and 24.04. The total of about 30 birds in three localities were sighted in coastal waters of the Sea Japan between Sea Kungang Gate and Sijung Lake; 20 to 30 individuals were observed in Haeju Bay on 29.04.

6. *Butorides striatus* (SCHRENK, 1869) — Recorded 5 times: on artificial lakes of Sokam — 17.04., and Sohung — 03.05., above Samil Lake — 23.04., and above a mountain river at Onjong-ri — 22.04. A total of 15 individuals was observed; most of them were single birds, a flock of 9 individuals was only observed near Samil Lake.

7. *Bubulcus ibis* (LINNAEUS, 1758) — 2 individuals were observed in the vicinity of the Onjong-ri — Sijung Lake road (ab. 8 km from Onjong-ri) on 24.04.

8. *Egretta alba* (LINNAEUS, 1758) — Recorded about 20 times between 17 and 30.04., in various environments: in rice fields, on artificial lakes (Sokam and Changsu), in river valleys (e. g. that of the Nam River) in the overall number of about 100 individuals. It occurred in greatest numbers in rice fields; e. g. a total of 63 individuals were observed along the 59 km-route from Onjong-ri

to Sijung Lake on 24.04. (55 birds in the first 10 km), and their greatest community amounted to 31 individuals.

9. *Egretta intermedia* (WAGLER, 1829) — Single feeding individuals were observed twice in rice fields near the road Haeju-Changsu Lake and at the lake itself, on 30.04. One of the birds caught a large frog it managed to swallow only after some 15 minutes.

10. *Egretta garzetta* (LINNAEUS, 1766) — Observed twice in rice fields: two communities of 2 and 14 individuals, at the road Onjong-ri — Sijung Lake on 24.04., and at the road Haeju — Changsu Lake on 30.04., respectively.

11. *Egretta eulophotes* (SWINHOE, 1860) — 5 feeding birds were observed on the Haeju Bay coast on 29.04. They were looking for food in water pools on the beach at low tide.

12. *Ardea cinerea* LINNAEUS, 1758 — Recorded five times at the Taedong river above Nampo dam, at Changsu Lake, and in rice fields near the roads Sijung Lake — Kosong and Onjong-ri — Sijung Lake, between 18. and 30.04. A total of 11 individuals was observed, 7 of which were seen in rice fields.

13. *Anas platyrhynchos* LINNAEUS, 1758 — Observed four times: on the Taedong river below Mangyongdae — 08.04., and below the mouth of the Sunfakan river — 16.04., on Sokam artificial lake — 17.04., and 1 pair near the road from Onjong-ri to Sijung Lake.

14. *Anas poecilorhyncha* (SWINHOE, 1866) — Of all ducks, this species was observed most frequently and in the greatest number. It was recorded 19 times in various environments between 08.04. and 03.05.: on rivers (the Taedong, 08. and 18.04.), coastal waters (Haeju, 29.04.), dam lakes (Sokam, 17.04.; Taesong, 26.04.; Changsu, 30.04.; Sohung, 03.05.), and in rice fields (Sijung Lake — Kosong, 19.04.; Onjong-ri — Sijung ho, 24.04.; Haeju — Changsu Lake, 30.04.). A total of at least 210 individuals was observed; of these, 38 were recognized as males and 38 as females. Their greatest concentration (102 birds) was sighted in the vicinity of the town of Nampo. An overwhelming majority of birds observed formed pair bonds.

15. *Anas clypeata* LINNAEUS, 1758 — 9 males and 3 females were observed on the Taedong River below the mouth of the Sunfakan River on 16.04.

16. *Anas crecca* LINNAEUS, 1758 — Recorded twice: on the Taedong River below the mouth of the Sunfakan — 16.04., on Sokam artificial lake — 17.04., and in Haeju Bay — 29.04. The overall number of 40 individuals (21 males and 19 females) was observed; all females remained with the males. The greatest concentration of Teals, containing 17 couples was seen on Sokam artificial lake.

17. *Anas querquedula* LINNAEUS, 1758 — Recorded twice: on the Taedong River below the mouth of the Sunfakan — 16.04. (4 couples), and on Sokam Lake — 17.04. (2 males).

18. *Anas strepera* LINNAEUS, 1758 — Four couples of these birds were observed on the Taedong River below the mouth of the Sunfakan on 16.04.

19. *Anas penelope* LINNAEUS, 1758 — 2 males and 1 female were observed

in a small bay near Nampo Hotel in the lower course of the Taedong, on 18.04. only.

20. *Aythya ferina* (LINNAEUS, 1758) — Recorded thrice: on Sokam artificial lake — 17.04. (4 males and 7 females), on the Taedong in the vicinity of the town of Nampo — 18.04. (1 couple), and on a small lake near the road from Onjong-ri to Sijung Lake, 30 km from Onjong-ri (5 males and 1 female).

21. *Aythya fuligula* (LINNAEUS, 1758) — Recorded four times: on the Taedong near Mangyongdae — 08.04. (35 birds), and near the town of Nampo — 18.04., on the route Onjong-ri — Sijung ho — 24.04., and on Taesong artificial lake — 26.04. (3 couples and 1 female). A total of 81 individuals was observed; 23 were recognized as males and 23 as females. The biggest concentration of these birds was encountered in the small bay near Nampo Hotel — 38 individuals (20 males and 18 females).

22. *Melanitta fusca* (LINNAEUS, 1758) — Recorded four times, including 3 encounters on the Sea of Japan coast: near Sijung ho on 19.04. (2 males), between Onjong-ri and Sijung ho, 30 km from Onjong-ri, on 24.04., and in Wonsan, where 1 couple and a flock of 20 individuals was present in the coastal zone. The only inland observation was made on Sokam artificial lake on 17.04., where a male in breeding moult was sighted. The overall number of 46 individuals was observed, of which 15 males and 10 females were recognized.

23. *Bucephala clangula* (LINNAEUS, 1758) — 1 individual in female plumage was observed on the Sea of Japan in Wonsan on 24.04.

24. *Mergus serrator* LINNAEUS, 1758 — One couple was observed in Haeju Bay on 29.04.

25. *Mergus merganser* LINNAEUS, 1758 — Recorded six times in the total of 11 individuals (4 males and 7 females). Observed thrice in the middle course of the Taedong, near the mouth of the Sunfakan, on 08. and 16.04., once on Sokam Lake — 17.04., and twice on the Yellow Sea coast: below the lock at Nampo — 18.04., and in Haeju Bay, 29.04.

26. *Accipiter gentilis* (LINNAEUS, 1758) — Only one specimen was observed in the vicinity of Buddhist temples in Sangwonam Valley (Myohyangsan), about 600 m a.s.l., on 11.04.

27. *Accipiter nisus* (LINNAEUS, 1758) — Observed twice. Single passing individuals were seen in Manpok Valley (Myohyangsan) on 10.04. and in the centre of Pyongyang. One hawk *Accipiter* sp. was also near Kuryong Waterfall (Kumgangsan about 700 m a.s.l.) on 19.04., and another was spotted near Sariwon on the same day, but the exact determination of their species was impossible.

28. *Falco tinnunculus* LINNAEUS, 1758 — At least 15 individuals were observed in all in the period between 07.04. and 04.05.; this might suggest this species to be the most numerous bird of prey of the southern part of North Korea. A couple in copulation was observed on the Ke Son Mun triumphal arch in Pyongyang on 07.04. Individuals from another couple were observed thrice (25.26. and 30.04.) in front of Changgwangsan Hotel in the centre of Pyongyang. One couple undoubtedly nested in a recess in the 11-floor Kumgangsan Hotel.

Single individuals, usually males, were seen in Mangyongdae, on the Taedong near Mangyongdae and near the mouth of Sunfakan (08.04.), in the town of Sunan (17.04.), in the village of Chim chon (12 km N of Sariwon) on 04.05., and in the port of Haeju (29.04.). Three birds were sighted from the Pyongyang — Haeju highway on 27.04.

29. *Tetrastes bonasia* (LINNAEUS, 1758) — Observed or only heard in Myohyangsan (350—550 m a.s.l.). Lure was used to increase the degree of detection of this species; its sound provoked answers from males in the vicinity. Two responding males were sighted in a high forest in Sangwonam — Pulyong Range on 11.04. 3 more birds (2 of them kept together) were lured and seen in larch-oak-walnut forest between the Buddhist temple of Pulyong and Kumgang Waterfall (route of about 1 km) on the same day. In all, 5 birds probably occupying 4 territories were recorded along a stretch of 7 km on 11.04. A feather of this species was found in Habiro Valley on 12.04., and 1 female was observed near the old Myohyangsan Hotel.

30. *Phasianus colchicus* LINNAEUS, 1758 — The most common and the most numerous of gallinaceans, present in forest edges, shrubs, and even the Botanical Garden in Pyongyang. A total of 32 calling birds, including 24 cocks, was seen or heard between 08.04 and 03.05. Birds were observed or heard in the following localities: in Mangyongdae (08.04.), near the Historical Museum of Taeung in Myohyang-san (09.04.), by the Taedong River near the mouth of the Sunfaken River (16.04.), at the artificial Sokam Lake. 3 specimens were recorded in the close vicinity of Kumgangsán Hotel (19.04.), and 3 cocks and 1 hen was seen near the road from Samil Lake to Wonsan (21—24.04.). Its most numerous presence, however, occurred in plant associations close to parkland, with fruit trees, thuja, forsythia, azaleas, and small pines near the village of Chongwansan (about 12 km N of Sariwon), where 5 cocks and 1 hen occupied an area of about 15 ha on 02.05. One or two birds were seen at the artificial lakes of Taesong (26.04.), Changsu (30.04.), and Sohung (03.05.), and near Haeju (27. and 29.04.). One calling male was also heard in the Pyongyang Botanical Garden on 26.04.

31. *Fulica atra* LINNAEUS, 1758 — 16 birds were seen feeding in the small bay near the hotel in Nampo, in the lower course of the Taedong, on 18.04.

32. *Hematopus ostralegus* LINNAEUS, 1758 — Observed twice: 3 birds in a small bay of the Taedong near the Nampo lock on 18.04., and 5 birds feeding on uncovered surfaces at low tide near Haeju.

