# STUDIA

## UNIVERSITATIS BABEŞ-BOLYAI

## BIOLOGIA

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# STUDIA

## UNIVERSITATIS BABEŞ-BOLYAI

## BIOLOGIA

**1**

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STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXXV, 1, 1990

# SUR LES GRAPPES DE *CERNUELLA VIRGATA* DA COSTA *(GASTR., STYLOMATOPHORA)* DANS LA DOBROUDJA (ROUMANIE)

BOGDAN STUGREN* et NICOLAE COMAN**

**SUMMARY.** — **On the Clusters of** *Cernuella virgata* **Da Costa** *(Gastr., Stylomatophora)* **in the Dobrudja (Romania).** In ruderal vegetation, on the shores of the Black Sea, gatherings of individuals of this species were studied in 1979 and 1989 in the same area. Clusters of snails were found especially on certain *Compositae*, i.e. *Carduus* and *Cirsium*, and also on the stems of poplar tree *(Populus nigra* ssp. *pyramidalis)*. The number of individuals which constitute a snail cluster is highly variable. Generally, it is under 50, rarely over 100. Clusters are structured according to Poisson's law of distribution.

La richesse du peuplement de *Cernuella virgata* Da Costa est signalée sur le bord de la Mer Noire par G r o s s u [2, 3]. Nous avons observé un grand nombre de ces petits escargots dans certains habitats rudéraux près du village de Vama Veche (département de Constanţa), non loin de la frontière avec la Bulgarie, sur la chaussée parallèle à la mer, en août 1979 et 1989. Nous avons étudié surtout le modèle mathématique de répartition des escargots dans la formation végétale colonisée.***

**Observations sur les habitats colonisés.** En août 1979 nous avons observé le peuplement de cet escargot seulement dans l'aire située à l'est de la chaussée, entre le village et la plage, ce qui prouve qu'il s'agit d'une espèce halophile, fait signalé déjà pour les peuplements de Mangalia et de Costineşti [2]. La concentration des escargots sur la végétation rudérale de chardons (*Carduus* et *Cirsium*) démontre que *C. virgata* est une espèce attachée aux certaines Composées dont les tiges et les feuilles épineuses lui offrent un support favorable. Une observation pareille a été faite également pour *Helicella arenosa* dans la Camargue [1]. *C. virgata* n'est pas une espèce nitrophile proprement dite. Elle prospère sur les sols riches en nitrates, dont elle trouve un environnement favorable, grâce à la végétation nitrophile. Néanmoins, dans ce même habitat, la formation de panicauts (*Eryngium maritimum* et *E. campestre*) (Ombellifères), pourvus de même de feuilles épineuses est pauvre en escargots. Mais nous n'avons trouvé aucun escargot sur la formation d'arbrisseaux de *Hippophaë rhamnoides*, dont les épines sont abondantes. La densité des escargots dans une prairie d'euphorbes *(Euphorbia)* est plus élevée que dans la formation de panicauts, mais plus faible que dans la formation de chardons

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*** Nous remercions le malacologiste N. V. G r o s s u, professeur à l'Université de Bucarest, qui a bien voulu déterminer notre matériel.

*Tableau 1*

**Caracteristiques statistiques des grappes de** C e r n u e l l a v i r g a t a

$N_1$ — Effectif de la formation végétale. $N_2$ — Effectif du peuplement d'escargots. $s$ — Surface d'échantillonnage ($m^2$). $\bar{x}$ — Moyenne arithmétique de la fréquence des escargots sur une plante. $d_{ie}/p$ — Densité des escargots dans la formation végétale. $x_0$ — Fréquence des plantes non colonisées par des escargots. $d_{ip} \cdot m^{-2}$ — Densité individuelle des plantes sur $m^2$. $B_{ie}$ — Biomasse individuelle moyenne des escargots, en g. $B_{Te}$ — Biomasse totale du peuplement d'escargots. $d_{Be}/p$ — Biomasse moyenne des escargots sur une plante, en g. $d_{ie} \cdot m^{-2}$ — Densité individuelle des escargots sur $m^2$. $B_e \cdot m^{-2}$ — Biomasse individuelle moyenne des escargots sur $m^2$

| Formation végétale | $N_1$ | $N_2$ | $s$ | $\bar{x}$ | $d_{ie}/p$ | $x_0$ | $d_{ip} \cdot m^{-2}$ | $B_{ie}$ | $B_{Te}$ | $d_{Be}/p$ | $d_{ie} \cdot m^{-2}$ | $B_e \cdot m^{-2}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C a r d u u s 1 | 114 | 1015 | 100 | 5,58 | 8,90 | 26 | 1,14 | 0,25 | 253,75 | 2,255 | 10,15 | 2,537 |
| C a r d u u s 2 | 165 | 1022 | 100 | 6,24 | 6,19 | 28 | 1,65 | 0,25 | 255,50 | 2,555 | 10,22 | 2,555 |
| E r y n g i u m m a r i t i m u m | 201 | 89 | 10 | 0,42 | 0,442 | 142 | 20,10 | 0,25 | 22,25 | 0,11 | 8,90 | 2,225 |
| E r y n g i u m c a m p e s t r e | 36 | 30 | 10 | 0,11 | 0,83 | 32 | 3,60 | 0,25 | 7,50 | 0,208 | 3,0 | 0,75 |
| E u p h o r b i a | 79 | 227 | 10 | 8,52 | 2,87 | 21 | 7,90 | 0,25 | 56,75 | 2,87 | 22,70 | 5,675 |

(Tableau 1). Les troncs du peuplier (*Populus nigra* ssp. *pyramidalis*) des bords de la route étaient eux aussi colonisés par des escargots, mais seulement sur le flanc orienté vers la plage, source de la brise de mer. Cela démontre aussi que *C. virgata* est une espèce halophile.

En août 1989, les habitats rudéraux, autrefois richement peuplés par des escargots, n'existaient plus, étant integrés dans les terres cultivées. Peut-être,à cause du microclimat agraire plus sec, les escargots ont quitté ces habitats pour en coloniser d'autres, notamment les habitats rudéraux situés à l'ouest de la route, plus loin de la mer, en plein pays de jardins, de vergers et de prairies. Nous en avons trouvé des grappes sur des formations du chardon *(Cirsium)*, d'armoire d'absinthe *(Arte-*

*Tableau 2*

**Répartition du peuplement de l'escargot** Cernuella virgata **dans une formation de chardon** (Carduus sp.): **formation 1**

$x_i$ — Fréquence des escargots sur une plante. $f_i$ — Fréquence empirique des plantes avec 0, 1, 2, ..., 37 escargots. $P_i$ — Fréquence théorique des plantes avec 0, 1, 2, ..., 37 escargots, calculée d'après l'équation de Poisson [4]; non calculée quant $x_i > 13$, car les fréquences théoriques correspondantes sont inférieures à 0,1 et ne peuvent donc pas être représentées graphiquement.

| $x_i$ | $f_i$ | $f_i x_i$ | $P_i$ | $x_i$ | $f_i$ | $f_i x_i$ | $P_i$ |
|---|---|---|---|---|---|---|---|
| 0 | 26 | 0 | 0,4218 | 19 | 0 | 0 | — |
| 1 | 14 | 14 | 2,5336 | 20 | 0 | 0 | — |
| | 10 | 20 | 6,5666 | 21 | 1 | 21 | — |
| 3 | 11 | 33 | 12,2139 | 22 | 0 | 0 | — |
| | 12 | 28 | 17,0385 | 23 | 0 | 0 | — |
| 5 | 5 | 25 | 19,0149 | 24 | 0 | 0 | — |
| 6 | 5 | 30 | 17,6839 | 25 | 1 | 25 | — |
| 7 | 3 | 21 | 14,0966 | 26 | 1 | 26 | — |
| 8 | 1 | 8 | 9,8323 | 27 | 0 | 0 | — |
| 9 | 3 | 27 | 6,0960 | 28 | 0 | 0 | — |
| 10 | 1 | 10 | 3,4016 | 29 | 1 | 29 | — |
| 11 | 1 | 11 | 1,7255 | 30 | 0 | 0 | — |
| 12 | 0 | 0 | 0,8023 | 31 | 0 | 0 | — |
| 13 | 44 | 52 | 0,1372 | 32 | 0 | 0 | — |
| 14 | 5 | 70 | — | 33 | 0 | 0 | — |
| 15 | 2 | 30 | — | 34 | 0 | 0 | — |
| 16 | 2 | 32 | — | 35 | 1 | 35 | — |
| 17 | 1 | 17 | — | 36 | 0 | 0 | — |
| 18 | 2 | 36 | — | 37 | 1 | 37 | — |

$\bar{x}$ — Moyenne arithmétique = 5,58; $\Sigma f_i = 114$; $\Sigma f_i x_i = 637$

*misia absinthium)*, de chicorée sauvage *(Cichorium intybus)*. Les grappes les plus riches se sont constituées sur les troncs du peuplier. Les effectifs y dépassaient généralement une centaine d'individus. La grappe la plus grande comprenait 274 individus. Les escargots ont grimpé sur les troncs du peuplier jusqu'à une hauteur de 4 m. De même que dans d'autres localités de la côte de la mer [2], *C. virgata* a formé des grappes sur les clotûres des jardins et vergers. Sur une borne routière nous avons trouvé une grappe de 118 escargots.

Nous n'avons pas des données sur la physiologie écologique des mollusques terrestres, pour expliquer pourquoi les escargots évitent certaines plantes, tandis qu'ils colonisent d'autres dans la même formation végétale. À notre avis, c'est simplement à la suite du hasard.

**Modèle de répartition du peuplement d'escargots dans la formation végétale.** Lorsqu'on regarde une grappe d'escargots sur des tiges ou des feuilles, on pense immédiatement que cet ensemble serré d'individus n'est pas l'oeuvre du hasard, mais la conséquence des interactions entre les escargots. Une telle impression, bien qu'elle soit très vraisemblable, doit être pourtant verifiée par l'analyse mathématique. À notre connaissance, le modèle de répartition du peuplement d'escargots dans les formations

*Tableau 3*

**Répartition du peuplement de l'escargot** Cernuella virgata **dans une formation de chardon** (Carduus sp.): **formation 2**

Même explication que pour le Tableau 2

| $x$ | $f_i$ | $f_i x_i$ | $P_i$ | $x_i$ | $f_i$ | $f_i x_i$ | $P_i$ |
|---|---|---|---|---|---|---|---|
| 0 | 28 | 0 | 0,134785 | 22 | 1 | 22 | — |
| 1 | 19 | 19 | 0,841058 | 23 | 0 | 0 | — |
| 2 | 22 | 44 | 2,624102 | 24 | 1 | 24 | — |
| 3 | 21 | 63 | 5,452813 | 25 | 1 | 25 | — |
| 4 | 19 | 76 | 8,506388 | 26 | 1 | 26 | — |
| 5 | 7 | 35 | 10,61597 | 27 | 1 | 27 | — |
| 6 | 4 | 24 | 11,04061 | 28 | 0 | 0 | — |
| 7 | 4 | 28 | 9,841915 | 29 | 0 | 0 | — |
| 8 | 8 | 64 | 9,677865 | 30 | 2 | 60 | — |
| 9 | 2 | 18 | 5,322507 | 31 | 0 | 0 | — |
| 10 | 2 | 20 | 3,321244 | 32 | 0 | 0 | — |
| 11 | 5 | 55 | 1,884051 | 33 | 0 | 0 | — |
| 12 | 5 | 60 | 0,978665 | 34 | 0 | 0 | — |
| 13 | 1 | 13 | 0,469375 | 35 | 0 | 0 | — |
| 14 | 2 | 28 | — | 36 | 0 | 0 | — |
| 15 | 2 | 30 | — | 37 | 0 | 0 | — |
| 16 | 1 | 16 | — | 38 | 0 | 0 | — |
| 17 | 0 | 0 | — | 39 | 1 | 39 | — |
| 18 | 0 | 0 | — | 40 | 0 | 0 | — |
| 19 | 2 | 38 | — | 41 | 0 | 0 | — |
| 20 | 1 | 20 | — | 42 | 0 | 0 | — |
| 21 | 0 | 0 | — | 43 | 2 | 86 | — |

$\bar{x}$ — Moyenne arithmétique = 6,24 $\quad \Sigma_{f_i} = 165$; $\Sigma_{f_i x_i} = 922$

végétales n'a été étudié, jusqu'à présent, chez aucune espèce de gastéropodes terrestres.

Les données des Tableaux 2—6 et les diagrames des Fig. 1—3 démontrent que la répartition des escargots ne suit pas un modèle contagieux. Les fréquences théoriques des individus dans les grappes suivent le

*Tableau 4*

**Répartition du peuplement de l'escargot** Cernuella virgata **dans une formation de panicaut** (Eryngium maritimum)

Même explication que pour le Tableau 2

| $x_i$ | $f_i$ | $f_i x_i$ | $P_i$ |
|---|---|---|---|
| 0 | 142 | 0 | 132,0670 |
| 1 | 45 | 45 | 55,83 |
| 2 | 9 | 18 | 11,80 |
| 3 | 3 | 9 | 1,66 |
| 4 | 0 | 0 | 0,17 |
| 5 | 1 | 5 | 0,01 |
| 6 | 0 | 0 | 0,001 |
| 7 | 0 | 0 | 0,00006 |
| 8 | 1 | 8 | 0,000003 |

$\Sigma f_i = 201$ ; $\Sigma f_i x_i = 85$

$\bar{x}$ — Moyenne arithmétique = 0,4228

*Tableau 5*

**Répartition du peuplement de l'escargot** Cernuella virgata **dans une formation de panicaut** (Eryngium campestre)

Même explication que pour le Tableau 2

| $x_i$ | $f_i$ | $f_i x_i$ | $P_i$ |
|---|---|---|---|
| 0 | 32 | 0 | — |
| 1 | 3 | 3 | — |
| 2 | 0 | 0 | — |
| 3 | 1 | 1 | — |

$\Sigma f_i = 36$ ; $\Sigma f_i x_i = 4$

$\bar{x}$ — Moyenne arithmétique = 0,11

*Tableau 6*

**Répartition du peuplement de l'escargot** Cernuella virgata **dans une formation d'euphorbe** (Euphorbia **sp.**)

Même explication que pour le Tableau 2

| $x_i$ | $f_i$ | $f_i x_i$ | $P_i$ | $x_i$ | $f_i$ | $f_i x_i$ | $P_i$ |
|---|---|---|---|---|---|---|---|
| 0 | 21 | 0 | 0,0813462 | 16 | 2 | 32 | — |
| 1 | 14 | 14 | 0,310 | 17 | 0 | 0 | — |
| 2 | 15 | 30 | 0,6060 | 18 | 1 | 18 | — |
| 3 | 3 | 9 | 0,770 | 19 | 0 | 0 | — |
| 4 | 5 | 20 | 0,750 | 20 | 0 | 0 | — |
| 5 | 3 | 15 | 0,3734 | 21 | 0 | 0 | — |
| 6 | 1 | 6 | 0,2059 | 22 | 1 | 22 | — |
| 7 | 3 | 21 | 0,0993 | 23 | 0 | 0 | — |
| 8 | 1 | 8 | 0,0425 | 24 | 0 | 0 | — |
| 9 | 1 | 9 | 0,0164 | 25 | 0 | 0 | — |
| 10 | 0 | 0 | — | 26 | 1 | 26 | — |
| 11 | 1 | 11 | — | 27 | 0 | 0 | — |
| 12 | 1 | 12 | — | 28 | 0 | 0 | — |
| 13 | 1 | 13 | — | 29 | 1 | 29 | — |
| 14 | 1 | 14 | — | | 888 | | |
| 15 | 1 | 15 | — | $\Sigma f_i = 38$ ; $\Sigma f_i x_i = 324$ | | | |

$x$ — Moyenne arithmétique = 8,52

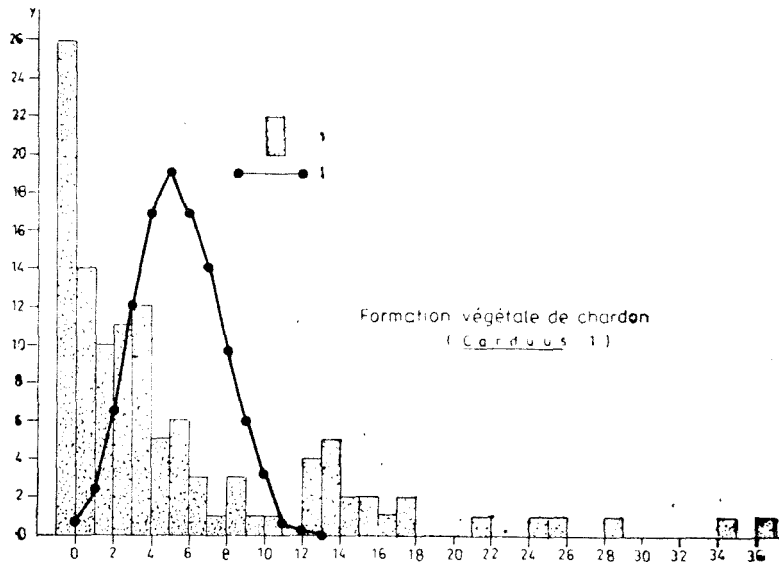


**Fig. 1.** *Répartition du peuplement de l'escargot* Cernuella virgata *dans deux formations de chardon* (Carduus *sp.*) : *formation 1.*

1 — Fréquence observée. 2 — Fréquence théorique calculée d'après l'équation de Poisson [4].

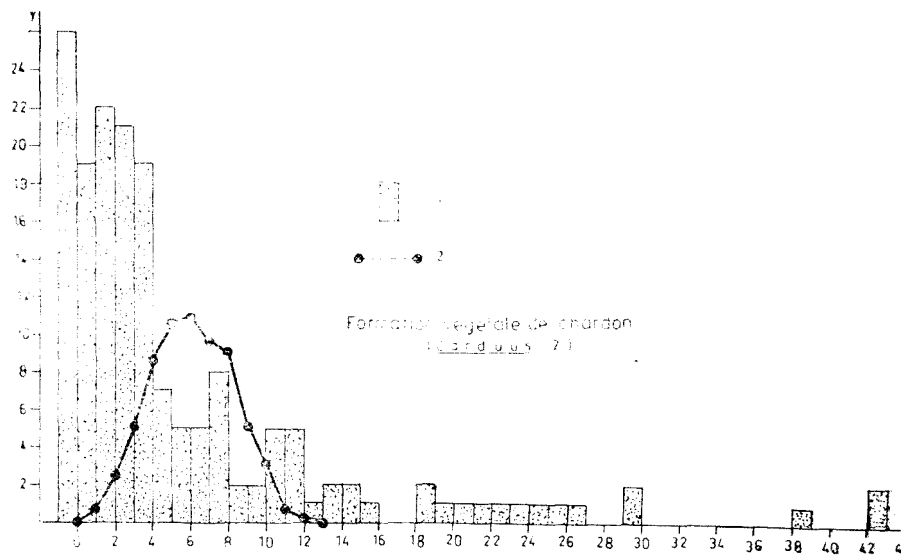

**Fig. 2.** *Répartition du peuplement de l'escargot* Cernuella virgata *dans deux formations de chardon* (Carduus *sp.*) : *formation 2.*

1 et 2 — Voir Fig. 1.

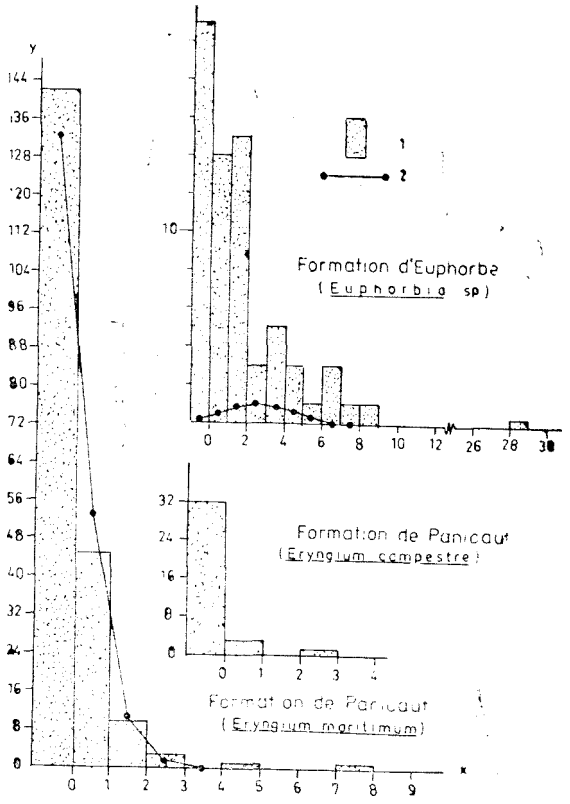


**Fig. 3.** *Répartition du peuplement de l'escargot* Cernuella virgata *dans une formation d'euphorbe* (Euphorbia *sp.*) *et dans deux formations de panicauts* (Eryngium campestre *et* E. maritimum).
1 et 2 — Voir Fig. 1.

modèle de Poisson, obéissant donc aux lois du hasard. L'agglomération des escargots est très grande sur certaines plantes, tandis que d'autres plantes sont faiblement colonisées ou totalement dépourvues d'escargots.

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# DIPLOPODEN AUS JUGOSLAWIEN (KROATIEN)

TRAIAN CEUCA

**SUMMARY. — Diplopods from Yugoslavia (Croatia).** The biological material, comprising more than 10,000 individuals, was collected in Croatia (Yugoslavia) by Dr. Dragutin Ruener (Zagreb). We identified about 40 diplopod species in this material. One of the species, *Microiulus ruzneri*, is new for science, two species *(Glomeris marginata* and *Leptophyllum styricum)* are new for the fauna of Yugoslavia and two species *(Cylindroiulus groedensis* and *Leptoiulus sarajevensis)* are new for the fauna of Croatia.

Von einer reichhaltigen (an 10.000 Stück) Diplopodensammlung aus Kroatien, die ich von Dr. Dragutin Ruener (Zagreb) zwecks Bestimmung erhielt, konnte ich beinahe 40 Arten bestimmen, von welchen ich folgende faunistische Neuerscheinungen veröffentliche.

## PLESIOCERATA

### *Glomeridae*

*Glomeris marginata* (Villers 1789)

Eine westeuropäische Art (leicht zu bestimmen, da der Körper gänzlich schwarz ist), deren Verbreitung von Spanien bis Rumänien reicht. Es wurden 3 ♂♂ + 2 ♀♀ von Konavoski dvori oberhalb der Lyuta-Quelle am 29. Mai 1972 gesammelt. Diese Art ist für die Diplopodenfauna Jugoslawiens neu.

## SYMPHYOGNATHA

### *Iulidae*

*Cylindroiulus groedensis* (Attems 1899)

Es wurden 3 ♂♂ + 7 ♀♀ + 2 juv. von Zagrebačka gora unterhalb des Alpinistenhauses Grafičar am 28. August 1970, 6 ♂♂ + 29 ♀♀ + 16 juv. von Zagrebačka gora oberhalb von Pusti dal am 3. September 1970, 3 ♀♀ + 4 juv. vom Berg Hum (Pitve, Jelsa, Insel Hvar) am 23. April 1971 gesammelt. Diese ist eine neue Art für die Diplopodenfauna Kroatiens.

*Leptophyllum styricum* Verh. 1896

Diese ist eine mitteleuropäische Art, die bloß aus den Westalpen bekannt ist. Es wurden 4 ♂♂ + 9 ♀♀ + 2 juv. von Zagrebačka gora unter-

* *Babeş-Bolyai -Universität, Lehrstuhl für Biologie, Zoologisches Laboratorium, 3400 Cluj, Rumänien*

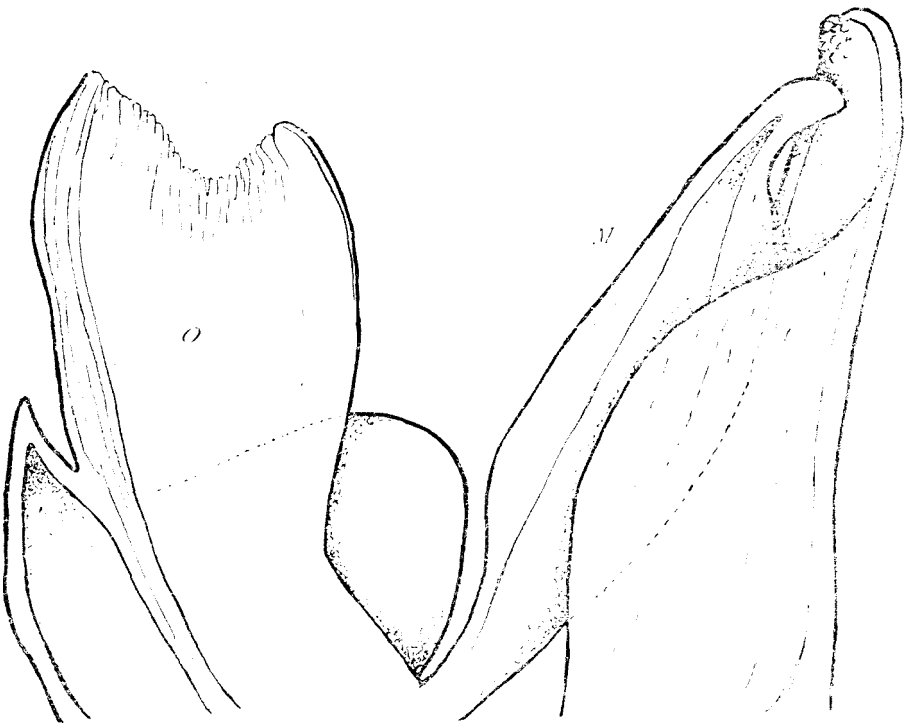


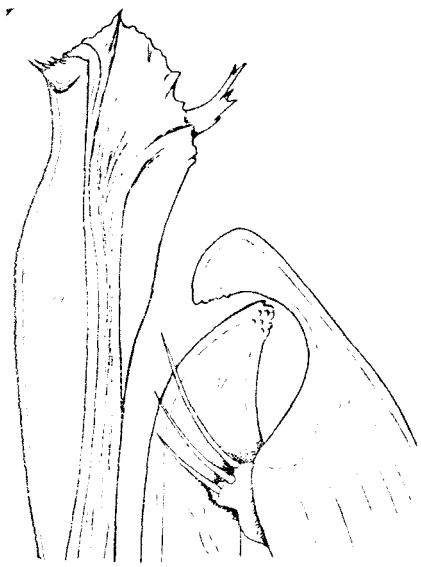

Abb. 1. *Leptophyllum styricum* Verh. 1896. Das rechte Gonopod eines ♂.
*P* — Promerit, *M* — Mesomerit, *O* — Opisthomerit.

halb des Alpinistenhauses Grafičar am 28. August 1970 gesammelt. Es ist eine neue Art für die Diplopodenfauna Jugoslawiens.

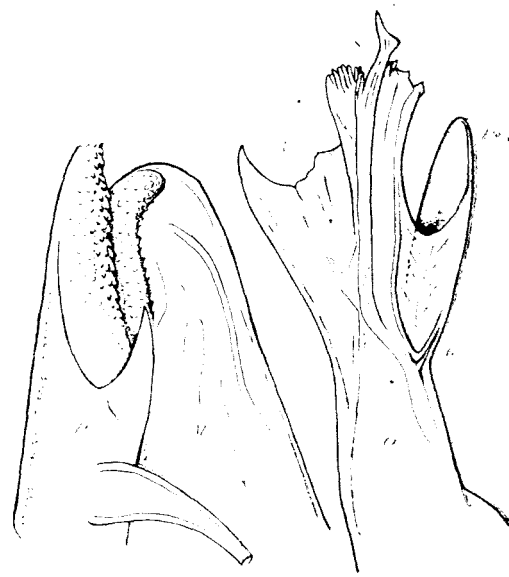
Zur Morphologie der männlichen Gonopoden kann man folgendes vermerken: zum Unterschied von Verhoeffs Gonopodenbildungen, wo der Mesomerit schlank und länger als der Promerit ist, im Gegenteil erscheint der gonopodiale Mesomerit bei den Exemplaren aus Kroatien offensichtlich kürzer und dicker als der Promerit. Ebenfalls ist der Opisthomerit tiefer ausgebuchtet als in Verhoeffs Abbildung (Abb. 1).

*Typhloiulus (Haploprotopus) ganglbaueri* Verh. 1899

Endemische Art, selten in Jugoslawien anzutreffen (Abb. 2). Für die Männchen ist es charakteristisch, daß das erste Beinpaar unverändert ist [2] und das primäre Aussehen von Gehfüßen hat [7]. Strasser [5] bedauert, daß er kein erwachsenes ♂ zur Untersuchung der Gonopoden hatte (Verhoeff [6] gibt sehr kleine Zeichnungen der Gonopoden). Es wurden 1 ♂ + 2 ♀♀ unterhalb des Berges Vrata (Pitve, Jelsa, Insel Hvar) am 22. April 1971 gesammelt.



A b b. 2. *Typhloiulus ganglbaueri* Verh. 1899. Das rechte Gonopod eines ♂. *P* — Promerit. *M* — Mesomerit. *O* — Opisthomerit.



A b b. 3. *Microiulus rucneri* n.sp. Das linke Gonopod eines ♂. *P* — Promerit. *M* — Mesomerit. *O* — Opisthomerit. *V* — Velum. *Ph* — Phyllacum. *S* — Solänomerit. *b* — Führungsstachel.

*Leptoiulus sarajevensis* Verh. 1898

Es wurden 1 ♂ + 17 ♀♀ + 5 juv. von Otočac, Lika, oberhalb Glavace am 24. Juli 1971 gesammelt. Diese Art ist für die Diplopodenfauna Kroatiens neu [4].

*Microiulus (Oroiulus) rucneri* n. sp.

Lg. ♂ = 17 mm; lt. = 0,8 mm; Segm. 52—53 (2—1)

Lg. ♀ = 19 mm; lt. = 1,0 mm; Segm. 54—55 (2—1)

Die Körperfarbe ist rostbraun, viel heller an der Unterseite, wo auch die Beine dieselbe helle Färbung haben. Zwischen den Ocellenfeldern (aus je 40—50 Ocellen bestehend) zieht sich ein breites kastanienbraunes Band, hinter dem am Vertex zwei lange Härchen sind.

Die Öffnungen der Repugnatoriendrüsen sind hinter der Nahtlinie der Diplosomiten. Die Furchen auf den Metazoniten sind schwach entwickelt. Das Härchenbüschel ist auf jedem Körperabschnitt vorhanden. Das Telsonschwänzchen ist relativ lang mit einem spitzen Stachel verlängert. Das erste Beinpaar des ♂ ist, wie üblich, in ein Paar Haken verwandelt. Der Penis nach dem zweiten Beinpaar ist kurz und terminal gespalten.

Die Gonopoden haben breite Promerite mit vielen kleinen Höckern auf ihrer Hinterseite (Abb. 3). Ihre Medialsporen sind gut entwickelt. Die Mesomeriten sind ebenso lang und ebenfalls so breit, vorne ausgebuchtet und sind ebenfalls mit Höckerchen auf ihrer Vorderseite versehen. Die freien Flagellen sind vorhanden und, wie üblich, lang und dünn. Die Opisthomeriten sind charakteristisch und haben auf ihrer Vorderfläch

ein gut entwickeltes Velum. An der Hinterfläche ist ein ebenfalls gut entwickeltes ovales Phyllacum. Die Solänomeriten zwischen den beiden Strukturen sind viel länger und erscheinen wie Auswüchse, die mit einem breiten Haken, der nach vorne gebogen ist, versehen sind. Zwischen Solänomerit und Velum ist eine dünne hyaline Membran gespannt. Der Raum zwischen Solänomerit und Phyllacum besteht aus einer augenscheinlichen Ausbuchtung. Der Führungsstachel des freien Flagellums ist vorhanden.

Es wurden 2♂♂ + 1 ♀ unterhalb des Berges Vrata (Pitve, Jelsa, Insel Hvar) am 22. April 1971 gesammelt.

Nach dem Aussehen der Gonopoden ist die neue Art *Microiulus rucneri* mit der endemischen Art *Microiulus storkani* Verh. 1932 am ähnlichsten, sowohl durch das Velum als auch durch das Phyllacum, mit der Ausnahme, daß die Membran, welche das Velum mit dem Solänomerit verbindet, deutlich niedriger ist [6]. Der Solänomerit hingegen ist ganz verschieden, da er breiter ist und einen nach vorn gerichteten Haken besitzt, der bei *M. storkani* aber gerade ist.

