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# *Mallophaga* from Birds Associated with the Water Environment in Poland

**Wszoły *(Mallophaga)* ptaków Polski, związanych ze środowiskiem wodnym**

**Пухоеды *(Mallophaga)* птиц Польши, связанных с водной средой**

## I. PROVENANCE OF MATERIAL

The *Mallophaga* examined during the course of the enquiry were collected from birds in the Wrocław, Katowice, Kraków, Lublin, Warszawa, Białystok, Olsztyn, Gdańsk and Koszalin Provinces in the years 1950—1959.

They were taken from the birds representing 13 families, which I numbered according to the sequence assumed by SOKOŁOWSKI (1958). Only *Strigidae* and *Falconidae* are placed at the end of the list (Nos. 12 and 13), because, contrary to the other families of birds searched for *Mallophaga*, all the species of these two families are not connected with the water environment. The numeration so established is consequently kept throughout the present study and also applied in the map to mark the localities at which the birds of the following families examined for Mallophaga were found: 1. *Ciconiidae*, 2. *Plegadiidae*, 3. *Ardeidae*, 4. *Gruidae*, 5. *Rallidae*, 6. *Charadriidae*, 7. *Laridae*, 8. *Anatidae*, 9. *Phalacrocoracidae*, 10. *Podicipidae*, 11. *Colymbidae*, 12. *Strigidae*, 13. *Falconidae* (Fig. 1).

As will be seen from this map the most abundant material was collected in the Wrocław Province, especially in the environs of the towns of Wrocław and Milicz. The following families were represented by the birds examined for *Mallophaga* from the Wrocław region: *Ardeidae*, *Rallidae*, *Charadriidae*, *Laridae*, *Anatidae*, *Phalacrocoracidae*, *Podicipidae*, *Colymbidae*, *Strigidae* and

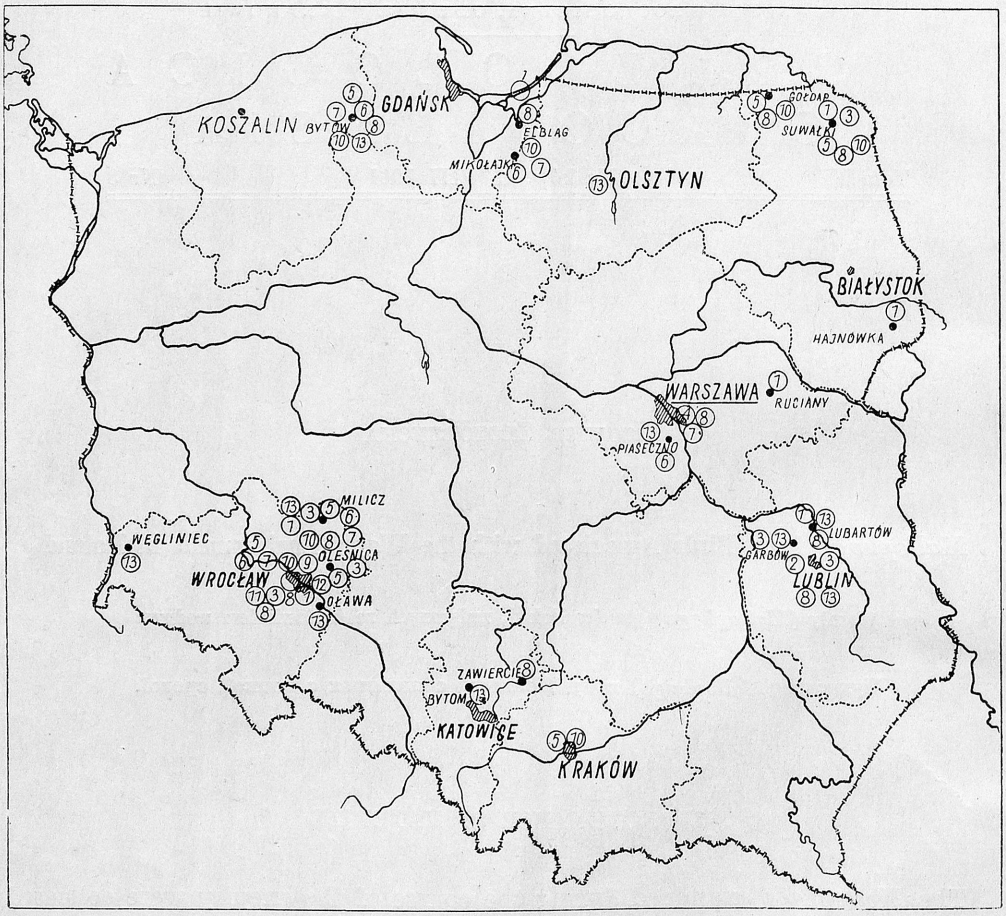


Fig. 1*.

The numbers in the circles denote following families of birds: 1 — *Ciconiidae*, 2 — *Plegadiidae*, 3 — *Ardeidae*, 4 — *Gruidae*, 5 — *Rallidae*, 6 — *Charadriidae*, 7 — *Laridae*, 8 — *Anatidae*, 9 — *Phalacrocoracidae*, 10 — *Podicipidae*, 11 — *Colymbidae*, 12 — *Strigidae*, 13 — *Falconidae*

*Falconidae*. They were mostly shot, while on migration, on the banks of the Odra River and its tributaries and sometimes in small marshy areas. In the Milicz region I also collected rich material embracing the families *Ardeidae*, *Rallidae*, *Charadriidae*, *Laridae*, *Anatidae*, *Podicipidae* and *Falconidae*. These birds inhabited the areas abounding in ponds and marshes, where they also mostly nested.

The *Mallophaga* found on the *Ciconiidae* and *Anatidae* from the Wrocław Zoological Garden deserve a special mention. I managed to collect them from living birds thanks to the kindness of Dir. K. Łukaszewicz, for which I should like to express my warm gratitude to him.

* Distribution of localities in which *Mallophaga* were collected from the respective avian families.

A part of *Mallophaga* from the birds of the family *Falconidae* were collected at Węgliniec near Zgorzelec in the Wrocław Province. All the *Mallophaga* from the Wrocław Province were collected by me personally.

Abundant material was collected by me, also personally, in the Pomorze Lake District, near Bytów in the Koszalin Province. I have elaborated it in a separate paper (ZŁOTORZYCKA 1959 a). This collection consisted of *Mallophaga* from the following avian families: *Rallidae*, *Charadriidae*, *Laridae*, *Anatidae*, *Podicipidae* and *Falconidae*. I obtained most of these birds through the courtesy of Prof. G. POLUSZYŃSKI, who at that time (1957), together with his co-workers, carried out investigations on the endoparasites of birds near Bytów. The Pomorze Lake District is a haunt of many species of birds migrating or nesting there. Similar features characterize the avifauna of the lakes in the Suwałki region in the Białystok Province. Here *Mallophaga* were taken from the following families of birds: *Ciconiidae*, *Ardeidae*, *Rallidae* and *Podicipidae*. I was given some *Mallophaga* from *Rallidae*, *Anatidae* and *Podicipidae* from the Gołdap region and those from *Ciconiidae* from the Białowieża region by J. WIPRZYCKI, student of the Warsaw University, who subsequently died prematurely. Besides, I received from him the *Mallophaga* from *Ciconiidae*, *Gruidae*, *Charadriidae*, *Laridae* and *Falconidae* from the Warszawa Province and some from *Ciconiidae*, *Plegadiidae*, *Ardeidae*, *Anatidae* and *Falconidae* from the Lublin Province. I owe to Eng. J. DANECKI, co-worker of the Zoological Museum in Wrocław, for the material from *Falconidae* from the Olsztyn region. I was provided with *Mallophaga* from the remaining provinces, namely with those from *Charadriidae*, *Laridae*, *Anatidae* and *Podicipidae* from Pomorze (Gdańsk Province), from *Anatidae* and *Falconidae* from the Katowice Province and from *Rallidae* and *Podicipidae* from the Kraków Province by Mgr. Z. DĄBROWSKI, worker of the Jagellonian University. My hearty thanks are due to both of them.

My elaboration of *Mallophaga* is grounded on material from various parts of Poland and from various environments. Therefore, I believe it possible to sketch the general characteristics of the *Mallophaga* fauna of Poland on the basis of my material, though the data from several provinces have been lacking so far. I have been also prompted to do this by my previous (ZŁOTORZYCKA 1959 a and b) and present observations as well as by the data from literature indicating that the specific composition of *Mallophaga* depends chiefly on the species of the host and not on the locality of its occurrence. To illustrate these observations better I have included in my study some material from *Ciconiidae*, *Rallidae*, *Laridae*, *Charadriidae* and *Anatidae* that I received by exchange from Dr. Savo BRELIH from Jugoslavia, for which I should like to express my thanks to him.

As regards the birds bred in zoological gardens, I have noticed (ZŁOTORZYCKA 1959 b) that those birds may have been bred for many generations, but they have the same species of *Mallophaga* as the respective birds living

at liberty. What makes them different is that the *Mallophaga* fauna from the birds reared in captivity is impoverished in species and, generally, in number so that after long breeding only the most characteristic *Mallophaga* of the given species are to be found on them.

The faunistic elaboration of the *Mallophaga* of Poland, as extensive as the present study, is the first one of this kind, as, so far, the data from the literature on this subject matter have been limited to the work by S. KÉLER (1940). In this work he mentions 28 species of *Mallophaga* collected by E. L. NIEZABITOWSKI from various families of birds and mammals in Poland. Among others he quotes the following *Mallophaga* from Poland which I also used to find in this country: *Ciconiphilus decimfasciatus* (BOIS. et LAC.) by syn. *Aneutalus importunus* (NITZSCH) from unidentified *Ardeidae*, *Colpocephalum zebra* NITZSCH from *Clethrionomys glareolus* (SCHREBER) and *Ardea cinerea* L., *Craspedorrhynchus platystomus* (NITZSCH) from *Aquila chrysaëtos* L., *Neophilopterus tricolor* (NITZSCH) from *Ciconia nigra* L., *Quadraceps phaeonotus* (NITZSCH) from an unidentified gull, *Strigiphilus cursor* (NITZSCH) from *Asio flammeus* PONT. and *Trinoton querquedulae* (L.) from *Anas platyrhynchos* L. and from *Nyroca marila* L.

Consequently all the species of *Mallophaga* collected by me are new to Poland with the exception of the above-mentioned ones.

## II. METHOD OF COLLECTING AND PRESERVING MATERIAL

Collections of *Mallophaga* were made in the manner described below. Immediately after killing or catching a bird all the *Mallophaga* noticed were collected and preserved in 70 per cent alcohole. I tried to repeat the same procedure with each bird for several successive days. Then, having treated material thus preserved with KOH, I made permanent preparations from it in Canada balsam following the routine method. I have realized that the treatment of *Mallophaga* with alkali is very important in this method, because the good clarification of *Mallophaga* facilitates their identification. I made the drawings of the specimens identified using a ROW microscope as a projector of image. 22 drawings made by this method are included in this work.

## III. SURVEY OF MATERIAL COLLECTED

The *Mallophaga* collected were elaborated faunistically according to the particular families of birds infested by them. In identifying the specimens I chiefly used the monography by SÉGUY (1944). Unluckily, this work is not

accurate and somewhat out of date as far as its nomeclature is concerned. Therefore, for the identification of specimens I was compelled to employ also source-books (DENNY 1842, GIEBEL 1864, BURMEISTER 1838, KELLOGG 1896, MJÖBERG 1910) as well as more recent monographies (BLAGOVESHCHENSKY 1940 a) and works comprising revisions of particular species of *Mallophaga* (CLAY 1949 a, 1953, 1958, 1959, HOPKINS a. TIMMERMANN 1954). I applied the specific classification of HOPKINS and CLAY (1952) for *Mallophaga* and that of SOKOŁOWSKI (1958) for birds. The data quoted for each of *Mallophaga* species discussed were taken, as a rule, from the recent literature (after 1940). The data from older writers were cited after SÉGUY (1944) and HOPKINS a. CLAY (1952). More recent faunistic data come mostly from the works by BÁLAT (1953 a and b, 1955, 1956, 1958), BLAGOVESHCHENSKY (1940 b, 1948, 1951), TULESHKOV (1957, 1958), SZIDAT (1940), EICHLER (1949) and CLAY (1958). I consider the above-mentioned works to be sufficient and most suitable, because they include many data more reliable and accurate than those from the works of the older authors. In order to obtain a possibly exact picture of the geographic distribution of *Mallophaga*, in citing the data from other works I take care to name the country or its region where the specimens in question were found, when possible. On this basis I attain another proof that the specific composition of *Mallophaga* depends chiefly upon the host species and not upon the geographic conditions under which the latter occurs.

In the present study *Mallophaga* are dealt with according to particular avian families within which they parasitize. In this way 13 sections have been established, in which I discuss the specimens collected from birds belonging to the families listed at the beginning of this work. Each section is provided with the general characteristics of the occurrence of the *Mallophaga* from the given family of birds. *Mallophaga* species typical of given families of birds are discussed at length, and the atypical ones are mentioned. The *Mallophaga* recognized typical in literature (HOPKINS a. CLAY 1952) or frequently found on birds of the species in question are reckoned among typical ones. On the other hand, those exceptionally found on the birds examined and in literature mentioned as typical of other avian families are reckoned here among atypical species. I avoid the use of the term „casual species" intentionally, because I was often unable to explain what had caused the exceptional occurrence of certain *Mallophaga* on some birds.

The survey of the hosts showing the degree of infestation by *Mallophaga* is presented in Table I.

As can be seen from this table 1-5 typical species of *Mallophaga* were generally found on particular species of birds. The greatest number of typical species were found on *Ciconia ciconia* L., *Grus grus* L., *Fulica atra* L., *Gallinula chloropus* L., *Larus canus* L., *Sterna hirundo* L., *Chlidonias nigra* L., *Anas platyrhynchos* L., *A. querquedula* L., *A. penelope* L., *Nyroca nyroca* GÜLD., *Milvus migrans* BODD.

Table I

List of hosts showing the degree of their infestation by *Mallophaga*

| Hosts | | | *Mallophaga* | | |
|---|---|---|---|---|---|
| Family | Species | Number of birds | Number of *Mallophaga* | Number of *Mallophaga* species | |
| | | | | typical | atypical |
| 1. *Ciconiidae* | *Ciconia ciconia* L. | 7 | 265 | 4 | 1 |
| | *Ciconia nigra* L. | 1 | 19 | 2 | — |
| 2. *Plegadiidae* | *Platalea leucorodia* L. | 4 | 9 | 1 | — |
| 3. *Ardeidae* | *Botaurus stellaris* L. | 6 | 98 | 2 | — |
| | *Ardea cinerea* L. | 3 | 38 | 2 | — |
| 4. *Gruidae* | *Grus grus* L. | 2 | 48 | 4 | 1 |
| 5. *Rallidae* | *Fulica atra* L. | 40 | 389 | 4 | 6 |
| | *Gallinula chloropus* L. | 5 | 52 | 4 | 4 |
| 6. *Charadriidae* | *Vanellus vanellus* L. | 8 | 70 | 3 | 1 |
| | *Capella gallinago* L. | 3 | 11 | 2 | — |
| | *Scolopax rusticola* L. | 1 | 28 | 2 | — |
| | *Tringa erythropus* PALL. | 2 | 18 | 3 | — |
| | *Tringa ochropus* L. | 1 | 9 | 2 | — |
| | *Limicola falcinellus* PONT. | 1 | 13 | 1 | — |
| | *Actitis hypoleucos* L. | 4 | 24 | 1 | — |
| | *Calidris minuta* LEISL. | 1 | 45 | 4 | — |
| | *Calidris alpina* L. | 1 | 6 | 3 | — |
| 7. *Laridae* | *Larus ridibundus* L. | 16 | 194 | 3 | 1 |
| | *Larus canus* L. | 3 | 88 | 4 | — |
| | *Sterna hirundo* L. | 6 | 43 | 5 | — |
| | *Sterna macrura* NAUM. | 1 | 5 | 1 | — |
| | *Sterna albifrons* PALL. | 1 | 17 | 2 | — |
| | *Chlidonias nigra* L. | 4 | 36 | 4 | — |
| 8. *Anatidae* | *Anas platyrhynchos* L. | 61 | 624 | 5 | 4 |
| | *Anas querquedula* L. | 9 | 68 | 5 | 1 |
| | *Anas penelope* L. | 4 | 62 | 4 | — |
| | *Anas crecca* L. | 4 | 52 | 3 | — |
| | *Anas strepera* L. | 2 | 7 | 3 | 1 |
| | *Nyroca nyroca* GÜLD. | 4 | 8 | 4 | — |
| | *Nyroca fuligula* L. | 3 | 16 | 1 | — |
| | *Bucephala clangula* L. | 2 | 13 | 2 | — |
| | *Anser anser* L. | 1 | 6 | 2 | — |
| | *Anser fabalis* LATH. | 1 | 20 | 2 | — |
| | *Cygnopsis cygnoides* L. | 3 | 22 | 2 | — |
| | *Cygnus cygnus* L. | 1 | 3 | 1 | — |
| 9. *Phalacrocoracidae* | *Phalacrorax carbo* L. | 2 | 6 | 1 | 1 |

Table I (continued)

| Hosts | | | *Mallophaga* | | |
|---|---|---|---|---|---|
| Family | Species | Number of birds | Number of *Mallophaga* | Number of *Mallophaga* species | |
| | | | | typical | atypical |
| 10. *Podicipidae* | *Podiceps cristatus* L. | 23 | 162 | 2 | 4 |
| | *Podiceps nigricollis* BREHM | 6 | 38 | 2 | — |
| | *Podiceps ruficollis* PALL. | 5 | 13 | 2 | 2 |
| | *Podiceps griseigena* BODD. | 8 | 16 | 2 | 5 |
| | *Podiceps auritus* L. | 1 | 7 | 2 | — |
| 11. *Colymbidae* | *Colymbus arcticus* L. | 1 | 18 | 1 | — |
| 12. *Strigidae* | *Asio flammeus* PONT. | 7 | 103 | 1 | 2 |
| | *Tyto alba* SCOP. | 3 | 8 | 1 | 1 |
| 13. *Falconidae* | *Aquila pomarina* BREHM | 1 | 16 | 1 | — |
| | *Milvus migrans* BODD. | 4 | 72 | 5 | 1 |
| | *Buteo buteo* L. | 23 | 608 | 3 | 3 |
| | *Buteo lagopus* BRUNN. | 3 | 151 | 2 | — |
| | *Accipiter nisus* L. | 4 | 13 | 2 | 1 |
| | *Accipiter gentilis* L. | 2 | 5 | 2 | — |
| | *Falco tinnunculus* L. | 1 | 6 | 1 | — |
| | *Falco subbuteo* L. | 1 | 7 | 1 | — |
| | *Pandion haliaëtus* L. | 2 | 16 | 1 | 1 |
| | *Haliaeëtus albicilla* L. | 1 | 31 | 3 | — |
| | *Circus aeruginosus* L. | 3 | 34 | 3 | 1 |
| | Together: | 317 | 3757 | | |

## List of *Mallophaga* typical of given hosts

The fauna of *Mallophaga* typical of particular species of birds presents itself in my collection as follows:

*Actornithophilus affinis* (NITZSCH)
*Actornithophilus lyallpurensis* ANSARI
*Actornithophilus ochraceus* (NITZSCH)
*Actornithophilus piceus* (DENNY)
*Actornithophilus spinulosus* (PIAG.)
*Anaticola anseris* (L.)
*Anaticola crassicornis* (SCOP.)

— *Tringa erythropus* PALL.
— *Tringa ochropus* L.
— *Vanellus vanellus* L.
— *Chlidonias nigra* L.
— *Calidris minuta* LEISL. *
— *Anser anser* L.
— *Cygnopsis cygnoides* L. *
— *Anas crecca* L.
— *Anas domestica* L.
— *Anas penelope* L.
— *Anas platyrhynchos* L.
— *Anas querquedula* L.

* The species of birds, on which the respective *Mallophaga* species have not been hitherto found, are marked with an asterisk.

| | |
|---|---|
| *Anaticola crassicornis* (SCOP.) | — *Anas strepera* L. |
| | — *Nyroca nyroca* GÜLD. * |
| *Anatoecus dentatus* (SCOP.) | — *Anas crecca* L. |
| | — *Anas domestica* L. |
| | — *Anas penelope* L. |
| | — *Anas platyrhynchos* L. |
| | — *Anas querquedula* L. |
| | — *Anas strepera* L. |
| | — *Anser anser* L. |
| | — *Anser fabalis* L. |
| | — *Bucephala clangula* L. |
| | — *Cygnopsis cygnoides* L. |
| | — *Nyroca fuligula* L. |
| | — *Nyroca nyroca* L. |
| *Aquanirmus colymbinus* (SCOP.) | — *Podiceps auritus* L. |
| | — *Podiceps cristatus* L. |
| | — *Podiceps griseigena* BODD. |
| | — *Podiceps nigricollis* BREHM |
| | — *Podiceps ruficollis* PALL. |
| *Ardeicola ciconiae* (L.) | — *Ciconia ciconia* L. |
| *Ardeicola maculatus* (NITZSCH) | — *Ciconia nigra* L. |
| *Ardeicola stellaris* (DENNY) | — *Botaurus stellaris* L. |
| *Ardeiphilus trochioxus* (BURM.) | — *Botaurus stellaris* L. |
| *Austromenopon durisetosum* (BLAG.) | — *Capella gallinago* L. |
| *Austromenopon fuscofasciatum* (PIAG.) | — *Chlidonias nigra* L. |
| | — *Sterna hirundo* L. |
| *Austromenopon icterum* (BURM.) | — *Scolopax rusticola* L. |
| *Austromenopon lutescens* (BURM.) | — *Calidris alpina* L. |
| *Austromenopon nigropleurum* (DENNY) | — *Tringa erythropus* PALL. * |
| *Austromenopon ridibundus* (DENNY) | — *Larus canus* L. * |
| | — *Larus ridibundus* L. |
| | — *Sterna hirundo* L. * |
| *Carduiceps cingulatus* (DENNY) | — *Calidris alpina* L. * |
| | — *Calidris minuta* LEISL. |
| *Ciconiphilus decimfasciatus* (BOIS. et LAC.) | — *Ardea cinerea* L. |
| *Ciconiphilus pectiniventris* (HAAR.) | — *Cygnopsis cygnoid* L. * |
| *Ciconiphilus quadripustulatus* (BURM.) | — *Ciconia ciconia* L. |
| *Colpocephalum flavescens* HAAN. | — *Buteo buteo* L. |
| | — *Buteo lagopus* BRÜNN. |
| | — *Circus aeruginosus* L. * |
| *Colpocephalum tricinctum* NITZSCH | — *Milvus migrans* BODD. |
| *Colpocephalum zebra* BURM. | — *Ciconia ciconia* L. |
| *Craspedonirmus colymbinus* (DENNY) | — *Colymbus arcticus* L. |
| *Craspedorrhynchus pachypus* (GIEB.) | — *Milvus migrans* BODD. |

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|---|---|
| *Craspedorrhynchus platystomus* (BURM.) | — *Accipiter gentilis* L. |
| | — *Accipiter nisus* L. * |
| | — *Aquila pomarina* BR. * |
| | — *Buteo buteo* L. |
| | — *Buteo lagopus* BRÜNN. * |
| | — *Milvus migrans* BODD. |
| *Degeeriella discocephalus* (BURM.) | — *Haliaeëtus albicilla* L. |
| *Degreeriella fulva* (GIEB.) | — *Asio flammeus* PONT. * |
| | — *Buteo buteo* L. |
| | — *Ciconia ciconia* L. * |
| *Degeeriella fusca* (DENNY) | — *Circus aeruginosus* L. |
| *Degeeriella r. regalis* (GIEB.) | — *Milvus migrans* BODD. |
| *Degeeriella r. rufa* (BURM.) | — *Accipiter nisus* L. |
| | — *Falco tinnunculus* L. |
| *Esthiopterum gruis* (L.) | — *Grus grus* L. |
| *Falcolipeurus sulcifrons* (DENNY) | — *Haliaeëtus albicilla* L. |
| *Fulicoffula lurida* (NITZSCH) | — *Fulica atra* L. |
| *Fulicoffula rallina* (DENNY) | — *Gallinula chloropus* L. * |
| *Gruimenopon longum* (GIEB.) | — *Grus grus* L. |
| *Heleonomus macilientus* (NITZSCH) | — *Grus grus* L. |
| *Holomenopon leucoxanthum* (BURM.) | — *Anas platyrhynchos* L. |
| | — *Anas querquedula* L. * |
| | — *Bucephala clangula* L. * |
| *Holomenopon nyrocae* (BLAG.) | — *Nyroca nyroca* GULD. * |
| *Ibidoecus plataleae* (DENNY) | — *Platalea leucorodia* L. |
| *Incidifrons fulicae* (L.) | — *Fulica atra* L. |
| *Incidifrons ralli* (SCOP.) | — *Gallinula chloropus* L. * |
| *Kurodaia haliaëti* (DENNY) | — *Pandion haliaëtus* L. |
| *Laemobothrion circi* FOURC. | — *Circus aeruginosus* L. |
| | — *Milvus migrans* BODD. |
| *Laemobothrion tinnunculi* (L.) | — *Falco subbuteo* L. |
| *Lunaceps holophaeus* (BURM.) | — *Calidris minuta* LEISL. * |
| | — *Limicola falcinellus* L. |
| *Neophilopterus incompletus* (DENNY) | — *Ciconia ciconia* L. |
| *Neophilopterus tricolor* (BURM.) | — *Ciconia nigra* L. |
| *Ornithobius cygni* (L.) | — *Cygnus cygnus* L. |
| *Pseudomenopon pilosum* (SCOP.) | — *Anas platyrhynchos* L. * |
| | — *Fulica atra* L. |
| | — *Gallinula chloropus* L. |
| | — *Podiceps auritus* L. |
| | — *Podiceps cristatus* L. |
| | — *Podiceps griseigena* BODD. |
| | — *Podiceps nigricollis* BR. |
| | — *Podiceps ruficollis* PALL. |

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|---|---|
| *Quadraceps furvus* (BURM.) | — *Tringa erythropus* PALL. |
| | — *Tringa ochropus* L. * |
| | — *Actitis hypoleucos* L. |
| *Quadraceps junceus* (SCOP.) | — *Vanellus vanellus* L. |
| *Quadraceps phaeonotus* (NITZSCH) | — *Chlidonias nigra* L. |
| | — *Sterna albifrons* L. |
| | — *Sterna hirundo* L. |
| *Quadraceps punctatus* (BURM.) | — *Larus canus* L. |
| | — *Larus ridibundus* L. |
| *Quadraceps sellatus* (BURM.) | — *Sterna hirundo* L. |
| *Quadraceps similis* (GIEB.) | — *Phalacrocorax carbo* L. |
| *Rallicola fulicae* (DENNY) | — *Fulica atra* L. |
| *Rallicola minutus* (NITZSCH) | — *Gallinula chloropus* L. |
| *Rhynonirmus helvolus* (BURM.) | — *Scolopax rusticola* L. |
| *Rhynonirmus scolopacis* (DENNY) | — *Capella gallinago* L. |
| *Saemundssonia gonothorax* (GIEB ) | — *Larus canus* L |
| *Saemundssonia integer* (NITZSCH) | — *Grus grus* L. |
| *Saemundssonia melanocephalus* (BURM.) | — *Chlidonias nigra* L. |
| | — *Sterna albifrons* PALL. |
| | — *Sterna hirundo* L. |
| | — *Sterna macrura* NAUM. |
| *Saemundssonia mülleri* EICH. | — *Larus canus* L. * |
| | — *Larus ridibundus* L. |
| *Saemundssonia temporalis* (GIEB.) | — *Vanellus vanellus* L. |
| *Saemundssonia variabilis* (DENNY) | — *Calidris alpina* L. |
| | — *Calidris minuta* LEISL. |
| *Strigiphilus cursor* (BURM.) | — *Asio flammeus* PONT. |
| *Striphilus rostratus* (BURM.) | — *Tyto alba* SCOP. |
| *Trinoton lituratum* BURM. | — *Anas penelope* L. |
| | — *Anas platyrhynchos* L. |
| | — *Anas querquedula* L. * |
| | — *Anas strepera* L. * |
| *Trinoton querquedulae* (L.) | — *Anas crecca* L. |
| | — *Anas penelope* L. |
| | — *Anas platyrhynchos* L. |
| | — *Anas querquedula* L. |
| | — *Nyroca nyroca* GÜLD. |

A total of 73 species of *Mallophaga* was examined.