33. *Charadrius dubius* SCOPOLI, 1786 — Recorded twice: a couple of birds was chasing another individual away from their territory on a gravel shore of the Taedong below the mouth of the Sunfakan on 16.04., and 1 individual was seen in rice fields along the route from Onjong ri to Sijung ho on 24.04. Apart from that, 3 displaying plovers (*Charadrius* sp.) were observed above the Nampo lock on 18.04., but their specific appurtenance was not determined.

34. *Philomachus pugnax* (LINNAEUS, 1758) — 16 individuals in winter moult were observed in a small bay of a reservoir on the Taedong about 1 km upstream from the Nampo lock, on 18.04.

35. *Tringa nebularia* GUNNERUS, 1767 — 6 individuals were seen feeding on stretches of the bottom of Haeju Bay uncovered at low tide, on 29. 04.

36. *Tringa glareola* LINNAEUS, 1758 — 2 individuals were observed feeding at Changsu Lake on 30. 04.

37. *Tringa hypoleucos* LINNAEUS, 1758 — Recorded thrice: one individual was seen above the Hyangsan River in Myohyang-san on 13. 04.; its voice was heard above the Taedong near the mouth of the Sunfakan on 16. 04.; finally, 2 birds were seen together at the artificial Sokam Lake.

38. *Limosa lapponica* (LINNAEUS, 1758) — 14 individuals in winter moult were observed in a bay of the Taedong about 1 km upstream from the Nampo lock on 18. 04.

39. *Numenius arquata* (LINNAEUS, 1758) — Recorded thrice: 2 individuals on the Yellow Sea coast near Haeju on 29. 04., 1 individual at Changsu Lake, on 30. 04., and 2 individuals in rice fields near Chim chon, 12 km N of Sariwon on 04. 05.

40. *Numenius madagascariensis* (LINNAEUS, 1766) — Recorded twice: 22 individuals in a small bay of the Taedong reservoir above the Nampo lock on 18. 04., and 1 individual on stretches of sea bottom uncovered at low tide near Haeju on 29. 04.

41. *Numenius phaeopus* (LINNAEUS, 1758) — 52 individuals were observed feeding in a small bay of the Taedong reservoir above the Nampo lock on 18. 04.

42. *Numenius minutus* GOULD, 1841 — 2 birds were observed sitting on a ploughed field near the road from Haeju to Changsu Lake, 2 km before the lake, on 30. 04. The two birds were small, and their beaks were short and less curved than those of other curlews observed here. After they were scared away, the colouring and streaking of the rump, characteristic for this species, could be observed.

43. *Gallinago* sp. — 1 individual was observed in a rice field near the Wonsan — Kosong road on 19. 04.

44. *Himantopus himantopus* LINNAEUS, 1758 — 1 individual was seen feeding on a rice field near the Wonsan — Kosong road on 19. 04.

45. *Larus argentatus* PONTOPPIDAN, 1763 — The most-often encountered gull species. It was recorded 10 times, in greatest number on the Yellow Sea coast: in the region of Nampo (18. 04) and Haeju (29. 04.); on the coast of the Sea of Japan in Wonsan (19. and 24. 04.); finally, all the way up the Taedong as far Pyongyang. It was also frequently observed within the capital. It usually occurred individually or in small, several-specimen flocks, and a bigger flock of 15 birds was only seen feeding on stretches of sea bottom uncovered at low tide near Haeju. A total of 46 individuals were counted. Adult birds were almost seven ($40 \div 6$) times more numerous than immature ones.

46. *Larus schistisagus* STEJNEGER, 1884 — 1 adult individual was observed by the Taedong at the mouth of the Sunfakan, on 16. 04.

47. *Larus canus* LINNAEUS, 1758 — 2 individuals in immature plumage were observed at the artificial lake of Sokam on 17. 04.

48. *Larus crassirostris* VIEILLOT, 1818 — The most numerous gull species, recorded 7 times, almost exclusively on the Yellow Sea coast: near the Nampo lock on 18. 04., and in Haeju Bay on 29. 04.; and on the Sea of Japan coast: near Wonsan (19. and 24. 04.) and Sijung ho. It was also exceptionally observed in Pyongyang at the Potong River, where a flock of 5 birds was seen on 18. 04. It occurred in groups of 5 to 40 individuals; more than 100 birds were observed on stretches of sea bottom uncovered at low tide near Haeju. 3 mating couples were seen there on 29. 04.

49. *Larus saundersi* (SWINHOE, 1871) — 3 individuals in breeding moult were observed on the shore of the Taedong, 1 km upstream from the Nampo lock, on 18. 04.

50. *Sterna* sp. — 1 individual was observed at the sea shore near Haeju on 29. 04.; the colouring of the bird was similar to that of *Sterna hirundo*.

51. *Columba livia domestica* (GMELIN, 1789) — Groups of domesticated pigeons, much resembling typical hybrids present in European towns and villages, were encountered in Pyongyang.

52. *Streptopelia orientalis* (LANTHAM, 1790) — The Rufous Turtle Dove was the most frequently encountered and the most numerous pigeon species observed. A total of 47 birds forming at least 33 pair bonds or occupying presumed territories in the southern part of North Korea, were recorded between 08. 04. and 03. 05. It was most often encountered in the number of 1 or 2 couples in the vicinity of human-inhabited places (e. g. 2 couples near Kungangsan Hotel) and in parkland-type tree groups (Mangyongdae, 08. 04.; Taeung Historical Museum in Myohyang-san, 09. 04.; Buddhist cemetery, 11. 04., and the Hyangsan River in the same locality, 13. 04.; Botanical Garden, 26. 04.). It was also quite often seen near water courses and reservoirs (e. g. at the reservoirs of Sokam, 19. 04., Samil, 23. 04., Sijung, 24. 04., Taesong, 26. 04., and Changsu, 30. 04., as well as at the Taedong below the mouth of the Sunfakan, on 16. 04.). 1 to 4 birds were also observed each day of the period of ornithological research in the region of Haeju, between 27. and 30. 04. A cooing male was also seen on the sea shore of Haeju Bay (29. 04.), and the greatest flock of the birds (composed of 6 individuals) was seen on Mount Ryongak-san (14. 04.).

53. *Otus scops* (LINNAEUS, 1758) — The voice of the subspecies *Otus scops sticnonotus* (SHARPE 1875), distinguished by some authors as the separate species *Otus sunia* (HODGSON, 1836), was heard only once — near Kungangsan Hotel on 20. 04. The bird called many times during a warm and moonless night (10—10 : 30 p.m., air temperature ab. 18°C). The bird was lured by means of recorded provocation (the voice of the Scops Owl) to the distance of about 50 m from the observers.

54. *Ninox scutulata* (RAFFLES, 1822) — One calling male was heard in the park at the Potong River in the centre of Pyongyang, in the evening of 01. 04., at about 8 : 30 p. m. The imitation of its voice permitted to lure it to the distance of about 30 m, thus enabling visual observation. Another individual (probably a female) called at the same time, about 200 m from the male. The

presumed centre of the territory of the couple contained tall trees, mainly willows, poplars, and acacias. The area is built over and fairly numerously visited by people.

55. *Asio otus* LINNAEUS, 1758 (?) — The probable presence of this species was established on the basis of several tens of pellets found at the Sokam reservoir on 17. 04. They were found in thinned pine forest, about 10 m from the edge of the reservoir. The size and the form of the pellets excluded *Strix uralensis* or *Otus bakkamoena*. They were all fresh and all-preserved, and their being found in an area of 15—20 m² suggests that they were deposited by owls spending winter or early spring nights there. Concentrated occurrence of pellets is typical for the Long-eared Owl spending nights in groups.

56. *Apus pacificus* (LATHAM, 1801) — Observed four times. About a hundred birds at once were observed above rocky islets on the Sea of Japan near Sijung-ho on 19. 04. The number of the swifts in the same place five days later was estimated as 50 individuals. The nesting of swifts on those islands, situated at 200 to 500 m from the coast, has already been recorded by TOMEK (1984), who found a nest containing three 2—3-day chicks on 14. 06. 1980. This might suggest that some of the birds start breeding at the end of the second decade of May. A single bird was also seen in the town of Tongchon (11 km SE of Sijung Lake; 24. 04.), and two passing birds were sighted near Changsu Lake on 27. 04.

57. *Eurystomus orientalis* (LINNAEUS, 1766) — Two stuffed individuals were seen in the Tacung Historical Museum in Myohyang-san, apart from other stuffed specimens for sale in the Pyongyang shop for diplomats. Korean guide informed us, that this species occurs scarcely in river valleys of Myohyang-san — the same is confirmed by TOMEK (1985).

58. *Alcedo atthis* (LINNAEUS, 1758) — Recorded 10 times in various environments between 17. 04. and 03. 05., in the overall number of 15 individuals. It was recorded many times from the area of cities: in Wonsan park, 24. 04., and in Pyongyang, 1. 05., two chasing birds were observed (territory occupation?), and four individuals were seen in Sariwon on 02. 05. It also occurred near lakes: the Sokam artificial lake, 17. 04., Samil-po, 23. 04., and Sohung artificial lake, 03. 05. The remaining observations come from the Sea of Japan coast: 1 individual was observed at a mountain river about 10 km N of Kosong, 19. 04., and 2 individuals were seen in water reservoirs in rice fields along the route Onjong ri — Wonsan, 24. 04.

59. *Upupa epops* LINNAEUS, 1758 — 17 birds were seen or heard in various environments (parks, river valleys, and reservoir edges with old hollow trees) in the period between 08. 04. and 02. 05. They were mostly single individuals (or their voices); couples of these birds were encountered only twice: at the Taedong near the mouth of the Sunfakan, 16. 04., and in the park in Chong wan san near Sariwon, 02. 05. Single birds were seen in the park and amusement grounds in Mangyongdae, 08. 04., near the new Myohyangsan Hotel, 13. 04., and near the park in the outskirts of Wonsan, 24. 04. One bird was seen in a hollow chestnut-tree at the artificial Sokam Lake on 17. 04., and another individual

was sighted flying out of the roof of the old fortress gate near the Botanical Garden in Pyongyang, on 01. 05. Voices of this species were also heard e. g. near the Nampo Dam, on the shores of lakes (Sokam, Samil), and twice at the Haeju-Pyongyang highway.