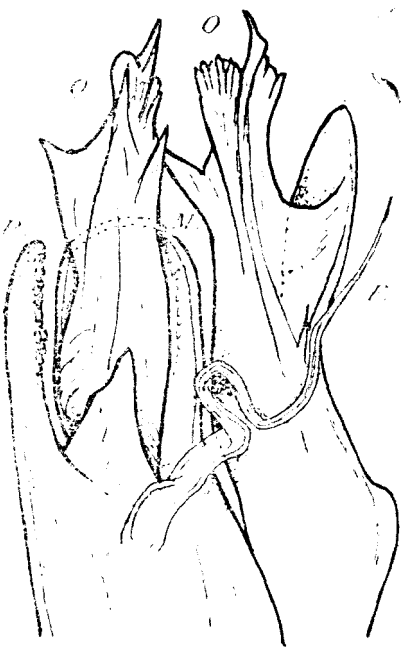



Abb. 4. *Microiulus rucneri* n.sp. Das linke Gonopod eines anderen ♂. *P* — — Promerit. *M* — Mesomerit. *O* — Opisthomerit. *Q* — Überzähliges Opisthomerit. *F* — Freies Flagellum [3].

## Teratologie [1]

Es ist interessant, daß das andere ♂ Individuum am linken Gonopod eine Mißbildung aufweist: neben dem normalen Opisthomerit *(O)* ist noch ein solcher zwischen Pro- und Mesomerit vorhanden, mit beinahe demselben Aussehen aber ohne Phyllacum und mit einem wenig veränderten Solänomerit *(Q)*. Man kann noch das gewundene Aussehen des freien Flagellums *(F)* hinzufügen, der an seiner Mitte eine harte Schlinge bildet Es ist ein Fall von binärer Schistomelie des Opisthomerits (Abb. 4).

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# HERPETOLOGISCHE NOTIZEN AUS DER INSEL KORFU

**BOGDAN STUGREN* und YORGIOS KAVVADIAS****

**SUMMARY. — Herpetological Reports from the Island of Corfu.** Despite the fact that Corfu comprises the richest and best investigated island herpetofauna of Greece, there are yet to clarify some details concerning the distribution and infraspecific systematics in certain reptiles. Here we report some facts in these regards and support the opinion that Corfu is inhabited by *Anguis fragilis peloponnesiacus* Štěpánek, not by the nominate race of *A. fragilis* L.

Mit seinen 30 Arten [4,5], beherbergt Korfu die reichste und am eingehendsten erforschte Herpetofauna der gesamten griechischen Inselwelt. Dennoch sind Verbreitungsgebiete und Rassenangehörigkeit einiger Inselreptilien nicht vollständig geklärt.

Auf Grund einer kleiner Kollektion*** aus dem Nordwesten und dem Süden der Insel (Abb. 1), von dem 2. Autor im Oktober 1984 und April 1985 gesammelt, werden hier einige Tatsachen in dieser Hinsicht berichtet.****

**1. Emys orbicularis** (L.). Die Sumpfschildkröte weist bisher auf Korfu nur 2 sichergestellte Fundorte auf: Landstraße von Kerkyra nach Paleokastritsa auf der Westküste [10] und Sidari im Nordwesten der Insel [4]. Hier wird Katousades, eine Ortschaft in der Gegend von Sidari, als 3. genauer Fundort angeführt. Das einzige Stück unserer Sammlung weist keine Besonderheiten auf.

**2 Podarcis taurica** (Pallas). Die Taurische Eidechse ist aus mehreren Fundstelllen auf Korfu bekannt [4,7], wo diese Art durch die Rasse *P. taurica ionica* (Lehrs) vetreten ist. Wir besitzen bloß **1** Stück aus Leukimis, unweit der Ortschaft Argyrades im Süden der Insel. Es hat Temporalia von bedeutender Größe und darunter ein deutlich hervorgehobenes Massetericum, wodurch unser Stück der Originalbeschreibung der ionischen Rasse [3] genau entspricht.

A b b. 1. *Fundstellen der im Text erwähnten Arten auf Korfu.* 1 — Kerkyra. 2 — Katousades. 3 — Paleokastritsa. 4 — Leukimis.

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** *Leukimis, Nomos Kerkyra, Griechenland*
*** Das Material ist im Zoologischen Museum der Universität Cluj aufbewahrt.
**** Für Zusendung von seltener Literatur sind wir Herrn Dr. Franz Tiedemann (Naturhistorisches Museum Wien) zu Dank verpflichtet.

**3. Anguis fragilis** L. Angaben über sichere Fundstellen der Blindschleiche auf Korfu sind spärlich. Als Fundort wird gewöhnlich nur die Insel im Allgemeinen angegeben [11]. Belegstücke stammen nur aus der Gegend der Stadt Kerkyra [4]. Wir berichten über einen weiteren sichergestellten Fundort im Süden der Insel, nämlich Leukimis bei Argyrades. Die Rassenangehörigkeit der korfiotischen Blindschleiche wird in faunistischen Übersichten entweder nicht erwähnt [6], oder als *A. fragilis fragilis* [7] vermerkt. Laut älterer Nomenklatur wird die Blindschleiche aus Korfu in die Rasse *A. fragilis gracca* Bedriaga eingereiht [11], die jedoch bloß ein Synonym von *A. fragilis fragilis* darstellt [6]. Außer der Nominatrasse, welche das kontinentale Griechenland, nördlich des Golfes und der Landesenge von Korinth besiedelt, kommt noch die Peloponnes-Blindschleiche (*A. fragilis peloponnesiacus* Štěpánek) als möglicherweise auf Korfu vorkommender Taxon in Frage.

Diese heikle taxonomische und zoogeographische Frage wird selbstverständlich auf Grund eines einzigen Stückes kaum gelöst. Die Untersuchung der Kopfbeschilderung unseres Stückes kann uns nur zu einer Hypothese annähern. Aus dem Vergleich unseres Exemplars aus Korfu mit der Originalbeschreibung von *A. fragilis peloponnesiacus* aus der Terra typica (Flußtal des Nedon bei Kalamatai) [8], sowie aus Abb. 2 geht hervor, daß das korfiotische Exemplar durch seine Präfrontalkonstellation (schmales Frontale grenzt an das unpaarige Präfrontale (Internasale)), an die Peloponnes-Rasse der Blindschleiche erinnert. Die Präfrontalkonstellation bei unserem Stück (Abb. 2B) ist jener des Holotypen von *A. fragilis peloponnesiacus* (Abb. 2A) sehr ähnlich, jedoch nicht identisch. Die paarigen Präfrontalia sind voneinander getrennt, jedoch nicht durch die vordere Spitze des Frontale, sondern durch einen etwas breiteren Fortsatz, wodurch das Frontale unmittelbar an das Internasale grentz. Rechts und links vom Frontale kommt je eine Reihe von 5 und bzw. 6 kleinen Schildern vor (bei dem Holotyp von *A. fragilis peloponnesiacus* jederseits des Frontale je 6 Schilder). Die hier beschriebene Präfron-

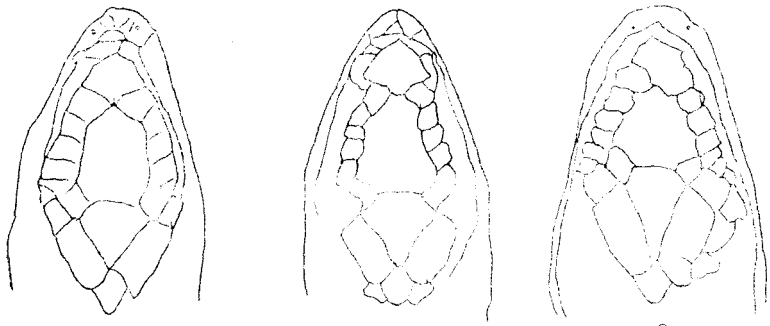


Abb. 2. *Konstellation der Präfrontalia bei* Anguis fragilis *aus Griechenland. A — Anguis fragilis peloponnesiacus* [8] *B* — Untersuchtes Exemplar aus Korfu. 3 — Nominatrasse [2].

talkonstellation aus Korfu ist, unseres Erachtens, nur eine taxonomisch unbedeutende morphologische Abweichung im Rahmen der geographischen Rasse *peloponnesiacus* aufzufassen.

Solange keine andersgestaltete Belegstücke aus Korfu vorhanden sind, vertreten wir die Ansicht, daß die korfiotische Blindschleiche der Rasse *A. fragilis peloponnesiacus* Štěpánek angehört. Dieser Gesichtspunkt widerspricht einer älteren Feststellung [11], wonach die Blindschleiche aus Korfu an die Nominatrasse erinnert. Das Verbreitungsgebiet der Peloponnes-Blindschleiche rückt nordwärts von Peloponnes über die Ionischen Inseln in die Nähe von Korfu bis nach Kephallinia an [9]. Die Ausbreitung von *A. fragilis peloponnesiacus* aus Peloponnes nach Korfu ist womöglich durch nordwärts gerichtete Strömungen längs der Westküste des kontinentalen Griechenlands erfolgt. Solange die Variationen des Phänotyps der westgriechischen Populationen unbekannt sind, können wir einen Migrationsweg über das Festland nicht annehmen.

Die Nordgrenze der Rasse *peloponnesiacus* ist nicht eindeutig festgestellt [9]. Im Peloponnes, auf dem Taygetos-Gebirge ist diese Form mit dem Feuersalamander *(Salamandra salamandra)* vergesellschaftet [1]. Informationen über die zönologische Stellung der Blindschleiche auf den Ionischen Inseln fehlen gänzlich.

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# LES PEUPLEMENTS D'OISEAUX DES ÉCRANS FORESTIERS DE CEANU MARE (PLAINE DE TRANSYLVANIE)

DAN MUNTEANU*

**SUMMARY. — Bird Populations in the Forest Shelterbelts of Ceanu Mare (Transylvanian Plain).** A breeding bird census was carried out in the forest shelterbelts situated near Ceanu Mare (Cluj county) in May—June, 1982. The features of this recent man—made habitat, which includes 27 ha of trees and bushes are described, and the census results are presented in Table 1 and discussed in the text. The number of breeding species is 21 and their densities vary from 0.8 to 26.6 pairs/10 ha. The total density of the bird communities has a moderate value that reaches about 80 pairs/10 ha. The most characteristic birds are the species which usually live in the ecotone wood-plain. We note the absence of the birds feeding on soil (due to the pronounced paucity of the soil fauna) and the scarcity of the hole nesting species (they have no appropriate sites for nest building). It is sure that in the course of time some changes will appear in the bird communities, simultaneously with the modification of their habitat — the forest shelterbelts.

Les écrans forestiers sont des cultures d'arbres (parfois d' arbustes) ayant la forme des bandes longues et étroites, avec le rôle d'atténuer les facteurs naturels défavorables tels que les vents, les tempêtes de neige, les glissements de terrain, ou certaines résultantes de l'activité humaine (poussières industrielles, haldes). Dans notre pays on a réalisé des écrans forestiers dès le dernier siècle, mais leur plantation a pris son essor pendant la période d'après 1950. Ultérieurement, beaucoup de ces écrans ónt été défrichés, étant considérés comme des réservoirs d'insectes nuisibles. Dans la Plaine de Transylvanie, les écrans de protection — créés tant pour atténuer les conditions climatiques défavorables que dans le but de fixer le sol — occupent des surfaces très restreintes, ayant plutôt un caractère expérimental.

Ce travail présente la composition qualitative et quantitative des peuplements d'oiseaux nicheurs de quelques écrans forestiers de Transylvanie, par rapport aux conditions de milieu de ce type d'écosystème d'origine anthropique. Nous mentionnons que dans notre littérature ornithologique il n'y a qu'un seul travail concernant l'avifaune des écrans forestiers de protection [1].

**Caractérisation du terrain étudié.** Les écrans forestiers étudiés sont situés dans la Plaine de Transylvanie, sur le versant droit du ruisseau de Vişoara (affluent de l'Arieş), au sud du village de Bolduţ, appartenant à la commune de Ceanu Mare, département de Cluj (code UTM: GS 26). Le terrain planté a une forme demicirculaire, représentant un bassinet de 2 × 1,5 km (Fig. 1), avec des altitudes de 320—420 m. L'angle de pente oscille entre 5—15°, mais il y a aussi des portions abruptes ou des glissements de terrain ayant des inclinations plus accentuées.

Le sol est un chernozem formé sur des marnes et argiles, avec érosion de surface par endroits. La température moyenne annuelle est de 8,8 °C, la température du mois de janvier

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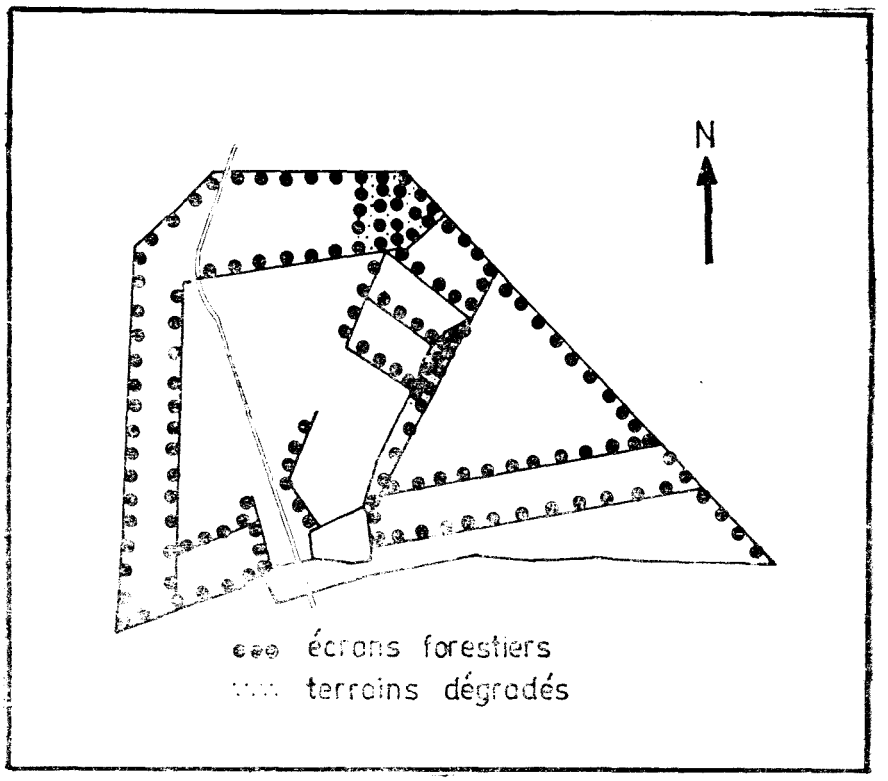


Fig. 1. *Esquisse des écrans forestiers de Ceanu Mare.*

de 5,2°C et celle du juillet de 19,8°C. Les précipitations arrivent à une moyenne annuelle de 510 mm ; l'humidité relative de l'air est de 68–73% en hiver et de 55–60% en été. Le vent dominant a une fréquence de 40–50% et souffle de nord-ouest.

Au point de vue phytogéographique, la zone en discussion fait partie du sous-étage de la forêt de chêne commun *(Quercus robur)*, mais elle a été soumise à des défrichements intenses, au cours du temps, et c'est ainsi qu'à présent il n'y a plus ici que de petites surfaces isolées de forêt. Dans son ensemble, la végétation présente d'évidents caractères de sylvosteppe.

Les écrans de Bolduț–Ceanu Mare ont un caractère expérimental et ont été plantés pendant les années 1951–1958 par la Station Sylvique de Cluj, afin de stabiliser le terrain. Ces cultures forestières ont un aspect de mosaïque à cause de leur emplacement et composition différents. Plus précisément, les écrans se présentent sous la forme de bandes de dimension, composition et structure différentes, étant constitués d'environ 30 espèces ligneuses (chêne, plan, frêne, orme, peuplier, merisier, robinier, marronier, érable champêtre, sycomore etc.), plantées en diverses combinaisons et variantes, auxquelles on ajoute des espèces d'arbustes (noisetier, cornouiller sanguin, épine noire, églantier, troène, aubépine etc.). Les arbres qui constituent ces cultures sont droits, bien formés, ayant des hauteurs qui parfois dépassent 20 m. Sur les terrains dégradés les espèces forestières ont un développement plus faible, mais elles forment des fourrés à cause de leur grande densité.

Les 16 écrans ont une longueur totale de 15,4 km et des largeurs de 11–12 m ; ils sont orientés en directions variées, mais surtout le long des courbes de niveau. Les écrans forestiers occupent une surface de 20,7 ha, à laquelle il faut ajouter les plantations effectuées sur des terrains dégradés, qui totalisent 6,2 ha (au total 26,9 ha).

À l'intérieur des écrans il y a une végétation herbacée d'aspect pauvre ; entre les écrans et sur les terrains environnants il y a des cultures agricoles (blé, betterave) ou prairies*.

**Méthode de travail.** Nos recherches ont été réalisées pendant les mois de mai—juin 1982. L'identification des composants de l'avifaune par la méthode des plans quadrillés a été assez facile grâce à la forme des écrans et en même temps à leur largeur réduite. Les peuplements d'oiseaux ont été estimés sur la base de 5 parcelles qui totalisent 5 ha, mais on a réalisé des observations ornithologiques sur toute la surface des plantations forestières.

**Résultats et discussions.** Le Tableau 1 présente les espèces composantes des communautés d'oiseaux qui nichent dans les écrans forestiers près de Ceanu Mare, leur densité en couples/10 ha est la dominance qu'elles enregistrent. Leur énumération suit, en général, la décroissance de la densité, mais les espèces voisines sont groupées par genres ou familles, et les non-passériformes sont indiquées ensemble à la fin du tableau. En tenant compte de la densité reduite de ces dernières, on a apprécié qu'il serait incorrect de rapporter les deux nids trouvés dans les parcelles étudiées (un nid de *Falco vestertinus* et un nid de *Falco subbuteo*) à la superficie de 10 ha. En ce qui concerne la corneille freux *(Corvus frugilegus)*, sa densité a été calculée en divisant le nombre des nids de la colonie (=72), située en dehors de parcelles-échantillons, à la superficie totale des plantations.

*Tableau 1*

**Les oiseaux nicheurs des écrans forestiers de Ceanu Mare**

| Espèce | Densité (couples/10 ha) | Dominance** (%) |
|---|---|---|
| Corvus frugilegus | 26,6 | 33,2 |
| Pica pica | 2,9 | 3,6 |
| Corvus corone cornix | 0,8 | 1,0 |
| Garrulus glandarius | 1,2 | 1,5 |
| Parus major | 9,0 | 11,2 |
| Luscinia luscinia | 7,4 | 9,2 |
| Sylvia atricapilla | 6,3 | 7,9 |
| Sylvia communis | 3,7 | 4,6 |
| Sylvia nisoria | 2,2 | 2,7 |
| Sylvia curruca | 3,3 | 4,1 |
| Oriolus oriolus | 4,1 | 5,1 |
| Lanius collurio | 3,0 | 3,7 |
| Emberiza citrinella | 2,6 | 3,2 |
| Passer montanus | 1,1 | 1,4 |
| Columba palumbus | 1,1 | 1,4 |
| Cuculus canorus | + | |
| Falco tinnunculus | + | |
| Falco subbuteo | + | |
| Falco vespertinus | + | |
| Asio otus | + | |
| Phasianus colchicus | + | |
| Total | >75,3 | |

* Les données concernant la caractérisation des écrans de Ceanu Mare nous ont été fournies par Gh. Purcean, technicien principal à la Station Sylvique de Cluj ; voir aussi le travail [2].

** La dominance a été calculée par rapport à une densité de 80 couples/10 ha.

L'analyse du tableau permet les constatations suivantes sur l'avifaune de cet écosystème d'origine anthropique:
— La densité des 21 espèces d'oiseaux nicheurs oscille entre 0,8 (ou même moins dans le cas de rapaces) et 26,6 couples/10 ha.
— Le poids principal de l'avifaune est donné par quelques espèces propres à l'écotone forêt-plaine, qui nichent surtout dans des buissons ou sur le sol; ce n'est que la corneille freux qui niche dans les plus hauts arbres.
— Il n'y a que trois espèces typiques de grande forêt, à savoir *Garrulus glandarius*, *Columba palumbus* et *Cuculus canorus*.
— Ce qui frappe c'est l'absence des espèces qui se nourrissent sur le sol, en premier lieu celle du merle noir *(Turdus merula)*, qui est fréquent dans des habitats naturels similaires. Ce fait s'explique par l'extrême pauvreté de la pédofaune qui, à son tour, est déterminée par l'humidité réduite du sol et par la faible présence de la litière et de l'horizon organique.
— La densité totale des oiseaux, évaluée à 80 couples/10 ha, est relativement réduite par rapport aux valeurs enregistrées, en général, dans les biocoenoses d'écotone.
— À défaut d'arbres vieux, de même que de pics (absents à cause de l'épaisseur réduite des arbres), les oiseaux qui nichent dans des creux des arbres sont peu nombreux (il y a une seule espèce de mésange, à savoir *Parus major*).
— Il y a quelques rapaces diurnes et une nocturne qui, autour des nids, ont à leur disposition de larges terrains (cultures agricoles ou prairies) pour capturer leur nourriture.

La composition qualitative des communautés d'oiseaux est déterminée, d'une façon évidente, par les conditions de milieu; cette relation très générale dans le monde des oiseaux est particulièrement bien illustrée dans les écrans forestiers étudiés. La limitation du nombre d'espèces nicheuses justement par ces conditions de milieu a comme résultat le maintien d'une abondance modérée des oiseaux. Il est significatif que les espèces nicheuses des écrans présentent des valeurs moyennes des densités, ce qui est l'expression du fait qu'elles n'ont pas réussi à saturer l'écosystème. À notre avis, comme nous l'avons déjà montré, le facteur limitatif de leur accroissement est constitué par l'insuffisance des ressources trophiques (la faune des invertébrés, surtout au niveau du sol) et l'insuffisance des lieux pour nicher (il s'agit des oiseaux qui nichent dans des cavités).

Il faut s'attendre à des modifications de la composition qualitative et quantitative des peuplements nicheuses d'oiseaux, au fur et à mesure que des modifications des écrans forestiers auront lieu à l'avenir. Ce processus pourrait être partiellement dirigé par l'intervention de l'homme, en plaçant des nichoirs afin d'attirer certaines espèces inexistantes dans la phase actuelle (étourneaux, gobemouches), ou de déterminer une plus grande abondance des espèces existantes (mésanges, moineau friquet).

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# MUSCLE METABOLISM AND AGGRESSIVE BEHAVIOUR IN $CuSO_4$-INTOXICATED *BETTA SPLENDENS*

**JÓZSEF HALLER*, ROZÁLIA OLASZ** and MARGIT KISS****

**SUMMARY.** — Young *Betta splendens* males were submitted to a short-term, 1 hour static toxicity test with 4 ppm $CuSO_4$; behavioural and muscle metabolism investigations were performed. Intoxicated fishes showed a marked reduction of aggressivity, of the *in vitro* glucose uptake and mitochondrial oxidation, and a marked increase in the free glucose content in muscle. Glycogen content of the muscle was not modified. Copper content was elevated but not significantly. The reduction of mitochondrial oxidation showed a significant correlation with the modifications in aggressivity.

Like most trace metals, copper is a cofactor of several enzymes [7, 11, 13]. Some mammalian species (*e.g.* porcins) tolerate well even high concentrations of copper, the detoxifiation mechanism being related to Cu-thioneins [4]. In contrast, copper is toxic for fishes. It accumulates mainly in liver, kidney, gill, gonads and causes severe morphological and functional malformations [1, 15, 23]. It elicits also some neural-behavioural effects. In sheep it causes vacuolisation of the white matter of the brain, alters metabolic processes and glial transport mechanisms [17]. Copper alters the locomotor activity in sea catfish and sheepshead [21].

In some papers the correlation between behaviour alterations and synaptic conduction has been stressed [18].

In previous experiments we noticed a significant correlation between aggressive behaviour and muscle energy metabolism. As the copper has strong effects on muscle metabolism (some literature data are given in the "Discussion" section), in the present paper we search for correlations between the metabolic effects of copper intoxication and changes in aggressive behaviour.

**Materials and methods.** Young male *Betta splendens* (mean weight 998±63 mg) were obtained from a local supplier. The fishes were kept isolated in small quadratic tanks (0.7–1 liter water volume) without the possibility of seeing each other. The temperature of the water was 20–24°C; the water was cleaned periodically.

Aggressivity measurements (once every second day, thus three measurements per fish) were performed by confronting them with their mirror image [2]. The total duration of aggressive acts during a 5-minute appearance of the mirror image was recorded in 5 experimental fishes (aggressive behaviour started after a latency period, and was interrupted by short pauses). For the recordings, computational programs were run.

After 6 days 100 ml water from the tanks was substituted by 100 ml $CuSO_4$ solution so that the final concentration of $CuSO_4$ reached 4 ppm. Previous measurements showed that the operation itself did not modify the aggressive behaviour pattern. After approximately 25 minutes the aggressivity measurements were repeated, and after an hour the fishes were killed for biochemical determinations. The control values for aggressivity measurements

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were obtained in the same fishes prior to intoxication, while in the case of biochemical determinations a separate control group was used (this group was kept under the same conditions, submitted to the same operation except intoxication).

The fishes were sacrificed by decapitation; carcass was rapidly sampled, and the following determinations were performed: the free glucose content [19], glycogen content [16], and the copper content (Merckotest—3319). Carcass was homogenised in ice-cold Krebs—Henseleit phosphate buffer in a Potter—Elvehjem glass homogenizer.

The carcass homogenates were incubated in glucose (10 mM) and $^{14}C$-acetate (obtained from the Institute for Physics and Nuclear Engineering Bucharest, specific activity 47 μCi/mg) containing Krebs—Henseleit phosphate buffer for an hour at 26 °C. The final radioactivity of the medium was $2 \times 10^5$ disintegrations per minute (dpm) per ml. Glucose consumption and $CO_2$ radioactivity (acetate oxidation) were determined.

For radioactivity measurements, a BF—5003 liquid scintillation spectrometer (Berthold, Wildbad, Germany) was used, a PPO—POPOP mixture being the scintillator.

The statistical comparisons were made according to the Fischer test. The individual modifications in different metabolic parameters (mean value of the control — individual values in the intoxicated fishes) were used for the calculation of correlations (Bravaise correlation coefficient [25]). For statistic analyses computational programs were run.

**Results and discussions.** The results of determinations are summarised in Table 1. Intoxicated fishes showed a marked reduction of the duration of the performed aggressive acts (—76.7%), and a marked increase in free glucose content (+76.3%). Glycogen content of the carcass in the intoxicated fishes was not modified, copper content was slightly, but not significantly, elevated. Only the $CO_2$ radioactivity showed a significant correlation with the modifications of aggressive behaviour (Table 2).

There are no data in the literature on $LC_{50}$ of $CuSO_4$ for *Betta splendens*. We list below some $LC_{50}$ values for $CuSO_4$ in some fish species: 2—3.7 ppm for 96 hours in *Lepidocephalichtis* [3], 4 ppm for 48 hours in

*Table 1*

**Effects of copper intoxication on aggressivity and muscle metabolism in Betta splendens**

| Parameters | Control | Intoxicated |
|---|---|---|
| Duration of aggressive acts | 247.1 ±4.03 (5) | 57.6 ±33.95*** (5) |
| Glycogen content | 5.48 ±0.36 (5) | 5.90 ±0.49 (5) |
| Free glucose content | 0.55 ±0.04 (5) | 0.97 ±0.07** (5) |
| Glucose consumption | 14.63 ±0.63 (5) | 11.96 ±0.94* (5) |
| Radioactivity of $CO_2$ | 88.9 ±9.4 (5) | 57.5 ±8.2* (5) |
| Copper content | 2.63 ±0.14 (5) | 2.84 ±0.29 (5) |

Values (mean ± SE) are given in seconds for the duration of aggressive acts, in mg per g tissue for the glycogen and free glucose contents, in mg per g tissue per hour for glucose consumption, in dpm per mg tissue per hour for the radioactivity of $CO_2$ and in ppm on wet weight basis for the copper content.

* Significant difference at $p < 0.05$.

** Significant difference at $p < 0.01$.

*** Significant difference at $p < 0.005$. The number of determinations is given in brackets.

*Table 2*

**Correlation between the individual modifications in aggressivity (ΔD) and the individual modifications in $CO_2$ radioctivity (ΔR, acetate oxidation)**

| Fish | C | E | D | B | A |
|---|---|---|---|---|---|
| ΔD | −244 | −237 | −237 | −174 | −55 |
| ΔR | − 62.4 | − 47.01 | − 32.94 | − 15.33 | −0.76 |
| | | | | | r=0.872 |
| | | | | | p<0.01 |

Values for ΔD are given in seconds, for ΔR in dpm per mg tissue per hour. A—D are notations for the individual fishes.

*Scilliorhinus* [22], 1.3 ppm for 168 hours in *Mugil* [9], 46 ppm for 96 hours in the coho salmon and 57 ppm for 96 hours in the steelhead [5]. Thus it seems plausible that the 4 ppm copper concentration has not reached the unknown $LC_{50}$ value for one hour (the total duration of the intoxication) in *Betta splendens.* We assume that the intoxication could not be very strong.

Copper content of the muscle tissue is: 1.1 ppm in *Cyprinus carpio* [14], 0.47 — 2.4 ppm in several marine fish species [8], 1.01 ppm in tuna [12], 0.15 ppm in the cod [10]. Our results are in agreement with these data. The fact that during the one-hour intoxication a significant accumulation of copper in muscle tissue did not occur is consistent with some literature data, which show that the muscle tissue is not among the target tissues for Cu accumulation (see the introductory section).

Studies on the metabolic effects of Cu on muscle are scarce in the literature. After a 3-hour intoxication with copper, the muscle glycogen was reduced in freshwater teleosts; a hyperglycemia also occurred [20]. In contrast, D a n g e [6] showed that muscle glycogen was not modified, but a hyperglycemia was noticed also by him. It has been shown that copper inhibits mitochondrial respiration [24]. Our results are in good agreement with these data. Glycogen content of the muscle tissue was not modified. The free glucose in muscle was elevated and *in vitro* glucose reduced, showing an inhibited glucose uptake by the muscle. As a possible consequence, the glycemia could be higher. We did not determine glycemia, because the fish is very small, and it is impossible to obtain the required quantity of blood. An inhibition of mitochondrial respiration, estimated based on the oxidation rate of acetate, was noticed also by us.

In copper-intoxicated catfish and sheepshead an initial hyperactivity and a later hypoactivity was noticed [21]. These phenomena were present in our fishes. After the introduction of $CuSO_4$ to the water, the fishes became very active, tried to escape by jumping out of the tanks. After 25 minutes a strong hypoactivity occurred, and a dramatical reduction of aggressivity could be noticed.

The reduction in aggressivity was significantly correlated with the reduction of mitochondrial oxidation, but yet we think that both the

reduction in aggressivity and in mitochondrial oxidation were indirect effects of copper intoxication. Copper causes severe alterations in gill morphology and function [1, 15, 23], and decreases oxygen uptake [3]. It is possible that copper has similar effects upon the labyrhintic organ of *Betta splendens*. In our view, the slight, not significant increase in copper content of the muscle tissue could not reduce the mitochondrial oxidation by 35% directly. If we assume an impaired oxygen uptake by gill and labyrhintic organ, there was a generally reduced oxygen availability in the intoxicated fishes. This could be a more plausible explanation both for the impairment of mitochondrial oxidation and the reduction of aggressivity. The reduced glucose uptake could be due also to the reduced oxygen availability. Under such conditions, insufficiency of ATP also occurs which probably affects the hexokinase activity and, thus, the penetration of glucose into the muscle fibres.

**Conclusion.** $CuSO_4$-intoxicated fishes showed a marked reduction of aggressivity, of the *in vitro* glucose uptake and mitochondrial oxidation, and a marked increase in the free glucose in muscle. The reduction of mitochondrial oxidation showed a significant correlation with the modifications in aggressivity.

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# POSSIBLE MUTAGENIC EFFECTS OF METHALAXYL

NICOLAE COMAN* and MANUELA DORDEA*

**SUMMARY.** - The mutagenic activity of the herbicide methalayxyl was studied. The $DL_{50}$ concentration for *Drosophila melanogaster* was established as corresponding to 5000 ppm included into the medium. This concentration as well as that utilized in agriculture (2 ppm) were used to estimate the mutagenic effects of methalaxyl. Using the CyL/Pm test, our paper reveals a low frequency of deleterious mutations at both doses of methalaxyl, without exceeding significantly the values of the control. The frequency of the lethal recessive mutations is 1.08% for the agricultural dose of methalaxyl, and 8.46% for the $DL_{50}$, as compared to 0.99% for the untreated control. We conclude that in the dose used as a herbicide (2 ppm), methalaxyl does not induce toxic effects or mutagenic ones in *Drosophila melanogaster*. It results also that the frequency of induced mutations depends on the dose of methalaxyl used. It means that methalaxyl should be used as a herbicide only at the lowest efficient concentrations.