## *Mallophaga* atypical of given hosts

Atypical *Mallophaga* occur on birds rather rarely and in small numbers. First of all, they are species common on their typical hosts. This can be easily explained, as the *Mallophaga* that infest one bird abundantly have more chance

of migrating to another bird than those that are scarse and few. Of the total of 317 birds searched for *Mallophaga* 19 exhibited the presence of atypical species. Of the total of 3757 *Mallophaga* collected 169 were atypical, representing 19 species. Among the atypical species collected special attention should be paid to *Pseudomenopon pilosum* (SCOP.), which was being found on atypical hosts more frequently than any other species, and to *Degeeriella fulva* (GIEB.), of which lots were collected from atypical hosts. The occurrence of these two species will be discussed in the faunistic part of this study, in the sections on the *Mallophaga* from their typical hosts. I have noticed some irregularities in the general arrangement of the atypical species, and these are illustrated in Table II. All the atypical *Mallophaga* collected, together with their hosts, are specified in this table in reference to those avian families in which they were previously found, that is to say in reference to their typical hosts. The presence of atypical *Mallophaga* may have been caused by the lack of isolation of the shot birds, or by other factors in the cases, in which I was able to state for certain that the dead birds were separated one from another. The latter fact is marked in Table II and in other places of this work with the sign „+". The following letter symbols are used in the caption of Table II: „a" for the columns comprising the numbers of birds of the given species infested by a definite species of atypical *Mallophaga*, „b" indicates the columns in which these species of atypical *Mallophaga* are specified and „c" the columns with the numbers of individuals of the atypical species of *Mallophaga*.

Atypical *Mallophaga* were most frequently taken from birds of the families *Rallidae*, *Anatidae*, *Podicipidae* and *Falconidae*, and they very often belong to the species that should live on birds of other families such as *Rallidae*, *Charadriidae*, *Anatidae* and *Falconidae*. On the base of my observations these relations would be as follows:

1. *Mallophaga* typical of *Rallidae* tend to migrate to the birds of the family *Anatidae*.
   *Rallidae* are rather often atypical hosts of the *Mallophaga* typical of *Laridae* and *Charadriidae*.
2. *Mallophaga* typical of *Anatidae* tend to migrate to the birds of the families *Rallidae*, *Podicipidae* and *Falconidae*.
   *Anatidae* are rather often atypical hosts of the *Mallophaga* typical of *Rallidae* and *Charadriidae*.
3. *Mallophaga* typical of *Falconidae* tend to migrate to the birds of the families *Pidicipidae* and *Strigidae*.
   *Falconidae* are rather often atypical hosts of the *Mallophaga* typical of *Anatidae*.
4. *Mallophaga* typical of *Charadriidae* tend to migrate to the birds of the families *Rallidae*, *Anatidae* and *Podicipidae*. No tendency to receive *Mallophaga* from other avian families has been noticed in the birds of the family *Charadriidae*.

5. No tendency to migrate to other birds has been found in the *Mallophaga* typical of *Podicipidae*.
   *Podicipidae* are rather often atypical hosts of the *Mallophaga* typical of *Charadriidae*.
6. No more considerable tendency to migrate to other birds has been found in the *Mallophaga* typical of *Laridae*. Similarly the birds of the family *Laridae* rarely receive *Mallophaga* from other birds.

I believe that the explanation of these facts is to be found in the influence exerted upon *Mallophaga* living on different birds by different ecological conditions. These relations are certainly not simple, and only further investigations will render an exhaustive answer and explanation possible.

## IV. FAUNISTIC DISCUSSION OF MALLOPHAGA FROM THE VIEWPOINT OF THEIR PERTAINING AS PARASITES TO PARTICULAR FAMILIES OF BIRDS

### 1. *Mallophaga* from *Ciconiidae*

7 specimens of *Ciconia ciconia* L. from the Milicz region, the Białystok and Lublin Province, Jugoslavia and 1 specimen of *Ciconia nigra* L. from the Wrocław Zoological Garden, were examined for *Mallophaga*.

In spite of a small number of birds examined I succeeded in collecting almost all species of *Mallophaga* typical of these two species of birds. Therefore I think that all these *Mallophaga* are common on their respective species of storks. Unluckily the data from literature, though consistent with one another, are published rarely. Supposedly it is so because storks are seldom searched for parasites, as they are under protection. The composition of the *Mallophaga* population on *Ciconia ciconia* L. varies from that on *C. nigra* L. However, the species of *Mallophaga* that live on *Ciconia nigra* L. are very similar to the respective species from *Ciconia ciconia* L. and constitute their substitutive species.

*Neophilopterus incompletus* (NITZSCH 1818)

34 ♂♂, 39 ♀♀ and 4 juv. found on 7 *Ciconia ciconia* L. This species was present on all the storks examined. It is considered to be a typical parasite of *Ciconia ciconia* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, TULESHKOV 1958 — Bulgaria, SZIDAT 1940, SÉGUY 1944).

*Neophilopterus tricolor* (BURM. 1838)

4 ♂♂ and 14 ♀♀ collected from 1 *Ciconia nigra* L. *Neophilopterus tricolor* (BURM.) is typical of *Ciconia nigra* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1951 — Tadjikistan, TULESHKOV 1958 — Bulgaria, SZIDAT 1940, SÉGUY 1944).

*Colpocephalum zebra* BURM. 1838

8 ♂♂ and 14 ♀♀ examined from 5 specimens of *Ciconia ciconia* L. *Colpocephalum zebra* BURM. is a typical parasite on *Ciconia ciconia* L. (HOPKINS a. CLAY 1952, TULESHKOV 1958 — Bulgaria, SZIDAT 1940, SÉGUY 1944).

*Ciconiphilus quadripustulatus* (BURM. 1838)

19 ♂♂, 63 ♀♀ and 19 juv. taken from 2 *Ciconia ciconia* L. from Radziądz near Milicz on 13. VIII. 1955. Both birds were infested by *Mallophaga* so heavily that a total of 85 specimens of various species was collected from one bird and as many as 135 from the other. *Ciconiphilus quadripustulatus* (BURM.) is typical of *Ciconia ciconia* L. (HOPKINS a. CLAY 1952, SZIDAT 1940, SÉGUY 1944).

*Ardeicola ciconiae* (L. 1758)

3 ♂♂, 8 ♀♀ and 1 juv. obtained from 4 *Ciconia ciconia* L. *Ardeicola ciconiae* (L.) is a typical species on *Ciconia ciconia* L. (HOPKINS a. CLAY 1952, TULESHKOV 1958 — Bulgaria, SZIDAT 1940, SÉGUY 1944). Besides, SÉGUY (1944) recorded it from *Ciconia nigra* L., *C. leucocephala* [1] and *Mycteria crumenifera*.

*Ardeicola maculatus* (NITZSCH 1866)

1 ♀ found on *Ciconia nigra* L. This species is reported to be typical of *Ciconia nigra* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, TULESHKOV 1958 — Bulgaria). SÉGUY (1944) should be mentioned here as well, because he considers the species *Ardeicola maculatus* (NITZSCH) to be the synonym of *Ardeicola ciconiae* (L.) and records it from *Ciconia nigra* L.

*Mallophaga* atypical of *Ciconiidae*

*Degeeriella fulva* (GIEB. 1874)

syn. *Nirmus fuscus* NITZSCH 1861, nec *Nirmus fuscus* DENNY 1842.

8 ♂♂, 33 ♀♀ and 8 juv. collected from 2 specimens of *Ciconia ciconia* L. from Radziądz near Milicz on 13. VIII. 1955. Fig. 2. *Degeeriella fulva* (GIEB.) is a typical parasite on *Aquila chrysaëtos* L. (HOPKINS a. CLAY 1952) [2].

It is curious that some dozens of *Mallophaga* of the species *Degeeriella fulva* (GIEB.) were present on two storks which did not come into contact with each other or with any other birds after their being shot. The occurrence of this species on storks is an exceptional phenomenon, since it was not found

[1] I do not give the names of the authors that described this species and any others, if they were not mentioned in the sources from which information was taken.

[2] I identify the species of *Mallophaga* as typical of given birds according to the list made by HOPKINS and CLAY (1952).

on several other storks that I collected in different regions of Poland. In view of this the question of the permanent occurrence of *Degeeriella fulva* (GIEB.) on *Ciconia ciconia* L. is still open. Besides my observations, the presence of *Degeeriella fulva* (GIEB.) on storks has not been recorded in literature.

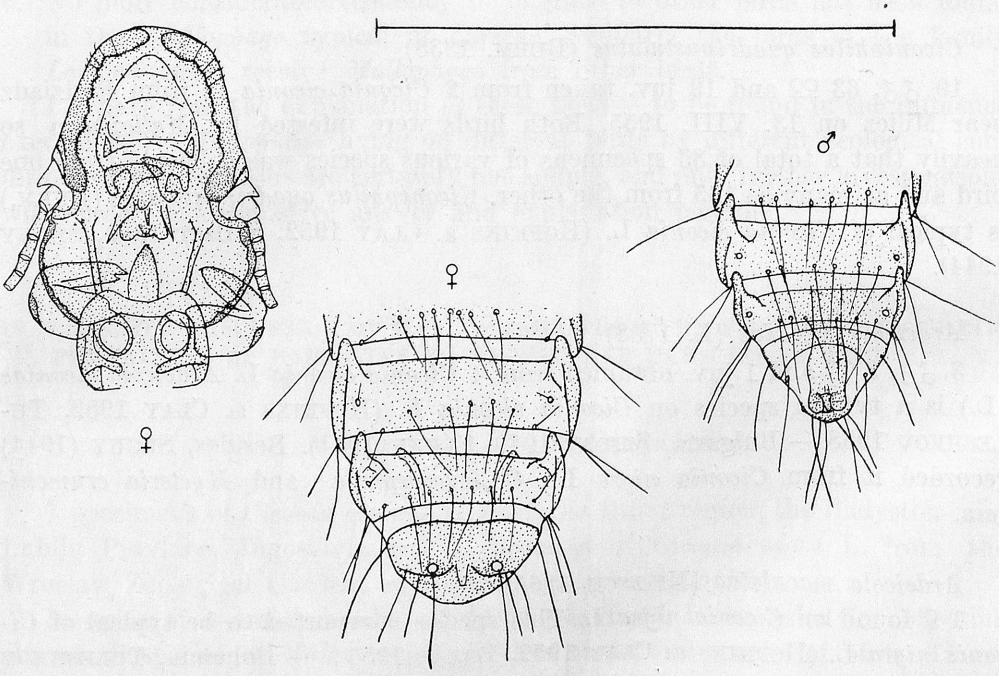


Fig. 2. *Degeeriella fulva* (GIEB.) (head, terminal abdominal segments of male and female) from *Ciconia ciconia* L., Radziądz, 13. VII. 1955. Scale length = 1 mm.

I have already written about finding *Degeeriella fulva* (GIEB.) on *Ciconia ciconia* L. and on *Asio flammeus* PONT. (ZŁOTORZYCKA 1959 b). Then I called the species *Degeeriella fulva* (GIEB.) by the name of *Degeeriella fusca* (DENNY 1842). The error resulted from my relying upon the monography by SÉGUY (1944) who synonymized *Degeeriella fulva* (GIEB.) with *Degeeriella fusca* (DENNY). It was only when the revision of the *Mallophaga* genus *Degeeriella* from *Falconiformes* was published (CLAY 1958) that I was able to designate *Degeeriella fulva* (GIEB.) correctly.

## 2. *Mallophaga* from *Plegadiidae*

Mallophaga from 4 specimens of *Platalea leucorodia* L. were examined. The material consisted of the species *Ibidoecus plataleae* (DENNY) only.

*Ibidoecus plataleae* (DENNY 1842)

In my collection there are 2 ♂♂ and 1 ♀ from 2 *Platalea leucorodia* L. from the Lublin region, 19. IV. 1950, as well as 2 ♂♂ and 2 ♀♀ from 2 *Platalea leucorodia* L. from Jugoslavia (Cerkno), 14. XI. 1956.

This species is a typical parasite of *Platalea leucorodia* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, BLAGOVESHCHENSKY 1951 — Tadjikistan, TULESHKOV 1958 — Bulgaria, SÉGUY 1944). In addition, SÉGUY (1944) records it from *Ibis religiosa* and *Anas platyrhynchos* L.

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### 3. *Mallophaga* from *Ardeidae*

*Mallophaga* were collected from 4 specimens of *Ardea cinerea* L. and 6 specimens of *Botaurus stellaris* L. from tde Wrocław, Lublin and Białystok Provinces. These species, like storks, have a characteristic fauna of *Mallophaga*. *Ciconiphilus decimfasciatus* (BOIS. et LAC.) turned out to be the commonest species on *Ardea cinerea* L., whereas *Ardeicola stellaris* (DENNY) was the commonest on *Botaurus stellaris* L. Both these species were found on all the specimens of the respective hosts.

*Ardeicola stellaris* (DENNY 1842)

10 ♂♂, 71 ♀♀ and 12 juv. collected from 6 *Botaurus stellaris* L. A large number of females by comparison with males is considerable in this collection. *Ardeicola stellaris* (DENNY) is a typical parasite of *Botaurus stellaris* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, TULESHKOV 1958 — Bulgaria, SÉGUY 1944 — Holland).

*Ardeiphilus trochioxus* (BURM. 1838)

3 ♀♀ obtained from a *Botaurus stellaris* L. This species is known to be typical of *Botaurus stellaris* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, TULESHKOV 1958 — Bulgaria, SÉGUY 1944). Besides, SÉGUY (1944) records it from *Ardea purpurea* L. and *A. russata*.

*Ciconiphilus decimfasciatus* (BOIS. et LAC. 1835)

10 ♂♂, 14 ♀♀ and 13 juv. from 4 *Ardea cinerea* L. are in my possession. This species is considered typical of *Ardea cinerea* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1940 — Talysh, 1948 — Barabinsk Lake, TULESHKOV 1958 — Bulgaria, SÉGUY 1944). In addition, it is known also from *Egretta garzetta* L. (BLAGOVESHCHENSKY 1940 — Talysh, SÉGUY 1944), *Nycticorax nycticorax* L., *Ixobrychus minutus* L., *Demiegretta jugularis*, *Sterna bergii*, *S. melanauchen* (SÉGUY 1944).

### *Mallophaga* atypical of *Ardeidae*

*Anatoecus dentatus* (SCOP.) typical of *Anas platyrhynchos* L. 1 ♂ found on an *Ardea cinerea* L.

## 4. *Mallophaga* from *Gruidae*

*Mallophaga* were taken from 2 specimens of *Grus grus* L. from the Warsaw Zoological Garden. It is noteworthy that all the species of *Mallophaga* known from *Grus grus* L. were accumulated on so poor material of birds. The exceptionality of this phenomenon is emphasized by my earlier observations, which confirmed the quantitative and qualitative poverty of *Mallophaga* on the birds reared in captivity; these birds, as a rule, were infested only by their most typical and common *Mallophaga* species (ZŁOTORZYCKA 1959 b).

*Saemundssonia integer* (NITZSCH 1866)

4 ♂♂, 11 ♀♀ and 2 juv. collected from 2 *Grus grus* L. *Saemundssonia integer* (NITZSCH) is a typical parasite of *Grus grus* L. (HOPKINS a. CLAY 1952, BALÁT 1956 — Slovakia, 1958 — Hungary, SÉGUY 1944). Besides, SÉGUY (1944) records this species from *Grus novae-hollandiae*.

*Esthiopterum gruis* (L. 1758)

2 ♂♂ and 6 ♀♀ from 2 *Grus grus* L. examined. This species is typical of *Grus grus* L. (HOPKINS a. CLAY 1952, BALÁT 1956 — Slovakia, SÉGUY 1944). In addition, SÉGUY (1944) found this species on *Balearica pavonina* L., *Grus antigone* L. and *Anas platyrhynchos* L.

*Gruimenopon longum* (GIEB. 1874)

2 ♂♂ and 6 ♀♀ taken from a *Grus grus* L. This species is typical of *Grus grus* L. (HOPKINS a. CLAY 1952, BALÁT 1956 — Slovakia, SÉGUY 1944 — under the synonym *Colpocephalum atrofasciatum* PIAG. 1880). SÉGUY (1944) records it also from *Grus antiqua*.

*Heleonomus macilentus* (NITZSCH 1866)

2 ♂♂ and 2 ♀♀ from 1 *Grus grus* L. are in my possession. This species is a typical parasite of *Grus grus* L. (HOPKINS a. CLAY 1952, SÉGUY 1944 — under the synonym *Colpocephalum truncatum* PIAG. 1880). Then it is recorded by SÉGUY (1944) from *Grus carunculata* and *G. mexicana*.

*Mallophaga* atypical of *Gruidae*

*Pseudomenopon pilosum* (SCOP.) typical of *Fulica atra* L. 1 ♀ found on *Grus grus* L.

## 5. *Mallophaga* from *Rallidae*

40 specimens of *Fulica atra* L. and 5 of *Gallinula chloropus* L. from the Wrocław, Koszalin, Białystok Province and Jugoslavia, were searched for *Mallophaga*. The *Mallophaga* fauna from both these species is generally rich in number

as well as in species. *Fulica atra* L. and *Gallinula chloropus* L. have very similar species of *Mallophaga*, i. e. the common species *Pseudomenopon pilosum* (Scop.) and the remaining ones appropriately substitutive for each other.

*Pseudomenopon pilosum* (Scop. 1763)
syn. *Pseudomenopon tridens* (Burm. 1838).

78 ♂♂, 79 ♀♀ and 23 juv. collected from 31 *Fulica atra* L., 3♂♂, 4 ♀♀ and 2 juv. from 3 *Gallinula chloropus* L., 9 ♂♂ and 64 ♀♀ from 7 *Podiceps*

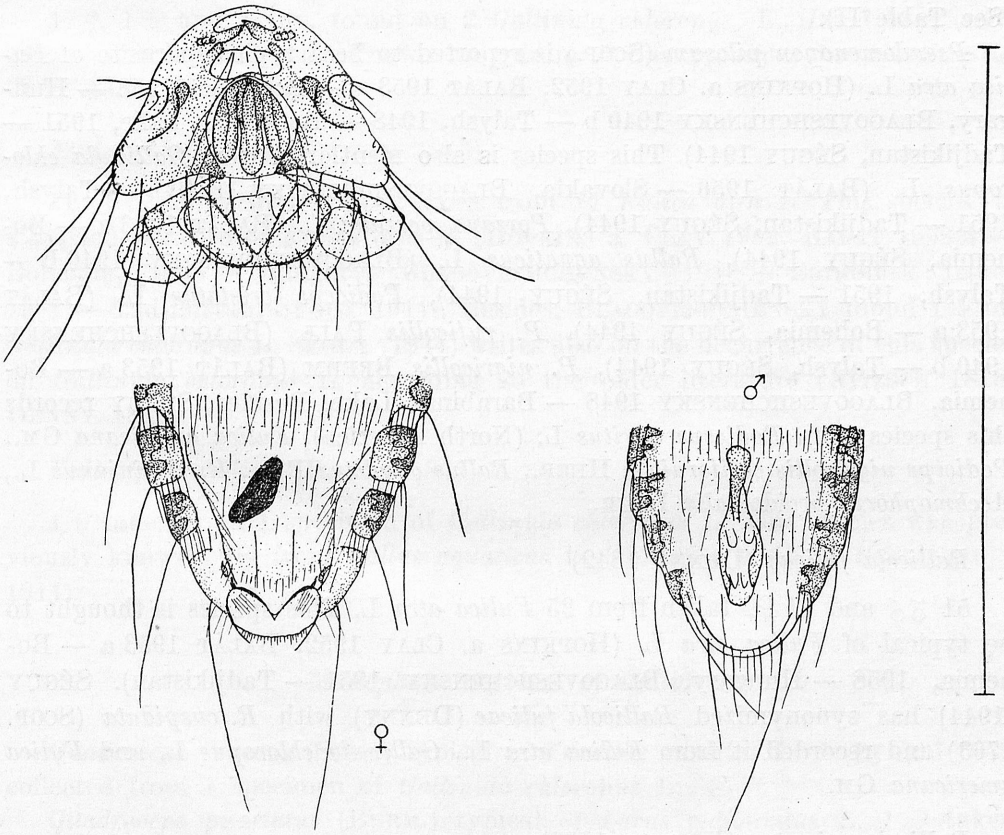



Fig. 3. *Pseudomenopon pilosum* (Scop.) (head, terminal abdominal segments of male and female) from *Anas platyrhynchos* L. Sominy, 2. IX. 1957. Scale length = 1 mm.

*cristatus* L., 5 ♂♂, 10 ♀♀ and 3 juv. from 2 *Podiceps nigricollis* Brehm, 2 ♀♀ from 1 *Podiceps auritus* L., 1 ♂ and 2 ♀♀ from 3 *Podiceps griseigena* Bodd. and 4 ♀♀ from 4 *Podiceps ruficollis* Pall. Besides, 6 ♂♂ and 7 ♀♀ were found on 5 specimens of *Anas platyrhynchos* L. (Fig. 3).

Living on birds pertaining to different orders *(Podicepedes* and *Ralli) Pseudomenopon pilosum* (Scop.) is an interesting exception. When considering the reasons for this fact, I have come to believe that it lived originally on birds

of *Ralidae* and subsequently spread over the family *Podicipidae*. I assume *Rallidae* as primary hosts, because *Pseudomenopon pilosum* (SCOP.) occurs on them more frequently than on the birds of the family *Podicipidae*. I consider it possible that the expansion of this *Mallophaga* species over *Podicipidae* took place relatively not long ago, as no substitutive species has had time to develop since. Therefore it might be supposed that *Pseudomenopon pilosum* (SCOP.) tends to spread over other species of birds and shows an aptitude for adaptation to various ecological conditions. This is supported by the fact that it used to be found on mallards (*Anas platyrhynchos* L.) from the Pomorze Lake District (Bytów region) and often singly on other avian species. (See Table II).

*Pseudomenopon pilosum* (SCOP.) is reported to be a typical parasite of *Fulica atra* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1958 — Hungary, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944). This species is also mentioned from *Gallinula chloropus* L. (BALÁT 1956 — Slovakia, BLAGOVESHCHENSKY 1940 b — Talysh, 1951 — Tadjikistan, SÉGUY 1944), *Porzana porzana* L. (BALÁT 1953 a — Bohemia, SÉGUY 1944), *Rallus aquaticus* L. (BLAGOVESHCHENSKY 1940 b — Talysh, 1951 — Tadjikistan, SÉGUY 1944), *Podiceps cristatus* L. (BALÁT 1953 a — Bohemia, SÉGUY 1944), *P. ruficollis* PALL. (BLAGOVESHCHENSKY 1940 b — Talysh, SÉGUY 1944), *P. nigricollis* BREHM (BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake. Besides, SÉGUY records this species from *Podiceps auritus* L. (North America), *Fulica americana* GM., *Podiceps nigricollis californicus* HEER., *Rallus obsoletus* RID., *R. virginianus* L., *Aechmophorus occidentalis* LAUR.

*Rallicola fulicae* (DENNY 1842)

51 ♂♂ and 91 ♀♀ taken from 25 *Fulica atra* L. This species is thought to be typical of *Fulica atra* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1958 — Hungary, BLAGOVESHCHENSKY 1951 — Tadjikistan). SÉGUY (1944) has synonymized *Rallicola fulicae* (DENNY) with *R. cuspidata* (SCOP. 1763) and recorded it from *Fulica atra* L., *Gallinula chloropus* L. and *Fulica americana* GM.

*Rallicola minutus* (NITZSCH 1866)
syn. *Rallicola parvulus* (PIAG. 1880)

9 ♂♂ and 1 ♀ obtained from 2 *Gallinula chloropus* L. *Rallicola minutus* (NITZSCH) is a typical species on *Gallinula chloropus* L. (HOPKINS a. CLAY 1952, SÉGUY 1944).

*Incidifrons fulicae* (L. 1758)
syn. *Incidifrons pertusus* (BURM. 1838)

7 ♂♂, 11 ♀♀ and 9 juv. collected from 16 *Fulica atra* L. *Incidifrons fulicae* (L.) is known to be typical of *Fulica atra* L. (HOPKINS a. CLAY 1952, BALÁT

1953 a — Bohemia, 1958 — Hungary, BLAGOVESHCHENSKY 1940 b — Talysh 1948 — Barabinsk Lake, SÉGUY 1944). Moreover, BLAGOVESHCHENSKY distinguishes *Incidifrons pertusus gallinulae* BLAG. (1951 — Tadjikistan) from *Gallinula ch. chloropus* L. and *I. p. porzanae* BLAG. (1951 — Tadjikistan) from *Porzana parva* SCOP. In addition, SÉGUY (1944) mentions *Incidifrons fulicae* (L.) from the following birds of California: *Fulica americana* GM., *Erismatura rubida* WILS. and *Podiceps nigricollis californicus* HEER.