60. *Picus canus* GMELIN, 1788 — The most numerous and the most frequently observed woodpecker. The total of 19 birds, forming at least 14 pair bonds, were recorded between 09. 04. and 03. 05. Calling males or couples of these birds were relatively often encountered in edges of old and middle-aged mixed or pine tree stands in Myohyangsan valleys. Control along a 7-km section of the Hyangsan River valley (from the new Myohyangsan Hotel upstream) yielded the presence of two couples between 09. and 13. 04. Other territory-occupying couples were encountered near the dam reservoir Sohung (03. 05) and in Suayngsan hills near Haeju (27. 04) covered with rather dry and poor pine woods with an admixture of deciduous trees. The height of the pines rarely exceeded 6 m. Intensively calling males were also heard on the slopes of Ryongak-san (14. 04), covered with small pines (their trunks were most frequently 20—30 cm in diameter), at forest edges close to dam reservoirs: Sokam, 17. 04., Taesong, 26. 04., and in the Pyongyang Botanical Garden, 26. 04. A territory of one couple encompassed pine and mixed tree stands and the park in the vicinity of the Kumgangsan Hotel complex.

61. *Dryocopus martius* (LINNAEUS, 1758) — A newly carved out hollow which might be ascribed to the Black Woodpecker, was found in a tree in the Habiro Valley (Myohyang-san) at the altitude of 650 m a.s.l., on 12. 04. It was made in a pine (trunk diameter about 60 cm) 10 m in height.

62. *Dendrocopos major* (LINNAEUS, 1758) — Fairly common. The presence of 15 individuals was recorded from eleven different places between 09. 04. and 03. 05., among which 6 birds were determined as males and 4 as females. Single individuals were seen near the Taeung Historical Museum and in the Hyangsan River in valley the Myohyang Mountains. It was also encountered in Pyongyang: in Moranbong park (1 female on 15. 04.), in the Botanical Garden (1 female on 26. 06.), and in the old tree stand on the boulevard along the Potong in the city centre (one male on 18. 04. and 1 female on 01. 05.). Other birds were seen or heard near the Kumgangsan Hotel complex (1 couple on 22. 04.), on Suyang-san hills near Haeju (27. 04.), and Tyonam-san hills in Sariwon (02. 05.), and in the vicinity of the Sohung Dam (3 individuals on 03. 05.)

63. *Dendrocopos leucotos* (BECHSTEIN, 1803) — Observed thrice in the mountains of Myohyang. A male making a hollow in a willow was seen at an old Buddhist cemetery on 11. 04. The tree was about 40 cm in diameter (measured at 1.2 m from the ground), and the opening of the hollow, facing West, was situated at a height of about 9 m (the diameter of the trunk at that level was 15 cm). 3 birds, including a couple near a hollow, were encountered along a 4-km section of the Habiro Valley.

64. *Dendrocopos kizuki* (TEMMINCK, 1835) — 14 birds, including 7 recognized as being in female plumage and only one in typical male colouring, were seen

or heard between 09. 04. and 03. 05. Single individuals were recorded from Myohyang Mountains (near the new hotel, on the Sangwonam — Pulyong mountain range, and in the valleys of Hyangsan and Habiro). A female emerging out of a hollow in a tree was sighted in the Kuryong Valley in the mountains of Kumgang (20. 04.). Another female was observed in the valley of Onjong ri (22. 04.) in the same mountain range. Four birds (including a male and a female) were located in oak-pine forests on the hill of Suyang-san near Haeju (28. 04. and four other birds were recorded on the 1.5-km stretch along the shore of the dam lake of Sohung.

65. *Hirundo rustica* LINNAEUS, 1758 — One of the most numerous bird species of the southern part of North Korea. The first birds to arrive from winter migration were sighted in the vicinity of the Changgwangsan Hotel in the centre of Pyongyang and above the hill of Ryongak-san on 14. 04. The following days saw a steady increase in frequency and size of flocks. By the end of April and the beginning of May, it was observed numerously or fairly numerously on all field trips, especially near bigger rivers and water reservoirs. 6 Swallow nests from the preceding year were situated on the entrance façade of the Changgwangsan Hotel. By 05. 05., 2 or 3 of them were already occupied.

66. *Hirundo daurica* LINNAEUS, 1771 — It was observed twice. 12 birds were observed in the village of Onjong ri at the foot of the mountains of Kumgan; two other individuals were recorded in the vicinity of a farm near the dam of Taesong.

67. *Alauda arvensis* LINNAEUS, 1758 — On the basis of the only three observations, it might be established that the Skylark is a species scarco in Korea. The birds were observed in the Taedong River valley below the mouth of the Sunfakan River (3 individuals, including a singing one, on 16. 04.); this might suggest that those birds were still in migration at the time. One bird was seen flying over the Pyongyang — Changsu Lake road on 27. 04., and 2 singing males were observed near the lake on 30. 04.

68. *Dendronanthus indicus* (GMELIN, 1789) — Only one singing male was observed on the Tyonam-san hill in Sariwon, on 02. 05. (the hill was covered with forest dominated by the pine).

69. *Anthus hodgsoni* RICHMOND, 1907 — The first bird arriving from its winter migration was observed in the vicinity of the Kumgangsan Hotel complex on 19. 04., and further 3 individuals appeared in the area of the nearby Samil Lake on 21. 04. 2 flocks of 10 and 4 birds were encountered near the hill of Suyang-san near Haeju, and further two individuals were seen in Changwansan near Sariwon on 02. 05. All encountered pipits were silent and rather timid. The dates of encounters and the behaviour of the birds suggest that our observation coincided with the beginning and, possibly, the culmination of migration.

Anthus sp. — A flock of 7 pipits was observed between Kumgangsan hotels and the village of Onjong ri on 22. 04., and three passing flocks of 10, 30, and about 40 birds were sighted from the Onjong-ri — Sijung-ho road on 24. 04.

Further five birds were seen flying over the Changsu reservoir on 30. 04. The specific appartenance of these pipits has not been determined.

70. *Motacilla cinerea* TUNSTALL, 1771 — A total of 63 individuals of this species were observed between 09. 04. and 03. 05. It was most frequently and most numerously sighted in river valleys of the Myohyangsan mountain range. 32 birds were recorded in the 7-km stretch of the Hyangsan River, a stretch constituting an optimum biotope for the Grey Wagtail (from the old Buddhist cemetery to the new Myohyangsan Hotel), between 09. and 13. 04. The number of territories occupied by this species was estimated as 20; thus the average density is 2.9 territories per 1 km of the river course, each couple occupying about 380 m of the waterfront. The Grey Wagtail was much less numerous in side stream valleys (Sangwonam, Manpok, and Habiro), where only 1—2 couples were noted in each. The majority of mentioned localities of the birds were situated between 300 and about 600 m a.s.l. 1 female was exceptionally sighted at an altitude of about 900 m a.s.l. near the Kuchung Falls in the Manpok valley on 10. 04. This species seemed to be less numerous in the Kumgang Mountains. 6 birds were counted along a stretch of 4 km in the Kuryon Valley on 20. 04.; they probably belonged to 4 different couples. Couples of these birds were also observed about 20 km N of Kosong on 19. 04., on Suyang-san Hill near Haeju (28. 04.), in Chongwan-san near Sariwon (02. 05.), and at the Sohung Lake (03. 05.). Also, two males were observed in the valley of Onjong-ri on 22. 04. In spite of intensive observation, birds with material for a nest not been encountered. A flock of 13 Grey Wagtails and 3 White Wagtails was seen attempting to spend the night in a small reed thicket in a widening of the Hyangsan River near the Young Pioneer organization Palace in the evening of 11. 04.

71. *Motacilla alba* LINNAEUS, 1758 — This was a species clearly more numerous than the Grey Wagtail; it was, on the other hand, much more dispersed. It occurred near streams and reservoirs as well as near human settlements distant from water. 1 to 5 individuals of this species were observed at almost very field outing. All individuals observed (42) belonged to the subspecies *Motacilla alba leucopsis* GOULD, 1837.

72. *Oriolus chinensis* (LINNAEUS, 1766) — A couple was seen on 22. 04., and a male was heard on 23. 04., at the forest edge in the Kumgangsan Hotel complex.

73. *Sturnus cineraceus* TEMMINCK, 1835 — A fairly numerous breeding bird in the centre of Pyongyang. The first couple of this species was sighted in the amusement park in Mangyongdae on 08. 04. and near the Palace of Culture at the Potong, were as much as 12, or even 19 couples of those birds were already present on 01. and 02. 05. A small number of the birds were busy with accumulating material for nests situated in recesses and roof openings in the Palace of Culture, and in natural tree hollows as well as those made by woodpeckers. The birds were rarely and scantily encountered in other observation areas, e. g. 1 to 2 couples were observed near reservoirs of Sokam (17. 04.) and Changsu (30. 04.), and in Chongwan-san (02. 05.) and Chimchon (04. 05.) near Sariwon. Four couples were

also seen from the Pyongyang-Haeju highway (27. 04.), and a flock of 7 birds were seen flying from the route Onjong-ri — Sijung-he on 24. 04.

74. *Garrulus glandarius* (LINNAEUS, 1758) — A total of 41 birds were observed in eight places between 11. 04. and 03. 05. The biggest number of birds was observed in the morning of 23. 04., when flocks of 8, 11, and 3 birds passed in the region of Samil Lake. Groups of 3 birds each were observed flying over a Buddhist temple in Sangwonam valley (ab. 700 m a.s.l.), and over a pagoda in Habiro valley on 12. 04. in Myohyang Mountains. Traps laid for jays were seen near the temple of Kungangan in the latter valley. Numerous fresh feathers around the traps testified the capture of at least several birds on that day. 1 bird was observed about 20 km N of Kosong on 19. 04. and another was sighted in the park in Wonsan on 24. 04. Two birds keeping together (couple?) were observed near Onjong ri (22. 04.) and on the hill of Suyang-san near Haeju (28. 04.; 4 birds), and at Sohung Lake (03. 05.; 5 birds in all). All birds observed belonged to the subspecies *Garrulus glandarius brandti* EVERSMAAN, 1842.