Our experiments regarding possible mutagenic effects of herbicides, experiments called for by the strive to preserve unaltered the environment and the ecological balance, were also carried out on methalaxyl [methyl *D, L*-N-(2,6-dimethylphenyl)-N-2'-methoxyacetyl)alaninate]. The effects of this herbicide have not been clearly described so far [2, 3, 6].

**Material and methods.** The mutagenic effects of methalaxyl have been estimated according to the CyL/Pm test, established by Wallace [5] for the study of radiation-induced mutagenic effects. Experiments were carried out on a wild strain of *Drosophila melanogaster*, from Riverside, California, reared on a "white medium", supplemented with semolina at 25°C.

$DL_{50}$ has been estimated relative to three concentrations of methalayxl (4000, 5000 and 6000 ppm, respectively) dissolved in ethyl alcohol and added to the medium. It has been found to correspond to a methalaxyl concentration of 5000 ppm.

The CyL/Pm method [1] consists in homozygotizing a *Drosophila* strain for the second pair of chromosomes and in rearing the homozygotized individuals on methalaxyl-bearing medium, at both the $DL_{50}$ concentration and the one used in agriculture (2 ppm). Control homozygotized individuals were reared on a normal medium lacking pesticide. Afterwards, the chromosomes resulting from the individuals submitted to the action of pesticides were re-homozygotized. The percent values of lethal recessive mutations and deleterious ones allow the estimation of the mutagenic capacity of the tested pesticide.

Vogel [4] estimates the test of lethal recessive mutations to be one of the most precise methods for establishing the mutations induced by various environmental agents.

**Results and discussions.** Only 0.99% of the individuals in the control group (Fig. 1) have lethal recessive mutations on the second pair of chromosomes. These data compare favourably with those of Wallace [5] and Vogel [4], who estimated 1% mutations by the same test. Examination of the deviation from the 2 CyL/+ : 1 +/+ ratio has revealed that 78.94% of the descendants range around the mean value, with an

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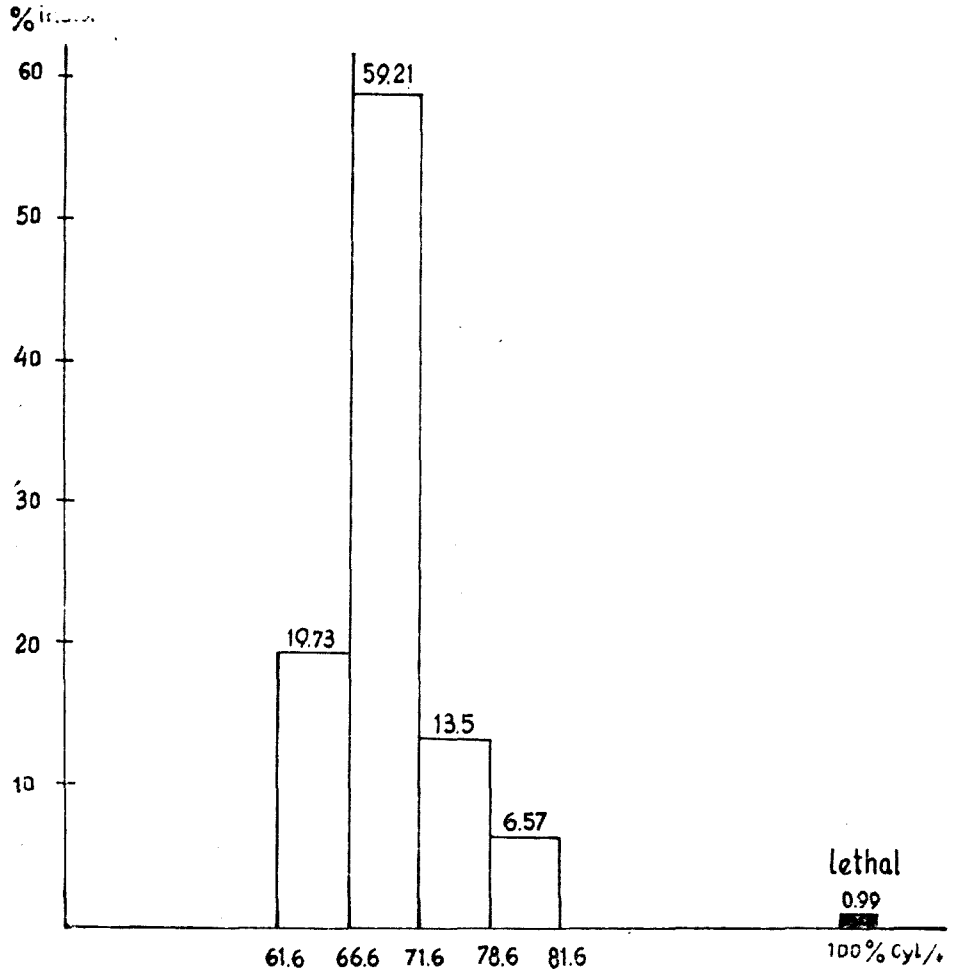


Fig. 1. *Frequency of deleterious and lethal recessive mutations in control, after the use of the CyLPm test.*

insignificant deviation of ±5%. In the control group, 20.07% of the analysed individuals reveal deleterious mutations with various degree effects upon offspring viability. This natural mutagenesis is a standing selection factor and, implicitly, one of the causes altering the population gene pool.

In order to obtain $DL_{50}$ in *Drosophila melanogaster* a high concentration of methalaxyl (5000 ppm) is required (Table 1). This means that the dose used in agriculture (2 ppm) is not toxic for *Drosophila melanogaster*. The results of the CyLPm test applied to methalaxyl-treated indi-

viduals ($DL_{50}$ concentration) are presented in Fig 2. It has been estimated that 8.46% of the treated individuals display lethal recessive mutations. Examination of the deviation from the 2 : 1 ratio (*i.e.* 66.66% CyL/+ : 33.33% +/+) has revealed that most of the individuals subjected to this test (78.72%) range around the mean value, with an insignificant deviation of ±5%. As to the other values, the variation range is shifted rightward, *i.e.* in favour of the CyL/+ forms and to the prejudice of the normal ones: 8.47% (*i.e.* 9.52% — 1.05%) of the tested individuals exhibited a deviation in favour of the CyL/+ forms between 5 — 10%. Although the occurrence frequency is low (0.52% for 3

*Table 1*

**The values for $DL_{50}$**

| Concentration of methalaxyl (ppm) | Repetition | Mean number of offsprings/tube |
|---|---|---|
| 0 (control) | 1 | 272 |
| | 2 | 339 |
| | 3 | 243 |
| | 4 | 310 |
| | $\bar{X}$ | 291 |
| 4000 | 1 | 196 |
| | 2 | 205 |
| | 3 | 153 |
| | 4 | 178 |
| | $\bar{X}$ | 183 |
| 5000 | 1 | 119 |
| | 2 | 114 |
| | 3 | 167 |
| | 4 | 171 |
| | $\bar{X}$ | 143 |
| 6000 | 1 | 108 |
| | 2 | 106 |
| | 3 | 115 |
| | 4 | 101 |
| | $\bar{X}$ | 107 |

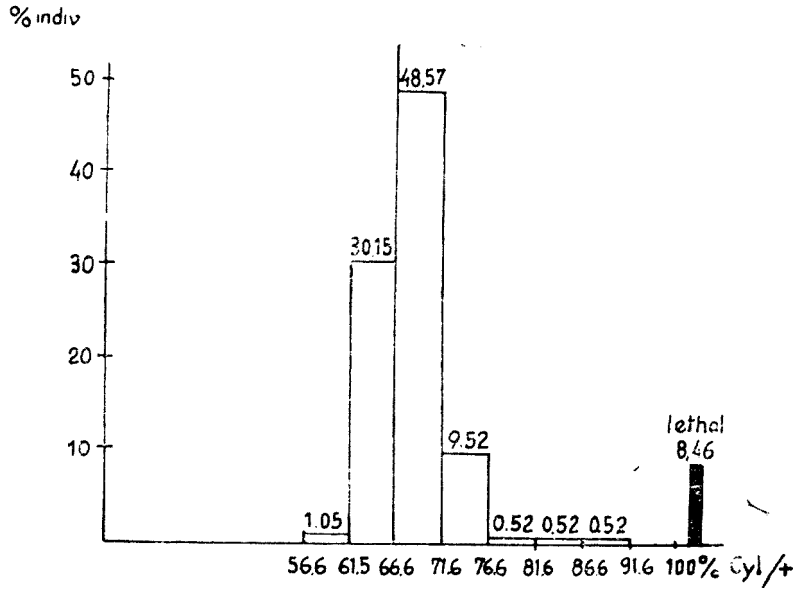


Fig. 2. *Frequency of deleterious and lethal recessive mutations after treatment with methalaxyl at $DL_{50}$ (5000 ppm).*

other consecutive classes), there are individuals in which the $F_7$ descendance deviates much from the normal value, this accounting for the fact that in these individuals the induced deleterious mutations have a strong impact upon viability.

The methalaxyl dose used in agriculture (2 ppm) has induced lethal mutations only in a small share (1.08%), a value almost identical to that recorded in the control (Fig. 3).

The resulting data reveal that the percent value of lethal recessive mutations induced by $DL_{50}$ (5000 ppm) is more than 8 times larger than in control, while that obtained with the dose used in agriculture (2 ppm) is

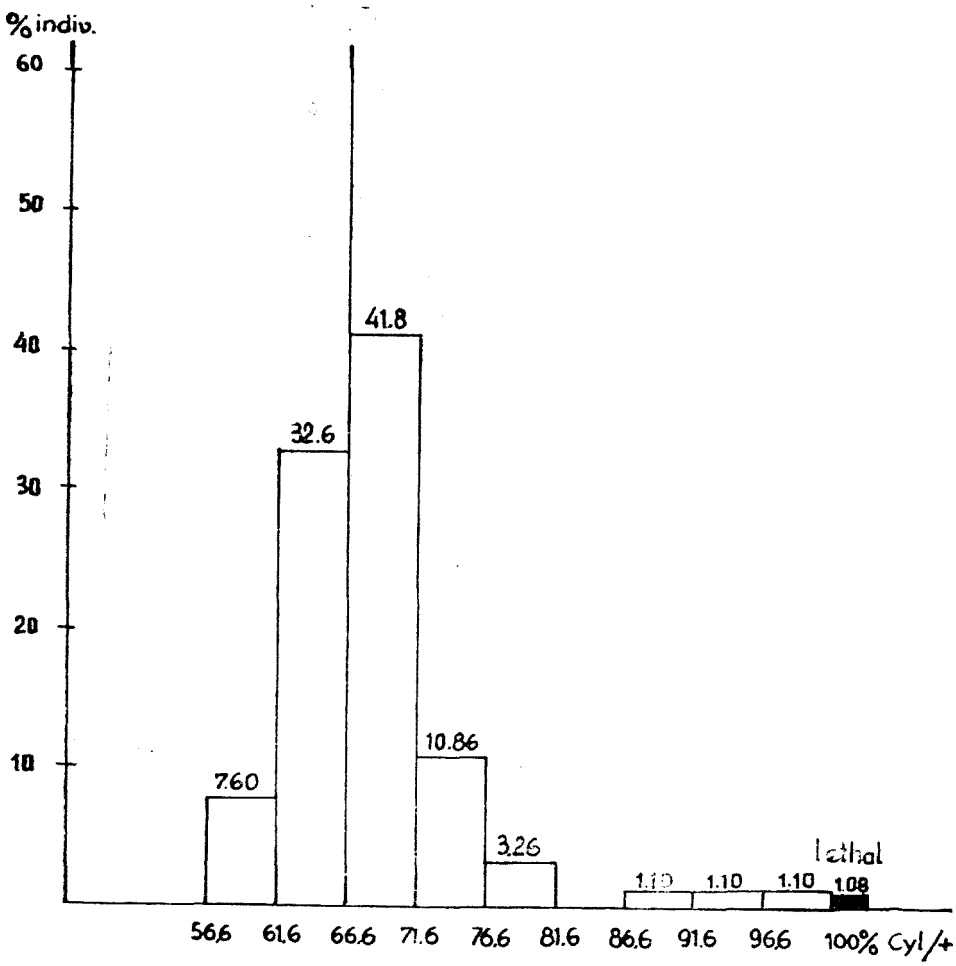


**Fig. 3.** *Frequency of deleterious and lethal recessive mutations after treatment with methalaxyl at agricultural dose (2 ppm).*

almost identical to the control. It is therefore obvious that the mutagenic effect depends on the pesticide dose.

Of all the individuals analysed, 74.4% have offsprings in the ratio 2 : 1. This means that they did not suffer deleterious mutations on the second pair of chromosomes. On the other hand 3.26% (*i.e.* 10.86%—7.60%) of the $F_7$ individuals showed a deviation of 5—10% from the 2 CyL/+ : 1 +/+ ratio, 3.26% — a deviation of 10—15%. 1.10% of the offsprings manifested a deviation of 20—25%, 25—30% and respectively 30—35% in favour of the CyL/+ forms.

**Conclusions.** In the dose used as a herbicide (2 ppm), methalaxyl does not induce toxic effects or mutagenic ones in *Drosophila melanogaster*.

The frequency of induced mutations depends on the dose of methalaxyl used ; therefore, it should be used as a herbicide only at the lowest efficient concentrations.

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# POSSIBLE MUTAGENIC EFFECTS OF ALACHLOR

**NICOLAE COMAN* and MANUELA DORDEA***

**SUMMARY.** — The mutagenic activity of the herbicide alachlor was studied. The $DL_{50}$ concentration for *Drosophila melanogaster* was established as corresponding to 4000 ppm alachlor included into the medium. This concentration as well as that utilized in agriculture (2 ppm) were used to estimate the mutagenic effects of alachlor. Using the CyL/Pm test, our paper reveals a low frequency of deleterious mutations at both doses of alachlor, without exceeding significantly the values of the control. The frequency of the lethal recessive mutations is 0.85% for the agricultural dose of alachlor, and 3.6% for the $DL_{50}$, as compared to 0.99% for the untreated control. We conclude that, in the dose used as a herbicide (2 ppm), alachlor does not induce toxic effects or mutagenic ones in *Drosophila melanogaster*. The comparative investigation of alachlor in an agricultural dose (2 ppm) and $DL_{50}$ (4000 ppm) requires that it should be used as a herbicide only at the lowest efficient concentrations.

It is a well-known fact that pesticides, used in pest control or against pathogenic agents of plants, animals and man, have a deep and complex impact upon the structure and function of the trophic chain and upon the ecosystems as a whole. They disturb the biogeochemical cycles in the entire ecosphere. Therefore, environment protection requirements call for the exclusive use in pest control of the pesticides with high toxicity and specificity for target species, low remanence, and no mutagenic effects. Care is also taken in establishing minimum doses with maximum efficiency.

In this line of research our experiments focus on the mutagenic capacity induced by alachlor [2-chloro-2', 6'-diethyl-N-(methoxymethyl)-acetanilide], a herbicide with dose-dependent effects according to the literature data available [2—7].

**Material and methods.** The mutagenic effects of alachlor have been estimated according to the CyL/Pm test, established by Wallace [9] for the study of radiation-induced mutagenic effects. Experiments were carried out on a wild strain of *Drosophila melanogaster*, from Riverside, California, reared on a "white medium" with semolina at 25°C.

$DL_{50}$ has been estimated relative to three concentrations of alachlor (4000, 5000 and 6000 ppm, respectively) dissolved in ethyl alcohol and added to the medium. It has been found to correspond to an alachlor concentration of 4000 ppm.

The CyL/Pm method [1] consists in homozygotizing a *Drosophila* strain for the second pair of chromosomes and in rearing the homozygotized individuals on alachlor-bearing medium, at both the $DL_{50}$ concentration and the one used in agriculture (2 ppm). Control homozygotized individuals were reared on a normal medium lacking pesticide. Afterwards, the chromosomes resulting from the individuals submitted to the action of pesticides were re-homozygotized. When one or both chromosomes in the second pair of alachlor-treated individuals reveal a lethal recessive mutation, the homozygote offsprings for that mutation are not viable and all the offsprings are represented by the CyL/+ form. When one or more deleterious mutations are induced to the chromosomes of the second pair, the viability of the normal forms will be variously affected, and the ratio 2 : 1 in $F_7$ will be disturbed in favour of CyL/+ forms.

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Vogel [8] estimates the test of lethal recessive mutations to be one of the most precise methods for establishing the mutations induced by various environmental agents.

**Results and discussions.** Only 0.99% of the individuals in the control group (Fig. 1) have lethal recessive mutations on the second pair of chromosomes. These data compare favourably with those of Wallace [9] and Vogel [8], who estimated 1% mutations by the same test. Examination of the deviation from the 2 CyL/+ : 1 +/+ ratio has revealed that 78.94% of the offspring range around the mean value, with an insignificant deviation of ±5%. In the control group, 20.07% of the analysed individuals reveal deleterious mutations with various degree effects upon offspring viability. This natural mutagenesis is a standing

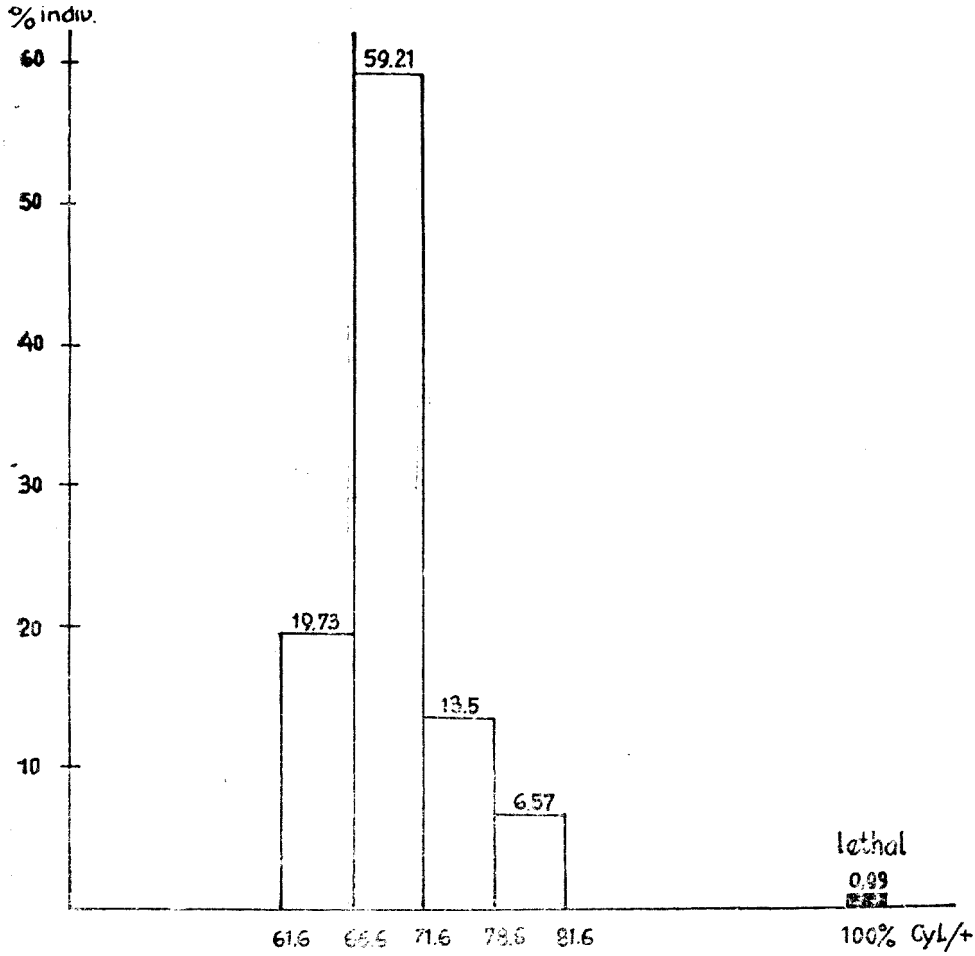


Fig. 1. *Frequency of deleterious and lethal recessive mutations in control, after the use of the CyLPm test.*

*Table 1*

**The values for $DL_{50}$**

| Concentration of alachlor (ppm) | Repetition | Mean number of offsprings/tube |
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| | 4 | 310 |
| | $\bar{X}$ | 291 |
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| | 2 | 135 |
| | 3 | 155 |
| | 4 | 148 |
| | $\bar{X}$ | 145 |
| 5000 | 1 | 129 |
| | 2 | 83 |
| | 3 | 112 |
| | 4 | 138 |
| | $\bar{X}$ | 115 |
| 6000 | 1 | 108 |
| | 2 | 84 |
| | 3 | 116 |
| | 4 | 106 |
| | $\bar{X}$ | 103 |

selection factor and implicitly one of the causes altering the population gene pool.

In order to obtain $DL_{50}$ in *Drosophila melanogaster* a high concentration of alachlor (4000 ppm) is required (Table 1). This means that the dose used in agriculture (2 ppm) is not toxic for *Drosophila melanogaster*. The results of the CyL/Pm test applied to alachlor-treated individuals ($DL_{50}$ concentration) are presented in Fig. 2. It has been estimated that only 3.6% of the treated individuals display lethal recessive mutations, which implies a relatively low mutagenic effect of alachlor, as compared to control.

Examination of the deviation from the 2 : 1 ratio (*i.e.* 66.66% CyL/+ : 33.33% +/+) has revealed that most of the individuals subjected

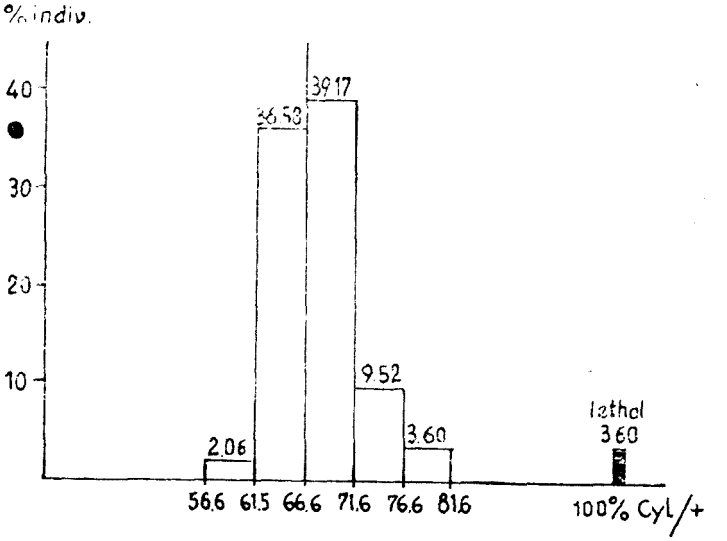


Fig. 2. *Frequency of deleterious and lethal recessive mutations after treatment with alachlor at $DL_{50}$ (4000 ppm).*

to this test (75.75%) range around the mean value, with an insignificant deviation of ±5%. As to the other values, the variation range is shifted rightward, *i.e.* in favour of the CyL/+ forms and to the prejudice of the normal ones: 7.46% (*i.e.* 9.52% – 2.06%) of the tested individuals exhibited a deviation in favour of the CyL/+ forms between 5–10%, while 3.6% manifested a deviation between 10–15%. This accounts for the fact that more than 11% of the tested individuals showed deleterious mutations, which affect to various degrees the viability of the wild homozygote offsprings in the $F_7$ generation.

The alachlor dose used in agriculture (2 ppm) has induced lethal mutations only in a small share (0.85%), a value almost identical to that recor-

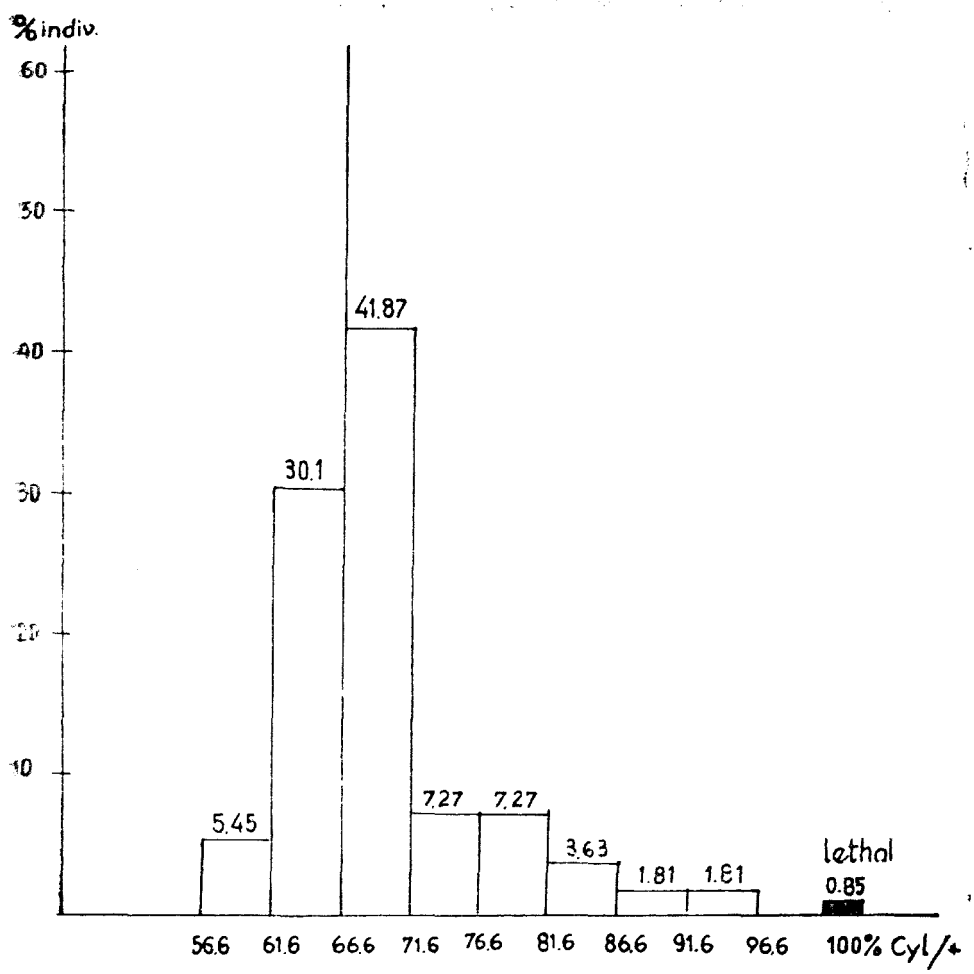


Fig. 3. *Frequency of deleterious and lethal recessive mutations after treatment with alachlor a agricultural dose (2 ppm).*

ded in the control (Fig. 1). Of all the individuals analysed, 71.97% have offsprings in the ratio 2 : 1. This means that they did not suffer deleterious mutation on the second pair of chromosomes. On the other hand, 4.82% (*i.e.* 7.27% — 5.45%) of the $F_7$ individuals showed a deviation of 5—10% from the 2CyL/+ : 1 +/+ ratio, 7.27% a deviation of 10—15%, 3.63% — 15—20% , 1.81% — 20—25%. Part of the $F_7$ individuals (1.81%) even exhibited a deviation of 25—30% from the 2CyL/+ : 1 +/+ ratio.

A comparative interpretation of these results (Fig. 3) with those recorded in control individuals (Fig. 1) leads to the conclusion that alachlor may be used as a pesticide in the agricultural dose of 2 ppm, since its mutagenic effects are insignificant.

**Conclusions.** In the dose used as a herbicide (2 ppm), alachlor does not induce toxic effects or mutagenic ones in *Drosophila melanogaster*.

The comparative investigation of alachlor in an agricultural dose (2 ppm) and $DL_{50}$ (4000 ppm) requires that it should be used as a herbicide only at the lowest efficient concentrations.

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# UTILIZATION OF $^{15}N$ TO EVALUATE THE AVAILABILITY OF NITROGEN FROM DIFFERENT FERTILIZERS FOR *LOLIUM MULTIFLORUM*

**LEONIDA CALANCEA* MARGARETA BOLOGA** and MARIA CHIRIAC****

**SUMMARY.** — Six fertilizers were experimented: urea as control, two urea adducts (urea phosphate and urea formiate), a slow-release N fertilizer (isobutylidene diurea, IBDU), and two amidic compounds (phosphoryl triamide and phosphonitrilic hexamide). The results have shown that the yields of *Lolium multiflorum* herbage depended on the doses applied, irrespective of the nature of the fertilizers. The highest coefficients of the utilization of nitrogen from fertilizers were found with urea phosphate (85%) and urea formiate (78%). With the other fertilizers the coefficients of N utilization were of maximum 45—55%.

The literature reveals a lot of researches concerning the utilization of $^{15}N$ with the aim of establishing the degree of plant availability of nitrogen from fertilizers and the dynamics of the fertilizer N in soil (*e.g.* [1—3, 6, 7, 10]).

Plants take up, on an average, 40—50% from the nitrogen of fertilizers, whereas a great part of N is lost through leaching and volatilization and only a small part remains fixed in the soil organic matter [3, 4]. This can be explained by the short-term action of the mineral N fertilizers which are exhausted under the influence of the soil microorganisms before the plants end their vegetative cycle.

In order to diminish the nitrogen losses that occur through leaching and volatilization, the use of some synthetic organic compounds was suggested. They comprise urea adducts with organic and inorganic acids, slow-release N fertilizers as well as amidic compounds with a high content of nitrogen and phosphorus [5, 9].

The objective of our study was 1. to establish the efficiency of 6 fertilizers on the crop production, 2. to know how they affect the N content of plants, 3. to establish their agrochemical differentiation depending on the coefficient of fertilizer N utilization by plants and 4. to determine the ratio between the N derived from fertilizers and the N derived from soil reserve.

**Materials and methods.** The experiments were carried out in pots of 3-kg capacity. They were filled with a soil of pseudogleyic podzolized type (pH = 5.8). The following fertilizers were experimented: urea as control, the adducts urea phosphate and urea formiate, the slow-release N fertilizer isobutylidene diurea (IBDU) and the amidic compounds phosphoryl triamide and phosphonitrilic hexamide (Fig. 1). All the fertilizers were labelled with $^{15}N$.

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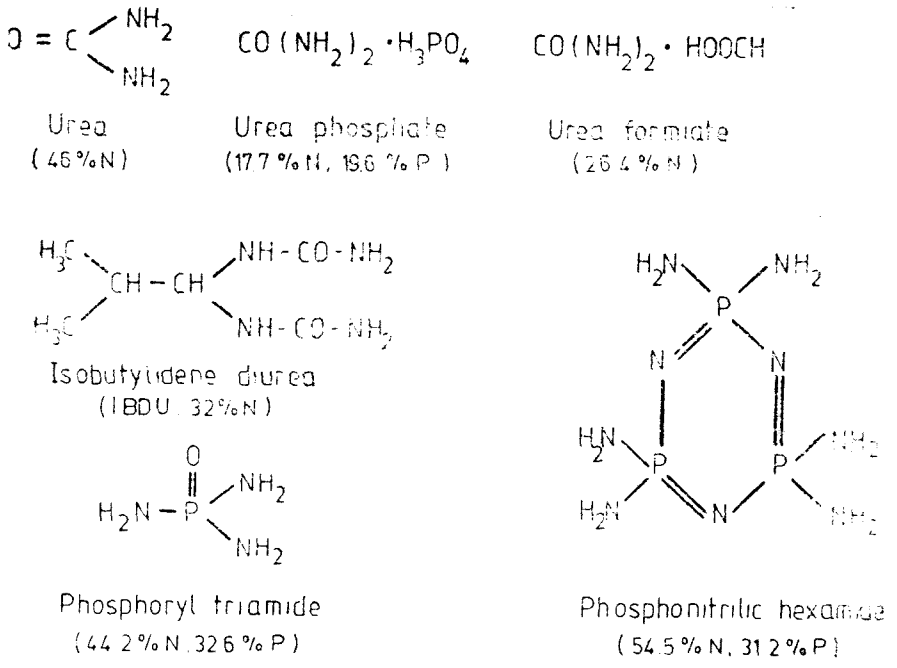


Fig. 1. *The fertilizers tested.*

Increasing doses of fertilizers were applied (50, 100, 200, 300, 400 and 500 mg N/pot), each dose in 3 pots. Besides N, phosphorus was also administered in a dose of 100 mg $P_2O_5$/pot.

The soil in each pot was sown with *Lolium multiflorum* (200 mg seeds/pot). During the vegetation period, soil humidity was maintained at 65—70% of the water-holding capacity. The plants were harvested thrice, but only the first two yields of herbage were taken into consideration, the third yield having been less significant. The isotopic analysis was carried out by the Rittenberg method [8].

The data were subjected to variance analysis, to calculation of the linear, polynomial and logarithmic regressions.