*Incidifrons ralli* (SCOP. 1772)
syn. *Incidifrons ralli* (DENNY 1842)

1 ♂, 1 ♀ and 1 juv. found on 2 *Gallinula chloropus* L. *Incidifrons ralli* (SCOP.) has been hitherto known only from *Rallus aquaticus* L. (HOPKINS a. CLAY 1952, SÉGUY 1944).

*Fulicoffula lurida* (NITZSCH 1818)

11 ♂♂, 23 ♀♀ and 1 juv. taken from 14 *Fulica atra* L. This species is a typical parasite of *Fulica atra* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1958 — Hungary, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944). Besides, BLAGOVESHCHENSKY found 1 ♀ on *Gallinula chloropus* L. SÉGUY (1944) writes also on the occurrence of this species on *Gallinula chloropus* L. according to the older literature (NITZSCH 1818, DENNY 1842).

*Fulicoffula rallina* (DENNY 1842)

1 ♀ taken from 1 specimen of *Gallinula chloropus* L. This species was previously known only from *Rallus aquaticus* L. (HOPKINS a. CLAY 1952, SÉGUY 1944).

## *Mallophaga* atypical of *Rallidae*

*Quadraceps junceus* (SCOP.) typical of *Vanellus vanellus* L. 3 ♂♂ and 6 ♀♀ collected from 1 specimen of *Gallinula chloropus* L. +

*Quadraceps punctatus* (BURM.) typical of *Larus ridibundus* L. 1 ♀ taken from a *Fulica atra* L.

*Aquanirmus colymbinus* (SCOP.) typical of *Podiceps auritus* L. 1 ♀ taken from a *Fulica atra* L. +

*Austromenopon ridibundus* (DENNY) typical of *Larus ridibundus* L. 2 ♂♂ and 3 ♀♀ collected from 1 specimen of *Fulica atra* L. and 1 ♀ from a *Gallinula chloropus* L.

*Actornithophilus affinis* (NITZSCH) typical of *Tringa erythropus* PALL. 1 ♀ found on a *Fulica atra* L. +

*Actornithophilus ochraceus* (NITZSCH) typical of *Vanellus vanellus* L. 8 ♂♂ and 3 ♀♀ collected from 1 specimen of *Gallinula chloropus* L. +

*Trinoton querquedulae* (L.) typical of *Anas crecca* L. 1 ♀ obtained from a *Fulica atra* L.

*Anatoecus dentatus* (SCOP.) typical of *Anas platyrhynchos* L. 1 ♂ and 7 ♀♀ collected from 2 *Gallinula chloropus* L.

## 6. *Mallophaga* from *Charadriidae*

8 specimens of *Vanellus vanellus* L., 1 of *Scolopax rusticola* L., 3 of *Capella gallinago* L., 1 of *Limicola falcinellus* PONT., 4 of *Actitis hypoleucos* L., 1 of *Calidris minuta* LEISL. and 1 of *Calidris alpina* L. from the Wrocław, Warszawa, Koszalin Provinces and Jugoslavia, were examined for *Mallophaga*. In spite of such poor material I have obtained from it a rather wide range of *Mallophaga* species.

*Quadraceps junceus* (SCOP. 1763)

19 ♂♂ and 12 ♀♀ collected from 7 *Vanellus vanellus* L. This species is generally known to be typical of *Vanellus vanellus* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944). SÉGUY (1944) records here also *Tringa nebularia* GÜNN. and *Cygnus cygnus* L. as casual hosts.

*Quadraceps furvus* (BURM. 1838)

5 ♂♂ and 8 ♀♀ found on 2 *Tringa erythropus* PALL., 2 ♀♀ on 1 *Tringa ochropus* L., 10 ♂♂, 13 ♀♀ and 1 juv. on 4 *Actitis hypoleucos* L. *Quadraceps furvus* (BURM.) is reported to be a typical parasite of *Tringa erythropus* PALL. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, SÉGUY 1944). Besides, it is recorded from *Tringa totanus* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Tringa nebularia* GÜNN., *Arenaria interpres* L., *Vanellus vanellus* L., *Actitis hypoleucos* L., *Charadrius dubius* SCOP., *Ch. alexandrinus* L. (Italy), *Ch. geoffroi* WAGL. (Italy), *Himantopus himantopus* L. (Italy), *Phalaropus tricolor* VIEILL. (U. S. A.), *Actitis macularia* L. (Panama), *Vanellus cayennensis* GM. (Surinam), *Glareola orientalis* LEACH. from Formosa (SÉGUY 1944). As results from the data above, *Quadraceps furvus* (BURM.) being a substitutive species to *Quadraceps junceus* (SCOP.) has a wider distribution than the latter, because it occurs on several species of the genus *Tringa*.

*Rhynonirmus scolopacis* (DENNY 1842)
syn. *Esthiopterum emarginatum* PIAG. 1880

1 ♂ and 8 ♀♀ from 3 specimens of *Capella gallinago* L. examined. This species is known to be a typical parasite of *Capella gallinago* L. (HOPKINS a. CLAY

1952, BALÁT 1958 — Hungary, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944). SÉGUY (1944) records it as well from *Phalaropus lobatus* L., *Gallinago delicata* ORD., *Larus pipixcan* WAGL. (U. S. A. Nebraska) and *Tringa ochropus* L.

*Rhynonirmus helvolus* (BURM. 1838)

9 ♂♂, 9 ♀♀ and 2 juv. obtained from one specimen of *Scolopax rusticola* L. This is the substitutive species of *Rhynonirmus scolopacis* (DENNY). *Rhynonirmus helvolus* (BURM.) has been known only from *Scolopax rusticola* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, SÉGUY 1944).

*Lunaceps holophaeus* (BURM. 1838)

7 ♂♂ and 6 ♀♀ collected from 1 *Limicola falcinellus* PONT., 3 ♂♂ and 4 ♀♀ from 1 *Calidris minuta* LEISL. *Lunaceps holophaeus* (BURM.) has not been L. hitherto recorded from *Limicola falcinellus* PONT. and *Calidris minuta* LEIS However, it is wide-spread in the family *Charadriidae* and I believe it is also characteristic of *Calidris minuta* LEISL. and *Limicola* PONT.

*Lunaceps holophaeus* (BURM.) is known to be typical of *Philomachus pugnax* L. (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944). Besides, it is recorded from *Numenius arquata* L. (BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, SÉGUY 1944), *Limosa limosa* L. (BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake), *Calidris alpina* L. (BLAGOVESHCHENSKY 1940 b — Talysh), *Erolia temmincki* LEISL., *Terekia cinerea* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake) *Calidris canutus* L., *Arenaria interpres* L. and *Charadrius dubius* SCOP. (SÉGUY 1944).

*Carduiceps cingulatus* (DENNY 1842)

15 ♂♂ and 19 ♀♀ taken from 1 *Calidris minuta* LEISL. and 1 ♂ from *Calidris alpina* L. This species is acknowledged to be a typical parasite of *Limosa limosa* L. (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, SÉGUY 1944). SÉGUY (1944) mentions it also from *Limosa lapponica* L., *Philomachus pugnax* L., *Crocethia alba* PALL., *Calidris minuta* LEISL. and *Vanellus vanellus* L.

*Saemundssonia temporalis* (GIEB. 1874)

2 ♂♂, 3 ♀♀ and 2 juv. collected from 5 *Vanellus vanellus* L. Only single specimens were found on these birds, although they were easily caught because of their small mobility. *Saemundssonia temporalis* (GIEB.) is typical of *Vanellus vanellus* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1958 — Hun-

gary, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944). In addition, SÉGUY (1944) records it from *Charadrius hiaticula* L., *Tringa erythropus* PALL., *Actitis hypoleucos* L. and *Crocethia alba* PALL.

*Saemundssonia variabilis* (DENNY 1842)

3 ♀♀ found on 1 *Calidris minuta* LEISL. and 1 ♀ on *Calidris alpina* L. This species is typical of *Calidris alpina* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, SÉGUY 1944). BALÁT (1953 a — Bohemia) records it also from *Calidris ferruginea* PONT. and *C. minuta* LEISL.

*Actornithophilus ochraceus* (NITZSCH 1818)

14 ♂♂, 15 ♀♀ and 1 juv. obtained from 4 *Vanellus vanellus* L. HOPKINS a. CLAY (1952) record *Actornithophilus ochraceus* (NITZSCH) as a typical parasite of *Pluvialis oreophilus* MEIN. Besides, it is known from *Vanellus vanellus L.* (BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, SÉGUY 1944), *Vanellus varius* and *Sterna nilotica* GM. (SÉGUY 1944). BLAGOVESHCHENSKY (1951 — Tadjikistan) distinguished *Actornithophilus ochraceus himantopi* BLAG. on *Himantopus himantopus* L. As can be seen from above, *Actornithophilus ochraceus* (NITZSCH) is also a typical parasite on *Vanellus vanellus* L.

*Actornithophilus lyallpurensis* ANSARI 1956

4 ♂♂ and 3 ♀♀ collected from 1 *Tringa ochropus* L. This species is considered typical of *Tringa ochropus* L. (ANSARI 1956 — Panjab).

*Actornithophilus affinis* (NITZSCH 1874)

1 ♂, 1 ♀ and 1 juv. collected from 1 *Tringa erythropus* PALL. This species is considered typical of *Tringa erythropus* PALL. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, SÉGUY 1944). Further, it is known from *Tringa ochropus* L. (CLAY 1951, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944), *T. glareola* L., *T. nebularia* GUNN., *T. totanus* L. (BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *T. stagnatilis* BECHST. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake) and from *T. latirostris* (SÉGUY 1944).

*Actornithophilus spinulosus* (PIAG. 1880)

1 ♂ taken from a *Calidris minuta* LEISL. This species has been hitherto unknown from *Calidris minuta* LEISL. but from *Limosa limosa* L. (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, SÉGUY 1944). Besides, SÉGUY (1944) records it from *Crocethia alba* PALL. and *Arenaria interpres* L. (Europe, Japan, India, China, Australia, Africa, Chile).

*Austromenopon nigropleurum* (DENNY 1842)

2 ♀♀ found on 1 *Tringa erythropus* PALL. *Austromenopon nigropleurum* (DENNY) is known to be typical of *Alca torda* L. (HOPKINS a. CLAY 1952, SÉGUY 1944, TIMMERMANN 1954). It is also recorded by SÉGUY (1944) from *Philomachus pugnax* L., *Tringa totanus* L., *Numenius arquata* L. and *Rissa tridactyla* L. *Austromenopon nigropleurum* (DENNY) has not been hitherto recorded from *Tringa erythropus* PALL. Being found on as remote orders as *Laro-Limicolae* and *Alcae* it is a noteworthy exception.

*Austromenopon durisetosum* (BLAG. 1948)

2 ♀♀ taken from 1 specimen of *Capella gallinago* L. This species is known only from *Capella gallinago* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake).

*Austromenopon icterum* (BURM. 1838)

3 ♂♂ and 5 ♀♀ collected from 1 *Scolopax rusticola* L. from the Wrocław region, 26. III. 1957. This species is known only from *Scolopax rusticola* L. (HOPKINS a. CLAY 1952, CLAY 1959, SÉGUY 1944). Only the female of *Austromenopon icterum* (BURM.) has been hitherto described.

Description of the male *Austromenopon icterum* (BURM.) (Fig. 4): *Austromenopon icterum* (BURM.) is a species closely related to *Austromenopon durisetosum* (BLAG.) so that CLAY (1959) gave one description for both the species in his key to the genus *Austromenopon*. They differ from each other chiefly by their body measurements which are as follows:

Measurements of *Austromenopon icterum* (BURM.) ♂, in mm.

| Individuals examined | Body | | Head | |
|---|---|---|---|---|
| | Length | Width | Length | Width |
| 1 | 1.55 | 0.65 | 0.31 | 0.55 |
| 2 | 1.62 | 0.56 | 0.27 | 0.54 |
| 3 | 1.55 | 0.56 | 0.27 | 0.53 |

For comparison the measurements (in mm.) of a male *Austromenopon durisetosum* (BLAG.) according to BLAGOVESHCHENSKY (1948) are given below.

Body length — 1.39
Body width — 0.57
Head length — 0.26
Head width — 0.46

The body measurements of the male *Austromenopon icterum* (BURM.) are somewhat larger than those of the male *Austromenopon durisetosum* (BLAG.).

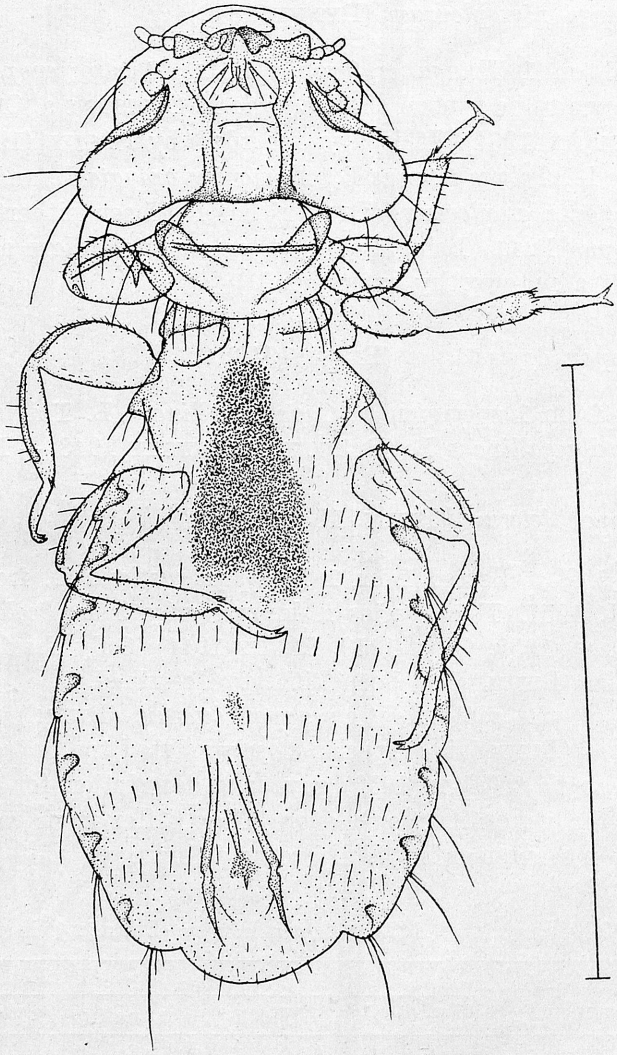


Fig. 4. *Austromenopon icterum* (BURM.) ♂ from *Scolopax rusticola* L., Kotowice, 25. III. 1957. Scale length = 1 mm.

The differences, in mm., are as follows:

Difference in body length — 0.16—0.23
Difference in body width — 0.08—0
Difference in head length — 0.05—0.01
Difference in head width — 0.09—0.07

The male *Austromenopon icterum* (BURM.) is considerably smaller than the females examined by me, whose measurements (in mm.) are presented below.

| Individuals examined | Body | | Head | |
|---|---|---|---|---|
| | Length | Width | Length | Width |
| 1 | 1.96 | 0.84 | 0.34 | 0.67 |
| 2 | 2.16 | 0.80 | 0.30 | 0.61 |
| 3 | 2.01 | 0.87 | 0.34 | 0.63 |
| 4 | 2.19 | 0.81 | 0.32 | 0.65 |
| 5 | 1.96 | 0.84 | 0.31 | 0.63 |

The average differences in the measurements of the males and the females of *Austromenopon icterum* (BURM.) examined by me are, in mm., as follows:

Difference in body length — 0.50
Difference in body width — 0.24
Difference in head length — 0.04
Difference in head width — 0.10

The male *Austromenopon icterum* (BURM.) is far less pigmented than the female and it is pale yellow. The setulae, which cover its body, are lighter and thinner. The ninth abdominal segment is rounded and smaller than the eighth segment. Contrary to the female, the male has no ciliated membrane at the end of the ninth abdominal segment. The penis with paramers is delicately framed and visible in segments VI—IX.

*Austromenopon lutescens* (BURM. 1838)

4 ♀♀ found on 1 specimen of *Calidris alpina* L. This species is considered to be typical of *Philomachus pugnax* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944). Besides, it has been recorded from *Vanellus vanellus* L. (BALÁT 1953 a — Bohemia, 1958 — Hungary, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944), *Tringa glareola* L. (BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *T. ochropus* L., *T. nebularia* GUNN., *T. stagnatilis* BECHST. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *T. totanus* L. (BALÁT 1953 a. — Bohemia, 1958 — Hungary, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *T. erythropus* PALL., *Actitis hypoleucos* L. (BALÁT 1953 a — Bohemia), *Calidris alpina* L. (BALÁT 1953 a — Bohemia, SÉGUY 1944), *C. canuta* L., *C. minuta* LEISL., *Capella gallinago* L., *Charadrius dubius* SCOP., *Limicola falcinellus* PONT. (BALÁT 1953 a — Bohemia), *Phalaropus lobatus* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944), *Terekia cinerea* GULD. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Alca torda* L., *Charadrius dubius curonicus* GM., *Haematopus ostralegus* L., *Numenius linneatus* (SÉGUY 1944).

As results from above, *Austromenopon lutescens* (BURM.) exhibits a remarkably wide distribution within the large family *Charadriidae*.

*Mallophaga* atypical of *Charadriidae*

*Austromenopon ridibundus* (DENNY) typical of *Larus ridibundus* L. 1 ♂ and 1 ♀ collected from 1 specimen of *Vanellus vanellus* L. +

## 7. *Mallophaga* from *Laridae*

16 specimens of *Larus ridibundus* L., 3 of *Larus canus* L., 6 of *Sterna hirundo* L., 1 of *Sterna macrura* NAUM., 1 of *Sterna albifrons* PALL. and 4 of *Chlidonias nigra* L. from the Wrocław, Koszalin, Gdańsk Provinces and Jugoslavia, were searched for *Mallophaga*.

From the viewpoint of systematics the *Mallophaga* fauna from *Laridae* is related to that from *Charadriidae*. The following genera of *Mallophaga* have been recorded from both these families: *Saemundssonia*, *Quadraceps*, *Austromenopon* and *Actornithophilus*. This proves a close relationship between the hosts representing the families *Charadriidae* and *Laridae*. Besides, these families are reckoned in the common order *Laro-Limicolae*.

*Saemundssonia melanocephalus* (BURM. 1838)

3 juv. from 6 *Sterna hirundo* L., 1 ♂ and 4 ♀♀ from 1 *Sterna macrura* NAUM., 2 ♀♀ and 5 juv. from 1 *Sterna albifrons* PALL., 9 ♂♂, 6 ♀♀ and 1 juv. from 3 *Chlidonias nigra* L. *Saemundssonia melanocephalus* (BURM.) is considered to be a typical parasite of *Sterna albifrons* PALL. (HOPKINS a. CLAY 1952, WARD 1953 — South Caroline, Cuba, West Indies, Bahama Is., Acklin I., Grand Caios I.). Further, this species is mentioned from *Sterna hirundo* L. and *Larus ridibundus* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944). In addition, SÉGUY (1944) records it from *Sterna sandvicensis* LATH., *S. fuscata* L., *S. hirundinacea*, *S. gracilis*, *S. bergi*, *S. forsteri*, *S. maxima*, *S. vittata* GM., *Hydropogne tschegrava* LEP., *Hydrochelidon leucoptera* TEM., *Chlidonias nigra* L., *Pagophila eburnea* PHIP., *Larus cirrhocephalus*, *Anous galapagensis*, *Stercorarius parasiticus* L., *S. pomarinus* TEM., *Creagrus furcatus*, *Oidemia* sp., *Pagodroma nivea*, *Nesiomimus macdonaldi*, *Thalassoeca antarctica*, *Chionis alba* and *Tringa* sp.

Unfortunately SÉGUY does not give any geographic data concerning the occurrence of the birds mentioned as well as the authors of many of the bird species. Basing on the data of BURMEISTER (1838) he literally quotes the latter's opinion that *Saemundssonia (Docophorus) melanocephalus* (BURM.) lives „on many species of *Larus* and *Sterna*".

*Saemundssonia gonothorax* (GIEB. 1874)

8 ♂♂, 10 ♀♀ and 30 juv. taken from 1 specimen of *Larus canus* L. This species is considered typical of *Larus marinus* L. (HOPKINS a. CLAY 1952, SÉ-

GUY 1944), besides, it is recorded from *Larus ridibundus* L. (BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *Larus cachinans* PALL., *L. canus* L. (BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake), *Larus taimyrensis* BUT., *L. ichthyaëtus* PALL., *L. minutus* PALL., (BLAGOVESHCHENSKY 1948 — Barabinsk Lake)[1], *Rissa tridactyla policaris* STEJN., *Xema sabini tschuktschorum* PORT., *Larus hyperboreus pallidissimus* PORT. (BLAGOVESHCHENSKY 1958 — Wrangel Lake), *Sula alba* L., *Rissa tridactyla policaris* STEJN. (California), *Creagrus furcatus* (Galapagos), *Tringa islandica* and *Megalestris maccormicki* (SÉGUY 1944). Moreover, SÉGUY (1944) reports in general that *Saemundssonia gonothorax* (GIEB.) is known from 25 other species of *Larus*.

*Saemundssonia mülleri* EICHLER 1942
syn. *Docophorus lari* MÜLLER 1927

66 ♂♂, 88 ♀♀ and 13 juv. obtained from 14 *Larus ridibundus* L. and 17 ♂♂, 11 ♀♀, 4 juv. from 2 *Larus canus* L. This species is known to be a typical parasite of *Larus ridibundus* L. (HOPKINS a. CLAY 1952, BALÁT 1958 — Hungary).

*Quadraceps punctatus* (BURM. 1838)

1 ♂, 5 ♀♀ and 4 juv. obtained from 5 *Larus ridibundus* L., 5 ♀♀ and 2 juv. from 1 *Larus canus* L. This species is known to be a typical parasite of *Larus ridibundus* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1958 — Hungary, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944). This species is also reported from *Larus ichthyaëtus* PALL. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944), *L. canus major* MIDD. (BLAGOVESHCHENSKY 1940 b — Talysh), *L. cachinnans* PALL., *L. taimyrensis* BUT. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *L. melanocephalus* TEMM., *L. leucophthalmus* TEMM. (Egypt), *L. occidentalis* AUD., *L. delavarensis* ORD. (California), *L. dominicanus* LICHT. (Chile) and *L. heermani* CAN. (SÉGUY 1944).

*Quadraceps phaeonotus* (NITZSCH 1866)

12 ♂♂ and 6 ♀♀ found on 4 *Chlidonias nigra* L., 2 ♂♂ on 1 *Sterna hirundo* L., 4 ♂♂ and 6 ♀♀ on 1 *Sterna albifrons* PALL. This species is known to be typical of *Chlidonias nigra* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohe-

[1] BLAGOVESHCHENSKY (1940 b) considers *Saemundssonia gonothorax* (GIEB.) to be the synonym of *Saemundssonia lari* (FABR.), *S. mülleri* EICH., *S. congener* (GIEB.) and *S. larina* (PIC.).

SÉGUY (1944) synonymizes *Saemundssonia gonothorax* (GIEB.) with *S. lari* (FABR.), *S. congener* (GIEB.), *S. larina* (PIC.); *S. magna* (PIAG.) and *S. breviappendiculata* (PIAG.).

mia, 1956 — Slovakia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944). Besides, it is recorded from *Sterna hirundo* L., *Hydrochelidon leucoptera* TEMM. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Sterna albifrons* PALL., *Chlidonias hybrida* PALL. (*Ch. leucopareius* TEMM.), *Hydrochelidon panagensis* (Italy), *H. surinamensis* GM. (Peru and Panama) and *Phalaropus fulicarius* L. (SÉGUY 1944). SÉGUY (1944) synonymizes *Quadraceps phaeonotus* (NITZSCH) with *Quadraceps anagrapsus* (NITZSCH 1866).

*Quadraceps sellatus* (BURM. 1838)

5 ♂♂ and 9 ♀♀ collected from 4 Sterna hirundo L. This species is regarded as typical of *Sterna hirundo* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944). Further, it is recorded from *Larus ridibundus* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944), *Larus minutus* PALL. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Sterna vittata* GM., *S. sandvicensis* LATH., *Larus fuscus argenteus* BREHM and *Hydropogne tschegrava* LEP. (SÉGUY 1944).

*Austromenopon ridibundus* (DENNY 1842)

5 ♂♂ and 11 ♀♀ found on 3 *Larus ridibundus* L., 1 ♀ on *Larus canus* L. and 1 ♀ on *Sterna hirundo* L. Perhaps the *Mallophaga* found on *Larus canus* L. and *Sterna hirundo* L. occurred on these birds casually, as they have not been known from them with the exception of my specimens and I found only 1 female on either bird.

*Austromenopon ridibundus* (DENNY) is known to be typical of *Larus ridibunds* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944). It is also recorded from *Larus minutus* PALL. (BALÁT 1952 a — Bohemia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Rissa tridactyla* L. and *Larus hyperboreus* (SÉGUY 1944).

*Austromenopon fuscofasciatum* (PIAG. 1880)

1 ♂ and 5 ♀♀ taken from 1 *Sterna hirundo* L. and 1 ♀ from *Chlidonias nigra* L. This species is recognized as typical of *Stercorarius pomarinus* TEMM. (HOPKINS a. CLAY 1952, SÉGUY 1944). SÉGUY (1944) mentions it also from *Sterna hirundo* L. and *S. sandvicensis* LATH.

*Actornithophilus piceus* (DENNY 1842)

1 ♂ obtained from a *Chlidonias nigra* L. This species is judged to be a typical parasite of *Sterna sandvicensis* LATH. (HOPKINS a. CLAY 1952, SÉGUY

1944) and, besides, is recorded from *Chlidonias nigra* L. BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944), from *Sterna hirundo* L., *Hydropogne tschegrava* LEP., *Larus minutus* PALL. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Gelochelidon nilotica* GM., *Sula piscator* L. and *Rissa tridactyla* L. (SÉGUY 1944).

### *Mallophaga* atypical of *Laridae*

*Fulicoffula* sp. typical of *Rallidae*. 1 juv. found on a *Larus ridibundus* L. +

## 8. *Mallophaga* from *Anatidae*

A total of 61 *Anas platyrhynchos* L., 9 *A. querquedula* L., 4 *A. penelope* L., 4 *A. crecca* L., 2 *A. strepera* L., 1 *A. domestica* L., 1 *Nyroca fuligula* L., 4 *N. nyroca* GÜLD., 2 *Bucephala clangula* L., 1 *Anser fabalis* LATH., 1 *A. anser* L., 3 *Cygnopsis cygnoid* L. and 1 *Cygnus cygnus* L. from the Wrocław, Warszawa, Lublin, Katowice, Koszalin, Białystok Provinces and Jugoslavia, was examined for *Mallophaga*.