75. *Cyanopica cyanus* (PALLAS, 1776) — Encountered in two places only, both in western provinces of Korea. 15 individuals were recorded in a coppice pine wood in the hills near Haeju between 27 and 28. 04., and 9 individuals were recorded from a similar habitat in the valley at Chongwan-san (see Tables 5 and 6). The majority of the birds occurred in concentrations, or in couples in two or three cases. The Azure-winged Magpie, along with the Japanese Crane, the Mandarin Duck, and the Magpie, belong to the most-often presented (e. g. in folk art and literature) ornithological symbols of Korean and Far East fauna. It was not recorded in stuffed bird collections for sale (see p. 484), though it used to occur there (T. TOMEK — personal comm.).

76. *Pica pica* LINNAEUS, 1758 — It is one of the most characteristic and the most numerous species in the southern part of North Korea. It was frequently and numerously encountered away from human settlements as well as in towns and villages. A more detailed counting of magpies and their nests was carried out on the route Pyongyang — Sariwon (60 km) on 02. 05. All encountered birds and nests were counted from the car on both sides of the road — in stretches of 150 m on each side. A total of 183 nests was recorded along this section of the route, including 131 nests in towns or in the vicinity of human settlements and 52 near the road and in copses distant from inhabited areas. 19 birds were seen near the nests (12 in towns, 7 away from human settlements). The relatively small number of Magpies seen might be partly influenced by the fact that the birds were incubating eggs at the time. The nests were situated at between 4 and 16 m from the ground. 4 nests were found below 6 m from the ground, 16 — between 6 and 8 m, 34 — between 8 and 10 m, 80 — between 10 and 12 m, 41 — between 12 and 14 m, and 8 — between 14 and 16 m. The nests (n = 175) were placed on poplars (89), locust-trees (59), plane-trees (21), willows (4), and wooden electric poles (between the pole and the wire — 2). The Magpie occurs and breeds in many localities within the capital, e. g. 3 pairs with nests near the Juche Idea Monument, several couples near the boulevard

along the Potong, some couples with nests in the city park on Moranbong hill, and at least 8 couples in the Botanical Garden. It also occurs in wooded areas in other cities (Wonsan, Sariwon). The Magpie is also fairly numerous in the vicinity of large dam lakes, e. g. Sohung (4 couples with nests within a stretch of about 1.5 km).

77. *Corvus macrorhynchos* WAGLER, 1827 — A species fairly often encountered and quite numerous. The ratio of the observed *C. macrorhynchos* to *C. corone* (between 08. 04. and 03. 05.) was $68 \div 107$). These birds were observed in 16 places in the southern part of North Korea. It was relatively often seen in lower mountain river valleys and in the vicinity of great lakes (Sokam, Sohung, Samil). The greatest number of birds of this species at one time were observed (about 20 individuals) feeding on a ploughed field at the road Sijung ho Wonsan (24. 04.).

78. *Corvus corone orientalis* EVERSMAAN, 1841 — Common, frequent, and numerous in many regions of the southern part of North Korea. It was recorded from almost each observation area, usually represented by single birds or flocks composed of 2 to 5 individuals; however, about 40 feeding birds were once seen following a tractor ploughing a field near Sijung-ho — Wonsan road (24. 04.). One couple of these crows was seen gathering hair from a feeding cow's hide near the same road. It was only once seen in Pyongyang, on Moranbong hill (15. 04.), where the bird was suffering from intensive attacks by a couple of Magpies.

79. *Microscelis amaurotis* (TEMMINCK, 1830) — A total of 16 birds were observed in 6 places between 06. 04. and 03. 05. It was most frequently and most numerous seen in Pyongyang, namely: 1 couple in the courtyard of the Changgwangsan Hotel in the centre of the city (the male sang intensively between 06. and 15. 04.), three singing males in the Moranbong hill park (15. 04.), and 3 couples in the Botanical Garden (26. 04.). Individual singing males were also recognized near the village of Onjong-ri (22. 04.), on Suyang-san near Haeju (27. and 28. 04.), and 3 birds (including two singing males) were sighted at Sohung Lake (03. 05.).

80. *Cinclus pallasii* TEMMINCK, 1820 — Only the Grey Wagtail was more numerous than this species at mountain streams and rivers of the Myohyang range. The presence of 14 birds occupying 8 territories was recorded from a 7-km stretch of the Hyangsan River (from the mouth of Habiro Valley to the new Myohyangsan Hotel) between 09. and 13. 04. This would point out that one territory of a couple encompasses some 900 m of the stream course. In some spots (territory boundaries?) the birds exhibited aggressive behaviour to other individuals. In spite of our intensive searches and constant bird watching, no nests — not even the preceding year's ones — could be found. A part of the nests might have possibly been destroyed by great floods caused by monsoon rains in July and August. Also, no birds with material for nests have been observed — this might suggest that the birds were at the stage of territory occupation and pair bonds formation at the time. The highest-situated site of the Brown Dipper was at the altitude of about 800 m a.s.l., near the Pison Falls

in Manpok Valley. Only one individual was observed in Kumgang Mountains — in the Sinkechon River valley on 20. 04.

81. *Troglodytes troglodytes* (LINNAEUS, 1758) — 10 singing males were discovered, and 3 other birds were seen, between 11. and 22. 04. It was most numerous in the mountains of Myohyang-san, where 4 singing males and 3 other birds (silent) were recorded (600—700 m a.s.l.) on 11. and 12. 04. A total of 6 singing males were heard in Kumgang Mountains on 20. and 22. 04.; of these, 4 were recorded from a 4-km section of the Sinkechon River valley, and 2 were discovered in the Manmulsang range. One of the birds sang at the altitude of about 850 m a.s.l.

82. *Cettia squameiceps* (SWINHOE, 1863) — The first two males to sing after their return from wintering were recorded near the Kumgangsang hotel complex on 24. 04. Also, songs of at least 18 males were recorded in six different places between 27. 04. and 03. 05. It was observed in greatest numbers at the Sohung reservoir (6 singing males, including 4 within a 1.5 stretch — 03. 05.), in Chongwan-san near Sariwon (4 singing males on 02. 05.), in the valley beneath the hill of Suyang-san (7 singing males, including 3 within a 1-km section of the stream, on 28. 04.). It was recorded only once from Pyongyang on 01. 05. (one singing male near the Botanical Garden).

83. *Cettia diphonae* (KITTLITZ, 1831) — The song of 4 males was recognized in three localities (cemetery near the Taesong reservoir — 1 male, 2 males at Sohung Lake, and 1 male at the Haeju — Pyongyang highway) between 26. 04. and 03. 05. Two birds were also seen on the shore of Changsu Lake, on 30. 04.

84. *Phylloscopus inornatus* (BLYTH, 1842) — Only one individual observed once on an island in Haeju Bay on 29. 04.

85. *Phylloscopus borealis* (BLASIUS, 1858) — 1 bird was observed near Manmulsang in Kumgangsang Mountains (about 600 m a.s.l.), and two singing males were recorded from Onjong-ri valley (22. 04.).

86. *Phylloscopus coronatus* (TEMMINCK et SCHLEGEL, 1847) — The songs of 6 or 7 males were recorded between 20. 04. and 03. 05. The first singing bird was seen in Sinkechon valley in the mountains of Kumgang-san (about 650 m a.s.l.) on 20. 04. Other birds sang on the slopes of the Manmulsang range and in Onjong-ri valley (a total of 3 males, 22. 04.), on Suyang-san hill near Haeju (2 males on 27. and 28. 04.), and at the Sohung reservoir (1 male on 03. 05.).

87. *Regulus regulus* (LINNAEUS, 1758) — It was recorded in greatest number from Myohyang-san Mountains, where 40 birds were observed or heard calling between 09. and 13. 04. Ten to twenty of these were present in the coniferous tree stand in the area of the Taeung Historical Museum on 09. 04. Bird calls and single individuals were recorded from all valleys of Myohyang Mountains. The most numerous flock (7 to 10 birds) was observed in the Hyangsang River valley. A flock of 3 to 5 birds was seen in Onjong-ri valley at the foot of the mountains of Kumgang-san on 22. 04., and one bird was observed near the artificial lake of Sohung on 03. 05. No singing Goldcrests were heard.

88. *Ficedula zanthopygia* (HAY, 1845) — 5 birds were observed in four places

in the period between 26. 04. and 03. 05. The first of these to arrive from its wintering (a female) was sighted in Pyongyang Botanical Garden on 26. 04. A pair of the birds was observed in a park in Chongwan-san near Sariwon (02. 05.), and 2 males were seen at Sohung Dam.

89. *Cyanoptila cyanomelana* (TEMMINCK, 1829) — The first males to arrive from their winter habitats were observed near Kumgangsán Hotel on 22. 04. Two couples of the birds were recorded from Pyongyang Botanical Garden on 26. 04. The biggest number of the birds (13 males and 4 females) was observed in their roost in a valley beneath Suyang-san hill near Haeju (28. 04.). A male and a female were also recorded from Tyonamsan hill in Sariwon (02. 05.), and two males were observed at Lake Sohung (03. 05.).

90. *Saxicola torquata* (LINNAEUS 1766) — A total of 33 birds (including 9 couples) were observed between 13. 04. and 03. 05. The first bird to be observed after its arrival from its wintering (a male) was sighted in the Hyangsan River valley in the mountains of Myohyangsan on 13. 04. It appears from our observation that males arrive approximately 10 days before the females. Couples of these birds were beginning to appear around 24. 04. Stonechat couples were relatively often seen at reservoirs: Taesong (2 couples on 26. 04.), Sohung (2 couples and 2 males on 03. 05.), Samil (3 males on 23. 04.), and Changsu (3 males on 30. 04.). Apart from that, couples of those birds were recorded from Sujansan hill near Haeju (27. 04.) and near the road from Haeju to Changsu Lake (30. 04.— 2 couples).

91. *Monticola solitarius* (LINNAEUS, 1758) — Sighted in three places only. A singing bird was seen flying from the mainland to a rocky islet on the Sea of Japan (about 200 m from the shore) near Sijung-ho on 19. 04., and another male was observed on rocks near the restaurant at Samil Lake on 21. and 23. 04. A pair of these birds was also observed on an island in Haeju Bay on 29. 04.