**Results.** *1. The efficiency of fertilizers on the crop yield.* The data of Table 1 show that the urea adducts (urea phosphate and urea formiate) and IBDU increased the yield to a greater extent than did urea. On the contrary, the amidic compounds with a high N and P content, as compared to urea, determined a yield decrease which was probably due to the early maturation effect of the phosphorus becoming available from these fertilizers. However, the decrease was not significant. The yield depended more on the dosage than on the nature of the fertilizers. The correlation coefficients between N dosage and crop yield are very high and significant (Fig. 2).

*2. The effect of fertilizers on the nitrogen content of plants.* One can deduce from Fig. 3 that urea phosphate and urea formiate, in comparison with urea, led to an increased N content in plants. The plants grown in the IBDU-treated soil contained less N than the plants whose

*Table 1*

**Influence of doses and forms of fertilizers on the yield of** L o l i u m m u l t i f l o r u m

| Variants (mg N/pot) | Fertilizer from | | | | | | Mean yield (g/pot) | % | ±d | S |
|---|---|---|---|---|---|---|---|---|---|---|
| | Urea | Urea phosphate | Urea formiate | IBDU | Phosphoryl triamide | Phosphonitrilic hexamide | | | | |
| 0 | 4.62 | 5.04 | 6.43 | 5.97 | 5.67 | 5.23 | 5.49 | 100.00 | — | — |
| 50 | 6.43 | 8.05 | 6.83 | 6.67 | 6.33 | 5.34 | 6.61 | 120.40 | + 1.12 | • |
| 100 | 7.88 | 10.86 | 9.09 | 9.10 | 7.54 | 6.34 | 8.07 | 154.28 | + 2.98 | • • |
| 200 | 10.34 | 13.57 | 13.32 | 10.31 | 9.32 | 8.76 | 10.94 | 199.27 | + 5.41 | ••• |
| 300 | 11.34 | 15.93 | 14.10 | 14.30 | 12.02 | 9.93 | 12.94 | 235.70 | + 7.45 | ••• |
| 400 | 13.80 | 15.45 | 16.96 | 14.54 | 13.56 | 11.20 | 14.25 | 259.56 | + 8.70 | ••• |
| 500 | 15.10 | 15.71 | 18.22 | 15.67 | 15.05 | 15.06 | 15.92 | 289.98 | +10.43 | ••• |
| S | 69.51 | 84.61 | 85.65 | 76.86 | 69.50 | 61.86 | | | | |
| | — | 1.220 | 1.215 | 0.948 | 1.093 | 1.149 | F = 8.47<br>P = 99% | | | |

$$F = \frac{S \times h^2}{S \times l^2}$$

DL 5% = 0.021

DL 0.1% = 1.976

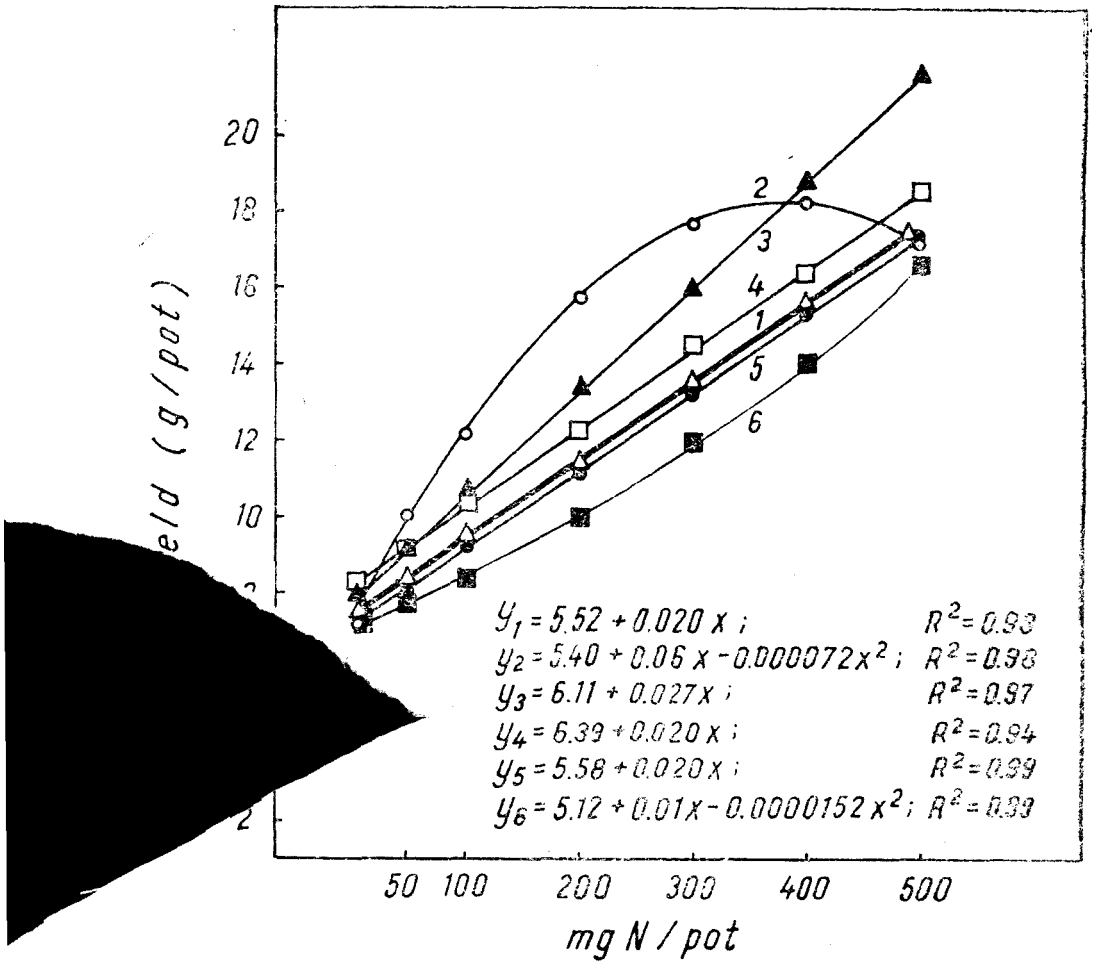


Fig. 2. *The effect of different N fertilizers, applied in different doses, on the yield of* Lolium multiflorum.

1 — Urea. 2 — Urea phosphate. 3 — Urea formiate. 4 — IBDU. 5 — Phosphoryl triamide. 6. Phosphonitrilic hexamide.

soil was treated with urea. Phosphoryl triamide and phosphonitrilic hexamide, applied in doses of 50—200 mg N/pot, increased, but in higher doses decreased the N content of plants. This decreasing effect should be ascribed to the increasing amounts of P released from these two fertilizers.

*3. The agrochemical differentiation of fertilizers depending on the coefficient of N utilization by plants* (Fig. 4). The highest coefficient of N utilization by plants (85%) was registered with urea phosphate applied in doses of 200 and 300 mg N/pot. At higher doses of this fertilizer, the coeffi-

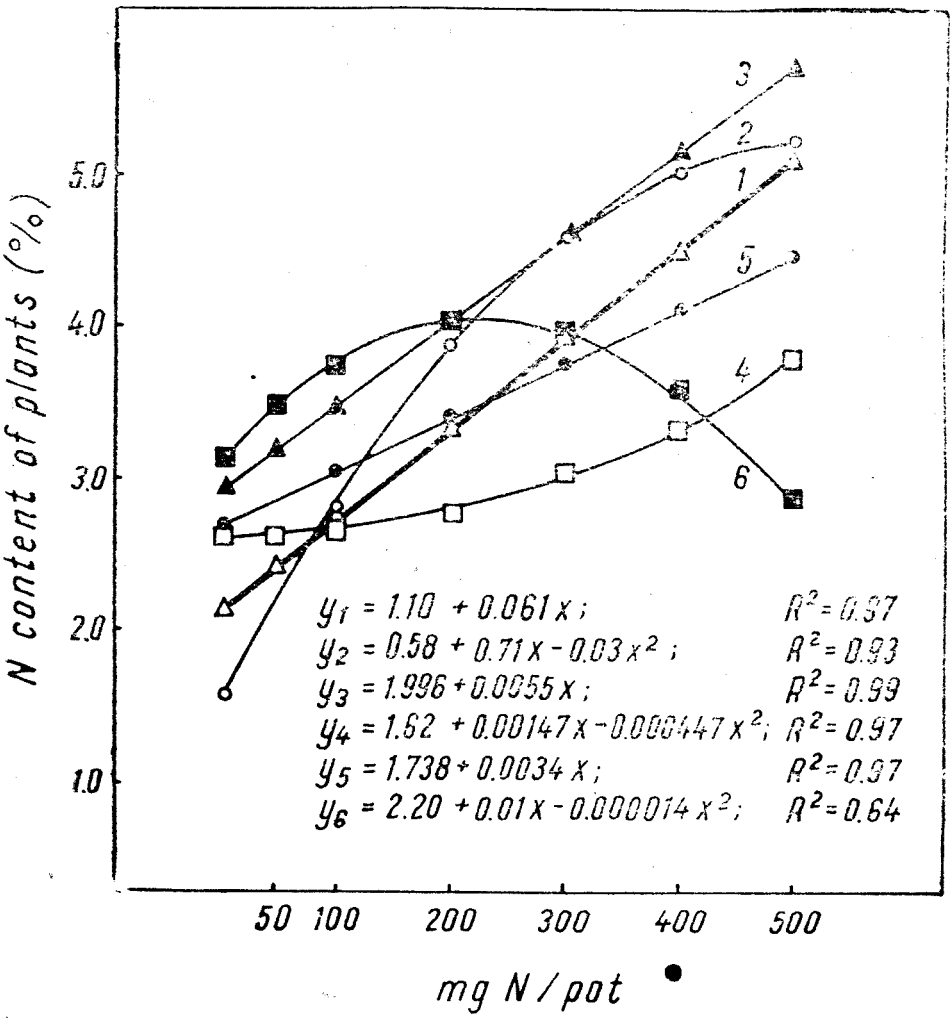


Fig. 3. *The effect of different N fertilizers, applied in different doses, on the N content of* Lolium multiflorum.
1—6 — See Fig. 2.

cient decreased very much. In the case of urea formiate, the highest value of this coefficient (80%) was found when this fertilizer was applied in doses of 300 and 400 mg N/pot. The optimum doses for obtaining the highest coefficient of N utilization from urea (55%) were similarly 300 and 400 mg N/pot. With the other fertilizers, the coefficient of N utilization increased up to 45—55% in parallel with the dosage increase.

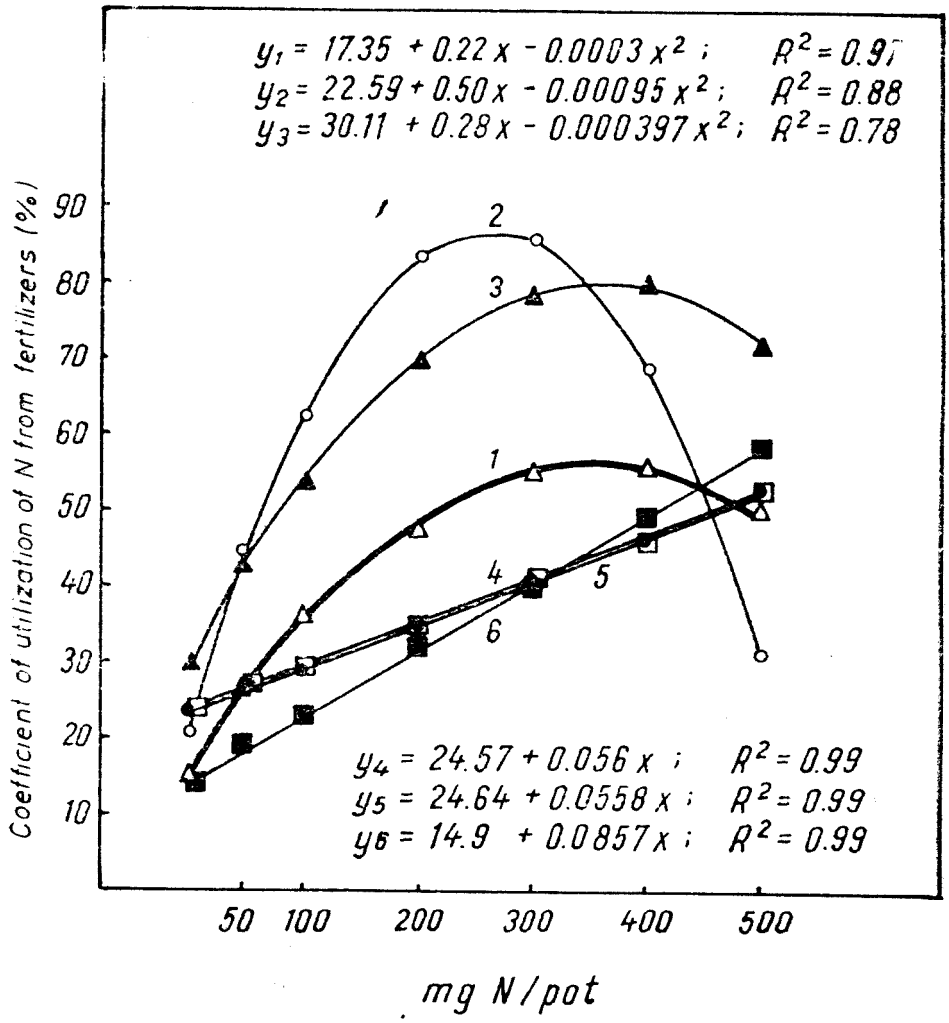


Fig. 4. *The effect of different N fertilizers, applied in different doses, on the coefficient of N utilization by* Lolium multiflorum.
1–6 — See Fig. 2.

*4. The effect of fertilizers on the ratio between N taken up from fertilizers/N taken up from soil reserve by plants* (Fig. 5). With urea applied in doses lower than 250 mg N/pot, the plants took up the nitrogen rather from the soil reserve than from this fertilizer. At higher doses, the uptake of N from urea increased with a decreasing tendency at the maximum doses (400 and 500 mg N/pot). The plants assimilated N rather from the soil reserve than from urea phosphate applied in low doses (up to 200 mg N/pot). The reverse was true at higher urea phosphate doses. The plant uptake of N was rather from the soil reserve than from IBDU (applied in doses up

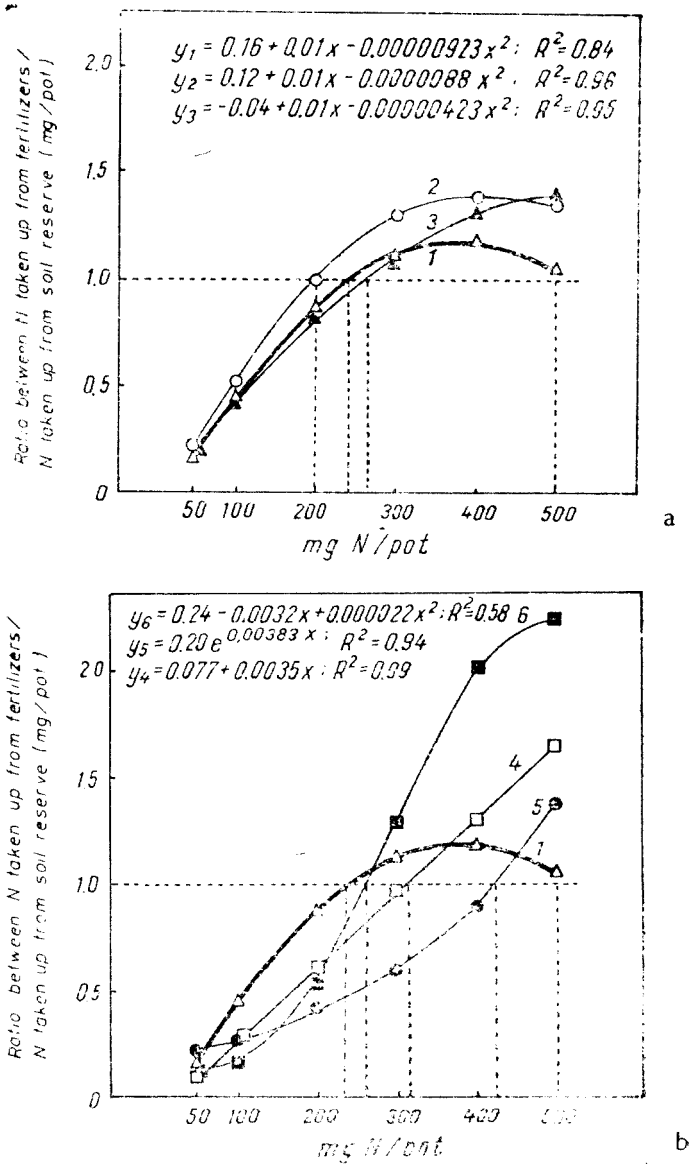


Fig. 5. *The effect of different N fertilizers, applied in different doses, on the ratio between N taken up from fertilizers/N taken up from soil reserve by* Lolium multiflorum.
1–6 — See Fig. 2.

to ~300 mg N/pot) or from phosphoryl triamide (applied in doses up to ~400 mg N/pot). An increased uptake of N from these two fertilizers occurred only at their higher doses. It is characteristic for phosphonitrilic hexamide that, when it was used in doses lower than 265 mg N/pot,

the plants took up N mostly from the soil reserve, but at its higher doses the plant uptake of N from this fertilizer was more pronounced than from the others.

It is evident from these findings that the economical optimum of N doses is achieved by stimulating the N uptake rather from the soil reserve than from the fertilizers. This economical optimum has a shorter or longer duration of time, depending on the amount of N reserve in the soil organic matter.

We can conclude that in order to obtain maximum crop yield we must have in view not only the N requirement of plants but also the maintenance of the N reserve in soil. This is the reason for which the researches on these topics are worth continuing.

**Conclusions.** Of the 6 fertilizers tested, urea phosphate and urea formiate were the most efficient in increasing the herbage yield of *Lolium multiflorum*, the N content of plants and the coefficient of N utilization by plants. The fertilizers differed significantly from each other, depending on their effect on the ratio between N taken up from fertilizers/N taken up from soil reserve by plants. This finding must be taken into account when calculating the optimum dose of N fertilizers.

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# SYSTEMATISCHER KATALOG DER ORNITHOLOGISCHEN SAMMLUNG DES LYZEUMS NR. 2 AUS REGHIN (I. Teil)

ŞTEFAN KOHL*

**SUMMARY. — Systematical Catalogue of the Ornithological Collection of the Secondary School No. 2 from Reghin (Part I).** This paper presents the collection of birds from the secondary school No. 2 in Reghin. The birds belong to 386 species; 237 taxa in 1769 specimens are from our country and 149 taxa in 161 specimens from other geographic zones. The osteologic material contains 2135 specimens. Part I of this paper reviews 160 species.

Aus dem gesamten Tierreich ist kaum eine Klasse besser bekannt als die der Vögel und deshalb wurde diese Kenntnis öfter als „Gradmesser und Wegweiser" zoologischer Forschung betrachtet. Dieses ist auch aus den großen ornithologischen Werken zu ersehen, in denen in großem Masse Material der Museen und Sammlungen verarbeitet wurde.

Damit das aufgespeicherte Gut den Fachleuten besser bekannt und dadurch zugänglich sein soll, ist es von größter Wichtigkeit Sammlungskataloge zu veröffentlichen.

Das Lyzeum Nr. 2 aus Reghin besitzt eine ornithologische Sammlung, die den Rahmen einer Schulsammlung sprengt und durch ihre Reichhaltigkeit den weiteren Forschungen dienen kann, besonders wenn man bedenkt, daß das in Arbeit befindliche Werk „Aves" aus der Fauna Rumäniens diese Angaben auch benötigt.

Im Jahre 1952 wurde der Verfasser dieses Katalogs als Präparator an der damaligen Pädagogischen Schule angestellt, um eine dem Unterricht dienende Sammlung aufzubauen. Durch die weitgehende Unterstützung des Schuldirektors — Julius Szász — konnte sich die Sammlung weiter entwickeln.

Wie aus dem Katalog hervorgeht, enthält die Sammlung 3516 Belegstücke, die 386 Arten angehören und zwar 237 inländischen, 149 fremdländischen in 1769 bzw. 161 Exemplaren. Bei einem Teil der Belegstücke liegen auch Skeletteile vor und außerdem sind noch 1586 vollständige oder Teilskelette (= Brustbein, Schultergürtel, Becken und Oberschenkelknochen) auffindbar (im Ganzen 2135 Skelette).

Bei den angeführten Arten ist der wissenschaftliche, rumänische, ungarische und deutsche Name, die Inventar-Nummer, Fundort und Kreis-Symbol, Zeitpunkt, Geschlecht und Alter, als auch die Konservierungsart angegeben. Nach dem wissenschaftlichen Namen kann eine in Klammer gesetzte Zahl folgen, die auf eine Literaturquelle hinweist.

Die systematische Klassifikation richtet sich nach der „Übersicht über die Ordnungen und Familien der Vögel „[9], die bloß in einigen Fällen von Peters „Check-List" [10] abweicht. Demgemäß wurde den Flamingos und Kolibris der Ordnungs-Status zugewiesen.

Im Katalog wird die binäre Nomenklatur angewandt und nur bei Arten die in taxonomischer Hinsicht untersucht wurden, verwendeten wir innerhalb der betreffenden Art, die ternäre Benennung an.

Wir danken hiermit Herrn Prof. H. E. Wolters (Bonn) und gedenken in Ehrfurcht Doz. Dr. A. Keve (Budapest), für ihre Hilfe und Ratschläge. Ebenso danken wir Kollegen Julius Filep (Sîngeorgiu de Mureş) für uneigennützig überlassenes osteologisches Material.

*Abkürzungen — Abbreviations*

A = Invertar-Symbol *(Aves)* — Inventory Symbol *(Aves)*
B = Balg — Bird skin
G — Deutscher Name — German name
M = Ungarischer Name — Hungarian name
N — Stopfpräparat — Prapared bird

* *Str. Aurel Vlaicu 3, 4225 Reghin, Rumänien*

**R** = Rumänischer Name — Romanian name
**S** = Teilskelett — Partial skeleton
**Sk** = Vollständiges Skelett — Complete skeleton
**ad** = Altvogel — Adult bird
**juv** = Jungvogel — Young bird
**pull** = Nestling — Nestling

## *SISTEMATISCHE BESCHREIBUNG DER SAMMLUNG*

### Ordo RHEIFORMES
### Familia RHEIDAE
### Genus **Rhea** Brisson, 1760

1. *Rhea americana L. 1758*

A—1434 Zoo Tg. Mureş MS Südamerika Ø ad — XII.1971. N
A—1781 Zoo Tg. Mureş MS Südamerika Ø ad 11.I.1974. N,S
A—1782 Zoo Tg. Mureş MS Südamerika Ø ad — IX.1978. N
S—2171, Zoo Tg. Mureş, Ø, 15.V.1970; S—2172, Zoo Tg. Mureş, Ø, — I. 1972.

### Ordo SPHENISCIFORMES
### Familia SPHENISCIDAE
### Genus **Spheniscus** Brisson, 1760

2. *Spheniscus humboldti Meyen, 1834*

A—1481 Zoo Wien Südamerika Ø ad — — 1973. N

### Ordo GAVIIFORMES
### Familia GAVIIDAE
### Genus **Gavia** I. R. Forster, 1788

3. *Gavia stellata (Pontoppidan), 1763*

A—1 Luieriu MS ♂ ad 5.XI.1954. N
A—2 Văleni de Mureş MS ♀ ad 6.XI.1956. N
S—1900, Papiu Ilarian MS, ♀, 26.X.1980; S—1910, Gheorghe Doja MS, ♀, 12.XI.1980.

4. *Gavia arctica (L), 1758*

A—3 Petelea MS ♂ ad 8.XI.1952. N
A—4 Ideciu de Jos MS ♂ ad 6.I.1953. N
A—5 Reghin MS ♂ ad 4.X.1964. B
A—1175 Petelea MS ♀ ad 1.XI.1964. B,S
A—1176 Reghin MS ♂ ad 8.XI.1964. B,S
A—1328 Gorneşti MS ♀ ad 14.X.1969. N,S
S—325, Gorneşti MS, ♀, 22.X.1964; S—74, Gorneşti MS, ♂, 24.XI.1965; S—313, Gorneşti MS, ♂, 24.XI.1965; S—319, Petelea MS, ♂, 14.XI.1968; S—326, Reghin MS, ♀, 3.XII. 1968; S—394, Cristuru Secuiesc HR, ♀, 4.I.1970; S—595, Gorneşti MS, Ø, 8.X.1971; S—1164, Sîng. de Mureş MS, ♂, 11.IX.1975; S—1208, Periş MS, Ø, —XI.1975; S—1441, Lunca Bradului MS, ♀, 26.X.1976; S—1901, Cîmpul Cetăţii MS, ♀, 29.X.1980.

## Ordo PODICIPEDIFORMES

## Familia PODICIPEDIDAE

## Genus **Podiceps** Latham, 1787

5. *Podiceps ruficollis (Pallas), 1764*

R: Corcodel mic; M: Kisvöcsök; G: Zwergtaucher.

| | | | | |
|---|---|---|---|---|
| A—6 | Reghin MS | ♀ | ad 20.XII.1953. | N |
| A—7 | Reghin MS | ♀ | ad 8.X.1955. | N |
| A—1374 | Reghin MS | ♂ | ad 13.XII.1970. | B,S |
| A—1647 | Reghin MS | ♂ | ad 15.XI.1975. | B,S |
| A—1648 | Reghin MS | ♂ | ad 15.XI.1975. | B,S |
| A—1649 | Reghin MS | ♂ | ad 15.XI.1975. | B,S |

S—400, Reghin MS, ♂, 15.I.1970; S—582, Cristuru Secuiesc HR, ♂, — II.1972; S—778, Reghin MS, ♀, 3.XI.1973; S—1351, Vidrasău MS, ♀, 29.II.1976; S—1862, Sîncraiu de Mureş MS, ♀, 9.I.1979; S—2071, Reghin MS, ♂, 29.I.1982.

6. *Podiceps nigricollis C.L. Brehm, 1831*

R: Corcodel gît negru; M: Feketenyakú vöcsök; G: Schwarzhalstaucher.

| | | | | |
|---|---|---|---|---|
| A—1213 | Petelea MS | ♂ | juv 20.XII.1965. | N |
| A—1262 | Reghin MS | ♂ | juv 28.VI.1966. | B, S |
| A—1667 | Tg. Mureş MS | ♀ | ad 27.IV.1973. | N, S |
| A—1742 | Uila MS | ♂ | juv 4.VIII.1977. | B, S |

S—728, Tg. Mureş MS, ♂, 27.IV.1973; S—1529, Uila MS, ♀, 4.VIII.1973; S—1530, Uila MS, ♂, 4.VIII.1973; S—2117, Cîmpul Cetăţii MS, ♂, 1982.

7. *Podiceps griseigena (Boddaert), 1783*

R: Corcodel gît roşu; M: Vörösnyakú vöcsök; G: Rothalstaucher.

| | | | | |
|---|---|---|---|---|
| A—13 | Fărăgău MS | ♂ | ad 7.VI.1963. | N |
| A—14 | Fărăgău MS | ♀ | ad 29.IV.1964. | N |

S—1611, Reghin MS, ♂, 16.IV.1978; S—1768. Tg. Mureş MS, ♀, 23.IV. 1979; S—1884, Reghin MS, ♀, 25.IX.1980; S—2156, Hodac MS, ♂, 12.VIII.1982; SK—1660, Topliţa HR.

8. *Podiceps cristatus (L.), 1758*

R: Corcodel mare; M: Búbos vöcsök; G: Haubentaucher.

| | | | | |
|---|---|---|---|---|
| A—8 | Reghin MS | ♂ | juv 15.IX.1952. | N |
| A—9 | Mila 23 TL | ♀ | ad 6.IV.1954. | N |
| A—10 | Mila 23 TL | ♂ | ad 6.IV.1954. | N |
| A—11 | Reghin MS | ♂ | ad 14.XI.1960. | N |
| A—12 | Reghin MS | ♂ | ad 2.IV.1962. | N |
| A—26 | Mila 23 TL | ♂ | pul 30.VI.1964. | N |
| A—1366 | Gornești MS | ♂ | ad 20.IX.1970. | B,S |

A—1367 Gornești MS ♀ ad 20.IX.1970. B,S
A—1413 Periș MS ♂ juv 8.VIII.1971 B,S
S—123, Gornești MS, ♂, 5.IV.1966; S—242, Cristuru Secuiesc HR, ♀, 13.I.1968; S—377, Batoș MS, ♂, 14.X.1969; S—614, Delta Dunării TL, Ø, —IV.1972; S—848, Reghin MS, ♂, 13.III.1974; S—1250, Sîncraiu de Mureș MS, ♂, 17.XII.1975; S—1908, Cîmpul Cetății MS, ♂, 12.XI.1980.

Genus **Podilymbus** Lesson, 1831

9. *Podilymbus podiceps L., 1758*

A—1139 Saskatchewan Kanada ♀ ad 1.V.1959. N

Ordo PELECANIFORMES

Familia PELECANIDAE

Genus **Pelecanus** L., 1758

10. *Pelecanus onocrotalus L., 1758*

R: Pelican comun; M: Rózsás gödény; G: Rosapelikan.
A—15 Sarinasuf TL Ø ad — — 1951. N
A—1424 Zoo Tg. Mureș MS Ø juv 20.VII.1971. N,S

Familia PHALACROCORACIDAE

Genus **Phalacrocorax** Brisson, 1760

11. *Phalacrocorax carbo (L.), 1758*

R: Cormoran mare,; M: Kárókatona; G: Kormoran.
A—16 Mila 23 TL Ø ad — — 1954. N
A—17 Mila 23 TL ♂ ad 3.V.1955. N

12. *Phalacrocorax albiventer (Lesson), 1831*

A—1347 Trelew Argentinien Ø ad 16—25.IV.1968. N

13. *Phalacrocorax pygmaeus (Pallas), 1773*

R: Cormoran mic; M: Kis kárókatona; G: Zwergscharbe.
A—18 Mila 23 TL ♀ ad 17.X.1953. N
A—1808 Murighiol TL ♀ ad 8.X.1979 N,S
S—1442, Sînpaul MS, ♂, 7.XI.1976; S—1784, Murighiol TL, ♀, 8.X.1979.

Ordo CICONIIFORMES

Familia ARDEIDAE

Genus **Ardea** L., 1758

14. *Ardea cinerea L., 1758*

R: Stîrc cenușiu; M: Szürke gém; G: Fischreiher.
A—19 Reghin MS ♂ ad 18.V.1953. N
Sk—147, Reghin MS, ♀, 28.V.1966; S—1403, Sîng. de Mureș MS, ♀,

13.IX.1976; S—1761, Cîmpul Cetăţii MS, ♂, 2.IX.1979; S—1786, Cîmpul Cetăţii MS, ♂, 3.IX.1979; S—2022, Band MS, ♀, 10.IX.1981.

15. *Ardea purpurea L., 1766*

R: Stîrc roşu; M: Vörös gém; G: Purpurreiher.

| | | | | |
|---|---|---|---|---|
| A—20 | Petelea MS | ♀ juv | 24.VIII.1952. | N |
| A—21 | Mila 23 TL | Ø ad | 4.V.1955. | N |

S—1532, Ideciu de Jos MS ♀, 30.VIII.1977; S—1764, Ideciu de Jos MS, ♀, 5.IX.1979.

Genus **Butorides** Blyth, 1849

16. *Butorides virescens (L.), 1758*

| | | | | | |
|---|---|---|---|---|---|
| A—1457 | Playa Larga | Kuba | Ø ad | 12—17.XII.1968. | N |

Genus **Ardeola** Boie, 1822

17. *Ardeola ralloides (Scopoli), 1769*

R: Stîrc galben; M: Selyemgém; G: Rallenreiher.

| | | | | |
|---|---|---|---|---|
| A—22 | Solovăstru MS | ♀ ad | 27.V.1953. | N |
| A—23 | Mila 23 TL | ♂ ad | 17.X.1953. | N |
| A—24 | Mila 23 TL | ♂ ad | 4.V.1955. | N |
| A—25 | Mila 23 TL | ♀ ad | 4.V.1955. | N |
| A—1308 | Reghin MS | ♀ ad | 21.IX.1968. | B,S |

S—870, Gorneşti MS, ♀, 3.V.1974; S—1561, Ţigmandru MS, ♂, 29.IX. 1977; S—1881, Deda MS, ♂, 9.V.1980.