I realized that, as a rule, all birds of the genera *Anas*, *Nyroca* and *Bucephala* had a uniform fauna of *Mallophaga* as far as its specific composition was concerned, i. e. the same species of *Mallophaga* were present on all these birds, and not the sets of substitutive species, as it is usual within other avian genera. In my opinion the reasons for this may be various.

The presence of such a *Mallophaga* fauna on *Anatidae* may be caused by the ways of living of these birds. It has been known that ducks willingly lead the orphaned young ones of other species of *Anatidae*. Similarly the flocks of ducks are frequently mixed of different species at the migration season. Under such conditions the possibilities of general infestation by *Mallophaga* increase apparently. Nest parasitism in some species of *Anatidae* can be considered as a further factor causing the uniformity of the *Mallophaga* fauna in ducks. Nest parasitism has been stated in *Nyroca ferina* L. (WITKOWSKI 1958). The latest observations made by WITKOWSKI and unpublished as yet are very interesting. On the basis of his observations of duck breeding in the Milicz region he ascertained that the parasite laying eggs in another bird's nest was, as a rule, *Nyroca ferina* L. In about 40% of breedings it lays eggs in the nests of *Nyroca nyroca* GÜLD., and sometimes in those of *Anas platyrhynchos* L. The alien young hatch on condition that the parasitizing duck laid its eggs soon after the host duck had laid its. WITKOWSKI has computed that the cases in which all the young of a mixed clutch hatch are to 40% of the total of mixed egg-layings. So these are not frequent cases, but I believe that they can also contribute to the mixing and the specific unification of *Mallophaga* in ducks.

The *Mallophaga* living on geese *(Anser)* are related to those from ducks. On the other hand, the swans *(Cygnus)* show a quite peculiar fauna of *Mallophaga*. The species characteristic of *Cygnus cygnus* L. is *Ornithobius cygni* (L.), which, as regards systematics, diverges from all other genera of *Mallophaga* living on the birds of the genera *Anas* and *Anser*. As far as the *Mallophaga* fauna is concerned some resemblance to swans can be found only in *Cygnopsis cygnoid* L., which is the host to the species *Ornithobius mathisi* NEUM. (EICHLER 1954/1955, TULESHKOV 1958).

*Anatoecus dentatus* (SCOP. 1763)

143 ♂♂, 303 ♀♀ and 3 juv. collected from 47 *Anas platyrhynchos* L., 18 ♂♂, 28 ♀♀ and 1 juv. from 7 *A. querquedula* L., 16 ♂♂, 24 ♀♀ and 4 juv. from 3 *A. crecca* L., 7 ♀♀ from 1 *A. penelope* L., 1 ♀ from *A. strepera* L., 1 ♂ and 3 ♀♀ from 1 *A. domestica* L., 2 ♂♂ and 3 ♀♀ from 1 *Nyroca fuligula* L., 4 ♀♀ from 1 *N. nyroca* GÜLD., 6 ♂♂ and 4 ♀♀ from 2 *Bucephala clangula* L., 5 ♂♂ and 6 ♀♀ from 1 *Anser fabalis* LATH., 1 ♂ and 2 ♀♀ from 1 *A. anser* L. and 1 ♀ from 1 *Cygnopsis cygnoid* L.

*Anatoecus dentatus* (SCOP.) is a species most frequently met in most birds of the family *Anatidae*. SÉGUY (1944) distinguishes the species *Anatoecus icterodes* (NITZSCH) besides *Anatoecus dentatus* (SCOP.). According to EICHLER (1940 b) I assume both these species to be one, namely *Anatoecus dentatus* (SCOP.). It is known as typical of *Anas platyrhynchos* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, 1951 — Tadjikistan, TULESHKOV 1958 — Bulgaria, SÉGUY 1944). It is also recorded from *Anas crecca* L. (BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1940 b — Talysh, 1951 — Tadjikistan, SÉGUY 1944), *A. querquedula* L. (BALÁT 1953 a — Bohemia, 1956 — Slovakia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *A. acuta* L. (BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944), *Spatula clypeata* L., *Nyroca ferina* L., *N. fuligula* L., *Mergus albellus* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944), *Anser anser* L. (BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, SÉGUY 1944), *Anas strepera* L., *Bucephala clangula* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *Tadorna tadorna* L. (BLAGOVESHCHENSKY 1940 b — Talysh, SÉGUY 1944), *Anas strepera* L., *A. penelope* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *Anser erythropus* L., *Recurvirostra avosetta* L. (BLAGOVESHCHENSKY 1940 b — Talysh), *Oxyura leucocephala* SCOP. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Netta rufina* PALL. (BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944), *Anser cygnoid* L., *A. albifrons* SCOP., *Branta leucopsis* BECH., *Nyroca marila* L., *Clangula hyemalis* L., *Polysticta stelleri* PALL., *Mergus merganser* L., *Podiceps cristatus* L. and in America from *Macroramphus perspicillata* L., *Erismatura rubida* WILS.,

*Aythya affinis* BP., *A. a. maritima*, *Mergus serrator* L. and *Anas carolinensis* GM. (SÉGUY 1944). Further, BLAGOVESHCHENSKY (1958 — Wrangel Lake) records *Anatoecus dentatus* (SCOP.) from *Clangula hyemalis* L., *Somateria mollissima* v. *nigrum* GRAY., *S. spectabilis* L., *Arctonetta fischeri* BRANDT. and *Anas domestica* L.

All the foregoing data indicate a very wide distribution of *Anatoecus dentatus* (SCOP.) as regards both its hosts and area of occurrence.

*Anaticola crassicornis* (SCOP. 1763)

20 ♂♂, 50 ♀♀ and 5 juv. obtained from 23 *Anas platyrhynchos* L., 1 ♂ and 3 ♀♀ from 2 *A. querquedula* L., 12 ♂♂, 37 ♀♀ and 3 juv. from 3 *A. penelope* L., 1 ♂ and 2 ♀♀ from 1 *A. crecca* L., 2 ♂♂ and 1 ♀ from 1 *A. strepera* L. and 1 ♀ from *Nyroca nyroca* GÜLD

*Anaticola crassicornis* (SCOP.) is considered a typical parasite of *Anas platyrhynchos* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, TULESHKOV 1958 — Bulgaria, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944); besides, it is known from *Anas strepera* L., *A. acuta* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *A. crecca* L. (BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944), *Nyroca ferina* L., *Bucephala clangula* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *Spatula clypeata* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, SÉGUY 1944 — Europe and America), *Anas querquedula* L., *A. penelope* L., *Nyroca fuligula* L., *Oxyura leucocephala* SCOP. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Mergus albellus* L. (BLAGOVESHCHENSKY 1951 — Tadjikistan), *Anas domestica* L. (BLAGOVESHCHENSKY 1940 a), *Nyroca marila* L. (BALÁT 1953 a — Bohemia), *Anas formosa*, *Netta rufina* PALL., *Clangula hyemalis* L., *Oidemia fusca* L., *O. nigra* L., *Polysticta stelleri* PALL., *Somateria mollissima* L., *S. spectabilis* L., *Mergus serrator* L. (SÉGUY 1944 — Europe), *Aix sponsa* L., *Anas punctata* BUSCH., *Nyroca australis* GLD., *Clangula albeola* L., *Erismatura rubida* WILS., *Merganetta armata* GLD. and *Polysticta stelleri* PALL. (SÉGUY 1944 — America).

*Anaticola anseris* (L. 1758)

2 ♂♂, 5 ♀♀ and 2 juv. collected from 1 *Anser fabalis* LATH., 1 ♂ and 2 ♀♀ from 1 *A. anser* L., 4 ♂♂ and 1 ♀ from 1 *Cygnopsis cygnoid* L.

*Anaticola anseris* (L.) is substitutive for *Anaticola crassicornis* (SCOP.).

*Anaticola anseris* (L.) is a typical parasite of *Anser anser* L. (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan, TULESHKOV 1958 — Bulgaria, SÉGUY 1944 — Sweden and America). This species is also recorded from *Anser fabalis* LATH. (BALÁT 1953 a — Bohemia,

1956 — Slovakia, SÉGUY 1944), *Branta bernicla* L., *Alopochen aegyptiacus* L., *Anser canadensis*, *A. albifrons* SCOP. *Himantopus himantopus* L. (SÉGUY 1944).

*Trinoton querquedulae* (L. 1758)

12 ♂♂ and 20 ♀♀ taken from 17 *Anas platyrhynchos* L., 2 ♂♂ and 2 ♀♀ from 4 *A. querquedula* L., 1 ♀ from 1 *A. penelope* L., 3 ♂♂ and 2 ♀♀ from 3 *A. crecca* L., 1 ♀ from 1 *Nyroca nyroca* GÜLD.

*Trinoton querquedulae* (L.) is recognized as typical of *Anas crecca* L. (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1940 b — Talysh, 1951 — Tadjikistan, 1948 — Barabinsk Lake, TULESHKOV 1958 — Bulgaria). SÉGUY (1944) mentions *Anas crecca* L. as a casual and *A. platyrhynchos* L. as the typical host of this species. Besides, other authors record *Trinoton querquedulae* (L.) from *Anas platyrhynchos* L. (BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), then from *Spatula clypeata* L. (BALÁT 1953 a — Bohemia, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944), *Anas querquedula* L., *Netta rufina* PALL. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan, SÉGUY 1944), *Anas penelope* L. (BLAGOVESHCHENSKY 1940 b — Talysh, SÉGUY 1944), *A. strepera* L., *Nyroca ferina* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake, 1951 — Tadjikistan), *Bucephala clangula* L., *Mergus albellus* L. (BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944), *Nyroca fuligula* L., *Oxyura leucocephala* SCOP. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *Tadorna tadorna* L. (BLAGOVESHCHENSKY 1940 b — Talysh), *Anser albifrons* SCOP., *Anas carolinensis* GM. (Alaska), *A. formosa* GEORG., *Nyroca marila* L., *N. m. nearctica* STEJN. (California), *Mergus merganser* L., *M. serrator* L., *Erismatura rubida* WILS., *Urinator pacificus* LAUR. (California), *Haematopus ostralegus galapagensis* RIDG. (Galapagos), *Plecopterus gambiensis* L. (Sudan) and *Botaurus stellaris* L. (SÉGUY 1944).

As can be seen from the data above *Trinoton querquedulae* (L.) has a distribution as wide as that of *Anatoecus dentatus* (SCOP.) or *Anaticola crassicornis* (SCOP.). Only single specimens of this species were found on individual birds by me.

*Trinoton lituratum* BURM. 1838?

27 ♀♀ collected from 22 *Anas platyrhynchos* L., 2 ♀♀ from 2 *A. querquedula* L., 2 ♀♀ from 2 *A. penelope* L., 1 ♀ from an *A. strepera* L. The species is thought to be typical of *Mergus albellus* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, SÉGUY 1944). Besides, it is mentioned from *Anas penelope* L., *A. platyrhynchos* L., *Spatula clypeata* L. (BALÁT 1953 a — Bohemia), *Anser albifrons* SCOP., *Anas acuta* L., *Spatula clypeata* L., *Mergus serrator* L., *Dendrocygna arborea* L. (SÉGUY 1944).

In my opinion the systematic position of *Trinoton lituratum* BURM. is obscure. It seems to me that the *Mallophaga* designated as *Trinoton lituratum* BURM. may be the juvenile forms of the species *Trinoton querquedulae* (L.) (Figs. 5 and 11).

I have been induced to form this opinion by the following observations:

1. *Trinoton lituratum* BURM. was described on the basis of females, whereas no males have been known so far. If we take into consideration all the data concerning the occurrence of this species, it hardly seems probable that there has been no opportunity to find a male.

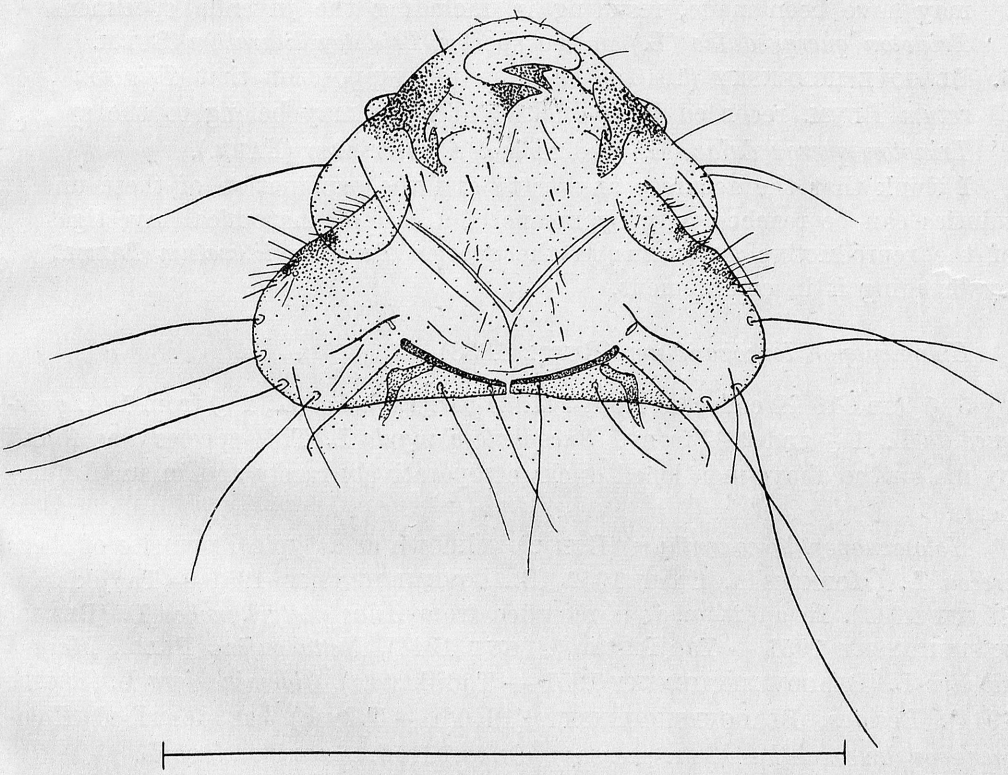


Fig. 5. *Trinoton lituratum* BURM. (head of female) from *Anas platyrhynchos* L., Sominy, 2. IX. 1957. Scale length = 1 mm.

2. I used to find *Trinoton lituratum* BURM. on the same species as I found *Trinoton querquedulae* (L.) and often accompanied by the latter. Since I have succeeded in obtaining only adult specimens of *Trinoton querquedulae* (L.) up to now, I suppose that the specimens that I was enforced to identify, basing on the description of BURMEISTER (1838), as *Trinoton lituratum* BURM. might be the juvenile individuals of *Trinoton querquedulae* (L.).

3. The body proportions of *Trinoton lituratum* BURM. suggest those of juveniles — that is to say, the head and limbs are relatively big by comparison with the abdomen.
4. The coloration of the chitin shell in all individuals of *Trinoton lituratum* BURM. is very light, and the brown pigmental spots are accumulated in small areas, which is frequently characteristic of juveniles.
5. The female *Trinoton lituratum* BURM. has been described by external morphological features and the sex determined on the basis of the lack of the penis, which is always distinctly seen through the chitin shell in *Mallophaga.* Since the penis is also undeveloped in juveniles, a mistake may have been made, resulting in including the juvenile specimens of *Trinoton querquedulae* (L.) in the species *Trinoton lituratum* BURM.
6. BLAGOVESHCHENSKY (1940 a) has raised a supposition that *Trinoton lituratum* BURM. recorded from ducks and geese may belong to the species *Trinoton querquedulae* (L.) and *Trinoton anserinum* (FABR.).

I think that the accurate answer to and the explanation of these uncertainties can be reached only by means of a careful anatomical investigation of the reproductive apparatus in the species *Trinoton lituratum* BURM., or by breeding it in confinement.

*Holomenopon leucoxanthum* (BURM. 1838)

5 ♂♂ and 16 ♀♀ collected from 7 *Anas platyrhynchos* L., 1 ♂ from 1 *A. querquedula* L., 1 ♂ and 2 ♀♀ from 1 *Bucephala clangula* L. This species was found by me on the above-mentioned ducks comparatively rarely and in small numbers.

*Holomenopon leucoxanthum* (BURM.) is known as a typical parasite of *Anas crecca* L. (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944). In addition, it is recorded from *Anas platyrhynchos* L. (BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944), *Netta rufina* PALL., *Mergus albellus* L. (BLAGOVESHCHENSKY 1951 — Tadjikistan), *Oidemia nigra* L. (SÉGUY 1944). Besides, BLAGOVESHCHENSKY (1940 b — Talysh) has described *Holomenopon leucoxanthum* var. *marecae* (BLAG.) from *Anas penelope* L.

*Holomenopon nyrocae* (BLAG. 1940)

1 ♂ and 1 ♀ taken from 2 *Nyroca nyroca* GÜLD. This species has been hitherto known from *Nyroca ferina* L. as its typical host (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake). Moreover, BLAGOVESHCHENSKY (1948 — Barabinsk Lake) records it from *Oxyura leucocephala* SCOP.

*Ciconiphilus pectiniventris* (HAAR. 1916)

3 ♂♂, 8 ♀♀ and 5 juv. obtained from 2 *Cygnopsis cygnoid* L. The species is a typical parasite of *Anser a. domesticus* L. (HOPKINS a. CLAY 1952, SÉGUY

1944). BLAGOVESHCHENSKY distinguished also *Ciconiphilus pectiniventris* var. *parvus* (BLAG.) from *Anser anser* L. (1948 — Barabinsk Lake).

*Ornithobius cygni* (L. 1758)

3 ♀♀ from a *Cygnus cygnus* L. examined. This parasite is typical of *Cygnus cygnus* L. (HOPKINS a. CLAY 1952, TULESHKOV 1958 — Bulgaria, SÉGUY 1944). It is known from *Cygnus olor* GM. and *C. bewicki* YARR. as well (SÉGUY 1944).

## *Mallophaga* atypical of *Anatidae*

*Pseudomenopon pilosum* (SCOP.) typical of *Fulica atra* L. 6 ♂♂ and 7 ♀♀ obtained from 5 *Anas platyrhynchos* L. +, from the Pomorze Lake District (Bytów region) in August and September 1957. A total of 20 *Anas platyrhynchos* was examined there. Therefore 25% of these ducks were infested by *Mallophaga* of the species *Pseudomenopon pilosum* (SCOP.). It may be concluded from this that this species lives also on *Anas platyrhynchos* L. (ZŁOTORZYCKA 1959 a). This, however, would refer only to the Pomorze Lake District, because the species has not been collected from ducks elsewhere except for one juvenile specimen found on an *Anas platyrhynchos* L. + in the Suwałki region in 1959. Perhaps the fact testifies to an expansion of the parasite now developing and aiming at acquiring new hosts. This subject is dealt with in the section on *Mallophaga* from *Rallidae*.

*Actornithophilus affinis* (NITZSCH) typical of *Tringa erythropus* PALL. 1 ♀ taken from an *Anas platyrhynchos* L. +

*Actornithophilus ochraceus* (NITZSCH) typical of *Vanellus vanellus* L. 5 ♂♂, 2 ♀♀ and 3 juv. found on 1 specimen of *Anas querquedula* L.

*Rallicola fulicae* (DENNY) typical of *Fulica atra* L. 1 ♂ and 1 ♀ collected from 2 *Anas platyrhynchos* L. +, 1 ♂ and 1 ♀ from an *Anas strepera* L.

*Incidifrons fulicae* (L.) typical of *Fulica atra* L. 1 ♂ and 1 ♀ from 2 *Anas platyrhynchos* L. +

## 9. *Mallophaga* from *Phalacrocoracidae*

Only 2 specimens of *Phalacrocorax carbo* L. were examined for *Mallophaga*, one from the Wrocław region on 31. III. 1952, and the other from Jugoslavia (Zbiljsko, 9. IV. 1955). The following *Mallophaga* species were present on these birds:

*Quadraceps similis* (GIEB. 1866)

3 ♀♀ from either bird were examined. HOPKINS a. CLAY (1952) consider this species to be a typical parasite of *Tringa nebularia* GÜNN. SÉGUY (1944)

mentions *Quadraceps similis* (GIEB.) under the synonym of *Degeeriella interrupta* (PIAG.) to be typical of *Phalacrocorax carbo* L. I support the statement of SÉGUY that *Quadraceps similis* (GIEB.) is typical of *Phalacrocorax carbo* L.

The species atypical of *Phalacrocoracidae* were represented in my collections by 1 ♀ *Anaticola crassicornis* (SCOP.) typical of *Anas platyrhynchos* L. found on the cormorant from the Wrocław region, 31. III. 1952.

## 10. *Mallophaga* from *Podicipidae*

A total of 23 *Podiceps cristatus* L., 6 *P. nigricollis* BREHM, 5 *P. ruficollis* PALL., 8 *P. griseigena* BODD. and 2 *P. auritus* L. from the Wrocław, Kraków, Gdańsk, Koszalin and Białystok Provinces, was searched for *Mallophaga*.

The *Mallophaga* faunas on all the birds examined were very similar and poor in species.

*Aquanirmus colymbinus* (SCOP. 1763)
syn. *Nirmus fuscomarginatus* DENNY 1842
*Nirmus rucinutus* NITZSCH 1842

27 ♂♂, 45 ♀♀ and 8 juv. collected from 21 *Podiceps cristatus* L., 6 ♂♂, 13 ♀♀ and 1 juv. from 6 *P. nigricollis* BREHM, 1 ♂, 3 ♀♀ and 3 juv. from 2 *P. ruficollis* PALL., 2 ♂♂, 6 ♀♀ from 3 *P. griseigena* BODD. 2 ♂♂, 1 ♀ and 2 juv. from 1 *P. auritus* L.

*Aquanirmus colymbinus* (SCOP.) is known as typical of *Podiceps auritus* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia). Then BALÁT (1953 a — Bohemia) records *Aquanirmus colymbinus* (SCOP.) from *Podiceps cristatus* L., *P. g. griseigena* BODD., *P. n. nigricollis* BREHM and *P. ruficollis* PALL. SÉGUY (1944) mentions *Podiceps cristatus* L. as the typical host of this species and *P. auritus* L., *P. ruficollis* PALL., *Sterna gracilis* GOULD. and *Nesiomimus parvulus* GLD. as casual hosts. Basing on the foregoing data I suppose that *Aquanirmus colymbinus* (SCOP.) steadily occurs on all the species of grebes.

*Pseudomenopon pilosum* (SCOP. 1763)

The occurrence of this species on the birds of the family *Podicipidae* is discussed in the section on *Mallophaga* from *Rallidae*, for it is considered typical of *Fulica atra* L.

## *Mallophaga* atypical of *Podicipidae*

*Anaticola crassicornis* (SCOP.) is typical of *Anas platyrhynchos* L. 1 ♂ and 3 ♀♀ collected from 2 *Podiceps cristatus* L. and 1 juv. from *P. griseigena* BODD.

*Craspedorrhynchus platystomus* BURM. typical of *Buteo buteo* L. 1 ♀ taken

from *Podiceps griseigena* BODD. and 1 juvenile specimen of *Craspedorrhynchus* sp. from *Podiceps cristatus* L.

*Rhynonirmus scolopacis* (DENNY) typical of *Capella gallinago* L. 2 ♀♀ obtained from 1 *Podiceps cristatus* L. and 1 ♀ from *Podiceps ruficollis* PALL.

*Quadraceps furvus* (BURM.) typical of *Tringa erythropus* PALL. 1 ♂ found on a *Podiceps griseigena* BODD. +

*Fulicoffula lurida* (NITZSCH) typical of *Fulica atra* L. 1 ♂ found on 1 *Podiceps griseigena* BODD. and 1 ♀ on *P. ruficollis* PALL.

*Anatoecus dentatus* (SCOP.) typical of *Anas platyrhynchos* L. 1 ♂ and 2 ♀♀ collected from 1 specimen of *Podiceps cristatus* L.

*Actornithophilus* sp. typical of the birds of the order *Laro-Limicolae*. 1 juvenile taken from a *Podiceps griseigena* BODD. +

## 11. *Mallophaga* from *Colymbidae*

*Mallophaga* were taken only from 1 specimen of *Colymbus arcticus* L. from the Wrocław region on 2. XII. 1955. They represented the following species:

*Craspedonirmus colymbinus* (DENNY 1842)

3 ♂♂ and 15 ♀♀ were collected. The species is given as typical of *Colymbus arcticus* L. (HOPKINS a. CLAY 1952, BALÁT 1956 — Slovakia, TULESHKOV 1958 — Bulgaria). SÉGUY (1944) regards *Craspedonirmus colymbinus* (DENNY) as the typical parasite of *Colymbus stellaris* PONT., and a casual one of *C. arcticus* L., *C. immer* BRUNN., *Tadorna tadorna* L. and *Urinator lumme* (America).

## 12. *Mallophaga* from *Strigidae*

7 specimens of *Asio flammeus* PONT. and 3 of *Tyto alba* SCOP. from the Wrocław Province were searched for *Mallophaga*. The *Mallophaga* fauna was, as a rule, similar on these species.

*Strigiphilus cursor* (BURM. 1838)

16 ♂♂ and 17 ♀♀ collected from 6 *Asio flammeus* PONT. The species is known as typical of *Asio flammeus* PONT. (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1940 b — Talysh, 1948 — Barabinsk Lake, 1951 — Tadjikistan, BALÁT 1956 — Slovakia, 1958 — Hungary, SÉGUY 1944 — Alaska). Besides, it is recorded from *Asio otus* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *A. otus wilsonianus* LESS. (SÉGUY 1944 — California, Iova, Nebraska), *Strix aluco sylvatica* SHAW., *Bubo bubo* L., *B. maculosus* VIEILL. (Africa), *B. ascalaphus* SAV. (Egypt), *B. virginianus* GM. (Cansas), *Asio galapagensis* GOULD. (Galapagos) and *Falco tinnunculus* L. (SÉGUY 1944). The foregoing data point to a wide distribution of *Strigiphilus cursor* (BURM.).

*Strigiphilus rostratus* (BURM. 1838)

4 ♀♀ and 1 juv. taken from 2 *Tyto alba* SCOP. The species is known to be typical of *Tyto alba* SCOP. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, TULESHKOV 1957 — Bulgaria), SÉGUY (1944) mentions it only from *Asio flammeus* PONT.

## *Mallophaga* atypical of *Strigidae*

*Colpocephalum flavescens* HAAN. typical of *Haliaeëtus albicilla* L. 2 ♀♀ obtained from 1 *Asio flammeus* PONT., 1 ♂ and 2 ♀♀ from 1 *Tyto alba* SCOP. + *Degeeriella fulva* (GIEB.) typical of *Aquila chrysaëtos* L. 2 ♂♂, 32 ♀♀ and 10 juv. collected from 1 specimen of *Asio flammeus* PONT. from the Zoological Garden in Wrocław. This bird, however, had been recently caught and had not come into contact with other birds in confinement yet. Mass occurrence of *Degeeriella fulva* (GIEB.) on *Asio flammeus* PONT. should be regarded as an exceptional phenomenon and only further investigations will make it possible to answer whether the *Mallophaga* of this species are steady inhabitants also on *Asio flammeus* PONT.