92. *Phoenicurus auroreus* (PALLAS, 1776) — Couples of these birds began to appear on 09. 04. (near Myohyangsan Hotel and Taeung Historical Museum). A total of 23 birds (including 7 couples) were observed in 11 places. Its occurrence was usually fairly dispersed; only two couples and a female were seen together in the vicinity of Kumgangsán Hotel on 19. 04. Two singing males were recorded from the top of the Manmulsang (906 m a. s. l., in the Kumgang-san Mountains), and single males were noted on Suyang-san hill near Haeju (28. 04.), in the area of Lake Samil (21. 04.), and in Hyangsan valley (2 males on 13. 04.).

93. *Tarsiger cyanurus* (PALLAS, 1773) — Ever since the first observations in Myohyang-san forests (11. 04.), birds in female and young males' plumage were scantily recorded from all observation areas (see Tables I through IV, X, and the sighting of 1 individual in a park in Wonsan on 02. 05.) except in South Hwanghae province (e. g. not recorded from forests in the vicinities of Haeju and Sariwon, Tables V and VI). It is only in the Botanical Garden in Pyongyang that an individual in adult male plumage was observed among three other birds of this species, on 25. 04. The highest observation site for this species was that

of 850—900 m a.s.l. from Manmulsang range in Kumgang-san Mountains. The species was clearly in migration.

94. *Erithacus cyane* (PALLAS, 1776) — Recorded twice: a male was observed near Kumgangsán Hotel on 19. 04., and another one was seen in the valley beneath Suyangsán hill near Haeju on 28. 04.

95. *Turdus chrysolaus* TEMMINCK, 1831 — One male was seen together with other thrushes (*T. naumanni* and *T. pallidus*) at the edge of a forest in the vicinity of Kumgangsán Hotel complex, on 19. 04.

96. *Turdus pallidus* GMELIN, 1789 — 5 to 6 individuals (including at least one couple) were recorded at the base of Kumgang-san Mountains in the area of Kumgangsán Hotel between 19. and 22. 04.; 2 individuals (in pair bond?) were observed in Pyongyang Botanical Garden on 26. 04.; 4 individuals (including 1 or 2 couples) were seen in hills near the old fortress (Suyang-san) near Haeju on 28. 04., and one couple was recorded from the bottom of the valley near Haeju on the same day; finally, one individual was seen at the Sohung reservoir on 03. 05. This species was often observed with other thrushes, mainly *T. naumanni* (e. g. in Kumgang-san).

97. *Turdus naumanni* TEMMINCK, 1820 — The most frequently encountered and the most numerous species of thrushes. 7 birds were recorded from an old Buddhist cemetery in a river valley in Myohyang-san on 11. 04. About 25 birds, usually in flocks with other thrushes (see above) were seen in the vicinity of the hotel complex at the base of Kumgang-san Mts. between 19. and 22. 04. One individual in intermediate colour phase was sighted in the area of Lake Samil on 23. 04.; one was seen in Wonsán city park on 24. 04.; two were recorded from Taesong Dam on 26. 04., and one was seen on a hill near Haeju on 28. 04. A total of about 40 birds were observed. Of these, only a few belonged to the dark-coloured subspecies *T. n. eunomus* TEMMINCK, 1830; a distinct majority had the rusty-brown plumage of the more southern subspecies *T. n. naumanni* TEMMINCK, 1820.

98. *Zoothera dauma* (LATHAM, 1790) — Two observations: one bird was seen feeding with other thrushes (see above) in a garden adjacent to the forest within the Kumgangsán hotel complex area on 19. 04.; the other sighting of at least one bird was made on the slope of a wooded hill near an old fort near Haeju on 27. 04.

99. *Aegithalos caudatus* (LINNAEUS, 1766) — Encountered frequently and in large numbers. A total of 29 birds (including 11 presumed couples) were seen or had their voices recorded in 15 different observation areas. 17 individuals on estimated 12 territories were seen or heard in Myohyang-san Mountains between 09. and 13. 04. Also, a flock of 5 individuals (two of which were recognized as the white-headed forms) were seen in migration in Sangwon valley on 11. 04. A freshly-built, completed nest was found in the same valley, at an altitude of about 500 m a.s.l. (Pulyong), on the same day. The nest was found in an enclave of larch stand, placed at about 6 m above the ground between

two twisted lianas about 4 cm in diameter. Both birds, who belonged to the white-headed form, were busy with gathering padding for the nest. Of 13 birds forming presumed pair bonds, 11 were recognized as white-headed forms, and 2 had dark stripes at sides of their heads. Of a couple encountered in Hyangsan River valley on 13. 04., one individual was white-headed while the other possessed a dark stripe. A total of six birds was observed (they probably belonged to 4 couples) in the mountains of Kungang-san. Among five of them, one was recognized as white-headed and 4 as those with the dark stripe on sides of the heads. Voices of single birds were heard near Sijung Lake on 24. 04., in Pyongyang Botanical Garden on 26. 04., and 1 individual of the white-headed form was seen, and another one was heard, on Suyang-san hill Haeju on 28. 04. The Long-tailed Tit was fairly often encountered during the one-day trip to the region of the Sohung reservoir near Sariwon on 03. 05. 4 couples were recorded from a 3-km route along the shores of the reservoir. Of these, 2 specimens with dark stripes on sides of the head were recognized, while one of the couples consisted of a white-headed individual and an eye-striped bird.

100. *Parus palustris* LINNAEUS, 1758 — The most frequently and the most numerously encountered tit species, only exceeded in these respects by the Great Tit. It was often seen in deciduous tree stands and in parks. A total of 66 birds (including 14 presumed couples) were observed in almost all observation areas between 09. 04. and 03. 05. in favourable forest habitats. 10 passing birds were seen in Hyangsan valley (Myohyang Mts.) as early as 10. 04., but a considerable part of the settled population formed pair bonds by 11.—13. 04., as pointed out by observations in many localities in Myohyang-san. The highest sighting spot was that at the altitude of about 700 m a.s.l. in Habiro Valley. It seemed to be somehow less numerous in Kungang-san Mts. (19—22. 04.) than in Myohyang-san, but some birds might have already been busy with incubation, so that the probability of their discovery decreased. Individual birds were also observed in Pyongyang (in Moranbong park on 15. 04., and in the Botanical Garden on 26. 04.). This species was mainly determined on the basis of audial observation; however, in the case of visual observation, there is a possibility of confusing it with *Parus montanus*.

101. *Parus ater* LINNAEUS, 1758 — It was observed in almost all controlled coniferous and mixed tree stands. A total of 62 individuals (including at least 8 presumed couples) were recorded between 08. 04. and 03. 05. In Pyongyang it was observed on Moranbong hill (15. 04.) and in the Botanical Garden. Courtship of one couple was observed, and a nest burrow discovered, in the remains of old foundations in the vicinity of Lake Sokam on 17. 04.

102. *Parus varius* TEMMINCK et SCHLEGEL, 1848 — Observed regularly yet not numerous. A total of 22 individuals (including at least 4 couples) were observed in twelve localities between 11. and 28. 04. 6 birds in 6 places were recorded from Myohyang-san Mountains, and 9 individuals — including 2 couples — were seen in three places in Kungang-san Mountains. The presence of four birds in estimated four territories were recorded from a 4-km stretch along

the river of Sinkechon. It seems that this species was somehow rarer and less numerous outside mountains areas: one bird was seen on the slope of Tyongak-san (12 km W of Pyongyang); it also recorded from Onjong-ri valley at the base of Kumgang-san Mts. (1 couple and 2 other individuals on 22. 04.), and from Suyang-san hill near Haeju (1 couple on 28. 04.). Its highest appearance occurred below Chon son dae Peak (906 m a.s.l.) in the Manmulsang range (Kumgang-san). The hole in a tree of this tit was found in the valley of the Sin Ke Chon River (Kumgang-san) at the altitude of about 600 m a.s.l. on 20. 04.

103. *Parus major* LINNAEUS, 1758 — The most frequently observed and the most numerous tit species, in parks as well as in deciduous and mixed tree stands. An estimated number of 110—120 birds (including at least 13 couples and 3 flocks of 3, 10, and some 40 birds in migration seen in Hyangsan River valley on 13. 04.) was observed in all, between 09. 04. and 03. 05.

104. *Sitta europaea* LINNAEUS, 1758 — A fairly numerous and frequently-encountered bird inhabiting old deciduous and mixed tree stands. 34 representatives of the Nuthatch (including 3 couples) were recorded from 17 different places between 09. and 22. 04. One of the couples was observed in a tree hole near the Taeung Historical Museum on 09. 04. It was more numerous and more frequently encountered in Myohyang-san Mts than in the Kumgang-san. A total of 20 birds on estimated 17 territories were observed during four fine days (09., 11.—13. 04.) in Myohyang-san. 11 Nuthatches were recorded in Kumgang-san during three fine, sunny days; they occupied and approximate number of 10 territories. The highest recorded appearance of the Nuthatch was made in oak-stone pine woods near Chon son dae Peak (906 m a.s.l., Manmulsan range). A couple making a hole in a willow (the diameter of the tree at 30 cm from the ground — 1.2 m, the same at the level of the hole — 15 cm from the ground — 3.5 m) was observed at Lake Sokam on 17. 04.

105. *Passer montanus* LINNAEUS, 1758 — It is by far the most frequently and the most numerous encountered bird species of Korea. It occupies there the same ecological niche as the House Sparrow *Passer domesticus* in Europe. A total of 1000—1200 individuals were observed in all observation areas, in various places, between 07. 04. and 03. 05. This species is also the most numerous one in villages as well as in towns. Large groups of the Tree Sparrow, between 50 and 200 in number, were recorded from Mangyongdae (some with nest material) on 08. 04., from an amusement park near the same village, from Hyangsan train station on 13. 04., the park on Moranbong on 15. 04., near the boulevard along the Potong in Pyongyang on 18. 04., 01. and 02. 05., the park on the outskirts of Wonsan on 24. 04., among dense urban area around Changgwangsan Hotel in Pyongyang on 27. 04., and in the centre of Sariwon on 03. 05. Its nests were situated in niches and openings in buildings, summer-houses, street lamps, and natural tree hollows. It also occupied some nest-boxes in Moranbong park in Pyongyang. One couple of Tree Sparrows built their nest in the base of a Magpie nest.