Genus **Egretta** T. Forster, 1817

18. *Egretta alba (L.), 1758*

R: Egretă mare; M: Nagykócsag; G: Silberreiher.

| | | | | |
|---|---|---|---|---|
| A—27 | Mila 23 TL | ♀ ad | 12.IV.1954. | N |

19. *Egretta garzetta (L.), 1766*

R: Egretă mică; M: Kis kócsag; G: Seidenreiher.

| | | | | |
|---|---|---|---|---|
| A—28 | Delta Dunării TL | Ø ad | — — 1952. | N |
| A—29 | Delta Dunării TL | Ø ad | — — 1952. | N |
| A—30 | Mila 23 TL | ♀ ad | 3.V.1955. | N |

Genus **Nycticorax** T. Forster, 1817

20, *Nycticorax nycticorax (L.), 1758*

R: Stîrc de noapte; M: Bakcsó; G: Nachtreiher.

| | | | | |
|---|---|---|---|---|
| A—31 | Gorgova TL | ♂ ad | 5.IV.1954. | N |
| A—32 | Gorgova TL | ♀ ad | 5.IV.1954. | N |
| A—33 | Focşani VN | Ø juv | — — 1955. | N |

S—266, Cristuru Secuiesc HR, ♀, 8.IV.1968; S—867, Gurghiu MS, ♀, 21.IV.1974.

## Genus **Ixobrychus** Billberg, 1828

21. *Ixobrychus minutus (L.), 1766*

R: Stîrc pitic; M: Törpegém; G: Zwergdommel.

A—34 Hodoşa HR ♀ ad 12.V.1954. N
A—35 Coteşti VN ♂ ad 23.V.1957. N
A—36 Coteşti VN ♀ ad 23.V.1957. N
A—1705 Batoş MS ♂ juv 25.IX.1976. B,S
Sk—1659, Reghin MS, ♀, 12.XI.1965; S—288, Reghin MS, ♂, 25. VII. 1968; S—535, Ibăneşti MS, ♂, 5.V.1971; S—631, Topliţa HR, ♂, 23.IV. 1972; S—727, Tg. Mureş MS, ♂, 6.V.1973; S—1357, Gurghiu MS, ♂, 2.V.1976; S—1418, Tg. Mureş MS, ♂, 1.X.1976; S—2145, Reghin MS, ♂, 23.VI.1982.

## Genus **Botaurus** Stephens, 1819

22. *Botaurus stellaris (L.), 1758*

R: Buhai de baltă; M: Bölömbika; G: Rohrdommel.

A—37 Şăulia MS ♀ ad 16.X.1951. N
S—2051, Răstoliţa MS, ♂, 1.II.1982.

## Familia CICONIIDAE

## Genus **Ciconia** Brisson, 1760

23. *Ciconia ciconia (L.), 1758*

R: Barză albă; M: Fehér gólya; G: Weißstorch.

A—38 Reghin MS ♂ ad 23.IX.1955. N
A—39 Morăreni MS ♀ ad 10.II.1964. B
S—1188, Reghin MS, Ø, 11.VIII.1948; S—278, Cristuru Secuiesc HR, ♂, 2.VI.1968; S—615, Cristuru Secuiesc HR, ♂, 20.V.1972; S—1130, Sovata MS, ♂, 11.IV.1975; Brîncoveneşti MS, ♀, 6.VII. 1975; S—1514, Dedrad MS, ♀, 14.IV. 1977; S—1792, Chichiş CV, ♀, 29.VI. 1979; S—1834, Comlod BN, ♀, 18.IV.1980; S—2013, Pietriş MS, ♂, 10.VIII. 1981; S—2014, Pietriş MS, ♀, 10.VIII.1981.

24. *Ciconia nigra (L.), 1758*

R: Barză neagră; M: Fekete gólya; G: Schwarzstorch.

A—1593 Vărşag HR ♂ juv 26.VI.1974. N,S
S—1782, Tuşnad HR, ♂, 1.IX.1979.

## Familia THRESKIORNITHIDAE

## Genus **Threskiornis** Gray, 1842

25. *Threskiornis aethiopica (Latham), 1790*

A—1564 Zoo Wien Indien Ø — — 1974. N

Genus **Plegadis** Kaup, 1829

26. *Plegadis falcinellus (L.), 1766*

R : Ţigănuş ; M : Batla ; G : Sichler.

A—40 Mila 23 TL ♂ ad 12.IV.1954. N
A—41 Mila 23 TL ♀ ad 12.IV.1954. N
S—1060, Reghin MS, ♂, 16.III.1975.

27. *Plegadis chihi (Vieillot), 1817*

A—1783 Argentinien Ø ad — — 1972. N

Genus **Platalea** L., 1758

28. *Platalea leucorodia L., 1758*

R : Lopătar ; M : Kanalasgém ; G : Löffler.

A—42 Tulcea TL Ø ad — — 1949. N

Ordo PHOENICOPTERIFORMES

Familia PHOENICOPTERIDAE

Genus **Phoenicopterus** L., 1758

29. *Phoenicopterus ruber L., 1758*

A—1542 Zoo Wien Südamerika Ø — — 1974. N

30. *Phoenicopterus chilensis Molina, 1782*

A—1886 Zoo Wien Südamerika Ø ad — — 1979. N
A—1887 Zoo Wien Südamerika Ø ad — — 1979. N

Ordo ANSERIFORMES

Familia ANATIDAE

Subfam. **Anserinae**

Genus **Cygnus** Bechstein, 1803

31. *Cygnus cygnus (L.), 1758*

R : Lebedă de iarnă ; M : Énekes hattyú ; G : Singschwan.

A—43 Reghin MS ♂ ad 13.I.1962 N

32. *Cygnus olor (Gmelin), 1789*

R : Lebedă cucuiată ; M : Bütykös hattyú ; G : Höckerschwan.

A—1484 Zoo Tg. Mureş MS Ø ad — — 1972. N
A—1861 Zoo Tg. Mureş MS ♂ ad 14.I.1980. N
S—355, Bistriţa BN, ♂, 14.III. 1969 ; S—419, Bistriţa BN, ♂, 4.III. 1970.

Genus **Anser** Brisson, 1760

33. *Anser anser (L.), 1758*

R: Gîsca de vară; M: Nyári lúd; G: Graugans.

A—45 Delta Dunării TL Ø ad — — 1952. N

34. *Anser albifrons (Scopoli), 1769*

R: Gîrliţa mare; M: Nagylilik; G: Bläßgans.

A—46 Reghin MS Ø ad 8.X.1951. N
A—47 Reghin MS Ø juv 9.X.1951. N
A—48 Gorneşti MS ♀ ad 22.X.1964. B

35. *Anser fabalis (Latham), 1787*

R: Gîscă de sămănătură; M: Vetési lúd; G: Saatgans.

A—1663 Petelea MS ♂ juv 8.X.1975. N,S
S—1203, Văleni de Mureş MS, ♀, 11.X.1975.
Sk—1873, Reghin MS, ♀, 12.IX.1980.

Genus **Branta** Scopoli, 1769

36. *Branta ruficollis (Pallas), 1769*

R: Gîsca gîtroşu; M: Vörösnyakú lúd; G: Rothalsgans.

A—1565 Sîng. de Mureş MS Ø ad 5.III.1973. N
S—693, Sîng. de Mureş MS, ♂, 5.III. 1973.

Genus **Chloëphaga** Eyton, 1838

37. *Chloëphaga picta (Philippi & Landbeck), 1868*

A—1348 Chubut Argentinien ♂ ad — — 1968. N

38. *Chloëphaga poliocephala Sclater, 1857*

A—1349 Chubut Argentinien ♀ ad — — 1968. N

Genus **Dendrocygna** Swainson, 1837

39. *Dendrocygna viduata (L.), 1766*

A—1532 Zoo Wien Südamerika, Afrika Ø ad — — — N

40. *Dendrocygna bicolor (Vieillot), 1816*

A—1563 Zoo Wien Südamerika Ø ad — — 1974. N

Subfam. **Anatinae**
Genus **Anas** L., 1758

41. *Anas platyrhynchos L., 1758*

R: Raţă mare; M: Tőkés réce; G: Stockente.

A—50 Uila MS ♀ ad 22. I. 1974. N,S
A—49 Reghin MS ♂ ad 19.II.1974. N,S

S—583, Cristuru Secuiesc HR, ♂, 10.II.1972; S—692, Teaca BN, ♂, 25.II.1973; S—710, Gurghiu MS, ♀, 8.IV.1973; S—846, Uila MS. ♂, 22.I.1974; S—1172, Reghin MS, ♀, 14.IX.1975; S—1200, Reghin MS, ♂, 15.X.1975; S—1286, Reghin MS, ♂, 18.II.1976; S—1329, Reghin MS, ♀, 5.III.1976; S—1477, Răstolița MS, ♂, 1.III. 1977; S—1478, Ideciu de Jos MS, ♂, 18.III. 1977; S—1538, Miercurea Nirajului MS, ♂, 15.X. 1977; S—1608, Morăreni MS, ♂, 8.I.1978; S—1664., Ideciu de Sus MS, ♂, 22.X.1978; S—1846, Văleni de Mureș MS, ♂, 6.II. 1980; S—1936, Reghin MS, ♂, 30.XI.1980; S—1939, Teaca BN, ♀, 10.XII. 1980; S—1937, Reghin MS, ♂, 24.I.1981; S—1963, Reghin MS, ♂, 8.II. 1981; S—1974, Reghin MS, ♀, 8.II.1981; S—1954, Reghin MS, ♂, 16.II. 1981; S—1998. Ideciu de Jos MS, ♂, 10.VII. 1981; S—2126, Breaza MS, ♂, 24.III.1982; S—2154, Reghin MS, ♀, 9.VIII. 1982; S—2157, Reghin MS, ♀, 13.IX.1982.

42. *Anas querquedula L., 1758*

R: Rață cîrîitoare; M: Böjti réce; G: Knäkente.

| | | | | |
|---|---|---|---|---|
| A—51 | Reghin MS | ♂ ad | 13.III.1950. | N |
| A—52 | Sabeetate HR | ♂ ad | 2.IV.1954. | N |
| A—53 | Reghin MS | ♀ ad | 20.III.1954. | N |

S—86, Reghin MS, ♂, 21.III. 1957; S—117, Voivodeni MS, ♂, 12.III. 1966; S—199, Cristuru Secuiesc HR, ♂ — III.1967; S—258, Cristuru Secuiesc HR, ♂, 18.III.1968; S—589, Periș MS, ♂, 13.III.1972; S—704, Reghin MS, ♂, 18.III.1973; S—853, Reghin MS, ♂, 17.III.1974; S—851, Reghin MS, ♂, 23.III.1974; S—852, Gurghiu MS, ♀, 24.III. 1974; S—869, Gurghiu MS, ♂, 21.IV.1974; S—926, Reghin MS, ♂, 21.VIII. 1974; S—1333, Suseni MS, ♂, 16.III.1976; S—1495, Ideciu de Jos MS, ♂, 13.IV.1977; S—1609, Sînpaul MS, ♀, 12.III.1978; S—1875, Suseni HR, ♂, 25.III. 1980; S—2122, Reghin MS, ♀, — IV.1982.

43. *Anas crecca L., 1758*

R: Rață mică; M: Csörgő réce; G: Krickente.

| | | | | |
|---|---|---|---|---|
| A—55 | Breaza MS | ♀ ad | 2.X.1951. | N |
| A—54 | Reghin MS | ♂ ad | 16.II.1957. | N |
| A—1586 | Rindunica TL | ♂ ad | 17.I.1972. | B,S |

S—347, Dedrad MS, ♂, 14.III.1969; S—703, Reghin MS, ♂, 18.III. 1973; S—854, Ideciu de Jos MS, ♂, 24.III.1974; S—855, Reghin MS, ♂, 23.III.1974; S—927, Reghin MS, ♂, 10.IX.1974; S—1330, Reghin MS, ♀, 8.IV.1976; S—1993, Reghin MS, ♀, 20.III.1981.

44. *Anas acuta L., 1758*

R: Rață sulițar; M: Nyílfarkú réce; G: Spießente.

| | | | | |
|---|---|---|---|---|
| A—1594 | Miercurea Ciuc HR | ♂ ad | 10.II.1974. | N |

45. *Anas penelope L., 1758*

R: Rață fluierătoare; M: Fütyülő réce; G: Pfeifente.

| | | | | |
|---|---|---|---|---|
| A—1501 | Reghin MS | ♂ ad | 28.IX.1973. | N,S |

46. *Anas clypeata L., 1758*

R: Raţă lingurar; M: Kanalas réce; G: Löffelente.

| | | | | |
|---|---|---|---|---|
| A—56 | Delta Dunării TL | ♂ ad | — — 1952. | N |
| A—1327 | Reghin MS | ♂ ad | 20.III.1967. | N |

Genus **Aix** Boie, 1828

47. *Aix galericulata (L.), 1758*

R: Raţă mandarin; M: Mandarinréce; G: Mandarinenente.

| | | | | |
|---|---|---|---|---|
| A—1535 | Südost—Asien | ♂ ad | — — — | N |

Genus **Netta** Kaup, 1829

48. *Netta rufina (Pallas), 1773*

R: Raţă cu ciuf; M: Üstökös réce; G: Kolbenente.

| | | | | |
|---|---|---|---|---|
| A—57 | Mila 23 TL | ♂ ad | 10.IV.1953. | N |
| A—58 | L. Razelm TL | ♀ ad | 5.V.1954. | N |
| A—1751 | Tulcea TL | ♂ ad | 1.IV.1977. | N,S |

Genus **Aythya** Boie, 1822

49. *Aythya ferina (L.), 1758*

R: Raţă capcast aniu; M: Barátréce; G: Tafelente.

| | | | | |
|---|---|---|---|---|
| A—59 | Jîrlău BR | ♂ ad | — III.1954. | N |
| A—1776. | Reghin MS | ♂ ad | 12.III.1978. | N,S |

50. *Aythya collaris (Donovan), 1809*

| | | | | |
|---|---|---|---|---|
| A—1140 | Mich. Livingston U.S.A. | ♂ ad | 3.IV.1959. | N |

51. *Aythya fuligula (L.), 1758*

R: Raţă moţată; M: Kontyos réce; G: Reiherente.

| | | | | |
|---|---|---|---|---|
| A—60 | Mila 23 TL | ♂ ad | 9.IV.1954. | N |
| A—61 | Mila 23 TL | ♀ ad | 9.IV.1954. | N |

S—1903, Cîmpul Cetăţii MS, ♂, 12.XI.1980.

52. *Aythya nyroca (Güldenstaedt), 1770*

R: Raţă roşie; M: Cigányréce; G: Moorente.

| | | | | |
|---|---|---|---|---|
| A—63 | Mila 23 TL | ♀ ad | 1.V.1955. | N |
| A—64 | Fărăgău MS | ♀ ad | 7.VI.1963. | N |
| A—62 | Reghin MS | ♂ ad | 12.VII.1972. | N,S |

S—597, Fărăgău MS, ♂, 23.III.1972; S—1331, Cristuru Secuiesc HR, ♀, 21.III.1976; S—1332, Cristuru Secuiesc HR, ♀, 21.III.1976; S—1880, Suseni HR, ♂, 26.III.1980.

Genus **Melanitta** Boie, 1822

53. *Melanitta nigra (L.), 1758*

R: Raţă neagră; M: Fekete réce; G: Trauerente.
A—1218 Gorneşti MS ♂ ad 12.X.1965. N,S

Genus **Bucephala** Baird, 1858

54. *Bucephala clangula (L.), 1758*

R: Raţă sunătoare; M: Kerceréce; G: Schellente.
S—1169 Reghin MS ♂ 8.II.1954.

Genus **Mergus** L., 1758

55. *Mergus albellus L., 1758*

R: Ferestraş mic; M: Kisbukó; G: Zwergsäger.
A—65 Reghin MS ♂ ad 17.II.1950. N

56. *Mergus serrator L., 1758*

R: Ferestraş moţat; M: Örvös bukó; G: Mittelsäger.
A—1500 Periş MS Ø ad 20.X.1972. N
A—1871 Ideciu de Jos MS ♀ ad 21.X.1980. N,S
A—1872 Cîmpul Cetăţii MS ♂ ad 12.XI.1980. N,S
S—1886, Ideciu de Jos MS, ♀, 21.X.1980.

57. *Mergus merganser L., 1758*

R: Ferestraş mare; M: Nagybukó; G: Gänsesäger.
A—66 Reghin MS ♂ ad 12.II.1954. N,S
A—67 Reghin MS ♀ ad 13.II.1954. N

Genus **Oxyura** Bonaparte, 1828

58. *Oxyura jamaicensis (Gmelin), 1789*

A—1141 Mich. Menroe Cey U.S.A. ♀ ad 1.II.1960. N

Ordo FALCONIFORMES

Familia ACCIPITRIDAE

Subfam. **Aegypiinae**

Genus **Gyps** Savigny, 1809

59. *Gyps fulvus (Habl.), 1783*

R: Vultur sur; M: Fakókeselyű; G: Gansegeier.
S—1386 Cristeşti MS ♂ juv 16.VIII.1976.

Subfam. **Circinae**

Genus **Circus** Lacépède, 1799

60. *Circus cyaneus (L.), 1766*

R: Herete vînăt; M: Kékes rétihéja; G: Kornweihe.

| | | | | |
|---|---|---|---|---|
| A—169 | Goreni MS | ♂ ad | 24.I.1956. | N |
| A—1604 | Dedrad MS | ♀ ad | 23.XII.1974. | N,S |
| A—1693 | Reghin MS | ♀ ad | 5.IV.1976. | N,S |

61. *Circus macrourus (S. G. Gmelin), 1770*

R: Herete alb; M: Fakó rétihéja; G: Steppenweihe.

| | | | | |
|---|---|---|---|---|
| A—170 | Reghin (?) MS | Ø | — — — | N |

62. *Circus pygargus (L.), 1758*

R: Herete sur; M: Hamvas rétihéja; G: Wiesenweihe.

| | | | | |
|---|---|---|---|---|
| A—1884 | Fărăgău MS | ♂ ad | 8.IX.1980. | N,S |

63. *Circus aeruginosus (L.), 1758*

R: Herete de stuf; M: Barna rétihéja; G: Rohrweihe.

| | | | | |
|---|---|---|---|---|
| A—171 | Mila 23 TL | ♀ ad | 17.X.1953. | N |

Subfam. **Circaetinae**

Genus **Circaëtus** Vieillot, 1816

64. *Circaëtus gallicus (Gmelin), 1788*

R: Şerpar; M: Kigyászölyv; G: Schlangenadler.

| | | | | |
|---|---|---|---|---|
| A—172 | Teaca BN | ♂ ad | 31.V.1950. | N |

Genus **Terathopius** Lesson, 1830

65. *Terathopius ecaudatus (Daudin), 1800*

| | | | | | | |
|---|---|---|---|---|---|---|
| A—1528 | Zoo Wien | Afrika | Ø ad | — | — 1974. | N |

Subfam. **Accipitrinae**

Genus **Accipiter** Brisson, 1760

66. *Accipiter gentilis (L.), 1758* [2, 11]

R: Uliu porumbar; M: Héja; G: Habicht.

a) Accipiter gentilis gallinarum (Brehm), 1827

| | | | | |
|---|---|---|---|---|
| A—75 | Reghin MS | ♀ ad | — — — | N |
| A—76 | Reghin MS | ♂ juv | — — — | N |
| A—77 | Reghin MS | ♂ ad | 15.I.1950. | N |
| A—78 | Reghin MS | ♀ ad | 28.II.1954. | N |
| A—79 | Reghin MS | ♂ ad | 28.II.1954. | N |
| A—81 | Sölövăstru MS | ♂ juv | 14.V.1954. | B |

| | | | | | |
|---|---|---|---|---|---|
| **A—80** | Reghin MS | ♀ | juv | 22.I.1955. | N |
| **A—82** | Petrilaca MS | ♀ | ad | 20.IX.1955. | B |
| **A—83** | Reghin MS | ♂ | juv | 20.X.1955. | B |
| **A—84** | Reghin MS | ♀ | juv | 20.X.1955. | B |
| **A—85** | Petrilaca MS | ♂ | juv | 12.II.1956. | B |
| **A—86** | Cristuru Secuiesc HR | ♂ | juv | 13.XII.1957. | B |
| A—87 | Beica de Jos MS | ♀ | juv | 14.XI.1958. | B |
| A—88 | Reghin MS | ♀ | juv | 7.VII.1961. | B,S |
| A—89 | Reghin MS | ♀ | ad | 24.XI.1961. | B,S |
| A—90 | Reghin MS | ♂ | juv | 3.X.1962. | B,S |
| A—91 | Tg. Mureș MS | ♂ | juv | 24.XI.1962. | B,S |
| A—92 | Tg. Mureș MS | ♀ | juv | 12.XII.1962. | B,S |
| A—93 | Reghin MS | ♂ | ad | 5.I.1963. | B,S |
| A—94 | Tg. Mureș MS | ♂ | juv | 11.I.1963. | B,S |
| A—95 | Simbriaș MS | ♀ | ad | 5.III.1963. | B,S |
| A—109 | Tg. Mureș MS | ♂ | juv | 15.III.1963. | B,S |
| A—96 | Ibănești MS | ♂ | juv | 20.III.1963. | B,S |
| A—97 | Tg. Mureș MS | ♀ | ad | 17.IV.1963. | B,S |
| A—98 | Tg. Mureș MS | ♀ | juv | 25.V.1963. | B,S |
| A—99 | Tg. Mureș MS | ♀ | juv | 21.VIII.1963. | B,S |
| A—100 | Tg. Mureș MS | ♂ | ad | 22.IX.1963. | B,S |
| A—101 | Tg. Mureș MS | ♂ | juv | 22.XI.1963. | B,S |
| A—102 | Tg. Mureș MS | ♀ | juv | 23.XI.1963. | B,S |
| A—103 | Aluniș MS | ♀ | juv | 2.XII.1963. | B,S |
| A—104 | Voivodeni MS | ♀ | ad | 4.II.1964. | B,S |
| A—105 | Răstolița MS | ♀ | ad | 10.II.1964. | B,S |
| A—106 | Reghin MS | ♀ | ad | 24.II.1964. | B,S |
| A—107 | Reghin MS | ♂ | ad | 2.III.1964. | B,S |
| A—108 | Simbriaș MS | ♂ | ad | 4.III.1964. | B,S |
| A—110 | Glăjărie MS | ♀ | ad | 21.III.1964. | B,S |
| A—1190 | Reghin MS | ♂ | ad | 1.II.1965. | B,S |
| A—1189 | Goreni MS | ♂ | ad | 28.II.1965. | B,S |
| A—1211 | Reghin MS | ♂ | juv | 22.VII.1965. | B,S |
| A—1230 | Lăpușna MS | ♀ | ad | 28.VIII.1965. | B,S |
| A—1263 | Cozma MS | ♂ | juv | 4.VI.1966. | B,S |
| A—1264 | Cozma MS | ♂ | juv | 4.VI.1966. | B,S |
| A—1288 | Reghin MS | ♂ | ad | 22.III.1968. | B,S |
| A—1380 | Rîpa de Jos MS | ♂ | ad | 12.XII.1970. | B,S |
| A—1402 | Văleni de Mureș MS | ♂ | juv | 24.IV.1971. | B,S |
| A—1468 | Maiorești MS | ♂ | ad | 21.IX.1972. | B,S |
| A—1477 | Bistra Mureșului MS | ♀ | ad | 11.III.1973. | B,S |
| A—1519 | Petrilaca MS | ♂ | juv | 13.II.1974. | B,S |
| A—1520 | Reghin MS | ♂ | ad | 14.II.1974. | B,S |
| A—1551 | Gheorgheni HR | ♀ | ad | 5.V.1974. | B,S |
| A—1620 | Uila MS | ♂ | ad | 14.III.1975. | B,S |
| A—1621 | Răstolița MS | ♂ | juv | 15.III.1975. | B,S |
| A—1640 | Toplița HR | ♀ | ad | 3.V.1975. | B,S |
| A—1668 | Filea MS | ♀ | juv | 28.I.1976. | B,S |

| | | | | |
|---|---|---|---|---|
| A—1714 | Ibăneşti MS | ♀ ad | 18.VII.1976. | B,S |
| A—1717 | Răstoliţa MS | ♂ ad | 1.XII.1976. | B,S |
| A—1772 | Lunca MS | ♀ juv | 27.VIII.1978. | B,S |
| A—1824 | Lunca MS | ♂ juv | 14.XI.1979. | B,S |
| A—1853 | Ibăneşti MS | ♂ juv | 13.I.1980. | B,S |
| A—1870 | Sf. Gheorghe CV | ♀ juv | 6.XI.1980. | B,S |
| A—1897 | Reghin MS | ♂ juv | 2.IX.1981. | B,S |
| A—1921 | Reghin MS | ♂ juv | 18.III.1982. | B,S |
| A—1926 | Reghin MS | ♀ juv | 30.VI.1982. | B,S |

S—25, Iara de Mureş MS, ♀, 3.XII.1963; S—46, Bistriţa BN, ♂, 17.XII. 1957; S—48, Reghin MS, ♂, 25.III.1958; S—55, Gurghiu MS, ♀, 7.III. 1962; S—56, Săcal de Pădure MS, ♀, 23.XII.1964; S—111, Reghin MS, ♀, 12.IX.1965; S—239, Ibăneşti MS, ♂, 26.XII.1967; S—284, Reghin MS, ♀, 19.V.1968; S—559, Onuca MS, ♀, 28.IX.1971; S—560, Sovata MS, ♂, 10.XI.1971; S—590, Monor BN, ♀, 12.III.1972; S—1105, Vălureni MS, ♂, 15.IV.1975; S—1143, Şilea Nirajului MS, ♂, 20.VII.1975; S—1144, Reghin MS, ♀, 22.VII.1975; S—1162, Brîncoveneşti MS, ♀, 3.IX.1975; S—1163, Urisiu de Jos MS, ♀, 11.IX.1975; S—1224, Reghin MS, ♀, 8.XII. 1975; S—1341, Bistriţa BN, ♂, 14.IV.1976; S—1466, Brîncoveneşti MS, ♀, 18.I.1977; S—1527, Monor BN, ♀, 25.VIII.1977; S—1536, Miercurea Nirajului MS, ♂, 20.X.1977; S—1562, Răstoliţa MS, ♀, 26.X.1977; S—1649, Tg. Mureş MS, ♀, 9.VII.1978; S—1651, Livezeni MS, ♀, 2.X.1978; S—1652, Miercurea Nirajului MS, ♀, 1.X.1978; S—1675, Reghin MS, ♀, 11.XI.1978; S—1701, Corund HR, ♀, 18.XII.1978; S—1702, Hărţău MS, ♂, 15.XII.1978; S—1706, Săcăreni MS, ♀, 17.XII.1978; S—1707, Cîmpul Cetăţii MS, ♂, 28.XII.1978; S—1743, Veţa MS, ♂, 10.IV.1979; S—1744, Sîntandrei MS, ♀, 17.IV.1979; S—1745, Reci CV, ♂, 1.V.1978; S—1780, Păingeni MS, ♂, 20.X.1979; S—1821, Reghin MS, ♀, 9.II.1980; S—1828, Filipişu Mic MS, ♂, 30.III.1980; S—1874, Lunca Bradului MS, ♀, 29.VII.1980; S—1888, Reci CV, Ø, 13.X.1980; S—1920, Tg. Mureş MS, ♀, 22.XII.1980; S—1967, Sîng. de Mureş MS, ♂, 16.I.1981; S—1968, Corunca MS, ♀, 24.II.1981; S—2125, Luieriu MS, ♂, 30.VI.1982; S—2131, Luieriu MS, ♀, 30.VI.1982; S—2132, Luieriu MS, ♂, 30.VI.1982; S—2133, Idicel de Pădure MS, ♀, 10.VII.1982; S—2134, Idicel de Pădure MS, ♀, 15.VII.1982; S—2149, Idicel de Pădure MS, ♀, 25.VII.1982.

67. *Accipiter brevipes (Sewertzow), 1850*

R: Uliu scund; M: Kishéja; G: Kurzfangsperber.

| | | | | |
|---|---|---|---|---|
| A—111 | Risipiţi VN | Ø juv | — VII. 1953. | N |
| A—1470 | Reghin MS | ♀ juv | 25.VIII.1972. | N,S |

68. *Accipiter nisus (L.), 1758*

R: Uliu păsărar; M: Karvaly; G: Sperber.

| | | | | |
|---|---|---|---|---|
| A—112 | Reghin(?) MS | Ø ad | — — — | N |
| A—113 | Reghin MS | ♂ ad | 10.II.1954. | N |
| A—114 | Reghin MS | ♀ ad | 17.II.1954. | N |
| A—115 | Reghin MS | ♂ juv | 24.I.1956. | N |
| A—116 | Reghin MS | ♂ ad | 12.I.1959. | N |

| | | | | |
|---|---|---|---|---|
| A—117 | Reghin MS | ♀ ad | 23.I.1959. | N |
| A—118 | Hodoşa HR | ♂ ad | 13.III.1955. | B |
| A—119 | Hodoşa HR | ♂ ad | 13.III.1955. | B |
| A—120 | Reghin MS | ♀ ad | 15.IX.1961. | B |
| A—121 | Reghin MS | ♀ ad | 18.XI.1962. | B |
| A—122 | Reghin MS | ♂ ad | 4.XII.1963. | B |
| A—1181 | Reghin MS | ♀ ad | 15.XII.1964. | B |
| A—1199 | Reghin MS | ♀ ad | 11.III.1965. | B |
| A—1200 | Reghin MS | ♂ ad | 29.III.1965. | B,S |
| A—1339 | Gornești MS | ♂ ad | 22.II.1970. | B,S |
| A—1617 | Goreni MS | ♀ ad | 25.II.1975. | B,S |
| A—1658 | Lunca Bradului MS | ♂ ad | 8.XI.1975. | B,S |
| A—1682 | Beica de Jos MS | ♀ ad | 17.III.1976. | B,S |
| A—1687 | Reghin MS | ♂ juv | 10.IV.1976. | B,S |
| A—1694 | Răstoliţa MS | ♀ ad | 10.V.1976. | B |
| A—1715 | Răstoliţa MS | ♀ ad | 22.VIII. 1976. | B,S |
| A—1715 | Răstoliţa MS | ♀ ad | 22.VIII.1976. | B,S |
| A—1729 | Brîncovenești MS | ♀ ad | 18.II.1977. | B,S |
| A—1730 | Tonciu MS | ♀ ad | 27.II.1977. | B,S |
| A—1731 | Reghin MS | ♀ ad | 25.III.1977. | B,S |
| A—1762 | Ideciu de Jos MS | ♂ ad | 15.IV.1978. | B,S |
| A—1816 | Lunca Bradului MS | ♂ ad | 22.VII.1979. | B,S |
| A—1851 | Reghin MS | ♂ ad | 4.I.1980. | B,S |
| A—1852 | Lunca Bradului MS | ♂ ad | 1.III.1980. | B,S |
| A—1880 | Ibănești MS | ♂ juv | 6.III.1981. | B,S |
| A—1908 | Reghin MS | ♂ ad | 20.I.1982. | B,S |
| A—1923 | Bistra Mureşului MS | ♂ ad | 25.V.1982. | B,S |

S—1166, Sîmbriaş MS, ♂, 14.XI.1957; S—157, Reghin MS, ♀, 23.III.1966; S—188, Reghin MS, ♂, 2.II.1967; S—320, Bîla MS, ♀, 15.XI.1968; S—390 Maioreşti MS, ♂, 30.XII.1969; S—561, Cristuru Secuiesc HR, ♀, 14.XI. 1971; S—584; Reghin MS, ♂, 31.I.1972; S—663, Solovăstru MS, ♀, 28.X.1972; S—669, Solovăstru MS, ♀, 13.XI.1972; S—792, Reghin MS, ♀, 6.XI.1973; S—813, Poarta MS, ♀, 15.I.1974; S—814, Reghin MS, ♀. 8.I.1974; S—830, Reghin MS, ♂, 5.II.1974; S—859, Reghin MS, ♀, 14.II.1974; S—950, Reghin MS, ♂, 16.X.1974; S—1081, Victoria BV, ♀, 23.II.1975; S—1084, Petelea MS, ♀, 1.III.1975; S—1262, Miercurea Nirajului MS, ♀, 28.XI.1975; S—1260, Sîng. de Mureş MS, ♀, 21.XII.1975; S—1259, Reghin MS, ♀, 2.II.1976; S—1270, Toaca MS, ♂, 27.II.1976; S—1408, Sîng. de Pădure MS, ♀, 24.IX.1976; S—1450, Reghin MS, ♂, 10.XI.1976; S—1517, Goreni MS, ♀, 16.II.1977; S—1539, Sîng. de Mureş MS, ♀, 1.IX.1977; S—1557, Bazna SB, ♀, 9.IX.1977; S—1558, Reghin MS, ♀, 4.XI.1977; S—1567, Lunca MS, ♂, 12.XI.1977; S—1566, Reghin MS, ♀, 21.XI.1977; S—1600, Reghin MS, ♂, 20.XII.1977; S—1601, Reghin MS, ♀, 20.XII.1977; S—1602, Reghin MS, ♂, 5.I.1978; S—1603, Reghin MS, ♂, 9.I.1978; S—1604, Brîncovenești MS, ♂, 17.I.1978; S—1605, Tg. Mureş MS, ♂, 10.III.1978; S—1606, Ghindari MS, ♀, 5.III.1978; S—1665, Uila MS, ♀, 5.X.1978; S—1685, Reghin MS, ♀, 5.XI.1978;

S—1686, Reghin MS, ♂, 17.XI.1978; S—1687, Reghin MS, ♂, 22.XI.1978; S—1739, Ghindari MS, ♀, 19.XII.1978; S—1741, Sîng. de Mureş MS, ♀, 2.I.1979; S—1740, Ungheni MS, ♂, 27.I.1979; S—1742, Cotuş MS, ♂, 28.I.1979; S—1777, Deda MS, ♂, 3.X.1979; S—1805, Beica de Jos MS, ♂, 18.XI.1979; S—1806, Cotuş MS, ♀, 4.XII.1979; S—1832, Reghin MS, ♀, 5.III.1980; S—1833, Sîng. de Mureş MS, ♀, 7.III.1980; S—1871, Reghin MS, ♀, 9.IV.1980; S—1947, Reghin MS, ♀, 10.XII.1980; S—1990, Reghin MS, ♀, 4.I.1981; S—1979, Band MS, ♂, 20.I.1981; S—2045, Sîng. de Mureş MS, ♂, 13.XI.1981; S—2069, Sîng. de Mureş MS, ♀, 31.XII.1981; S—2078, Tofalău MS, ♀, 10.II.1982; S—2095, Cristeşti MS, ♀, 12.II.1982; S—2094, Ernei MS, ♀, 18.II.1982; S—2096, Băiţa MS, ♂, 11.III.1982; S—2140, Sîng, de Mureş MS, ♂, 24.III.1982; Sk—912, ——— 1973.