## 13. *Mallophaga* from *Falconidae*

2 *Pandion haliaëtus* L., 1 *Haliaeëtus albicilla* L., 3 *Circus aeruginosus* L., 1 *Aquila pomarina* BR. and 4 *Milvus migrans* BODD. from the Wrocław, Lublin, Katowice, Koszalin and Olsztyn provinces, were searched for *Mallophaga*. All these species of birds are more or less connected with the water environment. In addition, *Mallophaga* were collected from the following species: 23 specimens of *Buteo buteo* L., 3 of *B. lagopus* BRÜNN., 4 of *Accipiter nisus* L., 2 of *A. gentilis* L., 1 of *Falco subbuteo* L. and 1 of *F. tinnunculus* L. Although these birds live far from water, I include them in my work because the fauna of *Mallophaga* is the same within the whole family *Falconidae*.

*Craspedorrhynchus platystomus* (BURM. 1838)

42 ♂♂, 94 ♀♀ and 26 juv. collected from 15 *Buteo buteo* L., 3 ♂♂, 7 ♀♀ and 5 juv. from 2 *B. lagopus* BRÜNN., 4 ♂♂, 8 ♀♀ and 4 juv. from 1 *Aquila pomarina* BR., 3 ♂♂, 6 ♀♀ and 4 juv. from *Milvus migrans* BODD., 1 ♂, 1 ♀ and 2 juv. from 2 *Accipiter nisus* L. and 1 ♀ from *A. gentilis* L.

*Craspedorrhynchus platystomus* (BURM.) is known as a typical parasite of *Buteo buteo* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, TULESHKOV 1957 — Bulgaria, Sofia — ZOO, SÉGUY 1944). It is also known from *Milvus milvus* L., *Pernis apivorus* L., *Acci-*

*piter gentilis* L., *Buteo erythropus* KING. (Argentina, ZOO), *Buteo swainsoni* (U. S. A.), *B. borealis costariensis*, *B. abbreviatus* (Costa-Rica), *Accipiter velox* (U. S. A.), *Leucopternis semiplumbea* from Costa-Rica (SÉGUY 1944).

*Craspedorrhynchus pachypus* (GIEB. 1874)

1 ♂ from a *Milvus migrans* BODD. examined. The species is regarded as typical of *Haliastur indus* BODD. (HOPKINS a. CLAY 1952, SÉGUY 1944). Besides, HOPKINS and CLAY (1952) as well as SÉGUY (1944) record it from *Buteo buteo* L. and *Milvus migrans* BODD. [SÉGUY 1944, by the synonymous name of *Philopterus angulatus* (Piag. 1880)].

*Degeeriella fusca* (DENNY 1842)

28 ♀♀ obtained from one specimen of *Circus aeruginosus* L. Besides this specimen I have found no *Mallophaga* of this species on other birds of the family *Falconidae*. *Degeeriella fusca* (DENNY) is, however, often mentioned in literature from many species of birds of the family *Falconidae*. In these cases, I feel, the species *Degeeriella fusca* (DENNY) may have been confused with *D. rufa* (BURM.), *D. fulva* (GIEB.) and *D. regalis* (GIEB.). All these species are like each other, and it was only the revision of this group of species (CLAY 1958) that established their systematic position clearly. *Degeeriella fusca* (DENNY) is a typical parasite of *Circus aeruginosus* L. (CLAY 1958, HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, BLAGOVESHCHENSKY 1951 — Tadjikistan, TULESHKOV 1957 — Bulgaria, SÉGUY 1944). It is also mentioned from *Circus cyaneus* L. (BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, BLAGOVESHCHENSKY 1951 — Tadjikistan), *Circus macrourus* GM. (BALÁT 1956 — Slovakia, BLAGOVESHCHENSKY 1951 — Tadjikistan), *Buteo rufinus* CRETZSCH. (BLAGOVESHCHENSKY 1940 b — Talysh, 1951 — Tadjikistan), *Accipiter nisus* L. (BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944), *Circus pygargus* L., *Aegypius monachus* L., *Accipiter gentilis* L., *Buteo buteo* L., *B. lagopus* BRÜNN., *Milvus milvus* L., *M. migrans* BODD., *Falco rusticolus islandicus* BRUN., and from America from *Falco rufipes*, *F. brachydactylus*, *Buteo jakal*, *B. swainsoni*, *B. borealis*, *B. lagopus sanctijohannis* GM., *Circus cyaneus hudsonicus* L., *Accipiter gentilis atricapilus* WILS., *A. bicolor*, *Falco sparverius*, *F. peregrinus anatum* BP. and *Elanus leucurus* (SÉGUY 1944). Then BLAGOVESHCHENSKY records *Degeeriella fusca* (DENNY) under the synonymous name of *D. rufa* var. *socialis* (GIEB.) from *Circus aeruginosus* L. (1940 b — Talysh, 1948 — Barabinsk Lake) and from *Circus macrourus* GM. (1948 — Barabinsk Lake).

*Degeeriella rufa rufa* (BURM.) 1838)

3 ♂♂ and 3 ♀♀ taken from 1 *Falco tinnunculus* L. and 7 ♀♀ from 2 *Accipiter nisus* L. After being shot both the individuals did not come into contact

with any other birds and I suppose that *Degeeriella rufa rufa* (BURM.) lives also on *Accipiter nisus* L. This species is known to be typical of *Falco tinnunculus* L. (HOPKINS a. CLAY 1952, CLAY 1958, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, BLAGOVESHCHENSKY 1951 — Tadjikistan, TULESHKOV 1957 — Bulgaria, SÉGUY 1944). It has been also recorded from *Falco cherrug* GRAY, *F. peregrinus germanicus* ERL. (BALÁT 1953 a — Bohemia), *Falco cherrug koatsi* DEM. (BLAGOVESHCHENSKY 1951 — Tadjikistan), *F. naumanni* FLEISCH., *F. columbarius* L., *F. subbuteo* L., *F. peregrinus* TUNDST., *F. vespertinus* L., *Spizaetus cirrhatus*, *Accipiter nisus* L., *A. gentilis* L. and *Buteo lagopus* BRÜNN. (SÉGUY 1944).

*Degeeriella discocephalus discocephalus* (BURM. 1838)

2 ♂♂ and 19 ♀♀ obtained from 1 specimen of *Haliaeëtus albicilla* L. This species is considered typical of *Haliaeëtus albicilla* L. (HOPKINS a. CLAY 1952, CLAY 1958, BALÁT 1953 a — Bohemia, 1956 — Slovakia, BLAGOVESHCHENSKY 1940 b — Talysh, 1951 — Tadjikistan, SÉGUY 1944). Besides, it is mentioned from *Aquila heliaca* SAV. and *Haliaeëtus discocephalus* (SÉGUY 1944 — U. S. A.).

*Degeeriella fulva* (GIEB. 1874)
syn. *Degeeriella giebeli* HOPK. 1947.
*Degeeriella angusta* (GIEB. 1874)

104 ♂♂, 191 ♀♀ and 76 juv. collected from 15 specimens of *Buteo buteo* L. out of a total of 23 individuals. It appeared that the degree of infestation of buzzards by these parasites varied considerably. I found out that the heaviest infestation of the birds by *Degeeriella fulva* (GIEB.) was from June until December. It is the more noteworthy as in the remaining months the drop in the number of *Degeeriella fulva* (GIEB.) was accompanied by an increase of infestation by the species *Craspedorrhynchus platystomus* (BURM.) in the same birds. *Degeeriella fulva* (GIEB.) lives on the wings and body of the buzzard, and *Craspedorrhynchus platystomus* (BURM.) on its head. Of course, the ecological conditions are different in either case, because the plumage of the head varies from that of the body. The seasonal oscillation in the number of both *Mallophaga* species may be influenced by such factors as differences in the temperatures in summer and winter, various ways of moulting as regards the place (head or body) and other unknown factors.

*Degeeriella fulva* (GIEB.) is reported to be a typical parasite of *Buteo buteo* L. and *Aquila chrysaëtos* L. (HOPKINS a. CLAY 1952, CLAY 1958). Other authors record this species from *Buteo buteo* L., *B. lagopus* PONT. (BALÁT 1956 — Slovakia, 1958 — Hungary, TULESHKOV 1957 — Bulgaria), *Aquila heliaca* SAV. (Kurdistan), *A. rapax* TEM. (Rajputana, Kenya), *A. clanga* PALL. (Czechoslovakia and Germany), *A. verreauxi* LESS. (South Africa), *A. wihlbergi* (Uganda), *A. pomarina* BREHM, *Buteo r. rufinus* CRETZSCH., *B. r. cirtensis*

LEV., *B. rufofuscus* FORST., *B. r. augur* RÜPP., *B. hemilasius* TEM. a. SCHLEG., *B. regalis* GRAY, *B. jamaicensis alascensis* GRINN., *B. j. borealis* GM., *B. j. kriderii* HOOP., *B. j. costariensis* RID., *B. harlani* AUD., *B. l. lineatus* GM., *B. v. vulpinus* GLOG., *B. b. burmanicus* HUM., *B. l. lagopus* PONT., *B. l. s.-johannis* GM., *Geranoaetus melanoleucus australis* SWAN. (Chile), *Ichthyophaga ichthyaetus* HORST. (India), *Lophaëtus occipitalis* DAUD. (Sudan, Uganda, Kenya), *Hieraaëtus ayresii* GURN. (Uganda); *H. pennatus* GM. (Palestine), *Spilornis cheela albidus* TEMM. (Rajputana), *S. c. cheela* LATH. (Nepal), *S. c. burmanicus* SWAN., *Polemaëtus bellicosus* DAUD. (Natal), *Melierax musicus poliopterus* CAB. (Kenya), *M. metabates* subspp. (Aden, Morocco, Southwest Africa, Portugal) — CLAY 1958.

*Degeeriella regalis regalis* (GIEB. 1866)
syn. *Degeeriella vittata* (GIEB. 1874)

16 ♂♂, 8 ♀♀ and 1 juv. found on 3 specimens of *Milvus migrans migrans* BODD. This species is regarded as typical of *Milvus milvus milvus* L. and *Milvus migrans migrans* BODD. (HOPKINS a. CLAY 1952, CLAY 1958). Then it is recorded from *Milvus m. migrans* BODD. (TULESHKOV 1957), *M. aegyptiacus*, *M. ater*, *M. migrans parasiticus* DAUD., *M. m. arabicus* SWAN., *M. m. govinda* SYKES. (Italy, Greece, Kenya, Uganda, Rhodesia, Bechuana Land, Arabia, Aden, Deccan, India, Nepal), *M. l. lineatus* GRAY (Thailand), *Buteo galapagensis* GOULD. (Galapagos), *B. swainsoni* BON. (North America), *B. jamaicensis borealis* GM. (Arizona), *Haliaastur i. indus* BODD. (Rajputana, Deccan, India), *Haliaeëtus leucoryphus* PALL (India) — CLAY 1958.

*Falcolipeurus sulcifrons* (DENNY 1842)
syn. *Esthiopterum quadrioculatum* NITZSCH 1861

1 ♂ and 3 ♀♀ obtained from a *Haliaeëtus albicilla* L. The species is known as a typical parasite of *Haliaeëtus albicilla* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, TULESHKOV 1957 — Bulgaria, SÉGUY 1944). Besides, it is recorded from *Aquila chrysaëtos* L. (BALÁT 1953 a — Bohemia, SÉGUY 1944) and from *Spizaetus cirrhatus* PIAG. (SÉGUY 1944).

*Colpocephalum flavescens* HAAN. 1829

1 ♂ and 5 ♀♀ collected from 1 *Haliaeëtus albicilla* L., 1 ♂ from *Circus aeruginosus* L., 9 ♂♂, 23 ♀♀ and 8 juv. from 8 *Buteo buteo* L., 52 ♂♂, 74 ♀♀ and 10 juv. from 2 *B. lagopus* BRÜNN., 1 ♂ and 3 ♀♀ from 1 *Accipiter gentilis* L. *Colpocephalum flavescens* HAAN. is typical of *Haliaeëtus albicilla* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, TULESHKOV 1957 — Bulgaria, BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944). The species

is also known from *Aquila chrysaëtos* L. (BALÁT 1953 a — Bohemia, SÉGUY 1944 — Alaska and California), *Buteo lagopus* BRÜNN (BALÁT 1953 a — Bohemia), *Falco tinnunculus* L. (BLAGOVESHCHENSKY 1940 b — Talysh), *F. subbuteo* L. (BLAGOVESHCHENSKY 1948 — Barabinsk Lake), *F. peregrinus babylonicus* SCL., *Cerchneis naumanni pekinensis* SWINH. (BLAGOVESHCHENSKY 1951 — Tadjikistan), *Milvus milvus* L., *Accipiter gentilis* L., *Falco peregrinus* TUNST., *Pernis apivorus* L., *Harpyja destructor* DEN., *Gypaëtus barbatus* L., *Buteo buteo* L., *Circus pygargus* L., *Nyctea scandiaca* L., *Haliaeëtus leucogaster*, *Aquila pomarina* BR., *Otogyps auriculatus* DAUD., *Haliaeëtus pelagicus* (Arctic Zone), *H. leucocephalus* (Kansas and Alaska), *Archibuteo sancti-johannis* (Kansas), *Alanoides forficatus* (Iova), *Buteo galapagensis*, *Fregata aquila* (Galapagos), *Haliaastur indus* (SÉGUY 1944). Moreover, BALÁT (1956 — Slovakia) records *Colpocephalum* sp. (? *flavescens* HAAN.) from *Buteo lagopus* PONT. and (1958 — Hungary) from *B. lagopus* PONT., *Falco peregrinus germanicus* ERL. and *F. s. subbuteo* L.

*Colpocephalum tricinctum* NITZSCH 1861

22 ♂♂, 15 ♀♀ and 2 juv. taken from 4 specimens of *Milvus migrans* BODD. This species is recorded only from *Milvus migrans* BODD. (HOPKINS a. CLAY 1952, CLAY 1951, TULESHKOV 1957 — Bulgaria, SÉGUY 1944).

*Kurodaia haliaëti* (DENNY 1842)

5 ♂♂, 5 ♀♀ and 5 juv. collected from one specimen of *Pandion haliaëtus* L. This species is recorded only from *Pandion haliaëtus* L. (HOPKINS a. CLAY 1952, BALÁT 1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, SÉGUY 1944).

*Laemobothrion circi* FOURC. 1785

1 ♂ and 3 ♀♀ obtained from 1 *Circus aeruginosus* L. and 1 ♀ from *Milvus migrans* BODD. This species is considered to be typical of *Circus aeruginosus* L. (HOPKINS a. CLAY 1952, BLAGOVESHCHENSKY 1951 — Tadjikistan, TULESHKOV 1957 — Bulgaria, SÉGUY 1944). It is also known from *Milvus migrans* BODD., *Haliaeëtus albicilla* L. (BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944), *Neophron p. percnopterus* L., *Gyps f. fulvus* HALL., *Gypaëtus barbatus hemachalamus* HUTT., *Buteo rufinus* CRETZSCH. (BLAGOVESHCHENSKY 1951 — Tadjikistan), *Gyps fulvus* HALL., *Circus cyaneus* L., *C. pygargus* L., *Buteo buteo* L., *Circaëtos ferox* GM., *Strix aluco* L. (Europe) and in America from *Polyborus vulgaris*, *Milvus ater* and *Platalea leucorodia* L. (SÉGUY 1944).

*Laemobothrion tinnunculi* (L. 1758)

6 ♀♀ and 1 juv. found on one specimen of *Falco subbuteo* L. This species is known as typical of *Falco tinnunculus* L. (HOPKINS a. CLAY 1952, BALÁT

1953 a — Bohemia, 1956 — Slovakia, 1958 — Hungary, BLAGOVESHCHENSKY 1951 — Tadjikistan, SÉGUY 1944). Besides, it is recorded from *Circus a. aeruginosus* L., *Buteo r. rufinus* CRETZSCH. (BLAGOVESHCHENSKY (1940 b — Talysh), *Falco subbuteo* L., *F. columbarius* L., *F. peregrinus* L., *F. fuscicoeruleus* from Argentina (SÉGUY 1944).

*Mallophaga* atypical of *Falconidae*

*Anatoecus dentatus* (SCOP.) typical of *Anas platyrhynchos* L. 1 ♀ found on a *Buteo buteo* L. +

*Anaticola crassicornis* (SCOP.) typical of *Anas platyrhynchos* L. 1 ♀ found on a *Pandion haliaeëtus* L. and 1 ♀ on a *Circus aeruginosus* L. +

*Austromenopon ridibundus* (DENNY) typical of *Larus ridibundus* L. 1 ♀ found on a *Buteo buteo* L. from the Wrocław Zoological Garden.

*Pseudomenopon pilosum* (SCOP.) typical of *Fulica atra* L. 1 ♂ taken from a *Buteo buteo* L. and 1 ♀ from a *Milvus migrans* BODD. +

*Aquanirmus colymbinus* (SCOP.) typical of *Podiceps cristatus* L. 2 ♀♀ collected from 1 specimen of *Accipiter nisus* L. +

## V. A TRIAL OF EXPLANATION OF SOME DEPENDENCES OF CHITIN SHELL STRUCTURE IN *MALLOPHAGA* UPON THEIR ECOLOGICAL CONDITIONS

In the course of my investigations I observed, using for the purpose my own material, different types of chitin shell structures in *Mallophaga*. Species of diverse shapes and sizes and with chitin shells variously shaped are seen within the *Mallophaga* order. This is apparent, when larger units and not particular species are being compared with each other. The now accepted systematic classification of *Mallophaga* (HOPKINS a. CLAY 1952) frequently comprises the species with various chitin shell structures within one family. Therefore I grouped the *Mallophaga* species of the same type of external structure together and in this way erected wider auxilliary units within the particular families [1]. It appeared then that these groups correspond to the genera in the sense of the word used in the older nomenclature (GIEBEL 1864). Consequently, this division is natural and falls in with the systematics of *Mallophaga*. I named the groups thus formed according to the older genus names, from which the present genera of *Mallophaga* have been derived. So three groups have been established within the family *Menoponidae*: „*Menopon*" represented in my collection by the genera *Austromenopon*, *Pseudomenopon*, *Holomenopon* and *Gruimenopon*, „*Colpocephalum*" represented by *Actorni-*

[1] KÉLER (1957) in order to explain the phylogenesis of *Mallophaga*, formed similar auxiliary units based, however, on different morphological qualities (form of legs).

*thophilus*, *Ardeiphilus*, *Ciconiphilus*, *Heleonomus*, *Colpocephalum* and *Kurodaia* and „*Trinoton*“ represented by one genus, *Trinoton*. The group „*Laemobothrion*“ covers the present range of the family *Laemobothriidae* and comprises only the genus *Laemobothrion*. The group „*Docophorus*“ has been distinguished within the large family *Philopteridae* and has the following representatives in my collection: *Saemundssonia*, *Anatoecus*, *Incidifrons*, *Ibidoecus*, *Neophilopterus*, *Craspedorrhynchus*, *Craspedonirmus* and *Strigiphilus*. The group „*Nirmus*“ is represented in my collection by the genera *Rhynonirmus*, *Lunaceps*, *Carduiceps*, *Quadraceps*, *Rallicola*, *Aquanirmus* and *Degeeriella*, and the group „*Esthiopterum*“ by *Anaticola*, *Fulicoffula*, *Ardeicola*, *Esthiopterum*, *Ornithobius* and *Falcolipeurus*.

Having thus classified all the *Mallophaga* species examined I scrutinized them in order to state the hosts of *Mallophaga* in particular groups. I have come round to a conviction that the genus, showing clearly the ecological relations between *Mallophaga* and the respective host birds, is the smallest and most proper systematic unit for composing the general picture of these relations. As higher divisions I assumed the groups established by me for *Mallophaga*, and the families for birds. On this basis I made up a list, presented in Table III, illustrating the aforesaid ecological relations between *Mallophaga* and their hosts by my own material.

## Characteristics of the group „*Menopon*“

This group consists of *Mallophaga* living on the birds of the families *Charadriidae*, *Laridae*, *Rallidae*, *Podicipidae*, *Anatidae* and *Gruidae*.

The *Mallophaga* of the group „*Menopon*“, in the systematics reckoned among the most primitive ones, are characterized by a rather uniform build and slight ecological specialization. Their hosts belong to different families and orders having various habits of living. The birds of the families *Charadriidae* and *Laridae*, combined in the order *Laro-Limicolae*, are noted for swift flight just as the birds of the family *Gruidae* which, besides, can reach considerable heights in the air. The birds of the family *Anatidae* are in frequent contact with both water and air. They are able to fly fast and often dive very well. *Rallidae* and *Podicipidae* are in the closest connexion with water and they are excellently specialized in diving.

The diverse living habits of these birds create different environmental conditions for the *Mallophaga* parasitizing them. These *Mallophaga* must accordingly endure various, frequently rapid environmental changes, e. g., those in pressure, speed, temperature and humidity. I suppose that the lack of a developed specialization in these most primitive *Mallophaga* gives them wide adaptational abilities in different ecological conditions (Fig. 6).

## Characteristics of the group „*Colpocephalum*“

This group comprises the *Mallophaga* that live on the birds of the following families: *Charadriidae*, *Laridae*, *Ciconiidae*, *Gruidae*, *Falconidae* and *Strigidae*.

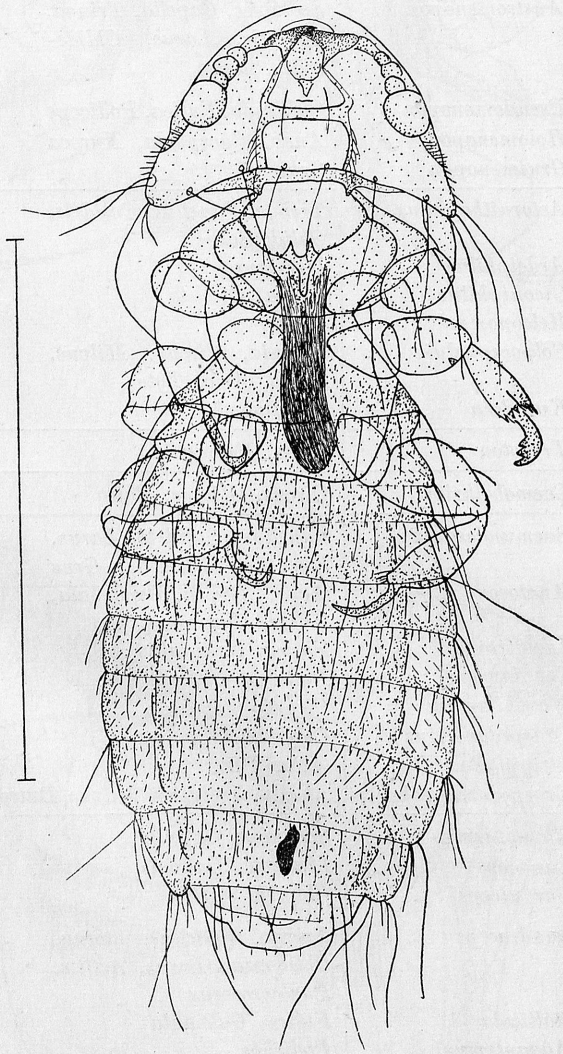


Fig. 6. *Holomenopon leucoxanthum* (Burm.) ♀ from *Anas platyrhynchos* L., Radziądz, 29. VIII. 1955. Scale length = 1 mm.