106. *Fringilla montifringilla* LINNAEUS, 1758 — Recorded thrice: a nomad flock of about 20 birds near the Kumgangsan hotel complex on 19. 04.; a flock of the same number of birds (possibly the same birds) mingled with Syskins were seen 1 km below the complex in Onjong-ri valley on 22. 04. About ten Bramblings feeding on pines were recorded from the park on the outskirts of Wonsan on 24. 04.

107. *Carduelis sinica* (LINNAEUS, 1766) — A frequently encountered, fairly numerous species; it inhabits scrubs and parks in the vicinity of human settlements. 51 birds (including 15 couples) were recorded from 25 lowland localities between 08. 04. and 03. 05. It has not been recorded from Myohyang-san or Kumgang-san, though it has been observed in the Kumgangsan hotel complex at the foot of those mountains. It also occurred in small numbers in green areas of cities, e. g. at the Potong, in the park on Moranbong, in the Botanical Garden in Pyongyang, and in the park outside Wonsan. A pair of the birds were seen gathering nest material in Mangyongdae, as early as 08. 04.

108. *Carduelis spinus* (LINNAEUS, 1758) — Feeding or nomadic flocks were observed 5 times: in Mangyongdae park (18. 04. — about 15 birds), twice in Myohyang-san Mts. (11. 04. — birds calling in passage above the mountain range Sangwonam-Pulyong, and 12. 04. — a flock of 25—30 birds passing near the Kuman-san monastery in Habiro Valley). A flock of about 40 birds was recorded in the vicinity of Kumgangsan Hotels on 19. 04., and 2 flocks of the total number of about 320 birds were seen there on 22. 04. An individual male was observed near Lake Samil on 23. 04.

109. *Loxia curvirostra* LINNAEUS, 1758 — Observed thrice. Flocks of 14 and 46 birds were observed near Lake Samil on 21. 04.; 4 individuals occurred in the same place on 26. 04. Two individuals (a pair?) were also seen in Onjong-ri valley at the base of the mountains of Kumgang on 22. 04.

110. *Eophona migratoria* HARTERT, 1903 — Seen four times: at Lake Changsu on 30. 04. one couple and a flock of 10 birds, at the Potong in the centre of Pyongyang on 02. 05. (4 males and 5 females), on the wooded hill of Tyonam-san in Sariwon (4 individuals) and in Chongwan-san near Sariwon (one couple) on the same day.

111. *Coccothraustes coccothraustes* (LINNAEUS, 1758) — Observed 5 times in the period 08.—30. 04.: in the amusement park near Mangyongdae (1 bird on 08. 04.), near Kumgangsan Hotel (one couple on 19. 04.), and at the Haeju-Pyongyang highway near Chaeryong (1 individual on 30. 04.). It was recorded twice from Pyongyang: on Moranbong hill (1 couple on 15. 04.) and in the Botanical Garden (2 birds on 26. 04.).

112. *Emberiza cioides* BRANDT, 1843 — 2 couples and 5 males were observed in six places between 26. 04. and 03. 05. Both couples were seen in Chongwan-san near Sariwon on 02. 05. Singing males were recorded from the area of Taesong (1 bird on 26. 04.) and Sohung (3 males on 03. 05.) reservoirs. The other male was observed at Changsu Lake on 30. 04.

113. *Emberiza fucata* PALLAS, 1776 — Only one male was seen sitting on electric wire near Taesong reservoir on 26. 04.

114. *Emberiza elegans* TEMMINCK, 1835 — This common and the most numerous of buntings recorded inhabits forest edges and meadows, and scrub-covered half-open areas. It was most frequently seen in parks since the very beginning of our observations; however, a busy flock of 10 individuals was encountered in the mountains of Myohyang on 10. 04. This confirms the fact that a part of the population was still in migration at the time. An increase in the activity of males and in the intensity of their singing became marked since mid-April (e. g. 20.—23. 04. in the Kumang-san region), and sharp fighting between males defending their territories and the gathering of nest material by females was observed in the vicinity of Haeju by the end of April. A total of about 80 individuals was recorded; a half at least formed pair bonds or displayed breeding behaviour.

115. *Emberiza tristrami* SWINHOE, 1870 — Observed twice: 1 couple on a hill covered with pine (Tyonam-san near Sariwon) on 02. 05., and 1 male near Sohung reservoir on 03. 05.

116. *Emberiza spodocephala* PALLAS, 1776 — Recorded thrice: 1 male near the village of Onjong ri on 22. 04., 1 couple on an island in Haeju Bay on 29. 04., and 1 couple near the Sports Palace in the boulevard at the Potong in Pyongyang on 02. 05.

117. *Emberiza aureola* PALLAS, 1773 — One male was sighted from the train Anbion — Wonsan on 19. 04.

Of particular interest is the relatively small number, in the presented survey of species, of birds-of-prey observed (*Falconiformes*). Except for *Falco tinnunculus* and some representatives of the genus *Accipiter* — sometimes not exactly determined — there are no records of large diurnal birds-of-prey, e. g. of the genera *Haliaeetus*, *Aquila*, *Buteo*, or *Circus*. Also, no migrations nor occurrences of many ducks of East Asia were recorded, not even of *Aix galericulata*, so common in this geographical region (e. g. ELSUKOV 1985, FUDJIMAKI, MUROFUSI 1985, KOLOMITSEV 1985, LABZYUK 1985). The period of observation did not encompass the time of migration and arrival of cuckoos *Cuculiformes*, shrikes *Lanius*, warblers of the genera *Locustella* and *Acrocephalus* (although one singing individual of this group was probably encountered but undetermined at Lake Samil), a part of flycatchers (e. g. *Muscicapa latirostris*, *Ficedula mugimaki*), large thrushes (e. g. *Turdus sibiricus*, *T. hortulorum*, *T. obscurus*) and robins (e. g. *Erithacus sibilans*, *E. calliope*). Kingfishers such as *Ceryle lugubris*, *Halcyon pileata*, or *H. coremanda*, which breed in Korea and are so characteristic for South-east Asia, were not encountered at all. The former and the latter species were mentioned by earlier works (e. g. WON Chong Woo 1963—1965, BOCHENSKI, OLEŚ, TOMEK 1981; TOMEK 1984, 1985; WON Pyong Oh 1987).

D. Stuffed birds in shop collections for sale

Data presented thus far characterize Korean avifauna of early spring. This results in the lack of information on many species passing later in the year yet characteristic for the Korean Peninsula. Some supplementation of the presented field records might be achieved by means of presenting a list of stuffed birds for sale in some Korean shops. Specimens for sale are not specifically determined. Also, there is no information on the dates and places where the specimens were collected. It is certain, however, that the birds were caught in North Korea fairly recently. In spite of this scant information, the content of collections presents in a way the frequency of occurrence and the availability of some species on North Korean territory. Of course, there is a certain selection of birds for those collections, i. e. birds are usually chosen for their impressive plumage. Information on some of those species is so scant that even a collection scientifically undescribed becomes a significant source of data on their occurrence. 4 shops offering stuffed birds for sale were encountered during our stay in Korea. These were the shop for foreign diplomats and shop counters in Koryo Hotel in Pyongyang, in a Wonsan hotel, and at a restaurant in Chaeryong.

Determinations and lists of presented specimens were done only in the diplomat's shop and in Chaeryong shop counter; single specimens were only recorded from the two other shops. The overall list of described birds (the number of individuals or couples, and — where possible — the sex of birds is given in parantheses) runs as follows:

Anas clypeata (1 pair), *Mergus merganser* (1 p.), *Grus japonensis* (1 indiv.), *Otis tarda* (1 indiv.), *Charadrius dubius* (2 indiv.), *Accipiter nisus* (3 ♂♂ and 1♀), *A. gularis* (1 ♂), *A. soloensis* (3 ♂♂), *Falco subbuteo* (3 indiv.), *Tetrastes bonasia* (2 indiv.), *Coturnix* sp. (2 indiv.), *Phasianus colchicus* (18 p.), *Streptopelia orientalis* (10 indiv.), *Cuculus canorus* (1 indiv.), *C. saturatus* (2 indiv.), *C. poliocephalus* (2 indiv.), *Halcyon pileata* (1 indiv.), *Eurystomus orientalis* (7 indiv.), *Upupa epops* (7 indiv.), *Picus canus* (1 ♂), *Dendrocopos major* (1 ♂), *Lanius bucephalus* (1 ♂), *L. cristatus lucionensis* (3 indiv.), *L. tigrinus* (1 ♂), *L. sphenocercus* (2 indiv.), *Saxicola torquata* (1 p.), *Turdus naumanni* (several indiv.), *Ficedula zanthopygia* (several indiv.), *Cyanoptila cyanomelana* (several ♂♂), *Terpsiphone atrocaudata* (4 p.), *Parus major* (3 indiv.), *Emberiza melanocephala* (1 ♂)*, *E. aureola* (2 p.), *Carduelis sinica* (40—45 indiv.), *Fringilla montifringilla* (10 indiv.), *Leucosticte arctoa* (6 indiv.), *Carpodacus roseus* (several indiv.), *Eophona migratoria* (18 indiv.), *Coccothraustes coccothraustes* (ca 10 indiv.), *Sturnus cineraceus* (several indiv.), *Oriolus chinensis* (50 indiv.), *Garrulus glandarius brandtii* (10—20 indiv.), *Nucifraga caryocatactes* (1 indiv.).

* The specimen is of unknown origin — its provenience from raising cannot be excluded. This species has not been recorded from the Korean Peninsula so far. It occurs in the westernmost part of China (SCHAUENSEE 1984). It is recorded from Japan (SONOBE 1982) on the basis of 2 observations, with the same reservation concerning its origin.