Genus **Buteo** Lacépède, 1799

69. *Buteo jamaicensis (Gmelin), 1788*

Sk—2158 Mich. Monroe U.S.A. ♀ 22.II.1973.

70. *Buteo buteo (L.), 1758*

R: Şorecar comun; M: Egerészölyv; G: Mäusebussard.

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|---|---|---|---|---|
| A—124 | Reghin MS | ♀ ad | 21.XI.1952. | N |
| A—125 | Reghin MS | ♂ ad | 31.III.1954. | N |
| A—126 | Petelca MS | ♂ ad | 20.II.1956. | N |
| A—127 | Reghin MS | ♂ ad | 12.I.1956. | B |
| A—128 | Idicel MS | ♀ ad | 28.I.1956. | B |
| A—129 | Reghin MS | ♀ ad | 5.II.1956. | B |
| A—130 | Tg. Mureş MS | ♀ ad | 7.II.1956. | B |
| A—131 | Reghin MS | ♂ ad | 12.II.1956. | B |
| A—132 | Reghin MS | ♂ ad | 19.II.1956. | B |
| A—133 | Reghin MS | ♂ ad | 19.II.1956. | B |
| A—134 | Petelca MS | ♂ ad | 20.II.1956. | B |
| A—135 | Reghin MS | ♂ ad | 20.II.1956. | B |
| A—136 | Reghin MS | ♂ ad | 22.II.1956. | B |
| A—137 | Petelca MS | ♂ ad | 25.II.1956. | B |
| A—138 | Petelca MS | ♂ ad | 26.II.1956. | B |
| A—139 | Petelca MS | ♂ ad | 27.II.1956. | B |
| A—140 | Reghin MS | ♀ ad | 12.III.1956. | B |
| A—143 | Reghin MS | ♀ ad | 22.VI.1956. | B |
| A—141 | Reghin MS | ♂ ad | 2.VI.1957. | B |
| A—142 | Reghin MS | ♀ ad | 2.VI.1957. | B |
| A—144 | Reghin MS | ♀ ad | 26.VII.1957. | B |
| A—145 | Reghin MS | ♂ ad | 23.I.1959. | B |
| A—146 | Reghin MS | ♂ ad | 12.VII.1960. | B |
| A—147 | Reghin MS | ♀ ad | 30.IX.1960. | B |
| A—148 | Şerbeni MS | ♀ ad | 8.VII.1962. | B |
| A—149 | Reghin MS | ♀ ad | 16.VII.1962. | B |
| A—150 | Tg. Mureş MS | ♂ ad | 11.VIII.1962. | B |
| A—151 | Reghin MS | ♂ ad | 2.III.1964. | B |
| A—1187 | Reghin MS | ♂ ad | 20.XII.1964. | B |
| A—1188 | Petelea MS | ♀ ad | 22.III.1965. | B,S |

| | | | | |
|---|---|---|---|---|
| A—1309 | Gorneşti MS | ♀ ad | 29.XI.1967. | B,S |
| A—1289 | Reghin MS | ♂ ad | 14.IV.1968. | B,S |
| A—1311 | Petelea MS | ♂ ad | 16.X.1968. | B,S |
| A—1430 | Reghin MS | ♀ ad | 28.IX.1971. | B,S |
| A—1444 | Petelea MS | ♂ ad | 16.I.1972. | B,S |
| A—1450 | Sovata MS | ♂ ad | 7.VII.1972. | B,S |
| A—1552 | Răstolița MS | ♀ ad | 27.IV.1974. | B,S |
| A—1669 | Bükk Ungarn | ♀ ad | 4.I.1976. | B |
| A—1690 | Batoş MS | ♂ ad | 16.III.1976. | B |
| A—1702 | Reghin MS | ♀ ad | 8.VIII.1976. | B,S |
| A—1722 | Reghin MS | ♀ ad | 9.I.1977. | B,S |
| A—1723 | Petelea MS | ♂ ad | 3.II.1977. | B,S |
| A—1726 | Luieriu MS | ♀ ad | 10.III.1977. | B,S |
| A—1815 | Reghin MS | ♂ ad | 31.VII.1979. | B,S |
| A—1860 | Uila MS | ♀ ad | 7.IV.1980. | B,S |
| A—1912 | Petelea MS | ♂ ad | 31.I.1982. | B,S |
| A—1922 | Reghin MS | ♀ ad | 30.IV.1982. | B,S |
| A—1927 | Luieriu MS | ♀ juv | 24.VI.1982. | B,S |

S—151, Reghin MS, ♂, 21.IX.1966; S—167, Tg. Mureş MS, ♂, 16. XI 1966; S—327, Reghin MS, ♀, 28.XII.1968; S—333, Reghin MS, ♂, 4.I. 1969; S—338, Reghin MS, ♂, 28.I.1969; S—399, Reghin MS, ♂, 6.I.1970; S—406, Poarta MS, ♀, 30.I.1970; S—492, Batoş MS, ♀, 17.I.1971; S—518, Reghin MS, ♂, 17.III.1971; S—520, Eicaz NT, ♂, 26.III.1971; S—555, Brîncovenești MS, ♀, 19.IX.1971; S—621, Răstolița MS, ♂, 3.VII.1972; S—641, Batoş MS, ♂, 18.VIII.1972; S—654, Petrilaca MS, ♂, 28.IX.1972; S—738, Brîncovenești MS, ♂, 10.III.1973; S—712, Jabenița MS, ♂, 14.III.1973; S—749, Bîrgău MM, ♀, 8.VIII.1973; S—783, Reghin MS, ♂, 11.XI.1973; S—840, Reghin MS, ♂, 24.II.1974; S—856, Borsec HR, ♀, 24.III.1974; S—861, Reghin MS, ♀, 10.IV.1974; S—878, Săcal de Pădure MS, ♂, 22.IV.1974; S—915, Răstolița MS, ♂, 24.VII.1974; S—942, Ideciu de Jos MS, ♂, 4.IX.1974; S—943, Maiorești MS, ♂, 4.X.1974; S—1013, Vălureni MS, ♀, 19.XII.1974; S—1014, Cristești MS, ♂, 4.I.1975; S—1053, Păsăreni MS, ♀, 9.I.1975; S—1055, Lechința MS, ♂, 21.II.1975; S—1054, Chendu MS, ♂, 2.III.1975; S—1082, Viforoasa MS, ♂, 12.IV.1975; S—1107, Eirei MS, ♂, 13.III.1975; S—1108, Gurghiu MS, ♂, 2.IV.1975; S—1145, Reghin MS, ♀, 20.VII.1975; S—1155, Corunca MS, ♀, 4.VIII. 1975; S—1234, Gorneşti MS, ♀, 13.I.1976; S—1251, Hăriău MS, ♂, 10. XII.1975; S—1247, Reghin MS, ♀, 26.XII.1975; S—1248, Morești MS, ♂, 11.I.1976; S—1287, Gledeni MS, ♂, 29.I.1976; S—1288, Delureni BN, ♂, 13.II.1976; S—1290, Brîncovenești MS, ♂, 24.II.1976; S—1326, Cerghid MS, ♀, 7.III.1976; S—1325, Vidrasău MS, ♀, 13.III.1976; S—1354, Jabenița MS, ♀, 25.III.1976; S—1355, Săcal de Pădure MS, ♀, 25.III. 1976; S—1388, Reghin MS, ♂, 11.VIII.1976; S—1389, Reghin MS, ♀, 13.VIII.1976; S—1404, Nazna MS, ♀, 29.VIII.1976; S—1405, Suveica MS, ♀, 5.IX.1976; S—1406, Fărăgău MS, ♂, 16.IX.1976; S—1413, Reghin MS, ♂, 27.IX.1976; S—1414, Reghin MS, ♀, 28.IX.1976; S—1415, Sîncraiu de Mureş MS, ♀, 4.X.1976; S—1436, Chinari MS, ♂, 20.X.1976; S—1438, Chinari MS, ♀, 20.X.1976; S—1439, Sînpaul MS, ♀, 25.X.1976;

S—1440, Bazna SB, ♀, 2.IX.1976; S—1497, Reghin MS, ♀, 1.V.1977; S—1503, Moişa MS, ♀, — V.1977; S—1521, Văleni de Mureş MS, ♂, 8. VIII.1977; S—1525, Tg. Mureş MS, ♀, 2.IX.1977; S—1526, Căluşeri MS, ♀, 6.IX.1977; S—1533, Corunca MS, ♀, 9.IX.1977; S—1534, Fîncel MS, ♀, 16.X.1977; S—1535, Hodoşa MS, ♂, 21.X.1977; S—1582, Solovăstru MS, ♂, 3.XII.1977; S—1583, Sîntu MS, ♂, 31.I.1978; S—1625, Sîncraiu de Mureş MS, ♀, 13.III.1978; S—1653, Şepteriu MS, ♂, 23.IX.1978; S—1699, Delureni BN, ♀, 6.XII.1978; S—1681, Micfalău CV, ♀, 10.XII.1978 S—1700, Delureni BN, ♀, 29.XII.1978; S—1698, Moacşa CV, Ø, 1.II.1979; S—1708, Rupea BV, ♀, 5.I.1979; S—1736, Moşun MS, ♀, 10.IV.1979; S—1737, Miercurea Nirajului MS, ♀, 24.V.1979; S—1760, Corunca MS, ♂, 9.X.1979; S—1787, Ungheni MS, ♂, 14.XI.1979; S—1797, Hărţău MS, ♂, 23.XI.1979; S—1798, Sîncraiu de Mureş MS, ♀, 24.XI.1979; S—1800, Veţa MS, ♀, 4.XII.1979; S—1799, Sînpaul MS, ♂, 7.XII.1979; S—1817, Petelea MS, ♂, 14.I.1980; S—1818, Reghin MS, ♀, 2.II.1980; S—1819, Reghin MS, ♂, 8.II.1980; S—1830, Lunca Bradului MS, ♂, 26. III,1980; S—1878, Reghin MS, ♀, 23.IX.1980; S—1890, Suveica MS, ♂, 12.X.1980; S—1889, Cerghid MS, ♀, 14.X.1980; S—1899, Ernei MS, ♂, 2.XI.1980; S—1898, Cristeşti MS, ♀, 10.XI.1980; S—1913, Tofalău MS, ♀, 26.XI.1980; S—1914, Sîng. de Mureş MS, ♀, 27.XI.1980; S—1921, Cuci MS, ♀, 28.XI.1980; S—1917, Şopteriu MS, ♀, 10.XII.1980; S—1938, Moşun MS ♂, 4.I.1981; S—1969, Glodeni MS, ♀, 23.I.1981; S—1953, Reghin MS, ♂, 1.III.1981; S—1970, Uioara AB, ♂, 7.II.1981; S—1971, Mădăraş MS, ♂, 10.III.1981; S—2011, Reghin MS, ♀, 3.VIII.1981; S—2020, Breaza MS, ♀, 28.VIII.1981; S—2049, Hodoşa MS, ♂, 31.X.1981; S—2041, Reghin MS, ♂, 10.XII.1981; S—2042, Hodoşa MS, ♂, 11.I.1982; S—2034, Brîncovenești MS, ♂, 24.I.1982; S—2075, Rupea BV, ♀, 10.II. 1982; S—2084, Band MS, ♂, 1.III.1982; S—2110, Răstoliţa MS, ♂, 20. III.1982; S—2127, Băiţa MS, ♀, 26.VI.1982; S—2153, Reghin MS, ♂, 25.VII.1982.

a) Buteo b. vulpinus (Gloger), 1833

A—123 Beica de Jos MS ♂ ad 11.IX.1962. B

71. *Buteo lagopus (Pontoppidan), 1763*

R: Şorecar încălţat; M: Gatyás ölyv; G: Rauhfußbussard.

A—152 Reghin MS ♀ ad 3.III.1950. N
A—153 Teaca BN ♂ ad 6.III.1950. N
A—154 Goreni MS ♀ ad 24.I.1956. B
A—155 Cheile Turzii CJ ♂ ad 5.II.1961. B
A—156 Tg. Mureş MS ♀ ad 20.XI.1962. N
A—1692 Poarta MS ♂ ad 24.III.1976. B,S

Sk—208, Reghin MS, ♂, 10.II.1967; S—318, Reghin MS, ♂, 7.XI.1968; S—994, Sărmaşu MS, ♂, 1.XII.1974; S—1285, Vînători MS, ♂, 11.II.1976; S—1284, Cerghid MS, ♂, 15.II.1976; S—1674, Reghin MS, ♀, 27.XI.1978.

## Genus **Hieraaetus** Kaup, 1844

72. *Hieraaëtus pennatus (Gmelin), 1788*

R: Acvilă pitică; M: Törpesas; G: Zwergadler.

A—157 Reghin MS ♀ ad 4.XII.1952. N

A—158 Reghin MS ♂ ad 23.V.1954. N
A—1212 Tg. Mureş MS ♂ ad 30.VI.1965. B,S
S—1183, Tg. Mureş MS, ♀, 19.V.1962.

Genus **Aquila** Brisson, 1760

73. *Aquila chrysaëtos (L.), 1758*

R: Acvilă de munte; M: Szirti sas; G: Steinadler.

A—159 Bistra Mureşului MS ♂ ad 2.IV.1952. N
A—160 Ibăneşti MS ♂ juv 3.VI.1956. N
A—161 Batoş MS ♂ juv 30.VII.1957. B
A—1832 Bistra Mureşului MS ♀ ad — I.1961. B
A—162 Iara de Mureş MS ♂ ad 2.V.1962. B,S
A—163 Aluniş MS ♀ ad 29.VIII.1962. B
A—164 Bistra Mureşului MS ♂ ad 8.XII.1963. B,S
A—1456 Lăpuşna MS ♀ juv 12.VII.1972. B,S
S—1037, Filea MS, ♂, 18.I.1975; S—1656, Şardul Nirajului MS, ♂(?), 15.IX.1978; S—1753, Hărţău MS, ♂, 8.V.1979; S—1781, Sîmbriaşi MS, ♀, 23.X.1979; S—1801, Bălan HR, ♂, 15.XII.1979.

74. *Aquila pomarina C. L. Brehm, 1831*

R: Acvilă ţipătoare mică; M: Kis békászósas; G: Schreiadler.

A—165 Gurghiu MS ♀ ad 8.VI.1954. N
A—166 Reghin MS ♀ pull 29.VI.1957. N
A—167 Reghin MS ♀ ad 1.IX.1962. B
A—1229 Petelea MS ♂ ad 30.VIII.1965. B,S
A—1310 Tulcea TL ♀ ad 6.X.1968. B,S
A—1750 Săcal de Păsure MS ♂ ad 11.VI.1976. N,S
A—1761 Văleni de Mureş MS ♂ ad 29.V.1978. B,S
A—1814 Reghin MS ♀ ad 12.VII.1979. B,S
A—1858 Reghin MS ♀ ad 27.IV.1980. B,S
S—1186, Suseni MS, ♀, 5.VI.1958; S—216, Glăjărie MS, ♂(?), 17.V.1966; S—368, Borsec HR, ♀, 2.V.1969; S—539, Batoş MS, ♂, 9.VI.1971; S—554, Orşova MS, ♂, 16.IX.1971; S—616, Gurghiu MS, ♀, 22.V.1972; S—750, Batoş MS, ♀, 26.VIII.1973; S—907, Batoş MS, ♀, 4.VII.1974; S—1377, Monor MS, ♀, 17.VI.1976; S—1378, Tonciu MS, ♂, 24.VI.1976; S—1382, Batoş MS, ♀, 9.VII.1976; S—1504, Victoria BV, ♂, 22.VI.1977; S—1528, Chiheru de Jos MS, ♀, 13.IX.1977; S—1754, Adrian Mic MS, ♂, 27.VI. 1979; S—1785, Brîncoveneşti MS, ♂, 8.X.1979; S—2118, Reghin MS, ♂. 27.IV.1982.

Subfam. **Haliaeetinae**

Genus **Haliaeetus** Savigny, 1809

75. *Haliaëtus albicilla (L.), 1758*

R: Codalb; M: Rétisas; G: Seeadler.

A—168 Mila 23 TL Ø ad 2.IV.1956. N
S—182 Mitreşti MS, ♂ juv, 8.I.1967.

Subfam. **Milvinae**

Genus **Milvus** Lacépède, 1799

76. *Milvus milvus (L.), 1758*
R: Gaie roşie; M: Vörös kánya; G: Rotmilan.
A—72 Suseni MS ♀ ad 20.III.1953. N
77. *Milvus nigrans (Boddaert), 1783*
R: Gaie neagră; M: Barna kánya; G: Schwarzmilan.
A—73 Reghin MS ♂ ad 10.VI.1956. N
A—74 Reghin MS ♀ juv 13.IX.1956. N
A—1257 Reghin MS ♀ ad 8.IV.1966. B,S
A—1553 Lăpuşna MS ♀ ad 28.V.1974. B,S

Subfam. **Perninae**

Genus **Pernis** Cuvier, 1816

78. *Pernis apivorus (L.), 1758*
R: Viespar; M: Darázsölyv; G: Wespenbussard.
A—68 Reghin MS ♀ ad 19.IX.1954. N
A—69 Reghin MS ♀ juv 17.IX.1959. N
A—70 Tg. Mureş MS ♂ ad 23.VIII.1962. B
A—71 Brîncoveneşti MS ♀ ad 7.VI.1963. B,S
A—1177 Răstolita MS ♀ ad 30.X.1964. B,S
A—1412 Reghin MS ♀ ad 8.VII.1971. B,S
A—1573 Stînceni MS ♀ ad 18.VI.1974. N,S
S—1181, Beica MS, ♂, 28.VIII.1958; S—237, Reghin MS, ♀, 10.VII. 1968; S—896, Văleni de Mureş MS, ♀, 18.VI.1974; S—1522, Săcalu de Pădure MS, ♂, 13.VIII.1977; S—1523, Răstolita MS, ♂, — IX.1977; S—1524, Mureşeni MS, ♂, 15.IX.1977; S—1765, Păingeni MS, ♂, 20.IX. 1979; S—2128, Răstolita MS, ♂, 12.VI.1982.

Subfam. **Pandioninae**

Genus **Pandion** Savigny, 1809

79. *Pandion haliaëtus (L.), 1758*
R: Uligan pescar; M: Halászsas; G: Fischadler.
A—173 Mîndreşti VN Ø ad 19.IV.1953. N
A—1644 Glodeni MS ♀ ad 29.IX.1975. N,S
S—2023, Sovata MS, ♀, 10.IX.1981.

Familia **FALCONIDAE**

Genus **Falco** L., 1758

80. *Falco peregrinus Tunstall, 1771*
R: Şoim călător; M: Vándorsólyom; G: Wanderfalke.
A—1934 Reghin MS ♀ juv 13.VIII.1951. N
81. *Falco subbuteo L., 1758*
R: Şoimul rîndunelelor; M: Kaba sólyom; G: Baumfalke.

A—174 Reghin MS ♂ ad 2.VIII.1955. N
A—175 Reghin MS ♂ ad 22.VIII.1955. N
A—176 Reghin MS ♀ ad 11.IX.1959. B
S—59, Filpişu Mic MS, ♂, 12.VIII.1965; S—96, Reghin MS, ♂, 5.IX.1965 S—148, Reghin MS, ♀, 24.VI.1966; S—1110, Brîncoveneşti MS, ♂, 12.V. 1975; S—1367, Fărăgău MS, ♂, 20.V.1976; S—1556, Tg. Mureş MS, ♂, 11.IX.1977; S—1811 Tg. Mureş MS, ♂, 31.VII.1979.

82. *Falco columbarius L., 1758*

R: Şoim de iarnă; M: Kis sólyom; G: Merlin.

A—177 Risipiţi VN ♂ ad — I.1954. N
A—178 Milaş BN ♂ ad 3.II.1964. N
A—1281 Reghin MS ♂ ad 2.II.1967. N,S
S—1807, Mierurea Nirajului MS, ♂, 9.III.1979; S—1808, Hărţău MS, ♂, 17.X.1979.

83. *Falco vespertinus L., 1766*

R: Vînturel de seară; M: Kék vércse; G: Rotfußfalke.

A—1592 Focşani VN ♀ ad — — 1950. B
A—179 Reghin MS ♀ ad 24.V.1956. N
A—180 Reghin MS ♂ ad 5.V.1958. N
A—181 Dedrad MS ♂ ad 6.V.1962. B
A—1566 Cluj CJ ♂ ad 24.VI.1974. N,S
A—1735 Sintu MS ♂ ad 13.V.1977. B,S
A—1770 Biharkeresztes Ungarn ♀ ad 15.VI.1978. B,S
S—1560, Reghin MS, ♀, — V.1977; S—1572, Reghin MS, ♀, 12.IX.1977.

84. *Falco naumanni Fleischer, 1818*

R: Vînturel mic; M: Fehérkarmú vércse; G: Rötelfalke.

A—1214 Maioreşti MS ♀ juv 27.VIII.1965. N,S
A—1703 Tg. Mureş MS ♂ ad 19.IX.1976. N,S

85. *Falco tinnunculus L., 1758*

R: Vînturel roşu; M: Vörös vércse; G: Turmfalke.

A—182 Reghin MS ♀ ad 19.V.1951. N
A—183 Reghin MS ♂ ad 20.V.1951. N
A—184 Reghin MS ♀ juv — — 1954. N
A—185 Reghin MS ♀ juv — — 1954. N
A—186 Reghin MS ♂ ad 4.IV.1955. B
A—187 Reghin MS ♀ ad 13.IV.1955. B
A—188 Reghin MS ♂ ad 26.V.1955. B
A—189 Reghin MS ♀ ad 23.IV.1958. B
A—190 Reghin MS ♂ ad 26.IV.1958. B
A—191 Cheile Turzii CJ ♀ ad 5.II.1961. B
A—192 Dedrad MS ♀ ad 6.V.1962. B
A—1204 Brîncoveneşti MS ♂ juv 28.VII.1965. B
A—1205 Brîncoveneşti MS ♂ juv 28.VII.1965. B
A—1277 Gorneşti MS ♀ ad 13.I.1967. B,S
A—1736 Reghin MS ♂ ad 30.IV.1977. B,S
A—1747 Reghin MS ♀ ad 14.IX.1977. B,S
A—1769 Reghin MS ♂ ad 15.VI.1978. B

S—285, Reghin MS, ♀, 21.VIII.1967; S—233, Reghin MS, ♂, 12.XI. 1967; Sk—262, Reghin MS, ♀, 10.III.1968; Sk—263, Reghin MS, ♂, 11.III.1968; S—277, Reghin MS, ♂, 27.V.1968; S—374, Batoş MS, ♀, 26.VIII.1969; S—548, Reghin MS, ♀, — VII.1971; S—627, Reghin MS, ♂, 21.IV.1972; S—924, Reghin MS, ♀, 21.VIII.1974; S—1109, Reghin MS, ♀, 25.IV.1975; S—1123, Bordoşiu MS, ♀, 31.III.1975; S—1140, Tg. Mureş MS, ♀, — IV.1975; S—1258, Chendu MS, ♂, 10.I.1976; S—1263, Ogra MS, ♀, 28.XI.1975; S—1269, Săcureni MS, ♂, 29.I.1976; S—1309, Corunca MS, ♀, 28.I.1976; S—1307, Beica de Jos MS, ♀, 14.II.1976; S—1308, Cuci MS, ♀, 29.II.1976; S—1310, Sîntu MS, ♂, 25.III.1976; S—1368, Reghin MS, ♂, 22.IV.1976; S—1409, Reghin MS, ♀, 24.IX.1976; S—1422, Sing. de Mureş MS, ♀, 5.X.1976; S—1447, Pănet MS, ♀, 21.X.1976; S—1552, Corunca MS, ♀, 19.IX.1977; S—1646 Iclanď MS, ♀, 16.VII.1978; S—1809, Dileu Nou MS, ♂, 25.I.1979; S—1810, Tg. Mureş MS, ♂, 17.V.1979; S—1868, Ernei MS, ♀, 12.IV.1980 S—1961, Reghin MS, ♂, 28.I.1981; S—2079, Livezeni MS, ♀, 13.I.1982; S—2104, Cristeşti MS, ♂, 4.II.1982; S—2102, Livezeni MS, ♀, 13.II.1982 S—2174, Breaza MS, ♂, 12.VIII.1982; S—2175, Breaza MS, ♀, 12.VIII. 1982; S—2176, Poarta MS, ♀, 15.VIII.1982.

86. *Falco sparverius L.*,
S—2159, Mich. Wayne U.S.A. ♂, 23.X.1970.

## Ordo GALLIFORMES

## Familia PHASIANIDAE

### Subfam. **Tetraoninae**

### Genus **Tetrao** L., 1758

87. *Tetrao urogallus L., 1758* [1, 6, 7]
R: Cocoş de munte; M: Siketfajd; G: Auerhuhn.

a) *Tetrao u. urogallus L., 1758*

| | | | | | |
|---|---|---|---|---|---|
| A—196 | Glommerstrask | Schweden | ♂ ad | — 1929. | B |

b) *Tetrao u. major C. L. Brehm, 1831*

| | | | | | |
|---|---|---|---|---|---|
| A—197 | Floenov, Hola | Tschechoslovakei | ♂ ad | 6.V.1963. | B |

c) *Tetrao u. aquitanicus Ingram, 1915*

| | | | | | |
|---|---|---|---|---|---|
| A—1335 | Astos (Hautes-Pyrenées) | Frankreich | ♂ ad | 9.VI.1939. | B |

d) *Tetrao u. rudolfi Dombrowski, 1912*

| | | | | | |
|---|---|---|---|---|---|
| A—193 | Răstoliţa MS | | ♂ ad | 23.IV.1952. | N |
| A—194 | Răstoliţa MS | | ♀ ad | 23.IV.1952. | N |
| A—195 | Topliţa HR | | ♂ ad | 25.IV.1957. | B |
| A—1193 | Arpaşu de Sus SB | | ♂♂ ad | 4.V.1965. | B,S |
| A—1194 | Lăpuşna MS | | ♀ ad | 29.IV.1965. | B,S |
| A—1249 | Lăpuşna MS | | ♀ ad | 2.V.1966. | B,S |
| A—1265 | Răstoliţa MS | | ♂ ad | 30.IV.1966. | B,S |
| A—1356 | Sovata MS | | ♂ ad | 10.V.1970. | B,S |
| A—1447 | Ibăneşti Pădure (Fincel) MS | | ♀ ad | 31.V.1974. | B,S |
| A—1638 | Borsec HE | | ♂ ad | 25.IV.1975. | N |

S—279, Răstolița MS, ♂, —; S—280, Răstolța MS, ♂, —; S—364, Răstoliță MS, ♀, 3.V.1957; S—76, Lăpușna MS, ♂, 28.IV. 1965; S—83, Lăpușna MS, ♂, 28.IV.1965; S—89, Lăpușna MS, ♂, 28.IV.1965; S—75, Răstolița MS, ♂, 30.IV.1965; S—94, Răstolița MS, ♂, 30.IV.1965; S—90, Gheorgheni HR, ♂, 4.V.1965; S—78, Răstolița MS, ♂, 8.V.1965; S—81, Răstolița MS, ♂, 8.V.1965; S—129, Răstolița MS, ♂, 24.IV.1966; S—131, Răstolița MS, ♂, 24.IV.1966; S—127, Ibănești Pădure (Fîncel) MS, ♂, 25.IV. 1966; S—128, Ibănești Pădure (Fîncel) MS, ♂, 25.IV.1966; S—130, Răstolița MS, ♂, 25.IV.1966; S—132, Răstolița MS, ♂, 25.IV.1966; S—134, Răstolița MS, ♂, 29.IV.1966; S—139, Răstolița MS, ♂, 1.V.1966; S—135, Lăpușna MS, ♂, 2.V.1966; S—136 Lăpușna MS, ♂, 2.V.1966; S—137, Răstolița MS, ♂, 2.V.1966; S—138, Răstolița MS, ♂, 2.V.1966; S—142, Răstolița MS, ♂, 2.V.1966; S—140, Bistra Mureșului MS, ♂, 5.V. 1966; S—141, Lunca Bradului MS, ♂, 6.V.1966; S—143, Sovata MS, ♂, 6.V. 1966; S—218, Ibănești Pădure (Fîncel) MS, ♂, 23.IV.1967; S—219, Gheorgheni HR, ♂, 24.IV. 1967; S—223, Gheorgheni HR, ♂, 24.IV.1967; S—221, Borsec HR, ♂, 29.IV. 1967; S—225, Borsec HR, ♂, 29.IV.1967; S—224, Gheorgheni HR, ♂, 30.IV.1967; S—220, Răstolița MS, ♂, 3.V.1967; S—222, Sovata MS, ♂, 8.V.1967; S—269, Sînsimion HR, ♂, 20.IV.1968; S—271, Ibănești Pădure (Fîncel) MS, ♂, 24.IV.1968; S—270, Ibănești Pădure (Fîncel) MS, ♂, 25.IV.1968; S—272, Lăpușna MS, ♂, 1.V.1968; S—273, Lăpușna MS, ♂, 1.V.1968; S—274, Răstolița MS, ♂, 5.V.1968; S—275, Răstolița MS, ♂, 5.V.1968; S—357, Borsec HR, ♂, 25.IV.1969; S—354, Bistra Mureșului MS, ♂, 26.IV.1969; S—358, Borsec HR, ♂, 26.IV.1969; S—360, Borsec HR, ♂, 26.IV.1969; S—361, Borsec HR, ♂, 26.IV.1969; S—367, Sovata MS, ♂, 2.V.1969; S—363, Voinesa OT, ♀, 2.V.1969; S—356, Răstolița MS, ♂, 4.V.1969; S—365, Gheorgheni HR, ♂, 4.V.1969; S—366, Sovata MS, ♂, 4.V.1969; S—359, Borsec HR, ♂, 5.V.1969; S—443, Borsec HR, ♂, 26.IV.1970; S—444, Borsec HR, ♂, 28.IV.1970; S—440, Răstolița MS, ♂, 29.IV.1970; S—441, Răstolița MS, ♂, 3.V.1970; S—442, Răstolița MS, ♂, 3.V.1970; S—445, Bistra Mureșului MS, ♂, 8.V.1970; S—446, Bistra Mureșului MS, ♂, 8.V.1970; S—447, Sovata MS, ♂, 10.V.1970; S—448, Sovata MS, ♂, 10.V.1970; S—450, Toplița HR, ♂, 10.V.1970; S—451, Răstolița MS, ♂, 10.V.1970; S—529, Răstolița MS, ♂, 7.V.1971; S—530, Bistra Mureșului MS, ♂, 7.V.1971; S—531, Bistra Mureșului MS, ♂, 11.V.1071; S—601, Lăpușna MS, ♂, 14.IV. 1972; S—602, Lăpușna MS, ♂, 14.IV.1972; S—603, Lăpușna MS, ♂, 16.IV. 1972; S—604, Lăpușna MS, ♂, 16.IV.1972; S—605, Lăpușna MS, ♂, 16.IV.1972; S—606, Lăpușna MS, ♂, 16.IV.1972; S—607, Bistra Mureșului MS, ♂, 16.IV.1972; S—608, Bistra Mureșului MS, ♀, 16.IV.1972; S—609, Bistra Mureșului MS, ♀, 16.IV.1972; S—610, Bistra Mureșului MS, ♂, 23.IV.1972; S—611, Sălard MS, ♂, 25.IV.1972; S—612, Lăpușna MS, ♂, 4.V.1972; S—613, Răstolița MS, ♀, 7.V.1972; S—651, Răstolița MS, ♂, 4.X.1972; S—720, Borșa MM, ♀, 22.IV. 1973; S—719, Răstolița MS, ♂, 23.IV.1973; S—723, Toplița HR, ♂, 26.IV.1973; S—726, Răstolița MS, ♂, 5.V.1973; S—722, Răstolița Ms, ♂, 7.V.1973; S—721, Răstolița MS, ♂, 9.V.1973; S—725, Răstolița MS, ♂, 9.V.1973; S—724, Răstolița MS, ♂, 10.V.1973; S—864, Răstolița MS, ♂, 14.IV.1974; S—

863, Borsec HR, ♂, 27.IV.1974; S—865, Borsec HR, ♀, 27.IV.1974; S—876, Răstoliţa MS, ♂, 2.V.1974; S—1118, Răstoliţa MS, ♂, 27.IV. 1975; S—1119, Răstoliţa MS, ♂, 10.V.1975; S—1498, Răstoliţa MS, ♂, 24.IV.1977; S—1501, Răstoliţa MS, ♀, 24.IV.1977; S—1499, Bistra Mureşului MS, ♂, 27.IV.1977; S—1500, Stinceni MS, ♂, 14.V.1977; S—1599, Borsec HR, ♂, 5.II.1978; S—1694, Arpaşu de Sus SB, ♂, 27.IV.1978; S—1695, Arpaşu de Sus SB, ♂, 27.IV.1978; S—1627, Răstoliţa MS, ♂, 6.V.1978; S—1746, Gheorgheni HR, ♂, 1.V.1979; S—1748, Covasna CV, ♂, 1.V.1979; S—1749, Covasna CV, ♂, 1.V.1979; S—1751, Gheorgheni HR, ♀, 1.V.1979; S—1752, Gheorgheni HR, ♀, 1.V.1979; S—1747, TolițaHR, ♂, 4.V.1979; S—1750, Bistra Mureşului MS, ♂, 10.V.1979; S—1796, Borsec HR, ♂, 25.XI.1979; S—1870, Bistra Mureşului MS, ♀, 3.V.1980; S—1836, Bistra Mureşului MS, ♂, 7.V.1980; S—1869, Lunca Bradului MS, ♂, 12.V.1980; S—1835, Comandău CV, ♂, 16.V.1980; S—1909, Cimpul Cetăţii MS, ♂, 12.X.1980; S—2012, Ibăneşti MS, ♀, 5.VI. 1981; S—2119, Răstoliţa MS, ♂, 14.V.1982.