The avian hosts of the *Mallophaga* of the group „*Colpocephalum*“ are not, generally speaking, so closely connected with water as the birds infested by the *Mallophaga* of the group „*Menopon*“. All these birds are known for their

Table III

Ecological relations between *Mallophaga* and their hosts

| *Mallophaga* | | Birds | |
|---|---|---|---|
| Group | Genus | Genus | Family |
| „*Menopon*“ | *Austromenopon* | *Scolopax, Capella, Tringa, Calidris, Larus, Chlidonias, Sterna* | *Charadriidae*<br>*Laridae*<br>*Rallidae* |
| | *Pseudomenopon* | *Gallinula, Fulica, Podiceps* | *Anatidae*<br>*Gruidae* |
| | *Holomenopon* | *Anas, Bucephala, Nyroca* | *Podicipidae* |
| | *Gruimenopon* | *Grus* | |
| „*Colpocephalum*“ | *Actornithophilus* | *Tringa, Vanellus, Calidris, Chlidonias* | *Charadriidae*<br>*Laridae* |
| | *Ardeiphilus* | *Botaurus* | *Ardeidae* |
| | *Ciconiphilus* | *Ardea, Ciconia* | *Ciconiidae* |
| | *Heleonomus* | *Grus* | *Gruidae* |
| | *Colpocephalum* | *Ciconia, Circus, Milvus, Buteo, Asio, Tyto* | *Falconidae*<br>*Strigidae* |
| | *Kurodaia* | *Pandion* | |
| „*Trinoton*“ | *Trinoton* | *Anas, Nyroca* | *Anatidae* |
| „*Laemobothrion*“ | *Laemobothrion* | *Circus, Milvus, Falco* | *Falconidae* |
| „*Docophorus*“ | *Saemundssonia* | *Vanellus, Calidris, Larus, Sterna, Chlidonias, Grus* | *Charadriidae*<br>*Laridae* |
| | *Anatoecus* | *Anas, Nyroca, Bucephala, Anser, Cygnopsis* | *Anatidae*<br>*Rallidae* |
| | *Incidifrons* | *Fulica, Gallinula* | *Calymbidae* |
| | *Inbidoecus* | *Platalea* | *Ciconiidae* |
| | *Neophilopterus* | *Ciconia* | *Plegadiidae* |
| | *Craspedonirmus* | *Colymbus* | *Gruidae* |
| | *Strigiphilus* | *Asio, Tyto* | *Falconidae* |
| | *Craspedorrhynchus* | *Aquila, Accipiter, Milvus, Buteo* | *Strigidae* |
| „*Nirmus*“ | *Rhynonirmus* | *Scolopax, Capella* | *Charadriidae* |
| | *Lunaceps* | *Limicola, Calidris* | *Laridae* |
| | *Carduiceps* | *Calidris* | *Rallidae* |
| | *Quadraceps* | *Tringa, Vanellus, Sterna, Chlidonias, Larus, Actitis, Phalacrocorax* | *Podicipidae*<br>*Phalacrocoracidae*<br>*Falconidae* |
| | *Rallicola* | *Fulica, Gallinula* | *Strigidae?* |
| | *Aquanirmus* | *Podiceps* | *Ciconiidae?* |
| | *Degeeriella* | *Haliaeëtus, Falco, Milvus, Circus, Buteo, Accipiter, Asio?, Ciconia?* | |
| „*Esthiopterum*“ | *Anaticola* | *Anas, Nyroca, Anser, Cygnopsis* | *Anatidae* |
| | *Fulicoffula* | *Fulica, Gallinula* | *Rallidae* |
| | *Ardeicola* | *Ciconia, Botaurus* | *Ciconiidae* |
| | *Esthiopterum* | *Grus* | *Ardeidae* |
| | *Ornithobius* | *Cygnus* | *Gruidae* |
| | *Falcolipeurus* | *Haliaeëtus* | *Falconidae* |

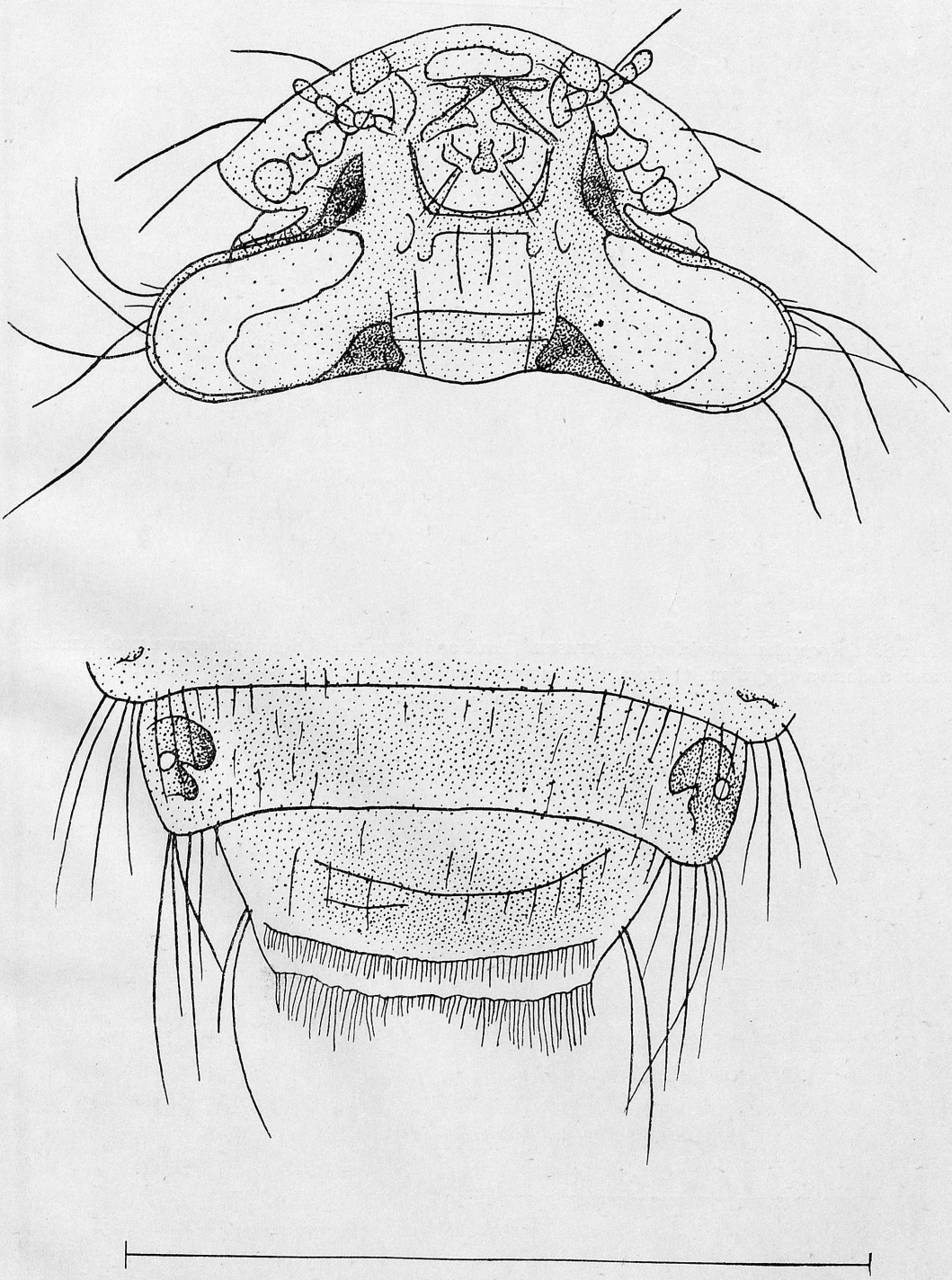


Fig. 7. *Ardeiphilus trochioxus* (Burm.) ♀ (head and terminal abdominal segments) from *Botaurus stellaris* L., Samoklęski, 22. VII. 1949. Scale length = 1 mm.

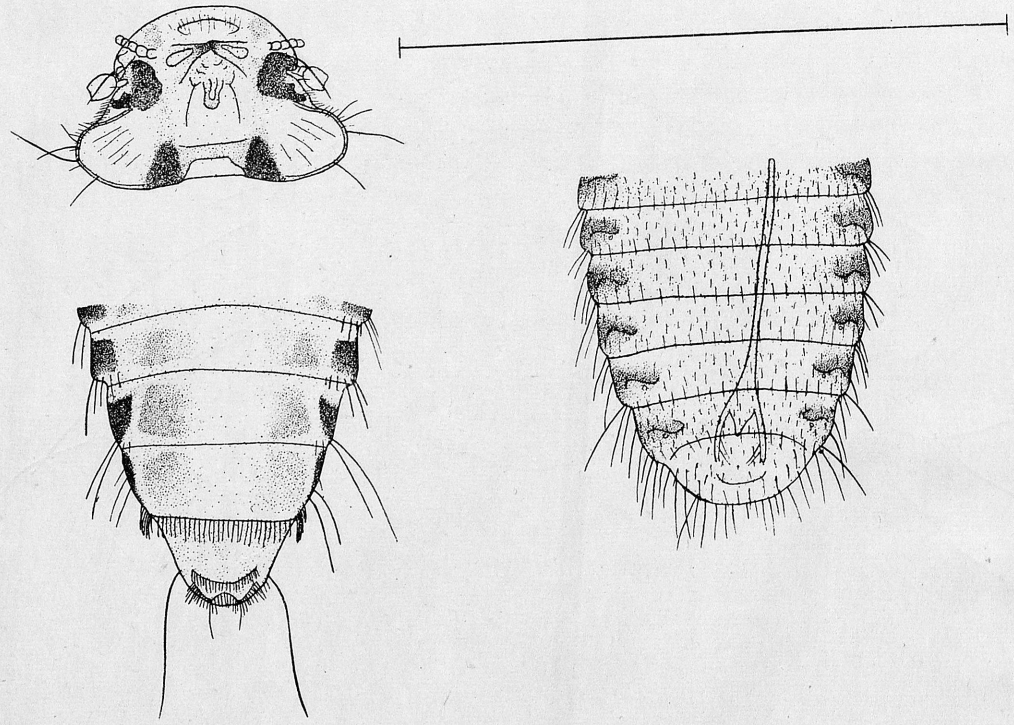


Fig. 8. *Colpocephalum tricinctum* NITZSCH (head and terminal abdominal segments of female and abdomen tip of male) from *Milvus migrans* BODD., Opatowice, 30. VII. 1952. Scale length = 1 mm.

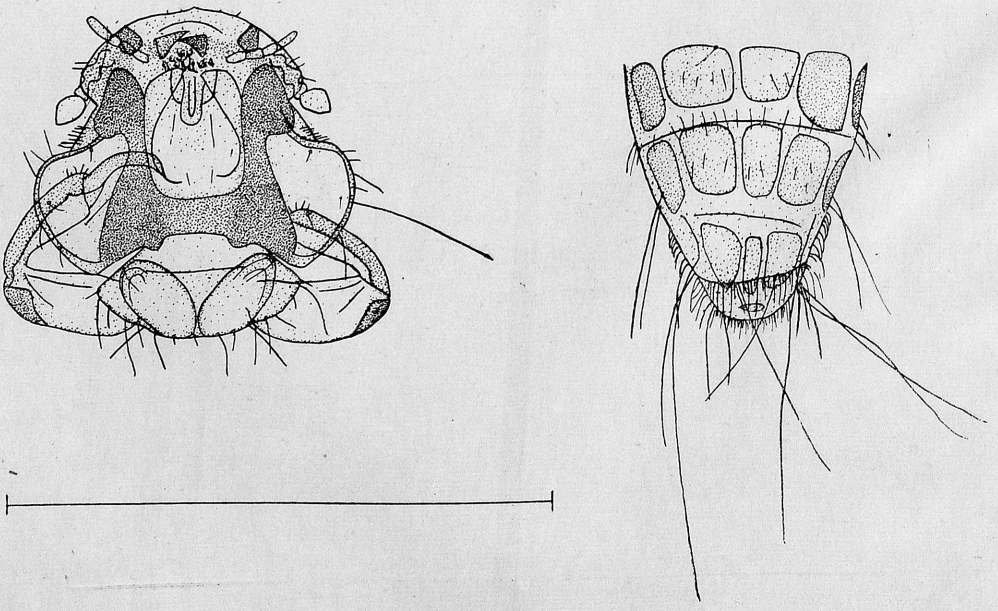


Fig. 9. *Colpocephalum zebra* BURM. ♀ (head and terminal abdominal segments) from *Ciconia ciconia* L., Radziądz, 13. VIII. 1955. Scale length = 1 mm.

skilful flight, and with the exception of *Charadriidae* and *Laridae* they are big birds.

The *Mallophaga* of the group „*Colpocephalum*" exhibit higher specialization in their build than those of the group „*Menopon*". This specialization reveals itself in a stronger and more diversified external structure. All thicker and stronger parts of the chitin shell are of darker pigmentation (NEUFFER 1954).

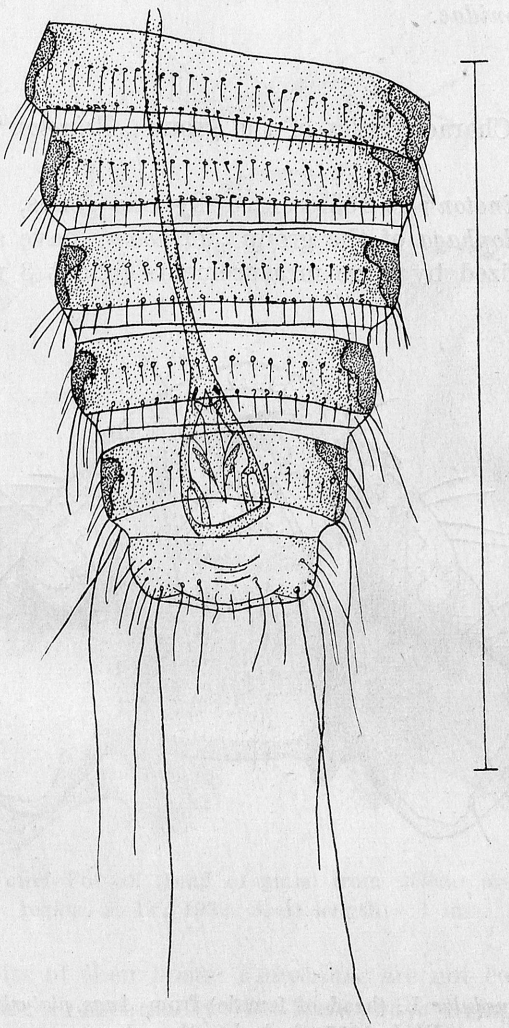


Fig. 10. *Colpocephalum zebra* BURM. ♂ (portion of abdomen) from *Ciconia ciconia* L., Radziądz, 13. VIII. 1955. Scale length = 1 mm.

The strengthenings have sometimes a characteristic arrangement. For instance, the chitin strengthenings of the head form four separate patches, which in other cases are joined together so as to form one patch in the shape of a horseshoe. On the thorax and abdomen there are also some chitin strengthenings

in the shape of compact patches on the lateral portions of the body (Figs. 7, 8, 9 and 10).

I think that the structure of this kind helps the *Mallophaga* to retain their place on the birds flying fast and willingly bathing in water. In my opinion the characteristic arrangement of pigment patch strengthenings in separate accumulations helps the parasites by absorbing shocks at rapid rising or alighting, which is especially significant in the birds of the families *Charadriidae* and *Falconidae*.

## Characteristics of the group „*Trinoton*"

The group „*Trinoton*" is represented by one genus, *Trinoton*, living on *Anatidae*. The *Mallophaga* of the group „*Trinoton*" have a specific structure. They are characterized by large measurements (about 8 mm.), mobility and

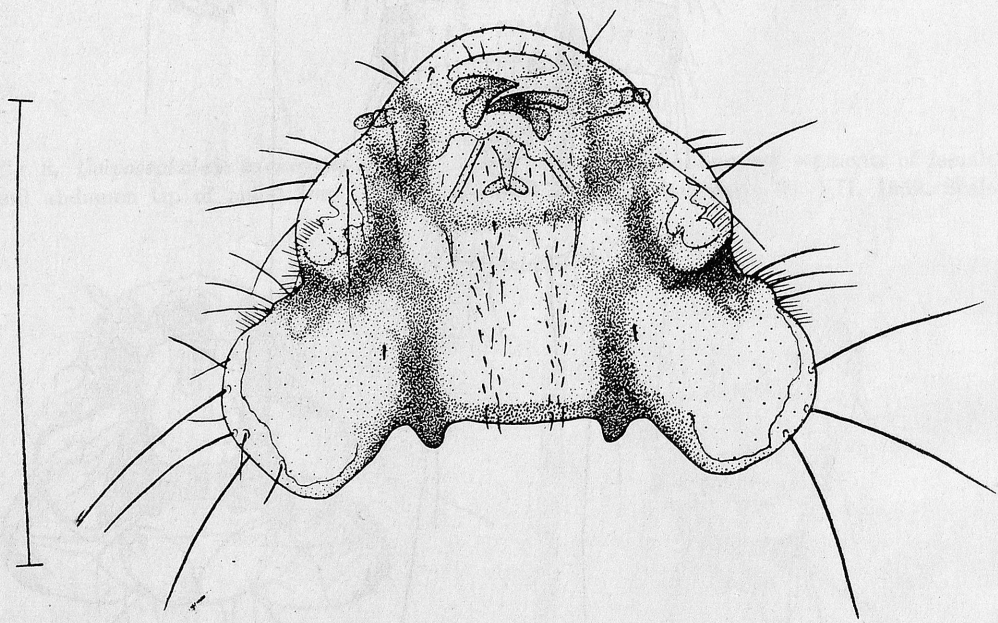


Fig. 11. *Trinoton querquedulae* L. (head of female) from *Anas platyrhynchos* L., Sominy, 13. VIII. 1957. Scale length = 1 mm.

strong build. Their bodies are provided with numerous hairs and setulae. I suppose that these chitin formations are useful to the parasites to keep on the feathers when the bird flies or swims. Besides, the numerous setulae scattered all over the body of these *Mallophaga* seem to play an important role protecting the parasites against low ambient temperatures and against getting wet (Fig. 11).

## Characteristics of the group „*Laemobothrion*"

The group „*Laemobothrion*" is represented also only by one genus, *Laemobothrion*. The *Mallophaga* of this genus live on *Falconidae* and show much resemblance to the *Mallophaga* of the group „*Trinoton*", e. g., large measurements (up to 10 mm.), dark pigmentation and mobility. Only the setae covering their bodies are poorly developed, which, I think, is connected with

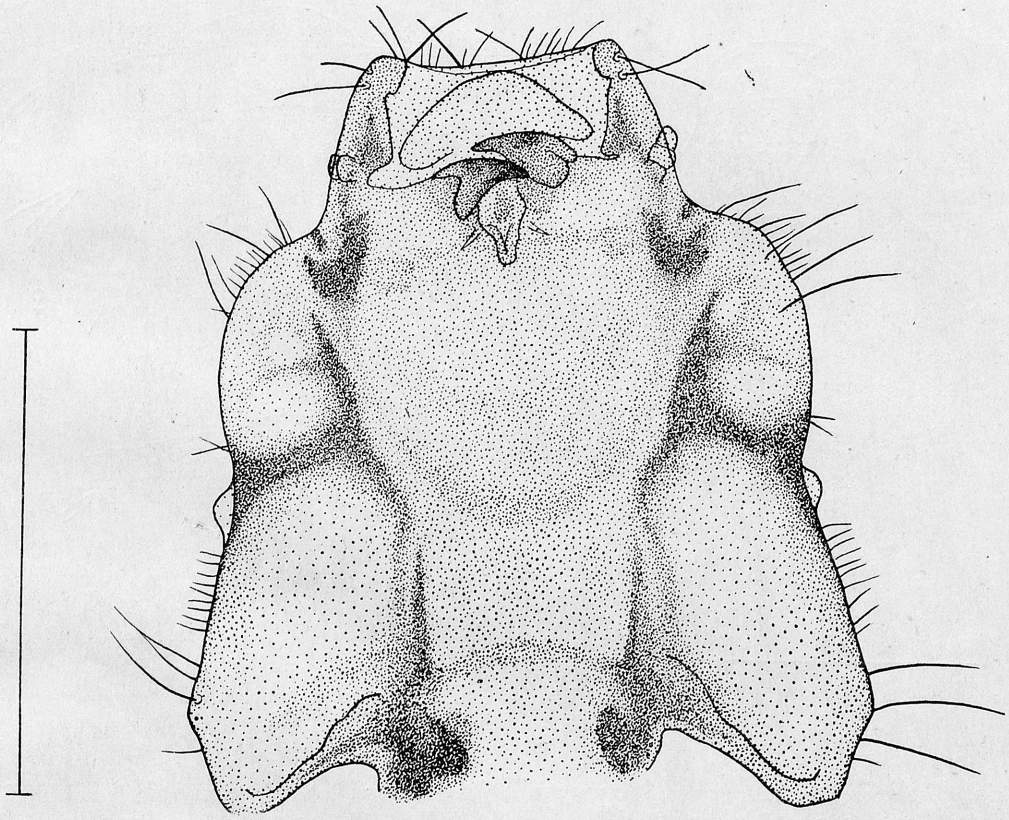


Fig. 12. *Laemobothrion circi* FOURC. (head of male) from *Milvus migrans* BODD., Wrocław region, 9. IV. 1952. Scale length = 1 mm.

different living habits of their hosts: *Falconidae* are not connected with water as much as *Anatidae*. Consequently the *Mallophaga* living on *Falconidae* are not exposed to such rapid changes of temperature and humidity as those living on *Anatidae* are (Fig. 12).

## Characteristics of the group „*Docophorus*"

The group includes the *Mallophaga* from the following families of birds: *Charadriidae*, *Laridae*, *Anatidae*, *Rallidae*, *Colymbidae*, *Ciconiidae*, *Plegadiidae*, *Falconidae* and *Strigidae*.

The foregoing birds much differ from one another as regards their living habits. The spreading of the group „*Docophorus*" over the birds of so numerous and various families requires an explanation different from that for the similar circumstance in the group „*Menopon*". The *Mallophaga* of the group „*Docophorus*", contrary to those of the group „*Menopon*", constitute a considerably specialized division. They are noted for their strong and stumpy

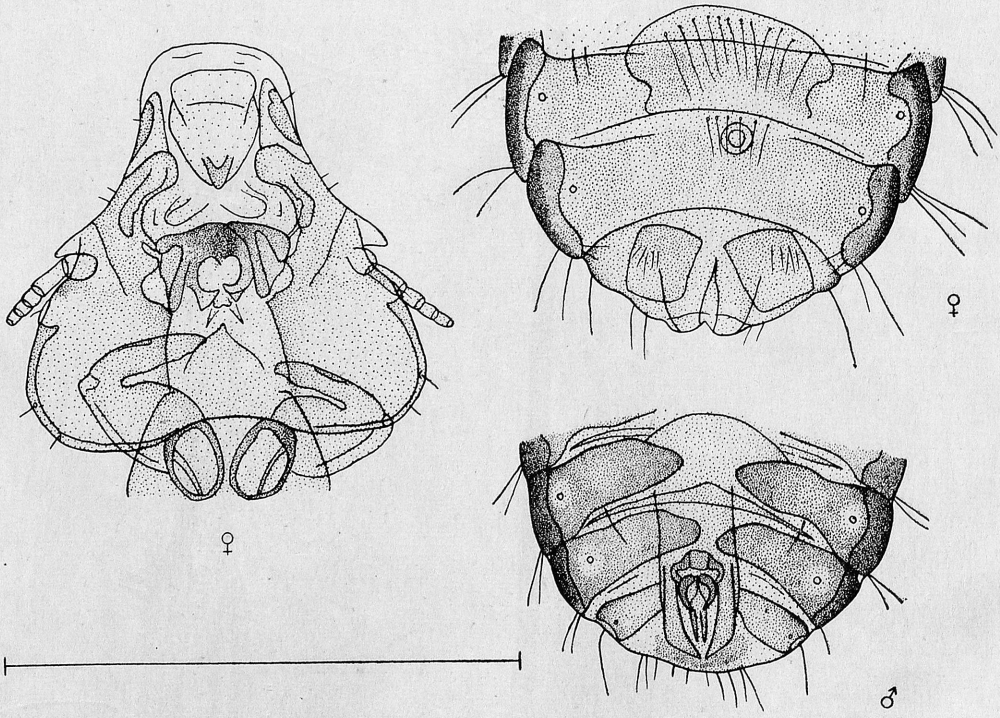



Fig. 13. *Saemundssonia integer* (NITZSCH) (head, terminal abdominal segments of male and female) from *Grus grus* L., Warszawa, 5. XII. 1954. Scale length = 1 mm.

structure of body, sedentary living habits and distinct location on the head and neck of the bird; they appear particularly numerously on the feathers with undeveloped webs. It is rather more difficult for the birds to get rid of the parasites located in the above-mentioned places than from other parts of their bodies. The birds of the family *Colymbidae* are an exception; I found only single specimens of the *Mallophaga* of the group „*Docophorus*" on them. I suppose *Colymbidae* produce worse conditions for *Mallophaga* to keep on them, owing to their frequent diving. Fig. 13 is presented as an example of a species belonging to the group „*Docophorus*".

## Characteristics of the group „*Nirmus*“

This group consists of the *Mallophaga* from *Charadriidae*, *Laridae*, *Rallidae*, *Phalacrocoracidae*, *Falconidae* and perhaps *Strigidae* and *Ciconiidae*.

The *Mallophaga* of this group are widely spread and live both on the birds that fly skilfully and on those that dive well. So, like *Mallophaga* of the group „*Colpocephalum*“, they must show an ability to adapt themselves to the different living ways of their hosts. These adaptations, like in the group „*Col-*

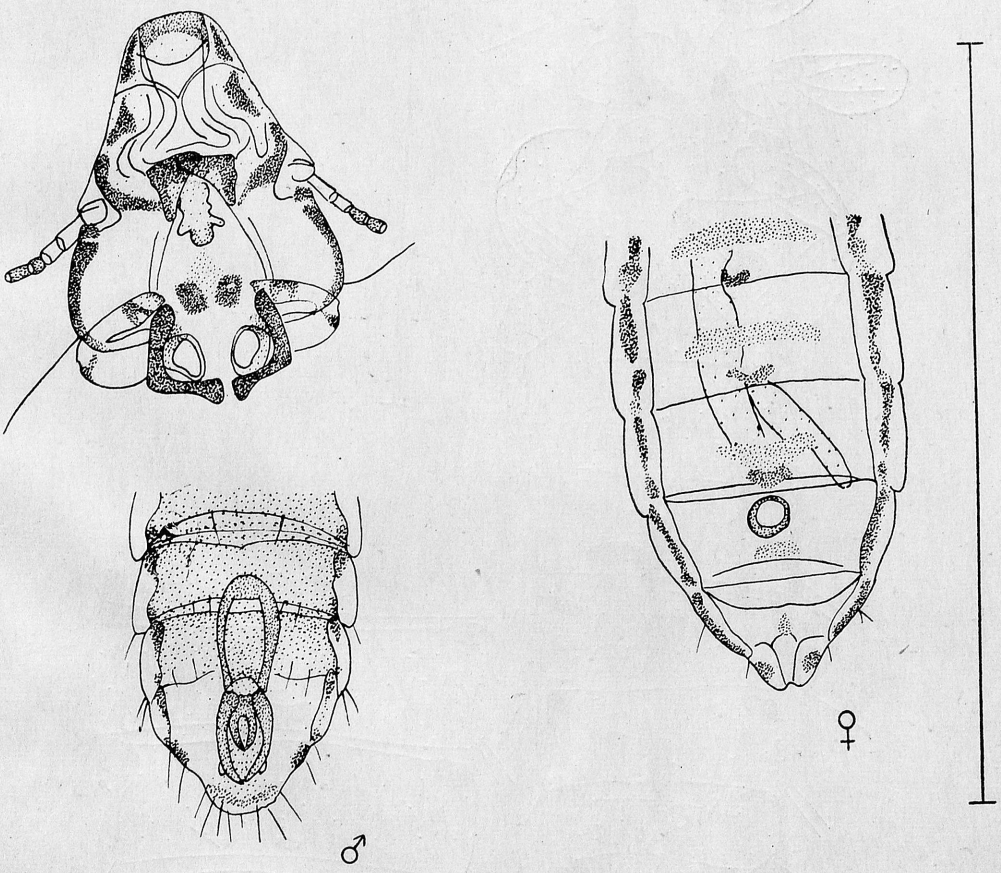



Fig. 14. *Quadraceps sellatus* (Burm.) (head, terminal abdominal segments of male and portion of female abdomen) from *Sterna hirundo* L., Sominy, 6. VIII. 1957. Scale length = 1 mm.