A total of about 300 individuals representing 43 species were recorded from among the stuffed birds. The described sample of individuals constituted ca 85% specimens exhibited in the shops visited (the consular shop contained some 220 specimens, the one in Chaeryong — 21, Koryo Hotel — ca 100, and Wonsan Hotel — between 10 and 20). The genera *Accipiter*, *Cuculus* and *Lanius* were the most fully represented; the biggest number of specimens belonged to the species *Oriolus chinensis*, *Carduelis sinica*, *Phasianus colchicus* and *Garrulus glandarius*. The most numerous species mentioned belong to the most common birds of North Korea. Very rare, on the other hand, is *Grus japonensis*, a specimen of which was for sale in the luxurious Koryo Hotel; it could come from either the field or a zoological garden (a flock of cranes is kept at the Zoo near Mangyongdae). There is no clear information on the present occurrence of the Black Paradise Flycatcher, *Terpsiphone atrocaudata*, in North Korea. No representatives of *Strigiformes*, large diurnal birds-of-prey of the order *Accipitriiformes* (e. g. of the genera *Haliaeetus*, *Aquila*, *Buteo*, and *Circus*), and *Cyanopica cyana*, have been recorded from the collections. Some of those birds are no doubt rare on the Korean Peninsula (e. g. TOMÉK 1984, 1985, WON Pyong Oh 1987), but their absence in the collections might have resulted from nature preservation reasons. The presented collections constitute an undetermined part of the overall number of specimens for sale in all Korean shops, so the scale of acquisition of birds for the purpose might endanger some species, especially those occurring in small populations.

IV. REMARKS ON SOME RARE, DISAPPEARING, OR ENDEMIC SPECIES FOR THE FAR EAST

Some information on rare and endemic Far East species has been gathered during the expedition to Korea. Sadly, direct field data on some of the most sought-for and the most peculiar species of this geographical region have not been achieved. Nevertheless, consultations with Korean zoologists and the study of basic works on Far East birds enabled us to specify the present state of knowledge of some of the species.

Tadorna cristata (KURODA, 1917) is one of the least known and the rarest bird species of the Far East. There are only 20 modest records of this duck, dated from between the 18th century and the second half of the 20th c. Some of these are supported with specimen evidence. There are, however, no records of nests, eggs, or immature individuals (WON Chong Koo 1963—1965, NOWAK 1983, 1984). The last information on this species (2♂♂ + 4♀♀) comes from the end of March, 1971, from coastal ocean waters of North Korea off Mt. Chilbo near the mouth of the Pochon River (O Myong Sok 1984). It should be noted that the preceeding reliable record of this shelduck comes from the vicinity of Vladivostok, 16. 05. 1964 (NOWAK 1983). It is feared that this species is by now completely extinct. However, NOWAK (1983, 1984, and personal comm.) does not

exclude the possibility of the presence of a small number of the Crested Shelduck, especially in some regions of the Soviet Primorsk, NE China, and Korea. The greatest probability of its existence is connected with mountain lakes of the area. According to NOWAK (1983), the Crested Shelduck is a distinct species (and not a hybrid) and a glacial relic of the Far East. It is included in the Red Data Book of IUCN (VINCENT 1966).

Mergus squamatus GOULD, 1964 — this is yet another of the very rare and poorly-known birds of the Far East. Its nests are situated at rivers, and its narrow breeding area is limited, as a rule, to the Amur basin and the southern part of Sikhote-Alin Range (NOVIKOV 1976, pp. 71—74; BORODIN 1984). It might also nest in NE China (cf. SONOBE 1982). It is extremely rare in migration in North Korea, although breeding sites of this merganser are sought for in that country (PAK U II - personal comm.). It is also recorded as a rare passage migrant from South Korea (WON Pyong Oh 1987).

Egretta eulophotes SWINHOE, 1860 — this egret species, scantily represented and poorly known, nests only in SE China and on North Korean coast of the Yellow Sea (VINCENT 1966, SONOBE 1982). According to PAK U II (pers. comm.), the breeding population of Korea amounts to about 200 individuals, and it is located on Gulf of West Korea islands. It occasionally migrates into the Soviet Primorsk (BORODIN 1984), rarely passes through South Korea (WON Pyong Oh 1987), and it winters in islands of SE Asia, mainly the Philippines and Indonesia (e. g. SONOBE 1982). Included in the Red Data Book of UICN (VINCENT 1966).

Ciconia boyciana SWINHOE, 1873 — the Eastern White Stork is represented by a very small population inhabiting mainly the Soviet Amur, Khabarovsk region, and Primorsk (lately, 450—500 pairs in USSR; after BORODIN 1984). First recorded from that area by TACZANOWSKI (1893) on the basis of data of B. DYBOWSKI and W. GODLEWSKI. This species was also recorded, in the past, from N Japan, NE China, and Korea (NOVIKOV 1976, pp. 14—35). It has not nested in North Korea for more than 10 years. According to PAK U II (pers. comm.), it nested (1—2 nests) on trees near rice fields in the vicinity of the town of Chongdan in South Hwanghae Province until 1950, and 1 brood was still recorded from Kimchaek in the coastal lowland in North Hamgyong Province in 1977. Since then this locality has ceased to exist. Presently, Eastern White Storks are seen very rarely in North Korea, only in winter, PAK U II informed us about the wintering of 17 birds on the Ongjin Peninsula between December, 1981, and January, 1982. One, and most probably the last brood of the Eastern White Stork in South Korea was recorded in Gwanseong-ri (Kwangjong-ri?) in South Chungchong Province. One nest with 6 eggs incubated by a single female was recorded within on old breeding area in the locality mentioned above in the spring of 1979 (KWAK, Koo, WON 1980), but details concerning this brood have not been presented. In a later survey of South Korean birds (WON Pyong Oh 1987), the Eastern White Stork (there named the "White Stork *Ciconia ciconia*") was given as a rare winter visitor. This species, gradually yet distinctly

disappearing, has been included into the Red Data Book of IUCN (VINCENT 1966).

Ciconia nigra LINNAEUS, 1758, is an extremely rare species in North Korea, which lies just outside the uniform range of this stork. It still bred at the Tuman River in the area of Musan in North Hamgyong Province about 15 years ago. Only one individual has been appearing there each year (PAK U II — personal comm.). It is more numerous in Manchuria and the Soviet Far East (e. g. BORODIN 1984). Recorded from South Korea as a rare winter visitor (WON Pyong Oh 1987).

Nipponia nippon (TEMMINCK, 1835) was a numerous and widely distributed species well until the half of the 19th c. Its range included regions from Central China to Hokkaido (Japan), and from the southern part of the Soviet Primorsk to Taiwan. It migrated into North China, Japan, and Primorsk only for its breeding period, while it was established as a sedentary species in South China and South Japan. The rapid human population growth and the spread of fire-arms in those areas became the main factors of the fast dwindling of that species (ARCHIBALD and LANTIS 1981). On the basis of observations and specimens gathered by J. KALINOWSKI, TACZANOWSKI (1887, 1888) mentions 3 males and a female from the areas of Seoul and Gouran from December and January, and another female killed near Tongdje in May. The then-known boundary of winter and spring distribution ran about 50 km N of Seoul, while the species occurred in the greatest number near Ginzan, where flocks up to 50 birds were seen. The species was rare N of Ginzan, and not observed in Korea in the summer (CAMPBELL 1892, after ARCHIBALD and LANTIS 1981) confirms TACZANOWSKI'S (o. c.) data, adding that it was easy to approach flocks of those confident birds within shooting distance in winter and spring. Since then, the next record of the species in Korean Peninsula was made in the sixties of the 20th c., when one bird was seen for sale in a Seoul market-place, 10 birds were observed flying in North Korea (in 1965), and one couple was seen in the centre of the demilitarized zone between North and South Korea in February, 1966 (FENNEL 1964, FISCHER et al. 1969 after ARCHIBALD and LANTIS 1981, WON Pyong Oh 1969). The Great Crested Ibis was observed only in the demilitarized zone in Panmunjon Valley (the Chorwon River basin) in the seventies, often in the same locality as in 1966. South Korean soldiers often observed 4 ibises between February and July, 1974, and 4 adult birds were observed there in December the same year. 2 birds were seen in the same place between December, 1977, and February, 1978 (most probably in pair bond), and one bird was seen there in March and the beginning of April. Airplane observation of the main river valleys (Hangan, Nakdong, and Kyung) and sea coasts of South Korea in 1974 did not yield any birds of this species (ARCHIBALD and LANTIS 1981). It is probably completely extinct on Soviet territory (BORODIN 1984, NOVIKOV 1976). It was last seen in that country in southern Primorsk near Ol'ga Bay on 25. 04. 1977 (LABZYUK 1981). Unexpectedly, two breeding couples were sighted in the Chinese province of Shansi, in Qinling Mountains, at the altitude of 1200 m a.s.l., in May, 1981.

Later, another couple of those birds was discovered, but of the three, only one couple bred young birds (during 3 years, 3 young per year). 2 couples bred a total of 5 young in 1984. The overall world wild population of this ibis numbered only 17—18 individuals in 1984 (including 17 in China and 1 unreliable and unexplained information about the occurrence of an individual bird from North Korea; ANONYMUS 1984). Also, 4 other birds (1 in Pekin Zoo and 1 male and 2 females on the Japanese island of Sado) are under a careful supervision (ANONYMUS 1984). The species has been qualified to the most endangered ones by the IUCN Red Data Book (VINCENT 1966).

Platalea minor TEMMINCK et SCHLEGEL, 1845 — is a very rare and very poorly known Far East species nesting in two small enclaves: on the SE edge of China on the coast of the East China Sea at the level of Taiwan, and in North Korea in the area of the Gulf of West Korea (WON Chong Koo 1964, SONOBE 1982). In this latter region, according to PAK U Il (pers. comm.), the bird nests solely in Gulf of West Korea islands off the mouth of the Taeryong River, in the number of about 30 individuals. It is only occasionally seen in migration on wintering in South Korea (WON Pyong Oh 1987). It is also sometimes observed wintering in Japan, in the southern regions of Honshu (SONOBE 1982).

Grus monacha TEMMINCK, 1835, nests only occasionally in mossy marshlands from SW Siberia to Amur. It winters in southern areas of China, Korea, and Japan, where 1400 individuals were recorded in 1969 (NOVIKOV 1976, pp. 123—130). In North Korea it winters in the region of West (ca 2000 individuals in 1987) and East Gulf Korea. A part of the population (about 300 individuals lately) passes over Korea for wintering in Japan (PAK U Il — pers. comm.). More than 4000 of those cranes winter on the Japanese island of Arasaki; of these, a part are *Grus grus* × *Grus monacha* hybrids with intermediate phenotype characteristics (SONOBE 1982). Included into the Red Data Book of the IUCN (VINCENT 1966).