## Genus **Bonasa** Stephens, 1819

88. *Bonasa bonasia (L.), 1758*

R: Ieruncă; M: Császármadár; G: Haselhuhn.

| | | | | |
|---|---|---|---|---|
| A—1216 | Bistra Mureşului MS | ♂ ad | 18.X.1965. | N,S |
| A—1217 | Bistra Mureşului MS | ♀ ad | 4.IV.1965. | N,S |
| A—1247 | Gurghiu (Mociar) MS | ♀ ad | 2.I.1966. | B,S |
| A—1248 | Lăpuşna MS | ♂ ad | 13.II.1966. | B,S |
| A—1323 | Răstoliţa MS | ♂ ad | 27.IV.1969. | B,S |
| A—1435 | Bistra Mureşului MS | ♀ ad | 29.III.1972. | B,S |
| A—1471 | Lăpuşna MS | ♂ ad | 12.XII.1972. | B,S |
| A—1599 | Lunca Bradului MS | ♂ ad | 20.IX.1973. | N,S |
| A—1555 | Borsec HR | ♀ ad | 25.V.1974. | B |
| A—1554 | Răstoliţa MS | ♂ ad | 18.VI.1974. | B |
| A—1602 | Bistra Mureşului MS | ♀ ad | 5.I.1975. | B,S |
| A—1611 | Bistra Mureşului MS | ♀ ad | 9.II.1975. | B,S |
| A—1657 | Sălard MS | ♂ ad | 28.XI.1975. | B,S |
| A—1758 | Aluniş MS | ♀ ad | 5.VI.1978. | B,S |
| A—1777 | Ibăneşti Pădure (Fîncel) MS | ♂ ad | 10.XII.1978. | B,S |
| A—1778 | Răstoliţa MS | ♀ ad | 13.XII.1978. | B,S |
| A—1785 | Răstoliţa MS | ♀ ad | 1.IV.1979. | B,S |
| A—1863 | Răstoliţa MS | ♀ ad | X.1980. | B |
| A—1913 | Lunca Bradului MS | ♀ ad | 6.III.1982. | B,S |
| A—1929 | Băile Bálványos CV | ♂ juv | 22.VIII.1982. | B,S |
| A—1930 | Băile Bálványos CV | ♀ ad | 22.VIII.1982. | B,S |

S—549, Lăpuşna MS, ♀, 10.IX.1971; S—987, Gurghiu MS, ♂, 21.XI. 1974; S—1261, Răstoliţa MS, ♂, 13.XII.1975; S—1493, Arpaşu de Sus SB, ♀, 25.III.1977; S—1803, Băile Bálványos CV, O, 9.VIII.1979; S—1804, Băile Bálványos CV, ♀ (?), 9.VIII.1979.

Subfam. **Perdicinae**

Genus **Oreortyx** Baird, 1858

**89.** *Oreortyx picta (Douglas), 1858*

A—1784 Nordwest-Mexiko Ø ad — — 1941. N

Genus **Callipepla** Wagler, 1832

**90.** *Callipepla squamata (Vigors), 1830*

A—1811 Mexiko ♀ — — — B

Genus **Perdix** Brisson, 1760

91. *Perdix perdix (L.), 1758* [8]

R: Potîrniche; M: Fogoly; G: Rebhuhn.

a) *Perdix p. perdix (L.), 1758*

| | | | | | |
|---|---|---|---|---|---|
| A—198 | Reghin MS | | ♀ ad | 29.XI.1954. | N |
| A—199 | Reghin MS | | ♂ ad | 31.XII.1954. | N |
| A—200 | Fărăgău MS | | ♂ ad | 8.XII.1957. | B |
| A—201 | Reghin MS | | ♀ ad | 5.II.1960. | B |
| A—202 | Reghin MS | | ♂ ad | 6.XI.1960. | B |
| A—203 | Reghin MS | | ♀ ad | 6.II.1961. | B |
| A—204 | Reghin MS | | ♀ ad | 30.I.1962. | B |
| A—205 | Reghin MS | | ♀ ad | 2.XI.1962. | B |
| A—1195 | Suseni MS | | ♂ ad | 9.III.1965. | B |
| A—1239 | Reghin MS | | ♀ ad | 30.XII.1965. | B,S |
| A—1240 | Reghin MS | | ♂ ad | 20.I.1966. | B,S |
| A—1556 | Dobromir CT | | ♂ ad | 22.III.1966. | B |
| A—1307 | Gornești MS | | ♀ ad | 6.X.1968. | B,S |
| A—1344 | Reghin MS | | ♂ ad | 11.IV.1970. | B,S |
| A—1381 | Reghin MS | | ♂ ad | 28.X.1970. | B,S |
| A—1403 | Reghin MS | | ♀ ad | 24.IV.1971. | B,S |
| A—1613 | Urisiu de Jos MS | | ♀ ad | 10.II.1975. | B,S |
| A—1614 | Reghin MS | | ♂ ad | 16.II.1975. | B,S |
| A—1676 | Reghin MS | | ♂ ad | 1.II.1976. | B,S |
| A—1683 | Beica de Jos MS | | ♀ ad | 19.II.1976. | B,S |
| A—1868 | Morăreni MS | | ♀ ad | 2.XI.1980. | B,S |
| | Comori MS | 8 pull | | 19.VI.1979. | N |

S—1190, Reghin MS, ♂, 10.III.1957; S—101, Reghin MS, ♂, 16.XII. 1965; S—106, Reghin MS, ♂, 20.I.1966; S—108, Reghin MS, ♂, 20.I. 1966; S—183, Băla MS, ♀, 27.I.1967; S—184, Băla MS, ♀, 27.I.1967; S—185, Băla MS, ♂, 27.I.1967; S—249, Dumbrăvioara MS, ♀, 1.II. 1968; S—331, Reghin MS, ♀, 15.I.1969; S—398, Reghin MS, ♀, 11.I. 1970; S—421, Reghin MS, ♀, 17.III.1970; S—465, Comori MS, ♂, 25.X. 1970; S—565, Reghin MS, ♀, 10.XI.1971; S—660, Reghin MS, ♂, 26.X. 1972; S—707, Reghin MS, ♂, 1.IV.1973; S—729, Reghin MS, ♂, 7.V. 1973; S—776, Cozma MS, ♀, 26.X.1973; S—777, Reghin MS, ♂, 8.XI. 1973; S—795, Petelea MS, ♂, 13.XII.1973; S—820, Reghin MS, ♂, 14.XII.1973; S—844, Solovăstru MS, ♀, 20.XII.1973; S—815, ReghinMS,

♂ 28.XII.1973; S—847, Şieuţi BN, ♂, 1.III.1974; S—879, Reghin MS, ♀, 6.III.1974; S—1065, Reghin MS, ♂, 6.III.1975; S—1225, Reghin MS, ♂, 25.XI.1975; S—1301, Răstoliţa MS, ♂, 6.I.1976; S—1303, Reghin MS, ♀, 6.II.1976; S—1304, Săcal de Pădure MS, ♂, 11.II.1976; S—1272, Reghin MS, ♂, 5.III.1976; S—1334, Reghin MS, ♂, 25.IV.1976; S—1371, Ditrău HR, ♂, 15.V.1976; S—1457, Reghin MS, ♂, 25.X.1976; S—1564, Reghin MS, ♂, 6.XI.1977; S—1616, Batoş MS, ♀, 5.I.1978; S—1680, Reghin MS, ♀, 14.XI.1978; S—1684; Reghin MS, ♀, 20.XI.1978; S—1838, Reghin MS, ♀, 3.III.1979; S—1839, Săcal de Pădure MS, ♀, 20.XI.1979; S—1840, Dumbrăvioara MS, ♂, 18.XII.1979; S—1841, Vălcni de Mureş MS, ♂, 1.II.1980; S—1932, Reghin MS, ♂, 6.XI.1980; S—1933, Reghin MS, ♂, 17.XII.1980; S—1934, Reghin MS, ♂, 29.XII. 1980; S—1935, Sintu MS, ♂, 7.I.1981; S—2048, Cristeşti MS, ♀, 5.XII. 1981.

Genus **Coturnix** Bonnaterre, 1791

92. *Coturnix coturnix (L.), 1758*

R: Prepeliţă; M: Fürj; G: Wachtel.

| | | | | |
|---|---|---|---|---|
| A—206 | Teaca BN | ♀ ad | 5.XI.1955. | N |
| A—207 | Reghin MS | ♀ ad | 16.VIII.1956. | N |
| A—1865 | Reghin MS | ♂ ad | 16.X.1980. | B,S |

S—1863, Reghin MS, ♀, 31.VII.1979; S—2024, Reghin MS, ♀, 29.IV. 1981.

Genus **Excalfactoria** Bonaparte, 1856

93. *Excalfactoria chinensis (L.), 1766*

| | | | | |
|---|---|---|---|---|
| A—1550 | China | ♂ | — — 1974. | N |

Subfam. **Phasaninae**

Genus **Phasianus** L., 1758

94. *Phasianus colchicus L., 1758*

R: Fazan; M: Fácán; G: Fasan.

| | | | | |
|---|---|---|---|---|
| A—208 | Arad AR | ♂ ad | 19.XII.1956. | N |
| A—209 | Reghin MS | ♂ ad | — — 1964. | N |
| A—1615 | Petelea MS | ♀ ad | 12.II.1975. | N,S |
| | Reghin MS | 8 pull. | — — 1977. | N |

S—252, Voivodeni MS, ♂, 22.II.1968; S—339, Teaca BN, ♂, 28.I.1969; S—387, Satu Mare SM, ♂, 21.XII.1969; S—504, Tg. Mureş MS, ♂, 20.II. 1971; S—563, Petelea MS, ♂, 20.XI.1971; S—594, Tg. Mureş MS, ♂, — XII.1971; S—791, Tg. Mureş MS, ♂, 5.XII.1973; S—819, Poarta MS, ♂, 15.I.1974; S—890, Brîncoveneşti MS, ♂, 18.V.1974; S—957, Nadăşa MS, ♂, 3.XI.1974; S—984, Petrilaca MS, ♂, 16.XI.1974; S—983, Uila MS, ♂, 22.XI.1974; S—985, Tonciu MS, ♂, 24.XI.1974; S—986, Tg. Mureş MS, ♀, 27.XI.1974; S—1010, Reghin MS, ♂, 13.I.1975; S—1011, Lunca MS, ♂, 19.I.1975; S—1035, Reghin MS, ♂, 24.I.1975; S—1036, Reghin MS, ♂, 2.II. 1975; S—1067, Reghin MS, ♀, 2.II.1975; S—1070,

Bistrița BN, ♂, 7.II.1975; S—1071, Reghin MS, ♂, 16.II.1975; S—1069, Reghin MS, ♂, 10.III.1975; S—1125, Reghin MS, ♂, 4.IV.1975; S—1146, Teleac MS, ♀, 6.VI.1975; S—1227, Fărăgău MS, ♂, 23.XI.1975; S—1231, Reghin MS, ♂, 7.XII.1975; S—1454, Reghin MS, ♂, 21.X.1976; S—1459, Reghin MS, ♀, 9.XI.1976; S—1515, Reghin MS, ♂, 13.VI.1977; S—1607, Reghin MS, ♀, 24.XI.1977; S—1620, Reghin MS, ♂, 26.XII.1977; S—1696, Poarta MS, ♂, 21.V.1978; S—1682, Reghin MS, ♂, 10.XII.1978; S—1703, Lefaia MS, ♂, 18.I.1979; S—1791, Breaza MS, ♀, 20.XI.1979; S—1952, Reghin MS, ♀, 7.III.1981.

Subfam. **Pavoninae**

Genus **Pavo** L., 1758

95. *Pavo cristatus L., 1758*
R: Păun; M: Páva; G: Pfau.
A—1361 Zoo Tg. Mureș MS ♂ ad — III.1970. N
A—1862 Zoo Tg. Mureș MS ♀ ad 17.II.1980. N

Subfam. **Numidinae**

Genus, **Numida** L., 1766

96. *Numida meleagris L., 1766*
R: Bibilică; M: Gyöngytyúk; G: Perlhuhn.
A—1706 Reghin MS ♀ ad 15.V.1976. N

Ordo GRUIFORMES
Familia GRUIDAE

Subfam. **Balearicinae**

Genus **Balearica** Brisson, 1780

97. *Balearica pavonina (L.), 1758*
A—1888 Zoo Wien Afrika Ø ad — — 1979. N

Familia RALLIDAE

Genus **Rallus** L., 1758

98. *Rallus aquaticus L., 1758*
R: Cîrstel de baltă; M: Guvat; G: Wasserralle.
A—210 Mila 23 TL ♂ ad 17.X.1953. N
A—211 Reghin MS ♂ ad 12.I.1964. N
A—1737 Tulcea TL ♂ ad 29.III.1977. B

Genus **Crex** Bechstein, 1803

99. *Crex crex (L.), 1758*
R: Cîrstel de cîmp; M: Haris; G: Wachtelkönig.
A—214 Focșani VN ♂ ad — — 1953. B
A—212 Reghin MS ♂ ad 10.IX.1953. N
A—213 Reghin MS ♂ ad 3.V.1957. N
A—215 Reghin MS ♀ ad 30.VIII.1960. B
A—216 Reghin MS ♀ ad 28.VIII.1961. B
S—276, Gornești MS, ♂, 22.IV.1968; S—909, Văleni de Mureș MS, ♂,

22.VII.1974; S—1640, Band MS, ♀, 20.V.1978; S—1735, Răstoliţa MS, ♂, 11.V.1979; S—1893, Văleni de Mureş MS, ♂, 25.IX.1980.

Genus **Porzana** Vieillot, 1816

100. *Porzana parva (Scopoli), 1769*

R: Creştet cenuşiu; M: Kis vízicsibe; G: Kleines Sumpfhuhn.

| | | | | | |
|---|---|---|---|---|---|
| A—217 | Mila 23 Tl | ♂ | ad | 5.IX.1954. | N |
| A—218 | Fărăgău MS | ♀ | ad | 9.IV.1961. | N |
| A—1491 | Fărăgău MS | ♂ | ad | 26.VIII.1972. | N,S |

101. *Porzana porzana (L.), 1766*

R: Creştet pestriţ; M: Pettyes vízicsibe; G: Tüpfelsumpfhuhn.

| | | | | | |
|---|---|---|---|---|---|
| A—219 | Reghin MS | ♂ | ad | 16.IV.1947. | N |
| A—220 | Reghin MS | ♂ | ad | 4.VIII.1956. | N |
| A—221 | Fărăgău MS | ♂ | ad | 22.IX.1957. | B |

S—752, Reghin MS, ♂, 30.VIII.1973; S—1160, Răstoliţa MS, ♂, 8.VIII.1975; S—1356, Reghin MS, ♀, 2.V.1976; S—2009, Ideciu de Jos MS, ♂, 16.VII.1981.

Genus **Gallinula** Brisson, 1760

102. *Gallinula chloropus (L.), 1758*

R: Găinuşă de baltă; M: Vízityúk; G: Teichhuhn.

| | | | | | |
|---|---|---|---|---|---|
| A—222 | Gurghiu MS | ♀ | ad | 30.III.1954. | N |
| A—223 | Reghin MS | ♂ | juv | 6.IX.1956. | N |
| A—224 | Reghin MS | ♀ | ad | 15.V.1960. | N |
| A—1833 | Dunăvăţul de Sus TL | ♂ | juv | 12.IX.1967. | B |
| A—1659 | Petelea MS | ♀ | juv | 28.XI.1975. | B,S |

S—1167, Reghin MS, ♂, 15.VIII.1948; S—464, Reghin MS, ♀, 16.VIII.1970; S—742, Reghin MS, ♂, 20.V.1973; S—871, Reghin MS, ♂, 26.IV.1974; S—880, Gurghiu MS, ♂, 7.V.1974; S—1141, Reghin MS, ♂, 6.VI.1975; S—1419, Voivodeni MS, ♂, 27.IX.1976; S—1449, Subcetate HR, ♂, 20.X.1976; S—1571, Reghin MS, ♂, 14.VII.1977; S—1668, Uila MS, ♀, 25.IV.1978; S—1639, Reghin MS, ♀, 16.V.1978; S—1669, Sîntu MS, ♂, 30.VIII.1978; S—1734, Sînpetru de Cîmpie MS, ♀, 4.V.1979; S—1861, Reghin MS, ♂, 10.X.1979; S—1885, Sîng. de Mureş MS, ♂, 3.X.1980; S—2141, Sînpaul MS, ♂, 2.V.1982.

Genus **Fulica** L., 1758

103. *Fulica atra L., 1758*

R: Lişiţă; M: Szárcsa; G: Bläßhuhn.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A—225 | Jîrlău BR | ♂ | ad | — | — | 1953. | N |
| | Fărăgău MS | 2 | pull | — | — | — | N |

S—485, Batoş MS, ♂, 4.XI.1970; S—1815, Tg. Mureş MS, ♀, 8.I.1979; S—1816, Săcal de Pădure MS, ♀, 26.XI.1979; S—1904, Cîmpul Cetăţii MS, ♀, 29.X.1980; S—1941, Toaca MS, ♀, 29.X.1980; S—1916, Lunca MS, ♂, 6.XII.1980; S—2116, Bicaz NT, ♂, 28.IV.1982.

## Ordo CHARADRIIFORMES
## Familia HAEMATOPODIDAE
### Genus **Haematopus** L., 1758

104. *Haematopus palliatus Temminck, 1820*

A—1350 Trelew Argentinien ♂ 16—25.IV.1968. N

## Familia CHARADRIIDAE
### Subfam. **Vanellinae**
### Genus **Vanellus** Brisson, 1760

105. *Vanellus vanellus (L.), 1758*

R: Nagiț; M: Bíbic; G: Kiebitz.

A—226 Focșani VN Ø ad — — 1950. N
A—227 Focșani VN Ø ad — — 1950. N
A—228 Mîndrești VN Ø ad — — 1953. N
A—229 Reghin MS ♂ ad 17.III.1963. N
S—161, Petelea MS, ♂, 16.X.1966; S—197, Reghin MS, ♀, 14.III.1967; S—351, Toplița HR, ♂, 28.III.1969; S—715, Reghin MS, ♀, 27.III.1973; S—718, Iara de Mureș MS, ♂, 17.IV.1973; S—588, Reghin MS, ♂, 17.III.1974; S—1085, Reghin MS, ♂, 20.IV.1975; S—1086, Reghin MS, ♂, 27.IV.1975; S—1305, Văleni de Mureș MS, ♂, 5.III.1976; S—1306, Văleni de Mureș MS, ♂, 3.III.1976; S—1335, Vidrasău MS, ♂, 7.III.1976; S—1336, Miercurea Nirajului MS, ♀, 7.III.1976; S—1337, Reghin MS, ♂, 16.III.1976; S—1338, Reghin MS, ♂, 21.III.1976; S—1690, Murgești MS, ♀, 31.V.1978; S—1638, Petelea MS, ♂, 16.VI.1978; S—1632, Suseni MS, ♂, 25.VI.1978; S—1942, Reghin MS, ♂, 20.IV.1980; S—1994, Petelea MS, ♀, 26.IV.1981; S—2052, Murighiol TL, ♂, 1.XI.1981; S—2099, Breaza MS, ♂, 18.III.1982.

### Subfam. **Charadriinae**
### Genus **Pluvialis** Brisson, 1760

106. *Pluvialis apricaria (L.), 1758*

R: Ploier auriu; M: Aranylile; G: Goldregenpfeifer.

A—230 Focșani VN Ø ad — — 1950. N
A—1616 Reghin MS ♀ ad 16.III.1975. N,S
A—1759 Periș MS ♂ ad 12.III.1978. N,S
A—1760 Reghin MS ♀ ad 12.III.1978. N,S
S—767, Letea TL, ♂, 3.III.1973; S—1999, Reghin MS, ♂, 6.IV.1981.

### Genus **Charadrius** L., 1758

107. *Charadrius dubius Scopoli, 1786*

R: Prundăraș gulerat; M: Kislile; G: Flußregenpfeifer.

A—231 Focșani VN Ø ad 10.V.1953. N
A—232 Golești VN ♂ ad 23.V.1957. N
A—233 Reghin MS ♂ ad 15.VII.1958. N
A—234 Mamaia CT ♂ ad 2.VII.1964. B
A—1404 Petelea MS ♀ ad 18.IV.1971. B,S

A—1502 Zau de Cîmpie MS ♀ juv 9.IX.1973. N,S
A—1695 Gorneşti MS ♂ ad 14.V.1976. B,S
A—1877 Reghin MS ♂ ad 28.III.1981. B,S
S—875, Periş MS, ♂, 21.IV.1974; S—2148, Brîncoveneşti MS, ♂, 6.VII. 1982.

108. *Charadrius vociferus L., 1758*
A—1458 Playa Larga Kuba Ø 12—17.XII.1968. N

Familia SCOLOPACIDAE
Subfam. **Tringinae**

Genus **Numenius** Brisson, 1760

109. *Numenius arquata (L.), 1758* [5]
R: Culic mare; M: Nagypóli; G: Großer Brachvogel.
a) Numenius a. arquata (L.), 1758
A—235 Focşani VN Ø ad — — 1953. N
b) Numenius a. orientalis Brehm, 1831
A—236 Mila 23 TL (Grindul Stipoc) ♀ ad 8.IV.1954. N

Genus **Limosa** Brisson 1760

110. *Limosa limosa (L.), 1758*
R: Sitar de mal; M: Nagygoda; G: Uferschnepfe.
A—395 Jîrlău BR Ø ad — — 1953. N
A—396 Jîrlău BR Ø ad — — 1953. N
A—397 Mila 23 TL (Grindul Stipoc) ♀ ad 7.IV.1954. N
A—398 Mila 23 TL (Grindul Stipoc) ♂ ad 12.IV.1954. N
A—399 Mila 23 TL (Grindul Stipoc) ♂ ad 30.VI.1964. B

Genus **Tringa** L., 1758

111. *Tringa erythropus (Pallas), 1764*
R: Fluierar negru; M: Kormos cankó; G: Dunkler Wasserläufer.
A—244 Fărăgău MS ♂ ad 7.VI.1963. N

112. *Tringa nebularia (Gunnerus), 1767*
R: Fluierar picior verde; M: Szürke cankó; G: Grünschenkel.
A—237 Focşani VN Ø ad — — 1952. N
A—1642 Gorneşti MS ♂ ad 27.VII.1975. N,S

113. *Tringa ochropus L., 1758*
R: Fluierar de zăvoi; M: Erdei cankó; G: Waldwasserläufer.
A—236 Periş MS ♀ ad 4.X.1957. N
A—239 Reghin MS ♀ ad 15.VII.1963. B
A—240 Iara de Mureş MS ♀ ad 3.IV.1964. N
A—1661 Gorneşti MS ♀ ad 27.VII.1975. B,S
A—1764 Glodeni MS ♀ ad 4.IV.1978. B,S
S—740, Gurghiu MS, ♂, 15.VII.1973; S—925, Răstolița MS, Ø, 8.VIII. 1974.

114. *Tringa glareola L., 1758*
R: Fluierar de mlaştină; M: Réti cankó; G: Bruchwasserläufer.
A—241 Reci CV ♂ ad 30.VIII.1959. N

A—1388 Tg. Mureş MS ♀ ad 8.V.1966. N

115. *Tringa hypoleucos L., 1758*

R: Fluierar de munte; M: Billegető cankó; G: Flußuferläufer.

A—242 Reghin MS ♀ ad — — 1952. N
A—243 Ibăneşti Pădure (Fîncel) MS ♂ ad 9.IV.1961. N
A—1203 Reghin MS ♂ ad 31.V.1965. B

Subfam. **Scolopacinae**

Genus **Gallinago** Brisson, 1760

116. *Gallinago gallinago (L.), 1758*

R: Becaţină comună; M: Közép sárszalonka; G: Bekassine.

A—247 Breaza MS ♂ ad 8.III.1958. N
A—1686 Reghin MS ♂ ad 2.XI.1975. N,S

117. *Gallinago media (Latham) 1787*

R: Becaţină mare; M: Nagy sárszalonka; G: Doppelschnepfe.

A—245 Reghin MS ♀ ad 3.IV.1952. N
A—246 Reghin MS ♀ ad 29.IV.1964. B

Genus **Scolopax** L., 1758

118. *Scolopax rusticola L., 1758*

R: Sitar de pădure; M: Erdei szalonka; G: Waldschnepfe.

A—248 Reghin MS ♂ ad 11.IV.1955. N
A—249 Reghin MS ♀ ad 26.X.1961. N
A—1448 Răstoliţa MS ♂ juv 11.VI.1972. B,S
A—1585 Tulcea TL ♂ ad 28.X.1973. B,S
A—1756 Reghin MS ♂ ad 28.XII.1977. B,S

S—125, Reghin MS, ♂, 12.IV.1966; S—259, Reghin MS, ♂, 27.III.1968; S—260, Reghin MS, ♂, 27.III.1968; S—267, Reghin MS, ♂, 13.IV.1968; S—352, Reghin MS, ♂, 6.IV.1969; S—460, Sovata MS, ♂(?), 10.V.1970; S—598, Tg. Mureş MS, ♂, 29.III.1972; S—599, Tg. Mureş MS, ♂, 29.III. 1972; S—708, Reghin MS, ♂, 3.IV.1973; S—868, Răstoliţa MS, ♂, 14.IV. 1974; S—882, Răstoliţa MS, ♂, 28.IV.1974; S—936, Reghin MS, ♂, 4.X. 1974; S—937, Caşva MS, ♂, 15.X.1974; S—1087, Păingeni MS, ♂, 27.III. 1975; S—1088, Hărţău MS, ♂, 20.IV.1975; S—1494, Arpaşu de Sus SB, ♂, 25.III.1977; S—1624, Suseni MS, ♂, — IV.1978; S—1666, Lunca Bradului MS, ♂, 9.IV.1978; S—1940, Lunca MS, ♀(?), 10.XI.1980.

Genus **Lymnocryptes** Kaup, 1829

119. *Lymnocryptes minimus (Brünnich), 1764*

R: Becaţină mică; M: Kis sárszalonka; G: Zwergschnepfe.

A—250 Reghin MS ♀ ad 8.XI.1956. N
A—251 Reghin MS ♂ ad 3.XII.1958. N

Subfam. **Calidridinae**

Genus **Calidris** Merrem, 1804

120. *Calidris minuta (Leisler), 1812*

R: Fugaci mic; M: Apró partfutó; G: Zwergstrandläufer.

A—252 Reghin MS ♀ ad 27.V.1961. N

A—253 Reghin MS ♂ ad 28.V.1961. N
A—1826 Murighiol TL ♀ ad 8.X.1979. B,S
A—1827 Murighiol TL ♂ ad 8.X.1979. N,S
A—1138 Nordost-Baikal U.d.S.S.R. Ø — — — B

Genus **Philomachus** Merrem, 1804

121. *Philomachus pugnax (L.), 1758*

R: Bătăuș; M: Pajzsoscankó; G: Kampfläufer.

A—254 Iara de Mureș MS ♂ ad 13.V.1953. N
A—255 Mila 23 TL ♂ ad 7.IV.1954. N
A—1315 Reghin MS ♂ ad 24.III.1968. N,S
A—1752 Gornești MS ♀ ad 14.V.1976. N,S
S—1366, Reghin MS, ♀, 21.V.1976; S—2000, Reghin MS, ♂, 6.IV.1981; S—2001, Reghin MS, ♂, 6.IV.1981.

Familia RECURVIROSTRIDAE

Genus **Himantopus** Brisson, 1760

122. *Himantopus himantopus (L.), 1758*

R: Cătăligă; M: Gólyatöcs; G: Stelzenläufer.

A—256 Sarinasuf TL Ø ad 30.III.1955. N

Genus **Recurvirostra** L., 1758

123. *Recurvirostra avosetta L., 1758*

R: Ciocîntors; M: Gulipán; G: Säbelschnäbler.

A—257 Sarinasuf TL Ø ad — — 1949. N

Familia BURHINIDAE

Genus **Burhinus** Illiger, 1811

124. *Burhinus oedicnemus (L.), 1758*

R: Pasărea ogorului; M: Ugartyúk; G: Triel.

A—258 Focșani VN Ø ad — — 1953. N

Familia STERCORARIIDAE

Genus **Stercorarius** Brisson, 1760

125. *Stercorarius longicaudus Vieillot, 1819*

R: Lup de mare codat; M: Nyílfarkú rablósirály; G: Falkenraubmöwe.

A—1409 Ernei MS Ø juv 10.IX.1959. N,S

Familia LARIDAE

Genus **Larus** L., 1758

126. *Larus delawarensis Ord, 1815*

Sk—2163 Mich. Delta, Danforth U.S.A. Ø 31.VII.1964.

127. *Larus canus L., 1758*

R: Pescăruș sur; M: Viharsirály; G: Sturmmöwe.

A—266 Voivodeni MS ♀ ad — I.1964. N

128. *Larus argentatus Pontoppidan, 1763* [3, 4]

R: Pescăruș argintiu; M: Ezüstsirály; G: Silbermöwe.

a) Larus a. argentatus Pontoppiddan, 1763

A—261 Kennenmerduinen Niederlande ♀ ad 25.V.1951. B

b) Larus a. ponticus Stegmann, 1934

A—259 Mila 23 TL Ø ad 10.V.1953. N
A—260 Mila 23 TL ♂ juv 19.X.1953. N
A—262 Mila 23 TL ♂ ad 10.IV.1964. B
A—263 Mila 23 TL ♀ ad 10.IV.1964. B
A—1210 Crișan TL ♀ juv 31.VIII.1965. B,S
A—1900 Murighiol TL ♂ juv 1.XI.1981. B,S

129. *Larus fuscus L., 1758*

R: Pescăruș negricios; M: Heringsirály; G: Heringsmöwe.