*pocephalum*“, depend on the strengthening of the chitin shell structure. The *Mallophaga* living on the birds that rise rapidly and fly swiftly are particularly strongly built. Separate chitin thickenings in the shape of dark patches stiffening the whole body are to be seen in them as they were in the group

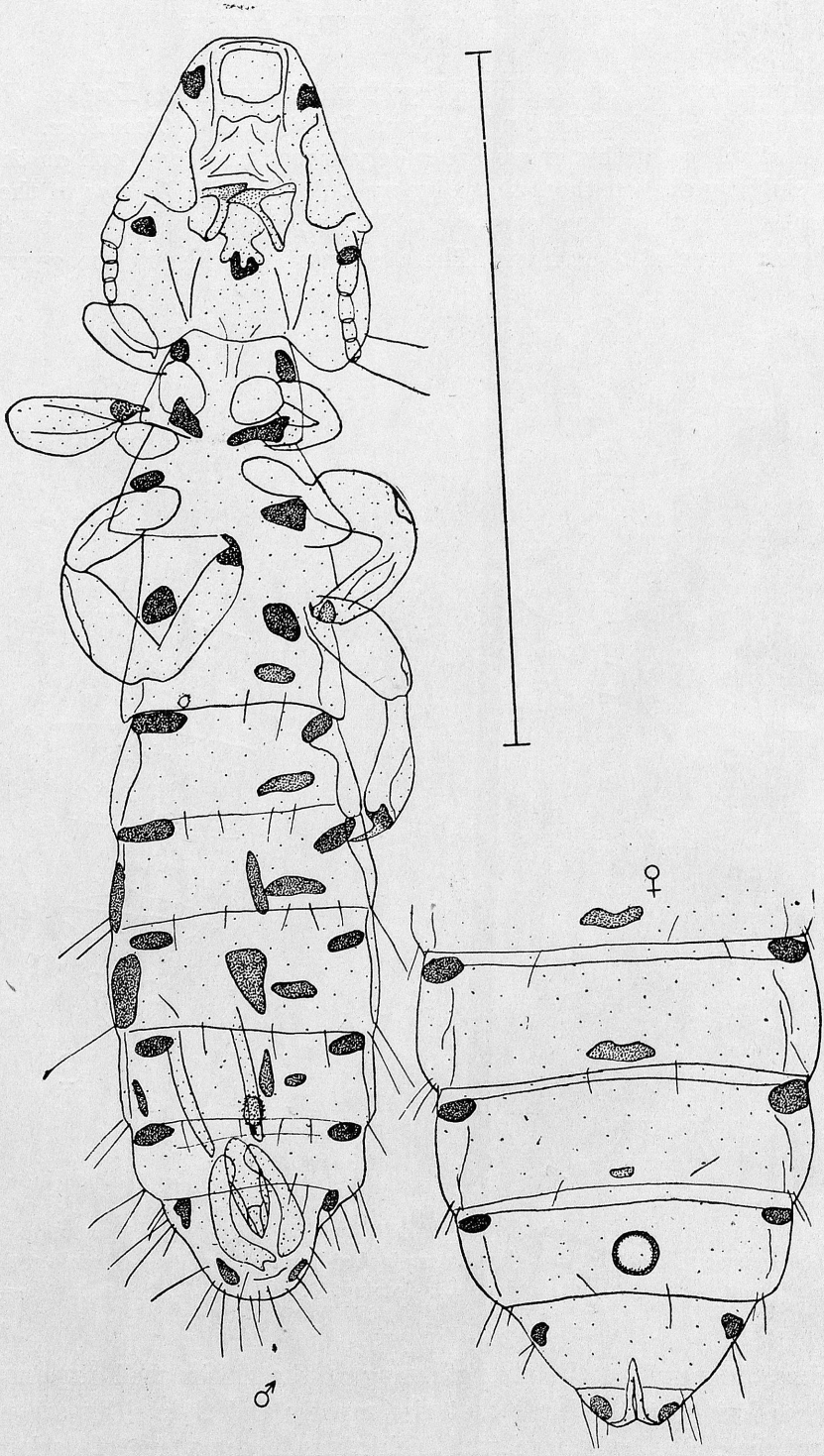
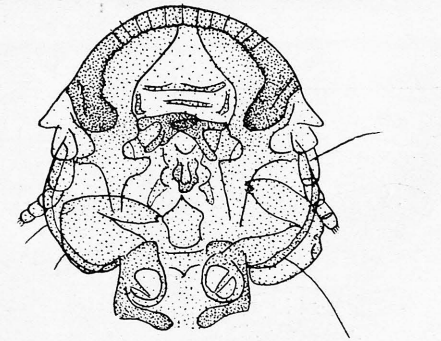
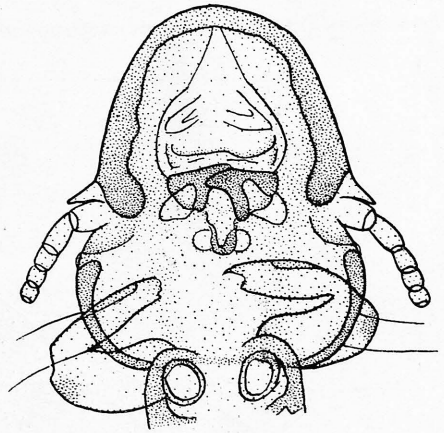
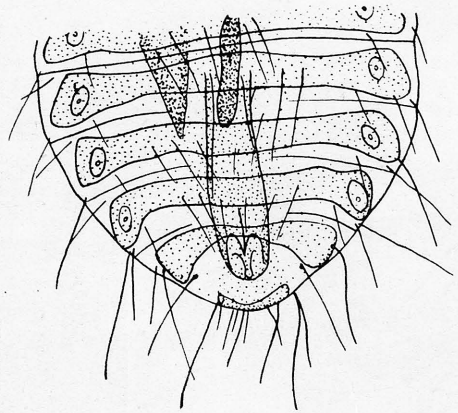



Fig. 15. *Quadraceps punctatus* (BURM.) (male and terminal abdominal segments of female) from *Larus canus* L., Krynica Morska, 27. VII. 1956. Scale length = 1 mm.



♂





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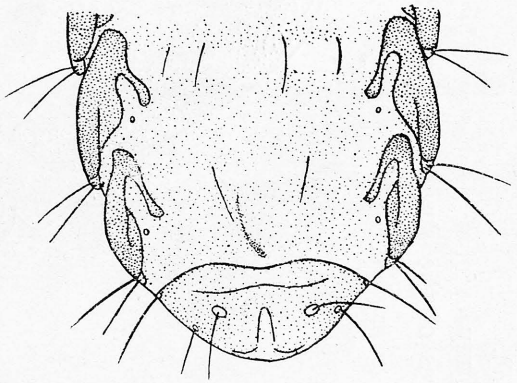

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Fig. 16. *Degeeriella discocephalus* (Burm.) ♂ (head and terminal abdominal segments) from *Haliaeëtus albicilla* L., Węgliniec, 15. XII. 1956. Scale length = 1 mm.

Fig. 17. *Degeeriella rufa rufa* (Burm.) ♀ (head and terminal abdominal segments) from *Accipiter nisus* L., Wrocław region, 24. XI. 1957. Scale length = 1 mm.

„*Colpocephalum*". They are particularly distinctly seen in the species occurring on the birds of the order *Laro-Limicolae* (Figs. 14 and 15).

This chitin strengthening is different in the *Mallophaga* of the group „*Nirmus*" living on *Falconidae*. Here the head is provided with a semi-circular thickening and the whole body is rather strongly chitinized with particularly great accumulations of pigment in its central and lateral portions (Figs. 16 and 17).

In my opinion these strengthenings play the same role as the analogous features of the structure in the *Mallophaga* of the group „*Colpocephalum*".

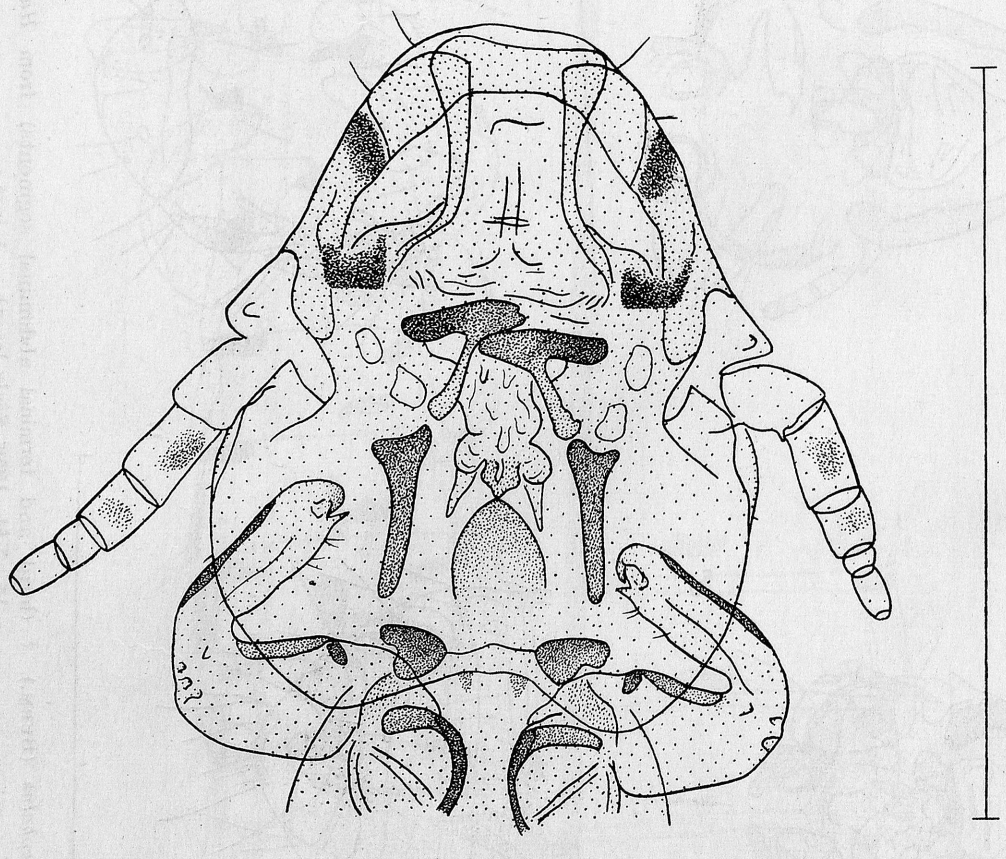

Fig. 18. *Esthiopterum gruis* (L.) (head of female) from *Grus grus* L., Warszawa, ZOO, 5. XII 1954. Scale length = 1 mm.

## Characteristics of the group „*Esthiopterum*"

This group comprises the *Mallophaga* from the following avian families: *Anatidae*, *Rallidae*, *Ciconiidae*, *Ardeidae*, *Gruidae* and *Falconidae*. The birds of these families are more or less closely connected with the water environment.

However, the birds marked for good diving such as *Podicipidae* are lacking here. As to the occurrence of the *Mallophaga* of the group „*Esthiopterum*" on the birds of the family *Anatidae*, I most frequently found them on the surface-feeding ducks which are poor divers. Consequently, the *Mallophaga* of the group „*Esthiopterum*" live on the birds that either do not dive at all

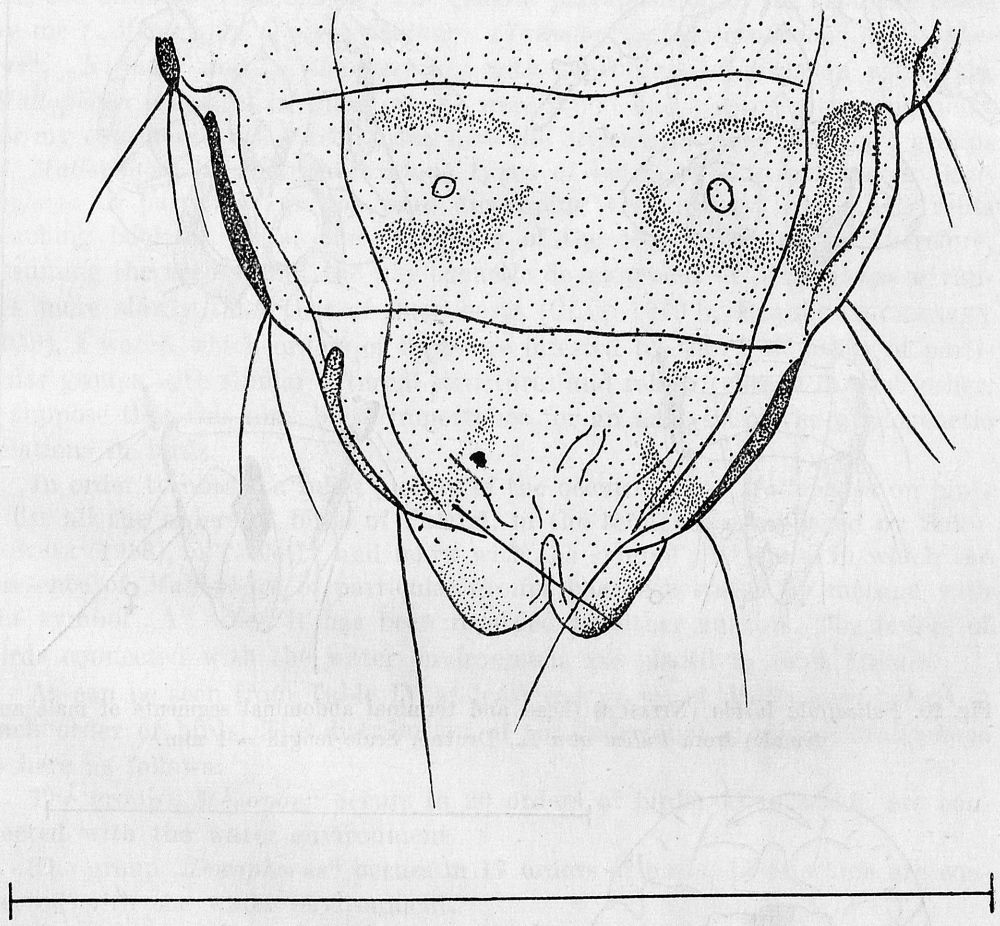

Fig. 19. *Esthiopterum gruis* (L.) ♀ (terminal abdominal segments) from *Grus grus* L., Warszawa, ZOO, 5. XII. 1954. Scale length = 1 mm.

or dive feebly but that fly well or at least moderately well. These *Mallophaga* are represented by species with elongated shapes of body. They live on the wing-feathers and cling to them in the position parallel to the barbs. Their chitin shell strengthenings are not very strong by comparison with other *Mallophaga*. I believe that the main adaptation permitting them to keep on birds is their characteristic position on the feathers (Figs. 18, 19, 20 and 21).

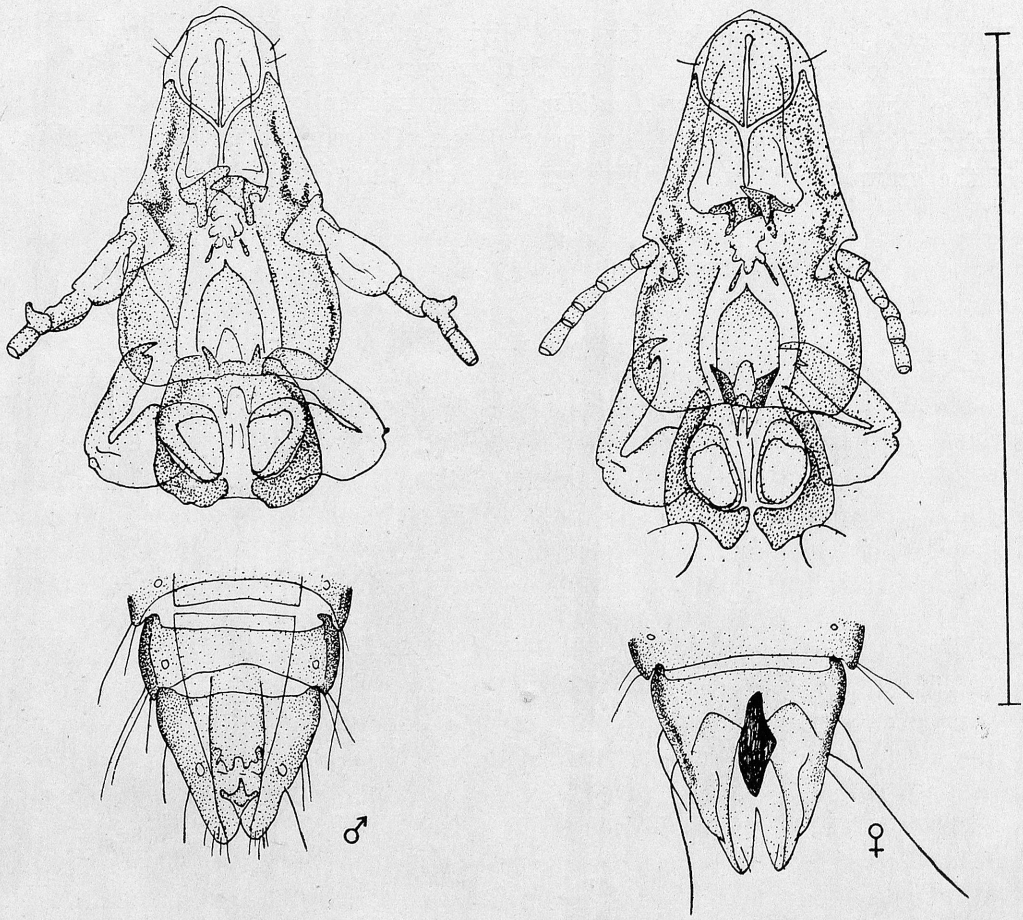


Fig. 20. *Fulicoffula lurida* (NITZSCH) (head and terminal abdominal segments of male and female) from *Fulica atra* L., Drużno, Scale length = 1 mm.

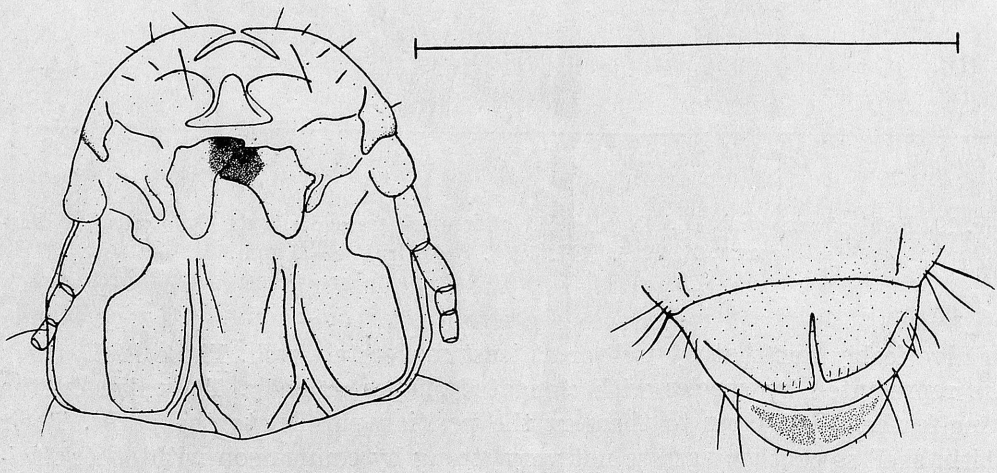

Fig. 21. *Ornithobius cygni* (L.) ♀ (head and terminal abdominal segments) from *Cygnus cygnus* L., Jugoslavia, Kresnice, February 1954. Scale length = 1 mm

## VI. A TRIAL OF CORRELATION OF AFFINITIES IN *MALLOPHAGA* WITH THOSE IN THEIR HOSTS

The conclusions drawn from my observations, completed with the data from literature (HOPKINS a. CLAY 1952, CLAY 1957, EICHLER 1941 a and b, 1942, 1949), have enabled me to present the relations between the *Mallophaga* and the birds more accurately. The general juxtaposition of the groups erected by me (*„Menopon"*, *„Colpocephalum"*, *„Trinoton"*, *„Laemobothrion"*, *„Docophorus"*, *„Nirmus"* and *„Esthiopterum"*) with the orders of birds on which the *Mallophaga* classified in these groups were found has become a starting point for my considerations. I keep using here the division into the auxilliary groups of *Mallophaga*, because the various types of chitin shell structures in *Mallophaga* of particular groups were developing very slowly, with their roots reaching back as far as the prehistory of the respective hosts. Therefore, assuming the theory that the phylogenetic development of *Mallophaga* advances more slowly than that of their hosts (CLAY 1949 b, BLAGOVESHCHENSKY 1959), I watch which orders of birds are infested by the *Mallophaga* of particular groups with similar external structures and related closely to each other. I suppose that this may be of importance for an analysis of the phylogenetic relations in birds.

In order to obtain a fuller picture of the occurrence of *Mallophaga* on birds I list all the orders of birds of Poland, in the sequence established by SOKOŁOWSKI (1958), in Table IV and mark with the symbol „M" those in which the presence of *Mallophaga* of particular groups has been stated by me and with the symbol „A" when it has been recorded by other authors. The orders of birds connected with the water environment are placed in thick frames.

As can be seen from Table IV at least one group of *Mallophaga* occurs in each order of birds. The distribution of the individual groups of *Mallophaga* is here as follows:

The group *„Menopon"* occurs in 20 orders of birds, 12 of which are connected with the water environment.

The group *„Docophorus"* occurs in 17 orders of birds, 14 of which are connected with the water environment.

The group *„Colpocephalum"* occurs in 17 orders of birds, 12 of which are connected with the water environment.

The remaining groups occur, as a rule, in the orders of birds more or less closely conected with the water environment. These groups are: *„Esthiopterum"* present in 10 orders of birds, *„Laemobothrion"* living on birds of 3 orders and *„Trinoton"* occurring in 2 orders.

Whenever I speak about the orders of birds connected with the water environment, I mean the orders, all species of which are connected with water. These are: *Gressores*, *Grues*, *Ralli*, *Laro-Limicolae*, *Anseres*, *Steganopodes*, *Tubinares*, *Phoenicopteri*, *Podicipedes*, *Colymbi*, *Alcae* and *Halcyones*. In addition, I include here the following orders, some species of which only are con-

Table IV

Occurrence of *Mallophaga* groups on birds belonging to orders known in Poland

| Order of birds | *Mallophaga* groups | | | | | | |
|---|---|---|---|---|---|---|---|
| | *„Menopon“* | *„Colpocephalum“* | *„Trinoton“* | *„Laemobothrion“* | *„Docophorus“* | *„Nirmus“* | *„Esthiopterum“* |
| *Passeres* | A | A | | | A | A | |
| *Macrochires* | A | | | | | A | |
| *Caprimulgi* | | | | | A | A | |
| *Upupae* | A | A | | | | A | |
| *Meropes* | | | | | A | | |
| *Coraciae* | A | | | | | A | |
| *Halcyones* | | A | | | A | A | |
| *Cuculi* | A | A | | | A | A | |
| *Pici* | A | A | | | | A | |
| *Striges* | | A | | | M A | M? A | |
| *Accipitres* | A | M A | | M A | M A | M A | M A |
| *Columbae* | A | A | | | | | A |
| *Pterocletes* | A | | | | | A | |
| *Galli* | A | A | | | | A | |
| *Gressores* | A | M A | | A | M A | M A | M A |
| *Phoenicopteri* | A | A | A | | A | A | A |
| *Grues* | M A | M A | | | M A | | M A |
| *Otides* | | | | | | A | |
| *Ralli* | M A | | | A | M A | M A | M A |
| *Laro-Limicolae* | M A | M A | | | M A | M A | A |
| *Anseres* | M A | A | M A | | M A | | M A |
| *Steganopodes* | A | A | | | A | M A | A |
| *Tubinares* | A | A | | | A | | A |
| *Podicipedes* | M A | A | | | | M A | |
| *Colymbi* | | | | | M A | A | |
| *Alcae* | A | | | | A | A | |

nected with the water environment: *Striges*, *Accipitres* and *Passeres*. I treat all these orders jointly, because the specific compositions of the *Mallophaga* populations from the birds related to each other always show much resemblance independently of the environments in which these birds live.

I explain the wide distribution of the *Mallophaga* of the groups *„Menopon“* and *„Colpocephalum“* over many orders of birds by the primitiveness and poor specialization of the *Mallophaga* of these groups belonging to the family *Menoponidae*.

On the contrary, I explain the wide distribution of the groups *„Docophorus“* and *„Nirmus“* by the plasticity of the adaptations of *Mallophaga* specialized according to the various biologies of the hosts.

The group *„Esthiopterum“* is limited only to the birds closely connected with the water environment, but it is not to be found in the orders *Podicipidae*, *Colymbi* and *Alcae* that are noted for excellent diving. Probably the

*Mallophaga* of the group „*Esthiopterum*" have not produced proper adaptations for the biology of these birds.

The groups „*Trinoton*" and „*Laemobothrion*" show a considerable specialization, but no wider distribution.

I consider also the phylogenetic aspect of the relations existing between the parasites and the hosts. Table V, given below, is to explain this matter. It presents the orders of birds, more or less connected with the water environment, from which I have worked out *Mallophaga*, as well as the orders standing next to them in the system. The avian orders possessing similar *Mallophaga* faunae are placed in thick frames.

Table V

Occurrence of *Mallophaga* groups on birds associated with the water environment with special reference to avian orders having similar *Mallophaga* faunae

| Order of birds | *Mallophaga* groups | | | | | | |
|---|---|---|---|---|---|---|---|
| | „*Menopon*" | „*Colpocephalum*" | „*Trinoton*" | „*Laemobothrion*" | „*Docophorus*" | „*Nirmus*" | „*Esthiopterum*" |
| *Striges* | | A | | | M A | M? A | |
| *Accipitres* | A | M A | | M A | M A | M A | M A |
| *Gressores* | A | M A | | A | M A | M A | M A |
| *Steganopodes* | A | A | | | A | M A | M A |
| *Ralli* | M A | | | A | M A | M A | M A |
| *Laro-Limicolae* | M A | M A | | | M A | M A | A |
| *Grues* | M A | M A | | | M A | | M A |
| *Tubinares* | A | A | | | A | | A |
| *Anseres* | M A | A | M A | | M A | | M A |
| *Phoenicopteri* | A | A | A | | A | A | A |
| *Podicipedes* | M A | A | | | | M A | |
| *Colymbi* | | | | | M A | A | |
| *Alcae* | A | | | | A | A | |

As will be seen from Table V various numbers of particular groups of *Mallophaga* occur in different orders of birds. With respect to that, the richest orders are: *Accipitres* (6 groups of *Mallophaga*), *Gressores* (6 groups), *Phoenicopteri* (6 groups), *Anseres* (6 groups), *Ralli* (5 groups), *Laro-Limicolae* (5 groups) and *Steganopodes* (5 groups). On the other hand, the poorest orders — as regards the number of the *Mallophaga* groups — are: *Colymbi* (2 groups), *Alcae* (3 groups) and *Striges* (3 groups). These are old and markedly specialized orders. It is known from literature (Clay 1949 b) that the phylogenetically old groups of birds are characterized by a *Mallophaga* fauna poor in species.

Taking into consideration the orders of birds specified in Table V and comparing the groups of *Mallophaga* present on them, certain conclusions can be drawn concerning the mutual relationship among some orders of birds,

and thus the confirmation of the results of the ornithological researches attained.