Grus japonensis (MULLER, 1776), is a rare and one of the most endangered birds of the Far East. It only nests in the territory of USSR, NE China and N Japan (BORODIN 1984, FENG Kemin 1985, MASATOMI 1985, NOVIKOV 1976, pp. 82—93, SONOBE 1982). It only winters in Korea (WON Chong Koo 1964, WON Pyong Oh 1987). According to PAK U Il (pers. comm.), about 300 individuals presently winter each year in North Korea, mainly in the West of the country (ca 200 indiv.). The largest and the best known winterings are situated in the area of the mouth of the Chongchon River between North and South Pyongan Provinces (about 170 individuals of *Grus japonensis* were observed there at the beginning of 1987, together with other crane species: *G. monacha* — ca 2000, *G. vipio* — ca 1000, and *G. grus* — 32 indiv.), on Ongjin Peninsula and in the area of Kaesong in the province of South Hwanghae, as well as on the east coast of the Korean Peninsula at the mouth of the Kumye River in South Hamgyong Province (50 indiv. together with ab. 200 indiv. of *G. vipio* in 1987), and in the vicinity of Samil Lake in the province of Kangwon. It also occasionally winters in South Korea (WON Pyong Oh 1987). A small flock of those cranes is kept

in the Zoo within the Pyongyang amusement park (5 indiv.). The species is endangered and included in the IUCN Red Data Book (VINCENT 1966).

Grus vipio PALLAS, 1811. — a rare and disappearing species occasionally nesting in the Amur basin. Its south-easternmost breeding areas are situated at Korea and, occasionally in South China and South Japan (WON Chong Koo 1964, BORODIN 1984, Koo Tae Hoe and WON Pyong Oh 1986, WON Pyong Oh 1987). About 1000 individuals wintered at the Gulf of West Korea, and about 200 at the Gulf of East Korea in 1987 (PAK U II — pers. comm.). Included in the IUCN Red Data Book (VINCENT 1966).

Numenius minutus GOULD, 1941 — a poorly-known species endemic for Siberia; Little Whimbrel winters in SE China and Australia, New Zealand and Tasmania (FLINT et al. 1968, NOVIKOV 1976, pp. 147—148, BORODIN 1984). Recorded by WON Chong Koo, 1964, from the western part of North Korea, and also observed once during our expedition (see p. 461). Known to migrate into South Korea (WON Pyong Oh 1987).

Dryocopus javensis richardsi TRISTRAM, 1879 — an extremely scarce and endangered species of the woodpecker; its entire population is located in central provinces of Korea (WON Chong Koo 1964, VINCENT 1966), numbering only 34 individuals in 1983—1984 (PAK U II — pers. comm.). Of those, according to PAK U II, about 30 birds occur in North Korea (mostly in the Kaesong — Pyongchon — Kumchon area), and 2 couples are present in South Korea. WON Pyong Oh (1984) mentions its breeding sanctuary in South Korea to be the forest of Kwangneug (40—50 km NE of Seoul). The species is entirely extinct on the Japanese islands of Tsushima (SONOBE 1982). Included in the Red Data Book of IUCN (VINCENT 1966).

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STRESZCZENIE

W pracy przedstawiono wyniki ekspedycji ornitologicznej przeprowadzonej w Korei Północnej w okresie od 7 kwietnia do 4 maja 1987 roku w ramach wymiany naukowej między Polską Akademią Nauk a Akademią Nauk KRL-D. Głównym celem wyprawy było zebranie możliwie miarodajnych danych o awifaunie tego kraju w okresie przedlegowym i we wczesnym etapie jej stabilizacji legowej, a także ustalenie składu gatunkowego i liczebności wczesnowiosennych zgrupowań ptaków w odniesieniu do charakterystycznych dla tego obszaru typów siedlisk.

Obserwacje i liczenia ptaków były prowadzone niezależnie i jednocześnie przez trzech obserwatorów. Badania organizowano w oparciu o lokalne bazy hotelowe w Phenianie, w Górach Myohyang (Hotel Myohyangsan), Górach Kumgang (Hotel Kumgangsan), w miastach prowincjonalnych — Wonsan, Hedžu i Sariwon (ryc. 1). Liczenia prowadzono zwykle na transektach, odnosząc wyniki do długości trasy i czasu obserwacji. Część obserwacji przeprowadzono z samochodów. Różnorodność gatunkową opisanych zgrupowań ptaków obliczono według formuły Shannona (H').

W czasie niespełna miesięcznej wyprawy w głąb kraju i na wybrzeża morskie stwierdzono 115 gatunków, a w dwóch przypadkach obserwowane ptaki opisano do rodzaju. Materiały charakteryzują awifaunę przejściową o przeważającym udziale gatunków migrujących (np. *Limosa lapponica*, *Philomachus pugnax*,

Haematopus ostralegus, *Tarsiger cyanurus*, *Turdus naumanni*, *Emberiza tristrami*, *Carduelis spinus*, *Fringilla montifringilla*, *Phylloscopus inornatus*, *Ph. borealis* i gatunki z rodzajów *Mergus*, *Numenius*, *Tringa*), a zwłaszcza dopiero łączących się w pary i zajmujących terytoria lęgowe (np. *Ficedula zanthopygia*, *Cyanoptila cyanomelana*, *Phylloscopus coronatus*, *Carduelis sinica*, gatunki z rodzajów *Hirundo*, *Cettia*, *Emberiza*). W świetle dotychczasowej literatury ornitologicznej spośród stwierdzonych gatunków do najbardziej interesujących należy jeden z najrzadszych ptaków Dalekiego Wschodu, jakim jest *Numenius minutus* (tylko lokalnie i w małych populacjach gnieździ się na Syberii), dalej czaple *Bubulcus ibis* (nie wykluczone, że obserwowane ptaki były lęgowe), *Egretta eulophotes* (gatunek gniazdowy w Korei Północnej) i *E. intermedia* (na przelocie?), *Larus saundersi* (zalatująca?), w niewielkich lokalnych populacjach gnieźdzące się *Phalacrocorax filamentosus* i *Cyanopica cyana*.

Informacje o 30 dalszych gatunkach zdobyto na podstawie przeglądu części kolekcji ptaków wypchanych i wystawionych na sprzedaż w niektórych sklepach koreańskich oraz z wywiadów. Zbiory sklepowe świadczą m. in. o zalatywaniu lub przelatywaniu przez Koreę kilku gatunków gnieźdzących się i zimujących w innych rejonach geograficznych (np. *Terpsiphone atrocaudata*, *Falco subbuteo*). Zbiory te potwierdzają obecność w awifaunie Korei dość szerokiej i interesującej faunistycznie reprezentacji gatunków z rodzajów *Accipiter*, *Lanius*, *Cuculus* i z grupy łuszczaków.

Na 16 stanowiskach obserwacyjnych opisano, z wykorzystaniem uproszczonych szacunków ilościowych, zgrupowania ptaków typowych dla Korei siedlisk (tab. I—X). Zgrupowania te nie zawsze są porównywalne, zwłaszcza z uwagi na nierówne trasy i czas obserwacji. Skala tego zróżnicowania pozwala jednak na ostrożne stwierdzenie, że wiosną najbardziej różnorodnie są zgrupowania ptaków w obrębie wielkich zbiorników retencyjnych (np. Sokam i Sohung — $H' = 3,9-4,5$ bita przy $S = 23-35$ gatunków), na lesistych wzgórzach (np. Suyang-san k. Hedżu — $H' = 4,3$ przy $S = 28$) i w podgórskich dolinach rzecznych ($H' = 3,5-4,2$ przy $S = 24-32$). Niezbyt wysoką wartość wskaźnika Shannona osiągnęło zgrupowanie ptaków urozmaiconej siedliskowo zatoki morskiej w Hedżu ($H' = 2,8$ przy $S = 28$). Jeszcze uboższe są pod tym względem siedliska antropogeniczne, np. wypoczynkowe tereny w obrębie wielkich miast (np. Phenian, Sariwon), a przede wszystkim otwartej zatoki morskiej w Nampo ($H' = 1,7$ przy $S = 5$). Pod względem liczebności osobników wyróżniają się zgrupowania ptaków Zatoki Hedżu ($N = 431-441$ osobn.), podgórskich dolin rzecznych, np. w Kungang-san ($N = 416-428$) i niektórych zbiorników zaporowych, np. w Nampo ($N = 327$) i Sokam ($N = \text{ok. } 200$). O wysokich wartościach tego wskaźnika decydują zwykle niektóre gatunki dominujące, np. *Carduelis spinus*, *Larus crassirostris*, *Passer montanus*, gatunki z rodzajów *Numenius*, *Anas* i *Aythya*. Dysproporcje w dominacji liczebnej gatunków wpływają natomiast na niższą wartość H' zespołów.

Przeprowadzono też klasyfikację ekologiczną obserwowanych ptaków wod-

no-błotnych (tab. XI—XII) oraz podano uwagi o statusie niektórych najrzadszych i osobliwych gatunków dalekowschodnich.

Od kilkunastu lat brakuje jakichkolwiek informacji o występowaniu kazarki grzebieniastej *Tadorna cristata*; są podejrzenia, że gatunek ten już wyginął. Skrajnie zagrożone są ibis japoński *Nipponia nippon* i dzięcioł Tristrama *Dryocopus javensis*, których populacje liczą już tylko kilkanaście i kilkadziesiąt (ok. 30) osobników. Tylko na zimowiskach i przelotach notuje się w Korei stada żurawi *Grus japonensis*, *G. vipio*, *G. monacha* i *G. grus*). W 1977 roku wygasło w KRL-D ostatnie stanowisko lęgowe dalekowschodniego bociana *Ciconia boyciana*; odtąd ten zanikający ptak jest tu notowany niezwykle rzadko, wyłącznie jako zimujący. Natomiast jedna z ostatnich enklaw lęgowych wschodnioazjatyckiej warzęchy *Platalea minor*, która znajduje się na wysepkach w Zachodniej Zatoce Koreańskiej (Morze Żółte), liczy zaledwie 30 osobników

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