As I have mentioned, the order *Striges* has 3 groups of *Mallophaga*: „*Colpocephalum*", „*Docophorus*" and „*Nirmus*" [1]. These are the groups most frequently represented in the remaining avian orders. The fact constitutes another reason for treating the owls *(Striges)* as a phylogenetically old group. The judgement expressed by SOKOŁOWSKI (1958), quoted below in extenso, concerns this subject as well as the subject of the relationship of owls to other orders of birds:

„Before now owls were believed to be affined with the diurnal birds of prey, and the only difference between them was supposed to be the adaptation of owls for nocturnal life and that of diurnal birds of prey for being active in the daytime. At present it is assumed that the owls form a quite different evolutional line and that their resemblance to the diurnal predatory birds has developed secondarily, owing to the fact that both get food in a very similar manner. The matter is not quite clear, as F. ENGELMANN ennumerates as many common features uniting owls with diurnal birds of prey as differences separating them. The differences between owls and all other predatory birds are not more eminent than those to be seen among some genera of diurnal birds of prey. Consequently owls give much trouble to the systematists, and even now it is not known with which birds they may associate. Some authors attempted to find resemblance between owls and the birds differing from them considerably in external appearance, such as rollers, nightjars and kingfishers. There is no doubt as to the fact that owls are a very old feathered race. O. HEINROTH supposes that, e. g., the barn owl as species is older than the present state of continents, and its antiquity is proved by the fact that it is present all over the globe though it does not migrate".

*Accipitres* and owls have the same groups of *Mallophaga*. Only the *Mallophaga* of the groups „*Menopon*" and „*Laemobothrion*" occurring in *Accipitres* have not been found in owls. The group „*Menopon*" embraces, as was mentioned above, the *Mallophaga* of the most primitive structure and slight specialization of external qualities, and it belongs to the phylogenetically oldest branch of *Mallophaga* (KÉLER 1957). Besides, this group is represented in a majority of birds. The lack of the group „*Menopon*" in *Striges* can be explained either by the lack of phylogenetic connexions between owls and *Accipitres* or by ecologic factors. Perhaps the *Mallophaga* of the group „*Menopon*" did not find suitable conditions on owls and have not developed on them, or at one time renounced them for some reason. The same refers to the other missing group, „*Laemobothrion*", which is typical of *Accipitres* and better specialized than the group „*Menopon*". All these, not to mention the fact that the *Mallophaga* from owls may be still inaccurately recognized, do

[1] As to the group „*Nirmus*", I must treat my data as questionable, for they refer to the finding of the species *Degeeriella fulva* (GIEB.), a typical parasite of *Buteo buteo* L, on *Asio flammeus* PONT.

not give sufficient evidence that there is no affinity between owls and *Accipitres*. The affinity is remote, if there is any.

According to Sokołowski (1958) *Accipitres* separated from *Gressores* and *Steganopodes* in the early period of the phylogenetic development. In his opinion *Steganopodes*, in spite of some resemblance to *Lamellirostres (Anseres)*, emerged early from the old group of birds, which combined the features of the predatory and wading birds. *Accipitres*, *Gressores* and *Steganopodes* have very similar compositions of *Mallophaga*. The largest number of the *Mallophaga* groups were found in *Gressores* and *Accipitres*, namely „*Menopon*", „*Colpocephalum*", „*Laemobothrion*", „*Docophorus*", „*Nirmus*" and „*Esthiopterum*". The group „*Laemobothrion*", most typical of *Accipitres* and met in *Gressores*, is lacking in *Steganopodes*. This may prove the very early differentiation of *Steganopodes* from the birds combining the features of predatory and wading birds. However, the general uniformity of the *Mallophaga* groups in *Accipitres*, *Gressores* and *Steganopodes* seems to be connected with the ties of affinity uniting these orders.

My further observations refer to the group of the orders *Laro-Limicolae* and *Grues*. Sokołowski (1958) thinks that there is a remote affinity between these orders and, besides, that *Alcae* have also descended from the same, common stem. *Laro-Limicolae* and *Grues*, comprising a number of most various forms, have the similar compositions of *Mallophaga*. The *Mallophaga* recorded from *Laro-Limicolae* belong under the following groups: „*Menopon*", „*Colpocephalum*", „*Docophorus*" and „*Estiopterum*". In *Grues* only the group „*Nirmus*", present in a majority of birds, is lacking. The lack of this group may indicate a rather remote affinity between the orders *Laro-Limicolae* and *Grues*. As to the relationship between these two orders and *Alcae*, no close connexions may be stated on the basis of the *Mallophaga* groups present on them. The orders *Laro-Limicolae* and *Steganopodes* show the identic compositions of *Mallophaga* groups. This fact is striking, as the birds of both these orders differ from each other considerably. However, it is difficult to draw any conclusions here.

*Phoenicopteri* resemble *Anseres* in some measure. The birds of these two orders have horny lamellae on the edges of mandibles and in result their manners of nourishing are similar. The structure of the digestive duct in *Anseres* resembles that in *Phoenicopteri* and the young in both orders are led to water just after drying. In addition, both *Anseres* and *Phoenicopteri* have the desmognathous and holorhinal structure of the skull (Stresemann 1934). Sokołowski (1958) explains these resemblances between the orders *Anseres* and *Phoenicopteri* by the analogy in the structures resulting from the similar nourishment of the birds belonging to these orders, and not by their affinity. It is, however, characteristic of these orders that they have similar compositions of *Mallophaga*. The following groups are known in *Phoenicopteri*: „*Menopon*", „*Colpocephalum*", „*Trinoton*", „*Docophorus*", „*Nirmus*" and „*Esthiopterum*". Of these only the group „*Nirmus*" is lacking in *Anseres*. The occur-

rence of the group „*Trinoton*“, unknown in other birds, is a distinctive quality of these orders. This may indicate some phylogenetic connexions between these two orders of birds which conforms with the opinion expressed by CLAY (1957).

The orders *Colymbi* and *Alcae* have analogous compositions of *Mallophaga* except for the group „*Menopon*“. The occurrence of this *Mallophaga* group in *Alcae* is sporadic and concerns only the species *Austromenopon nigropleurum* (DENNY), which according to HOPKINS and CLAY (1952) is reckoned among the typical parasites of *Alca torda* L. However, I used to find this species on the birds of the family *Charadriidae*, from which it is also recorded by SÉGUY (1944).

NAUMANN (1905) associates *Colymbi* and *Tubinares* with *Steganopodes* from the phylogenetic point of view, and SOKOŁOWSKI (1958), as was mentioned above, associates *Alcae* with *Laro-Limicolae* and *Grues*. No connexions can be found here as far as the compositions of *Mallophaga* groups are concerned. It is noteworthy that the birds of the order *Podicipedes*, in spite of their considerable similarity to *Colymbi*, have slight connexions as regards the composition of *Mallophaga*. Only the group „*Nirmus*“ is here common. *Colymbi* and *Alcae* have two common groups of *Mallophaga*, „*Docophorus*“ and „*Nirmus*“, which are also often met in other birds. The group „*Esthiopterum*“, recorded from all other aquatic birds, is lacking both in them and in *Podicipedes*. This may be due to the phylogenetic diversity of these orders, or to bad ecologic conditions for the *Mallophaga* of the group „*Estiopterum*“ in them.

Finally we should mention the order *Ralli*, from which the following groups of *Mallophaga* are known: „*Menopon*“, „*Laemobothrion*“, „*Docophorus*“, „*Nirmus*“ and „*Esthiopterum*“. *Ralli* constitute a phylogenetically old group, which is characteristic by their wide dispersion all over the earth in spite of their poor abilities to fly (HEINROTH 1924). For these reasons, just as in owls, it is difficult to associate them phylogenetically with other avian orders. HEINROTH (1924) placed *Ralli* close to *Grues* and SOKOŁOWSKI (1958) between *Otidae* and *Laro-Limicolae*. As regards the groups of *Mallophaga* in *Ralli*, „*Colpocephalum*“, occurring in a majority of birds, is lacking here. It points to the lack of a close phylogenetic connexion with other orders of water birds. It is interesting, that the group „*Laemobothrion*“, hitherto recorded exclusively from *Gressores* and *Accipitres*, has been found in *Ralli*.

Recapitulating my present considerations I gather that the structure of the *Mallophaga* fauna on birds depends chiefly upon the environment in which those *Mallophaga* live and the ties of affinity uniting their hosts.

Atypical *Mallophaga*

| Atypical hosts | *Mallophaga* species found on atypical hosts with references to their respective typical hosts | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Family | Species | *Rallidae* | | | *Laridae* | | | *Charadriidae* | | | *Anatidae* | | | *Podicipidae* | | | *Falconidae* | | |
| | | a | b | c | a | b | c | a | b | c | a | b | c | a | b | c | a | b | c |
| *Ciconiidae* | *Ciconia ciconia* L. | | | | | | | | | | | | | | | | 2 | *Degeeriella fulva* (GIEB.) + | 49 |
| *Ardeidae* | *Ardea cinerea* L. | | | | | | | | | | 1 | *Anatoecus dentatus* (SCOP.) + | 1 | | | | | | |
| *Gruidae* | *Grus grus* L. | 1 | *Pseudomenopon pilosum* (SCOP.) | 1 | | | | | | | | | | | | | | | |
| *Rallidae* | *Fulica atra* L. | | | | 1 | *Austromenopon ridibundus* (DENNY) | 5 | 1 | *Actornithophilus affinis* (NITZSCH) + | 1 | 1 | *Trinoton querquedulae* (L.) | 1 | 1 | *Aquanirmus colymbinus* (SCOP.) + | 1 | | | |
| | *Gallinula chloropus* L. | | | | 1 | *Quadraceps punctatus* (BURM.) | 1 | 1 | *Quadraceps iunceus* (SCOP.) + | 9 | 2 | *Anatoecus dentatus* (SCOP.) + | 8 | | | | | | |
| | | | | | 1 | *Austromenopon ridibundus* (DENNY) + | 1 | 1 | *Actornithophilus ochraceus* (NITZSCH) | 11 | | | | | | | | | |
| *Charadriidae* | *Vanellus vanellus* L. | | | | 1 | *Ausiromenopon ridibundus* (DENNY) + | 2 | | | | | | | | | | | | |
| *Laridae* | *Larus ridibundus* L. | 1 | *Fulicoffula* sp. + | 1 | | | | | | | | | | | | | | | |
| *Anatidae* | *Anas platyrhynchos* L. | 5 | *Pseudomenopon pilosum* (SCOP.) + | 13 | | | | | | | | | | | | | | | |
| | | 2 | *Rallicola fulicae* (DENNY) + | 2 | | | | 1 | *Actornithophilus affinis* (NITZSCH) + | 1 | | | | | | | | | |
| | | 2 | *Incidifrons fulicae* (DENNY) + | 2 | | | | | | | | | | | | | | | |
| | *Anas querquedula* L. | | | | | | | 1 | *Actornithophilus ochraceus* (NITZSCH) | 10 | | | | | | | | | |
| | *Anas strepera* L. | 1 | *Rallicola fulicae* (DENNY) | 2 | | | | | | | | | | | | | | | |
| | *Nyroca fuligula* L. | | | | | | | | | | | | | | | | 1 | *Degeeriella rufa* (BURM.) | 1 |
| *Phalacrocoracidae* | *Phalacrocorax carbo* L. | | | | | | | | | | 1 | *Anaticola crassicornis* (SCOP.) | 1 | | | | | | |
| *Podicipidae* | *Podiceps cristatus* L. | | | | | | | 1 | *Rhynonirmus scolopacis* (DENNY) | 2 | 1 | *Anatoecus dentatus* (SCOP.) | 3 | | | | 1 | *Craspedorrhynchus* sp., iuv. | 1 |
| | *Podiceps ruficollis* PALL. | 1 | *Fulicoffula lurida* (NITZSCH) | 1 | | | | 1 | *Rhynonirmus scolopacis* (DENNY) | 2 | 2 | *Anaticola crassicornis* (SCOP.) | 4 | | | | | | |
| | *Podiceps griseigena* BODD. | 1 | *Fulicoffula lurida* (NITZSCH) | 1 | 1 | *Actornithophilus* sp., iuv. + | 1 | 1 | *Actornithophilus ochraceus* (NITZSCH) | 2 | | | | | | | | | |
| | | | | | | | | 1 | *Quadraceps furvus* (BURM.) + | 1 | 1 | *Anaticola crassicornis* (SCOP.) | 1 | | | | 1 | *Craspedorrhynchus platystomus* (BURM.) | 1 |
| *Strigidae* | *Asio flammeus* PONT. | | | | | | | | | | | | | | | | 1 | *Degeeriella fulva* (GIEB.) + | 68 |
| | | | | | | | | | | | | | | | | | 1 | *Colpocephalum flavescens* HAAN. | 2 |
| | *Tyto alba* SCOP. | | | | | | | | | | | | | | | | 1 | *Colpocephalum flavescens* HAAN. | 3 |
| *Falconidae* | *Pandion haliaeëtus* L. | | | | | | | | | | 1 | *Anaticola crassicornis* (SCOP.) | 1 | | | | | | |
| | *Circus aeruginosus* L. | | | | | | | | | | 1 | *Anaticola crassicornis* (SCOP.) | 1 | | | | | | |
| | *Milvus migrans* BODD. | 1 | *Pseudomenopon pilosum* (SCOP.) + | 1 | | | | | | | | | | | | | | | |
| | *Buteo buteo* L. | 1 | *Pseudomenopon pilosum* (SCOP.) + | 1 | 1 | *Austromenopon ridibundus* (DENNY) | 1 | | | | 1 | *Anatoecus dentatus* (SCOP.) + | 1 | | | | | | |
| | *Accipiter nisus* L. | | | | | | | | | | | | | 1 | *Aquanirmus colymbinus* (SCOP.) | 2 | | | |

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STRESZCZENIE

Niniejsza praca obejmuje szereg spostrzeżeń i wniosków na podstawie zbadania wszołów z ptaków należących do następujących rodzin: *Ciconiidae*, *Plegadiidae*, *Ardeidae*, *Gruidae*, *Rallidae*, *Charadriidae*, *Laridae*, *Anatidae*, *Phalacrocoracidae*, *Podicipidae*, *Colymbidae*, *Strigidae* i *Falconidae*. Ptaki te pochodziły głównie z województw: wrocławskiego, katowickiego, krakowskiego, warszawskiego, lubelskiego, białostockiego, olsztyńskiego, gdańskiego i koszalińskiego.

1. Udało mi się zebrać 73 gatunki wszołów, w tym 16 gatunków zebrałam z ptaków, na których dotychczas nie były znane. Wykaz tych ostatnich wraz z ich nowymi żywicielami zamieszczam poniżej.

| | |
|---|---|
| *Actornithopilus spinulosus* (PIAG.) | — *Calidris minuta* LEISL. |
| *Anaticola anseris* (L.) | — *Cygnopsis cygnoid* L. |
| *Anaticola crassicornis* (SCOP.) | — *Nyroca nyroca* GÜLD. |
| *Austromenopon nigropleurum* (DENNY) | — *Tringa erythropus* PALL. |
| *Austromenopon ridibundus* (DENNY) | — *Larus canus* L. |
| | — *Sterna hirundo* L. |
| *Carduiceps cingulatus* (DENNY) | — *Calidris alpina* L. |
| *Ciconiphilus pectiniventris* (HAAR.) | — *Cygnopsis cygnoid* L. |
| *Colpocephalum flavescens* HAAN. | — *Circus aeruginosus* L. |
| *Craspedorrhynchus platystomus* (BURM.) | — *Accipiter nisus* L. |
| | — *Aquila pomarina* BR. |
| | — *Buteo lagopus* BRÜNN. |
| | — *Milvus migrans* BODD. |
| *Fulicoffula rallina* (DENNY) | — *Gallinula chloropus* L. |
| *Holomenopon leucoxanthum* (BURM.) | — *Anas querquedula* L. |
| | — *Bucephala clangula* L. |
| *Holomenopon nyrocae* (BLAG.) | — *Nyroca nyroca* GÜLD. |
| *Incidifrons ralli* (SCOP.) | — *Gallinula chloropus* L. |
| *Lunaceps holophaeus* (BURM.) | — *Calidris minuta* LEISL. |
| | — *Limicola falcinellus* PONT. |
| *Quadraceps furvus* (BURM.) | — *Tringa ochropus* L. |
| *Trinoton lituratum* BURM. ? | — *Anas querquedula* L. |
| | — *Anas strepera* L. |

2. Wydaje się, że zebrane przeze mnie wszoły z *Anas platyrhynchos* L., *A. querquedula* L., *A. penelope* L. i *A. strepera* L., które oznaczając według BURMEISTERA (1838) zaliczyłam do gatunku *Trinoton lituratum* BURM., są formami młodocianymi *Trinoton querquedulae* (L.).

3. Znalazłam na jednym okazie *Scolopax rusticola* L. 3 ♂♂ *Austromenopon icterum* (BURM.). Ponieważ dotychczas znane były tylko samice tego gatunku, zamieściłam opis ♂.

4. Przypuszczam, że szerokie rozprzestrzenienie gatunku *Pseudomenopon pilosum* (SCOP.), który, będąc typowym dla ptaków z rodziny *Rallidae*, wy-

stępuje również stale na ptakach z rodziny *Podicipidae*, może być spowodowane niedawną historycznie migracją tego gatunku z *Rallidae* na *Podicipidae*.

5. W badaniach swoich objęłam, prócz wszołów typowych dla danych ptaków, także i nietypowe. Wszoły nietypowe znajdywałam na ptakach rzadko i przeważnie w małych ilościach. Wyjątek stanowił tu gatunek *Degeeriella fulva* (Gieb.), którego zebrałam 49 osobników z 2 okazów *Ciconia ciconia* L. i 68 osobników z jednego okazu *Asio flammeus* Pont. Wszoły nietypowe chwytałam zarówno na ptakach izolowanych od siebie po zastrzeleniu, jak i nieizolowanych. Stwierdziłam, że na badanych przeze mnie ptakach z rodziny *Rallidae*, *Anatidae*, *Podicipidae* i *Falconidae* wszoły nietypowe występowały częściej niż na ptakach z pozostałych badanych rodzin. Ponadto zauważyłam, że nietypowymi na danych ptakach były najczęściej wszoły, które zwykle stale żyją na ptakach z rodziny *Rallidae*, *Charadriidae*, *Anatidae* i *Falconidae*. Być może istnieją u tych wszołów pewne tendencje migracyjne z jednych ptaków na drugie.

6. Prześledziłam morfologię pancerza chitynowego wszołów, które podzieliłam na 7 grup, na podstawie podobieństw w budowie zewnętrznej. Wszoły zaszeregowane do określonych grup posiadają specyficzny dla siebie skład żywicieli, a mianowicie na ptakach szybko latających znajdowałam głównie formy o mocno zbudowanym pancerzu chitynowym, a na ptakach mniej ruchliwych formy o cieńszym i słabszym pancerzu. Widocznie sposoby poruszania się ptaków stanowią między innymi ważny czynnik ekologiczny dla wszołów. Sposób związania rozmaitych ptaków ze środowiskiem wodnym stwarza różne warunki ekologiczne, mniej lub więcej korzystne dla wszołów. Odbija się to na liczebności osobniczej i gatunkowej, a poza tym na wykształceniu rozmaitych cech zewnętrznych u wszołów żyjących na ptakach z poszczególnych rodzin. Na ptakach dobrze nurkujących stwierdzałam ubóstwo ilościowe i gatunkowe wszołów w porównaniu z fauną wszołów żyjących na innych ptakach. Kaczki będące ściśle związane z wodą, posiadają niektóre gatunki wszołów silniej owłosione, niż analogiczne gatunki żyjące na ptakach drapieżnych. Być może stoi to w związku z większymi różnicami temperatur, na jakie są narażone wszoły ptaków pływających, w porównaniu z wszołami ptaków rzadziej stykających się z wodą.

7. Uczyniłam próbę korelacji pokrewieństw wszołów ze stosunkami pokrewieństwa między ich żywicielami, opierając się o teorię twierdzącą, że rozwój filogenetyczny wszołów kroczy wolniej niż rozwój filogenetyczny ich żywicieli (Clay 1949 b). Badając rozsiedlenie pokrewnych wszołów na ptakach z rozmaitych rzędów, udało mi się znaleźć pewne nawiązania filogenetyczne pomiędzy poszczególnymi rzędami ptaków, które są zasadniczo potwierdzone przez ornitologię. Na podstawie porównania podobnych grup wszołów mogłam potwierdzić istnienie pewnej więzi pokrewieństwa między rzędami: *Accipitres*, *Gressores*, *Steganopodes* i między *Grues* i *Laro-Limicolae*. Morfologicznie podobne do siebie wszoły występują na ptakach z rzędów *Anseres* i *Phoenicopteri*,

a także na *Colymbi* i *Alcae*, co może wskazywać na istnienie pewnego pokrewieństwa między tymi rzędami.

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## РЕЗЮМЕ

Настоящая робота содержит ряд наблюдений и заключений на основании изучения материала пухоедов, собранного на птицах принадлежащих к следующим семействам: *Ciconiidae, Plegadiidae, Ardeidae, Gruidae, Rallidae, Charadriidae, Laridae, Anatidae, Phalacrocoracidae, Podiipcidae, Colymbidae, Strigidae* и *Falconidae*. Птицы эти собраны были главным образом в воеводствах: вроцлавском, катовицком, краковском, варшавском, люблинском, белостоцком, ольштинском, гданском и кошалинском.

1. Мне удалось собрать 73 вида пухоедов, в том числе 16 видов я собрала на птицах, на которых до настоящего времени виды эти не были найдены. Перечень этих последних, вместе с их новыми кормильцами, я привожу ниже.

| | |
|---|---|
| *Actornithophilus spinulosus* (Piag.) | — *Calidris minuta* Leisl. |
| *Anaticola anseris* (L.) | — *Cygnopsis cygnoid* L. |
| *Anaticola crassicornis* (Scop.) | — *Nyroca nyroca* Güld. |
| *Austromenopon nigropleurum* (Denny) | — *Tringa erythropus* Pall. |
| *Austromenopon ridibundus* (Denny) | — *Larus canus* L. |
| | — *Sterna hirundo* L. |
| *Carduiceps cingulatus* (Denny) | — *Calidris alpina* L. |
| *Ciconiphilus pectiniventris* (Haar.) | — *Cygnopsis cygnoid* L. |
| *Colpocephalum flavescens* Haan. | — *Circus aeruginosus* L. |
| *Craspedorrhynchus platystomus* (Burm.) | — *Accipiter nisus* L. |
| | — *Aquila pomarina* Br. |
| | — *Buteo lagopus* Brünn. |
| | — *Milvus migrans* Bodd. |
| *Fulicoffula rallina* (Denny) | — *Gallinula chloropus* L. |
| *Holomenopon leucoxanthum* (Burm.) | — *Anas querquedula* L. |
| | — *Bucephala clangula* L. |
| *Holomenopon nyrocae* (Blag.) | — *Nyroca nyroca* Güld. |
| *Incidifrons ralli* (Scop.) | — *Gallinula chlorophus* L. |
| *Lunaeps holophaeus* (Burm.) | — *Calidris minuta* Leisel. |
| | — *Limicola falcinellus* Pont. |
| *Quadraceps furvus* (Burm.) | — *Tringa ochropus* L. |
| *Trinoton lituratum* Burm.? | — *Anas querquedula* L. |
| | — *Anas strepera* L. |

2. Мне кажется, что собранные мною пухоеды на *Anas platyrhynchos* L., *A. querquedula* L., *A. penelope* L., и *A. strepera* L., которые, определяя по Бурмейстеру (1838), я отнесла к виду *Trinoton lituratum* Burm., представляют в действительности молодые формы вида *Trinoton querquedulae* (L.).

3. Я нашла на одном экземпляре *Scolopax rusticola* L. три самца вида *Austromenopon icterum* (Burm.). Так как до настоящего времени известны были только самки этого вида, я привела описание самца.

4. Я полагаю, что широкое распространение вида *Pseudomenopon pilosum* (Scop.), который типичен для птиц из семейства *Rallidae* и который появляется также на птицах из семейства *Podicipidae*, может быть вызвано исторически недавней миграцией этого вида с семейства *Rallidae* на семейство *Podicipidae*.

5. В мои исследования я заключила не только пухоеды, типичные для данного вида птиц, но и нетипичные. Нетипичные пухоеды я находила на птицах редко и обыкновенно в небольшом количестве. Как исключение является вид *Degeeriella fulva* (Giеb.), собранный мною в количестве 49 экземпляров на двух экземплярах *Ciconia ciconia* L. и 68 экземпляров на одном экземпляре *Asio flammeus* Pont. Нетипичные пухоеды я находила на птицах, изолированных после того, как птицы эти были застрелены, и на неизолированных. Я констатировала, что нетипичные пухоеды чаще попадались на птицах из семейства *Rallidae, Anatidae, Podicipidae* и *Falconidae*, чем на птицах остальных, мною исследованных семейств. Я заметила, что нетипичными пухоедами на данном виде птицы чаще всего были такие, которые обыкновенно живут на птицах из семейства *Rallidae, Charadriidae, Anatidae* и *Falconidae*. Не исключается возможность, что у этих пухоедов существует тенденция к миграции с одних видов птиц на другие.

6. Я проследила морфологию хитинового панцыря пухоедов и поделила их на 7 групп, основываясь на сходстве во внешнем строении. При этом я заметила, что пухоеды, заключенные в известную группу, имеют специфический состав кормильцев, а именно: на быстро летающих птицах, я находила главным образом пухоеды с сильно построенным хитиновым панцырем. Это привело меня к заключению, что повидимому способы передвижения птиц являются между прочим важным экологическим фактором для пухоедов. Сверх того, я заметила, что связь разных птиц с водной средой, создает различные экологические условия, более или менее благоприятные для пухоедов. Это отражается на индивидуальной и видовой численности пухоедов, живущих из различных семейств, а также на их внешних признаках. На птицах, хорошо ныряющих, я констатировала количественную и видовую бедность пухоедов по сравнению с фауной пухоедов на других видах птиц. Кроме того, я заметила, что утки, тесно связанные с водой, имеют некоторые виды пухоедов, сильнее покрытых волосками, чем это замечается у аналогичных видов, живущих на хищных птицах. Возможно, что явление это имеет связь с большими изменениями температуры, которым подвержены пухоеды, живущие на плавающих птицах, чем те, которые живут на птицах, реже соприкасающихся с водой.

7. Я пыталась установить родственную связь у пухоедов с соотношением родственности между их кормильцами, опираясь на теории, утверждающей, что

филогенетическое развитие пухоедов подвигается вперед медленнее, чем филогенетическое развитие их кормильцев (Клей, 1949). Исследуя расселение родственных пухоедов на птицах из различных семейств, мне удалось найти известные филогенетические связи между известными рядами птиц, которые принципиально подтверждаются орнитологией. На основании сравнения похожих групп пухоедов, я могла констатировать существование известной родственной связи у рядов: *Accipitres, Gressores, Steganopodes* и у *Grues* и *Laro-Limicolae*. Морфологически похожие пухоеды живут на птицах из рядов: *Anseres* и *Phoenicopteri,* а также *Colymbi* и *Alcae*. Это обстоятельство может служить показателем существования известного родства между этими рядами.

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