A—1408 Gornești MS Ø — X.1969. N
A—1584 Peritrașca TL Ø 19.IX.1973. B,S

130. *Larus ridibundus L., 1766*

Pescăruș rîzător; M: Dankasirály; G: Lachmöwe.

A—264 Mila 23 TL ♀ juv 17.X.1953. N
A—265 Mila 23 TL ♂ ad 3.V.1955. N
A—1467 Gornești MS ♂ 1ad 19.V.1971. N,S
S—521, Reghin MS, Ø, 4.IV.1971; S—754, Slobozia IL, ♀, 4.IX.1973; S—1570, Ungheni MS, ♀, 22.X.1977; S—1793, Murighiol TL, ♂, 6.X.1979; S—1794, Murighiol TL, ♀, 6.X.1979.

131. *Larus minutus Pallas, 1776*

R: Pescăruș mic; M: Törpesirály; G: Zwergmöwe.

A—267 Aluniș MS, ♀ ad 20.V.1954. N
A—1493 Gornești MS ♀ ad 17.IX.1972. N,S
S—1455, Ibănești Pădure (Sirod) MS, Ø, 24.X.1976.

## Genus **Rissa** Stephens, 1826

132. *Rissa tridactyla (L.), 1758*

R: Martin cu trei degete; M: Csüllő; G: Dreizehenmöwe.

A—1274 Gornești MS ♂ juv 31.X.1966. N,S
Sk—1207, Gornești MS, ♂, 2.XI.1975; S—1614, Reghin MS, ♂, 5.V.1978.

## Familia STERNIDAE

## Genus **Chlidonias** Rafinisque, 1822

133. *Chlidonias leucopterus (Temminck), 1815*

R: Chirighiță aripi albe; M: Fehérszárnyú szerkő; G: Weißflügelseeschwalbe
A—268 Reghin MS ♂ ad 2.V.1959. N

134. *Chlidonias niger (L.), 1758*

R: Chirighiță neagră; M: Kormos szerkő; G: Trauerseeschwalbe
A—269 Hodoșa HR ♂ ad 12.V.1954. N

A—270 Reghin MS ♀ ad 2.V.1959. B
A—271 Suseni MS ♂ ad 20.V.1964. N
A—1492 Petelea MC ♀ ad 7.IX.1972 B

Genus **Sterna** L., 1758

135. *Sterna hirundo 1758*

R: Chiră de baltă; M: Küszvágó csér G: Fluß-seeschwalbe.
A—272 Dobrogea ♀ ad — — 1954. N

Familia ALCIDAE

Genus **Alca** L., 1758

136. *Alca torda L., 1758*

A—273 S'Leonards on Sea, Sussex, England ♀ ad 17.II.1906.

Genus **Fratercula** Brisson, 1760

137. *Fratercula arctica (L.), 1758*

A—274 Towyn-y-perhyn, Allerdaron England ♂ ad 30.VI.1903. B
A—275 (Fractercula a. grabae, Brehm, 1831) England ♀ — — — N

Ordo COLUMBIFORMES

Familia COLUMBIDAE

Genus **Columba** L., 1758

138. *Columba oenas L., 1758*

R: Porumbel de scorbură; M: Kék galamb; G: Hohltaube.
A—276 Gurghiu MS ♂ ad 26.III.1955. N

139. *Columba palumbus L., 1758*

R: Porumbel gulerat; M: Örvös galamb; G: Ringeltaube.
A—1453 Petelea MS ♀ juv 4.VIII.1972. N,S
A—1689 Reghin MS ♀ ad 28.III.1976. N,S
A—1786 Brîncovenești MS ♂ ad 25.V.1979. N,S
S—862, Bistra Mureșului MS, ♀, 11.IV.1974; S—1209, Gurghiu MS, ♀, 12.XI.1975; S—1506, Răstoliţa MS, ♂, 19.IV.1977; S—1755, Reghin MS, ♂, 20.VI.1979; S—2120, Brîncovenești MS, ♂, 24.V.1982.

140. *Columba livia domestica Gmelin, 1789*

R: Porumbel de casă; M: Házi galamb; G: Haustaube.
A—279 Reghin MS ♂ ad — — 1956. N
A—280 Reghin MS ♀ ad — — 1956. N
A—281 Reghin MS ♀ ad — — 1956. N
A—282 Reghin MS ♀ ad — — 1957. N

A—283 Reghin MS Ø ad — — 1957. N
A—1525 Răstolița MS Ø 10.XII.1973. N
Die Exemplare gehören verschiedenen Rassen an.

Genus **Streptopelia** Bonaparte, 1855

141. *Streptopelia turtur (L.,), 1758*

R: Turturică; M: Gerle; G: Turteltaube.
A—277 Gurghiu MS Ø ad — — 1955. N
S—165, Reghin MS, Ø, 9.V.1966; S—892, Reghin MS, ♂, 6.VI.1974; S—1381, Reghin MS, ♀, 15.VI.1976.

142. *Streptopelia decaocto (Frivaldsky), 1838*

R: Guguștiuc; M: Balkáni gerle; G: Türkentaube.
A—278 Reghin MS ♂ ad 14.XII.1953. N
A—1517 Reghin MS ♀ ad 8.I.1974. N,S
S—380, Reghin MS, ♂, 24.X.1969; S—403, Reghin MS, Ø, 18.I.1970; S—430, Gurghiu MS, ♀, 1.IV.1970; S—517, Reghin MS, ♂, 6.III.1971; S—731, Reghin MS, ♂, 22.V.1973; S—1151, Răstolița MS, ♂, 31.VII.1975; S—1364, Reghin MS, ♀, 5.V.1976; S—1426, Ibănești MS, ♀, 7.X.1976; S—1992, Reghin MS, ♂, 14.IV.1981.

Genus **Oena** Swainson, 1837

143. *Oena capensis (L.), 1766*

A—1580 Matopos Simbabwe ♂ ad — — 1968. N

Ordo P S I T T A C I F O R M E S

Familia PSITTACIDAE

Subfam. **Loriinae**

Genus **Trichoglossus** Vigors and Horsfield, 1827

144. *Trichoglossus ornatus (L.), 1758*

A—1538 Sulawesi Ø — — — N

Subfam. **Kakatoinae**

Genus **Plyctolophus** Vigors, 1831

145. *Plyctolophus sulfurea (Gmelin), 1788*

A—1446 Zoo Tg. Mureș MS Sulawesi Ø ad — V.1972. N

Genus **Kakatoe** Cuvier, 1800

146. *Kakatoe alba (P.L.S. Müller), 1776*

A—1854 Malukken Inseln Ø ad — — 1960. N

147. *Kakatoe roseicapilla (Vieillot), 1817*

A—1899 Zoo Wien Australien Ø ad 14.V.1981. N

Genus **Nymphicus** Wagler, 1832

148. *Nymphicus hollandicus (Kerr), 1792*

A—1583 Zoo Tg.Mureş MS Australien Ø ad — X.1974. N

Subfam. **Psittacinae**

Genus **Ara** Lacépède, 1799

149. *Ara maracana (Vieillot), 1816*

A—1834 Zoo Tg. Mureş MS Südamerika ♂ ad 5.I.1980. N,S

Genus **Cyanoliseus** Bonaparte, 1854

150. *Cyanoliseus patagonus (Vieillot), 1817*

A—1810 La Herreria, Chubut Argentinien ♀ ad 11.XII.1965. B

Genus **Enicognathus** C. R. Gray, 1840

151. *Enicognathus ferrugineus (P.L.S. Müller), 1776*

A—1169 Barrancas, Chubut Argentinien Ø ad 1.VI.1961. B

Genus **Pionopsitta** Bonaparte, 1854

152. *Pionopsitta pileata (Scopoli), 1769*

A—1465 Eldorado Misiones, Argentinien ♂ ad 17.X.1964. N
A—1466 Eldorado, Misiones Argentinien ♀ ad 17.X.1964. N

Genus **Anazona** Lesson, 1830

153. *Amazona leucocephala L., 1758*

A—1425 Playa Larga Kuba Ø ad 12—17.XII.1968. N

Genus **Psittacus** L., 1758

154. *Psittacus erithacus L., 1758*

A—1530 Zoo Wien Afrika Ø ad — — 1974. N
A—1612 Zoo Tg. Mureş MS Afrika Ø ad — I.1975. N

Genus **Psittacula** Cuvire, 1800

155. *Psittacula krameri manillensis (Bechstein), 1800*

A—1541 Westafrika Ø — — — N

Genus **Agapornis** Selby, 1836

156. *Agapornis pulleria (L.), 1758*

A—1531 Westafrika Ø — — 1974. N

Genus **Loriculus** Blyth, 1850

157. *Loriculus galgulus (L.), 1758*

A—1537 Kalimantan Ø — — — N

Genus **Platycercus** Vigors, 1825

158. *Platycercus eximius (Shaw), 1792*

A—1536 Australien Ø — — — N

Genus **Cyanoramphus** Bonaparte, 1854

159. *Cyanoramphus novaezelandia (Sparrman), 1787*

A—1898 Zoo Wien Neuseeland Ø 15.V.1981. N

Genus **Melopsittacus** Gould, 1840

160. *Melopsittacus undulatus (Shaw), 1805*

A—1158 Reghin, Gefangenschaft (Australien) Ø — — 1959. N

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# *RECENZII*

**Concise Dictionary of Biology,** Edited by Elisabeth Martin, Oxford Science Publications, Oxford, 1985, 256 pages.

The dictionary covers a relatively arge number of terms and concepts in biology, biophysics, biochemistry and key terms from medicine and paleontology.

The terms are clearly defined, providing valuable information. Due to the cross-referencing system, each entry may be placed in a broader scientific context. In order to better convey the meaning of a term, drawings (in anatomy, physiology, histology, biophysics, a.o.), chemical formulae (*i.e.* the structure of certain substances: steroids, cholesterol, testosterone, DNA and RNA molecules, etc.), and diagrams (*e.g.* blood vascular system, protein synthesis) are used. The final part comprises a range of tables providing information on basic and supplementary SI units, derived SI units with special names, conversion of units to SI units, a classification of animal and plant kingdoms, and the geological time scale.

The dictionary is a valuable source of information not only for specialists and biology students, but for anybody seeking concise and accurate definitions of biological terms.

IOAN COROIU

Václav Větvička, **Arbres et arbustes,** Ed. Gründ, Paris, 1984, 311 pages et 256 illustrations en couleurs.

Un livre qui doit être „bouquiné" par tout amoureux de la nature, un ouvrage qui se doit de figurer dans la bibliothèque de chaque botaniste, de chaque floriculteur, de chaque silviculteur et même dans celle des étudiants.

Dans la *première partie*, l'auteur présente quelques notions sur les caractères morpho-structuraux des espèces ligneuses (arbres, arbustes, arbrisseaux et lianes) qui ornent souvent les jardins tant publics que privés. Ensuite, le lecteur peut aussi y trouver quelques aspects sur l'écologie et sur la répartition de 5 grands types de forêts décidues ou non décidues de la Terre. Les considérations éco-protectrices, pratiques (concernant l'utilisation à des fins médicinales ou industrielles) et la courte histoire de l'introduction des essences ligneuses exotiques en Europe sont plus que bien venues.

Le plus grand volume de ce livre comprend les *descriptions illustrées*, où l'auteur du texte a réalisé une heureuse collaboration avec la graphicième — Vlasta Matoušová — dans la présentation d'environ 300 espèces.

À partir de la vieille Ginkgo et jusqu'à la Catalpa de Chine, les espèces sont ordonnées systématiquement et pour chacune on y fait une description de l'origine, de la silhoutte, des caractères botaniques, de la valeur décorative aussi bien que des commentaires taxonomiques.

Le contenu scientifique et l'illustration, dans une belle édition, font d'„*Arbres et arbustes*" un livre de haute valeur théorique et pratique.

VASILE CRISTEA

Claude Marius, **Mangroves du Sénégal et de la Gambie. Écologie, Pédologie, Géochimie, Mise en valeur et aménagement** (*Mangroves of Senegal and Gambia Ecology, Pedology, Geochemistry, Valorization and Management*), Editions de l'ORSTOM, Paris, 1985, 357 pages with 73 figures included in the text, 10 plates and 59 tables.

This work is a doctor's thesis dedicated to the study of mangroves at the boundary between the West African Coast and the Atlantic Ocean, more exactly at the estuaries of the Senegal and Gambia rivers. This monograph is rather geographical and pedological than biological. Originalities of soil chemistry, geomorphology, sediment evolution and local climate with respect to most of the tropical mangrove areas are pointed out. The mangrove flora and fauna are discussed only on 5 pages, whereas the biogeochemistry of mangrove swamps, the contribution of organic matter and of microbiological processes to the genesis of pyrite are largely discussed. Such ecological processes are not described in other monographical works on mangroves from other areas (the Red Sea

and the Malay archipelago). Finally, the detailed description of the West African mangrove ecosystem as a whole is a valuable contribution to the studies of mangroves the world over.

BOGDAN STUGREN

Galina Pospelowa, Hildegard Fliess, **Biologischer Pflanzenschutz in der Sowjetunion.** In Kommission bei Duncker und Humblot, Berlin, 1987, 218 Seiten, mit 9 Abbildungen und 13 Tabellen.

Die Arbeit umreißt auf der Basis einer reichen einschlägigen Literatur (356 bibliographische Angaben, davon 148 im Text zitierte Titel) den heutigen Stand der Entwicklung und praktischen Anwendung biologischer Pflanzenschutzverfahren in der Sowjetunion.

Die Darstellung gliedert sich in 10 Kapitel, in denen auf die wachsende Bedeutung biologischer Bekämpfungsmethoden im Rahmen des weltweit angestrebten „integrierten Pflanzenschutzes" und auf die in dieser Richtung erzielten Erfolge der Sowjetforschung hingewiesen wird. Nachdem anhand statistischer Angaben auf die Anwendung chemischer Pflanzenschutzmittel unter Berücksichtigung der damit verknüpften wirtschaftlichen Nachteile und ökologischen Risiken eingegangen wird, gibt die Studie eine Übersicht über die spezifischen Ziele bei der Entwicklung biologischer Bekämpfungsmethoden im Rahmen langfristiger Forschungsprogramme und faßt die wertvollen Ergebnisse der Sowjetforschung bei der Ausarbeitung, Vervollkommnung und praktischen Anwendung von biologischen Methoden, mikrobiologischen Präparaten und biotechnischen Verfahren zusammen. Besonders hervorgehoben werden die Ergebnisse bei der Insektenbekämpfung durch Entomophagen und Eiparasiten (insbesondere *Trichogramma*—Arten), der Milben und Blattläuse im Unterglasbau, der Unkrautbekämpfung durch Phytophagen, sowie beim Einsatz von mikrobiologischen Präparaten und biotechnischen Verfahren (Chemo — und Radiosterilisation, Anwendung von Lockstoffen), wobei wertvolle Hinweise für die Forschung und praktische Anwendung gegeben werden. Außerdem werden die wirtschaftlichen Schadensschwellen für verschiedene Pflanzenkulturen angegeben und die Kriterien für die Wirksamkeit der natürlichen Feinde von Pflanzenschädlingen angeführt. Der Leser erhält Einblick in die Organisation des Pflanzenschutzdienstes, die Entwicklungsperspektiven und Ziele der laufenden Forschungsprogramme, wobei Probleme der internationalen Kooperation in diesem Bereich angeschnitten werden.

Schließlich sind im Anhang weitere Angaben über die Anbauflächen verschiedener Pflanzenkulturen, die zugelassenen Biopräparate, die wirtschaftlichen Schadensschwellen für erforderliche Schutzmaßnahmen gegen die Schädlinge der Zuckerrübe, sowie Hinweise auf Forschungsinstitute für Pflanzenschutz enthalten.

Durch die kritische Diskussion der bisher erzielten Ergebnisse enthält die Abhandlung gleichzeitig wertvolle Anregungen für die weitere Entwicklung der biologischen Pflanzenschutzverfahren im Rahmen einer engeren internationalen Zusammenarbeit in Forschung und Praxis.

MARTIN KEUL

**Exkursionsflora für die Gebiete der DDR und der BRD,** *Band* 2, *Gefäßpflanzen*, 13. *Auflage (Flora Field Guide for the Regions of the GDR and the FRG*, Volume 2, Vascular Plants, 13th Edition), Herausgegeben von (Edited by) R. Schubert, K. Werner und (and) H. Mensel, Volk und Wissen Volkeigener Verlag, Berlin, 1987, 640 pages with 601 figures in the text.

The subjects have been grouped into 3 main sections: the general part (pp. 8—57), the keys for the identification of genera (pp. 61—94) and species (pp. 95—603) of *Pteridophyta* and *Spermatophyta*. Very interesting chapters on phytogeopraphy, phytocoenology, taxonomy, and protected plants are grouped in the general part, besides the anatomy and morphology of plants (pp. 8—37).

The book ends with an author's index, a general presentation of the taxonomic system and indexes of German popular names, Latin names and abbreviations used in the text.

Apart from the previous editions, the last two editions have the identification key of the families entirely revised and the nomenclature brought up to date. Most of the chapters have been substantially modified by more complete and accessible information.

We heartily recommend this well-known and appreciated work to all the friends of nature.

GHEORGHE COLDEA

**Exkursionsflora für die Gebiete der DDR und der BRD,** *Band* 3, **Atlas der Gefäßpflanzen.** 6. Auflage, Herausgegeben von E. Jäger, R. Schubert und K. We -

ner, Volk und Wissen Volkseigener Verlag, Berlin, 1987, 752 Seiten, mit 2814 Abbildungen.

Die durch ein enges schöpferisches Zusammenwirken von 14 Botanikern und 17 Graphikern völlig neu bearbeitete 6. Auflage des 3. Bandes W. Rothmalers „Exkursionsflora" umfaßt als „Atlas der Gefäßpflanzen" mit 2814 abgebildeten Pflanzen fast alle der im 2. Band angeführten Arten des berücksichtigten Gebietes. Die graphischen Darstellungen und die entsprechenden Abbildungsunterschriften vermitteln trotz der für eine „Exkursionsflora" erforderlichen Raumersparnis eine Fülle von Informationen, die die sichere Bestimmung der Pflanzenarten im Gelände erleichtern.

Die Abbildungen veranschaulichen in der Regel den vollständigen Habitus der Pflanzen und machen auf kennzeichnende morphologische Merkmale der Arten aufmerksam, wobei diagnostisch besonders wichtige Charaktere in teilweise stark vergrößerten Detailzeichnungen hervorgehoben werden, denen Maßstäbe zur leichten Abschätzung der natürlichen Größen beigegeben sind.

Ein besonderer Vorzug des vorliegenden Abbildungsbandes besteht in der Aufnahme von Merkmalen hinsichtlich der Blattmorphologie, der Behaarung, der Wurzelstockrichtung, typischer Wuchsformen und anderer vegetativer Kennzeichen, die sich sonst nur ungenau durch die einfache Beschreibung in den Bestimmungsschlüsseln des 2. Bandes definieren und veranschaulichen lassen, die aber für die Bestimmung vieler Pflanzen besonders im nichtblühenden Zustand von Bedeutung sind. Die Abbildungsunterschriften bringen neben der deutschen und wissenschaftlichen Benennung der Arten weitere wichtige Hinweise, die sich auf die Pflanzengröße, die Lebensform, die Blütezeit, die Blütenfarbe und eventuell auf andere typische Merkmale der Pflanzen beziehen. Zusätzliche Angaben gelten den im Gebiet unter Naturschutz stehenden Arten. Eine Liste mit Ergänzungen, das Literaturverzeichnis und die alphabetischen Register der deutschen und lateinischen Pflanzennamen, sowie die Erklärungen der verwendeten Zeichen und Abkürzungen vervollständigen den sorgfältig bearbeiteten und graphisch ausgezeichnet gelungenen Abbildungsband der Gefäßpflanzen des Gebietes. In Verbindung mit dem 2. Band ist der vorliegende Atlas ohne Zweifel ein verläßlicher Geländebegleiter sowohl für den an der Botanik interessierten Naturfreund als auch für den Wissenschaftler.

MARTIN KEUL

Paul Ozenda, **Die Vegetation der Alpen im europäischen Gebirgsraum.** Gustav Fischer Verlag, Stuttgart, New York, 1988, 353 Seiten, mit 223 Abbildungen und 1 Farbkarte.

Zum ersten Mal 1985 in französischer Sprache unter dem Titel „La végétation de la chaine alpine dans l'espace montagnard européen" erschienen, wird dieses wertvolle geobotanische Werk in deutscher Sprache von Magister Andreas Zirnig und von Prof. Dr. Hannes Mayer übersetzt und 1988 neugedruckt. Das Buck, obwohl es kein komplettes Studium über die gesamte Vegetation der Alpen ist, wie es auch der Autor im Vorwort festsetzt, ist allerdings ein echtes Modell biogeographischer und ökologischer Behandlung der Vegetation eines Gebirgsstockes. Die Vielfältigkeit der wissenschaftlichen, geobotanischen und pedo-ökologischen Angaben ist wohlerwogen in 13 Kapiteln verteilt, die dem Leser ein umfassendes Bild über die Alpen verschaffen.

Im 1. Kapitel wird eine Lokalisierung der Alpen in den europäischen Gebirgssystemen gemacht und es werden die geologischen, geomorphologischen, klimatischen und pedologischen Hauptdaten vorgestellt.

Im 2. Kapitel wird eine komplexe Analyse der Pflanzenwelt der Alpen durchgeführt, wobei die paläogeographischen Etappen aus der Entwicklung der Vegetation, die phytogeographischen Hauptelemente und die Wanderungs- und Bildungswege der Arten unterstrichen werden. Man schätzt, daß die kormophyte Pflanzenwelt der Alpen 4500 Arten zählt, von denen ungefähr 350 endemische Arten sind, was eigentlich 3/7 der ganzen Pflanzenwelt Europas bedeutet.

Im 3. Kapitel definiert man ökologisch und biologisch die Stufen und Unterstufen der Alpenvegetation, in engem Zusammenhang mit der Holzvegetation. Man charakterisiert ebenfalls und man begründet theoretisch den Begriff „Vegetations-Serie" und man erläutert ihn durch Beispiele der potentiellen Phytozönosen und der grundlegenden Abzweigungen.

Im 5. Kapitel stellt man die verwaltungs-politische Situation des Alpenraumes und mit Hilfe von Schaubildern die Schwankungen der Landbevölkerung in den französischen Alpen im Zeitabschnitt 1848—1962 vor. Gleichfalls stellt man die landwirtschaftliche Bodennutzung aus den verschiedenen Zonen der Alpen und die dadurch hervorgerufenen Veränderungen in der Struktur und Funktion der natürlichen Ökosysteme dar, wobei die Notwendigkeit des Schutzes eini

ger vom wissenschaftlichem Interesse aus wichtigen, vom zooanthropischen Zusammenstoß gefährdeten Zonen hervorgehoben wird.

In den Kapiteln 6—9 charakterisiert man ausführlich aus geobotanischem und ökologischem Gesichtspunkt die 5 spezifischen Vegetationsstufen der Alpen (submontane, montane, subalpine, alpine und nivale) und man gibt genau an auf jeder Stufe die Verbreitung bezüglich der Höhe, die pedo-klimatischen Bedingungen, die bedeutendsten Vegetationsgesellschaften und die ableitenden Gesellschaften, mit dem Hinweis zur Hauptbibliographie, sowie die Vegetationsserien die jede einzelne Stufe individualisieren. Die für jede einzelne Stufe spezifischen Vegetationsformationen sind am Ende des Buches auf einer sehr suggestiven Farbkarte dargestellt.

In den Kapiteln 10—12 werden die floristischen, geobotanischen und ökologischen Eigentümlichkeiten der Alpen beschrieben im Vergleich zu anderen benachbarten Massiven, wie z.B. die Kalkgebirge Jura, Apennin-Dinariden, der herzynische Gebirgsbogen von den Sudeten bis Schwarzwald und die zwei Gebirgsketten, Pyrenäen und Karpaten.

Im letzten (13.) Kapitel der Arbeit wird die Einheit des subalpinen Systems auf Grund des Vergleiches mit anderen Gebirgsmassiven Europas festgelegt, wobei die für die Alpen spezifischen Arten, Holz— und Grasphytozönosen hervorgehoben werden.

Das Literaturverzeichnis umfaßt die bedeutendsten geobotanischen Arbeiten bezüglich der Alpen und der angrenzenden Gebirgsmassive.

GHEORGHE COLDEA

**Mycologie. Pilzkunde**, 1. *Auflage* (*Mycology*, 1st Edition). BI — Lexikon. Herausgegeben von (Edited by) Heinrich Dörfelt. Bibliographisches Institut, Leipzig, 1988, 432 pages with 48 plates and numerous figures in the text.

An original work, long awaited by both specialists and nonspecialists interested in the practical or theoretical aspects of mycology, the mycological lexicon is the result of the efforts made by 9 reputed specialists, co-ordinated by Dr. Heinrich Dörfelt.

The lexicon is of great interest as the fungi are treated both from the food—toxicologic point of view and from their implication in the human and veterinary medicine, in agriculture and forestry, in the industry of pesticides, antibiotics, etc. The ecological aspects are not omitted either, the stress falling upon the value of fungi as decomposers and consumers.

The authors define and explain the wide-spread mycological terms, emphasizing the morphology and systematics, and including also the main mycological notions of phytopathology, physiology, biochemistry, cytology, medicine, technical mycology, genetics, zoology, ecology, aspects from the mycological research history, etc.

Though extended upon 432 pages, the authors are aware of the impossibility to exhaust the subject in a single volume, and indicate a valuable bibliography of 162 titles.

The work is of interest for lichenologists, too, as it includes the main lichenological terms as well.

The terms are treated alphabetically and the principal synonyms are indicated.

The well-inspired choice of terms, the clear and concise text allow a rapid and useful information, and the successful coloured pictures with the very suggestive drawings permit an easy identification of the taxa.

The work appeals to a large group of readers (mycologists, phytopathologists, ecologists, agri— and sylviculturists, physicians, historians, geneticists, biochemists, cytologists and amateur mycologists).

Owing to the value of the content, to the structure of information and to the graphical realization, the book reviewed here will certainly become a work of reference in mycology, that won't stop at a single edition.

ADRIANA POP

W. Jacobs, M. Renner, **Biologie und Ökologie der Insekten.** 2. *Auflage*, Gustav Fischer Verlag, Stuttgart, 1988, 690 Seiten mit 1261 Abbildungen.

Die Insekten bilden mit annähernd einer Million bekannter Arten die größte Gruppe von Lebewesen, welchen zu Recht die zahlreichsten wissenschaftlichen Arbeiten gewidmet sind.

Das Buch „Biologie und Ökologie der Insekten" bearbeitet von dem verstorbenen Professor W. Jacobs, ergänzt, revidiert und neu herausgegeben von Professor M. Renner, stellt neuerdings die umfassendste und nützlichste Arbeit ihrer Art dar.

Der Nobelpreisträger Karl v. Frisch hat darüber einmal geschrieben: „Wie glück

lich wäre ich gewesen, wenn es zu meiner Studienzeit ein solches Buch gegeben hätte!".

Das Werk behandelt alle Insektengruppen anhand von zahlreichen Beispielen der bekanntesten Repräsentanten der zentraleuropäischen und nordmediterranen Fauna. Die zweite Auflage bedient sich der neuesten Nomenklatur mit Hinweisen auf die häufigsten Synonyme.

Zusätzlich zu Bestimmungswerken, welche bloß zum Erkennen der Taxa dienen, bietet das vorliegende Lexikon reiche Informationen über Biologie, Ökologie, Ethologie und Physiologie der Insekten.

Das Sachregister (bei Arten die lateinischen und deutschen Namen) ist alphabetisch geordnet und erleichert somit die Benutzung des Lexikons. Die taxonomischen Kategorien werden allgemein verständlich beschrieben, beginnend mit genereller Charakteristik der Ordnung (Morphologie, Biologie, Ökologie, Ethologie usw.), der Familien und Beispielen innerhalb der Familien (Gattungen, Arten).

In klarem und präzisem Text werden die vielen Begriffe erläutert. Mehr als 1200 Abbildungen tragen zum leichteren Verständnis derselben bei, wodurch das Buch gleichzeitig als Bestimmungswerk für die vielen Insektengruppen dient.

Die Autoren sind bemüht, die weit verbreitete Meinung über die Schädlichkeit von Insekten für Menschen und Ökonomie zu bekämpfen. So wird im besonderen die Nützlichkeit der meisten Insekten für den Menschen hervorgehoben (Blütenbestäuber, Raubinsekten, Parasiten von Schädlingen, Destruenten, Insekten als Nahrungsmittel- und Rohstoffquellen usw.).

Für jede angeführte Spezies werden Hinweise auf wichtige Literatur angegeben, und so wächst der am Schluße angeführte Literaturnachweis an die 900 Titel an.

Das mit biologischen und ökologischen Informationen reich ausgestattete Lexikon wendet sich nicht nur an Schüler, Studierende und Biologielehrer, sondern auch an Ökologen, Zoologen, Agronomen, Forstwirtschaftler, Physiologen, Ethologen und Forschern auf dem Gebiete der medizinischen Entomologie.

Handliches Format und resistenter Einband sowie ein leicht zugänglicher Informationsreichtum gestalten dieses Buch zu einem wertvollen Taschenlexikon.

LÁSZLÓ RÁKOSY

Wolfgang Metzler, Dieter Gockert, **Dynamische Systeme in der Ökologie** *(Dynamic Systems in Ecology)*, Teubner, Stuttgart, 1987, 210 pages, with 79 figures in the text.

The book exhibits principles and technics of modelling complex, dynamic systems, *i. e.* simulation of ecological systems on the basis of mathematically well investigated dynamic big systems, which work by input—output mechanisms. The mathematical framework is developed from the Lotka—Volterra differential equations. The authors show fundamental interests in the modelling of predator—prey systems, population dynamics, and complex interactions in the process of „Waldsterben", the anthropogenic process of forest dying in Central Europe. They explain this systemic phenomenon as a consequence of a more simple, elementary event, namely the „Baumsterben", the dying of individual trees, caused by toxic chemicals in the atmosphere. The modelling of the „Waldsterben" could be understood only when the elementary event of „Baumsterben" is fully described as the evolution of a dynamic system. For the mathematically minded biologist this is a stimulating work. But it tells nothing for those biologists who have no instruction in mathematics. It seems to me that the aim of the work is to find a mathematical pattern for certain ecological processes in order to be formalized in a mathematical language for mathematicians who have no fundamental biological knowledge.

BOGDAN STUGREN

**Forest Ecosystems in Industrial Regions.** Edited by W. Grodziński, J. Weiner and P. F. Maycock, Springer—Verlag, Berlin—Heidelberg—New York—Tokyo, 1984, XVIII + 277 pages with 116 figures and 100 tables.

This work is volume 49 of the worldwide-known monograph collection "Ecological Studies". The present volume reunites papers by 51 Polish and one Canadian scientists. The team elaborated a monograph dedicated to the study of structure and dynamics of a lowland forest ecosystem (Niepolomice Forest near Cracow), a mixed forest, composed of pine and oak-hornbeam. The ecosystem works under the stress of an industrial region, which is not far located from the woody area. Therefore, the study of the biological processes in the vegetation and wildlife could bring out some data on the effects of chemical pollutants on the physiology of plants.

Chapter 1 describes existing climatic, edaphic and vegetational features. Chapter 2 tells about transport and input of air pollutants in the area, while chapter 3 exposes primary production of forested and nonforested natural areas in this study site. Chapter 4 deals with energy and matter flow in various consumer compartments (phytophagous insects, rodents, roe deer, red deer, wild boar, carniverous mammals, and birds). Chapter 5 deals with decomposition of dead organic matter, and chapter 6 with the outflow of macro- and microelements through the area. Chapter 7 draws conclusions on this forest ecosystem as an energy converter and estimates its chemical budget. Finally, chapter 8 outlines principles and technologies of forest management in industrial regions. References: 516 titles.

BOGDAN STUGREN

D. Franck, **Verhaltensbiologie. Einführung in die Ethologie** *(Behavioural Biology. Introduction to Ethology)*. Zweite, neubearbeitete und erweiterte Auflage (Second, revised and enlarged edition), Deutscher Taschenbuch Verlag, München, G. Thieme, Stuttgart- New York, 1985, 301 pages with 159 figures in the text.

The author, who is a professor of zoology at the University of Hamburg, has done in this paperback a concentrated textbook of ethology, *i.e.* essentials of ethology in the manner of a scientific monograph, but which, by its style, does not exclude the non-biologists from the circle of interested persons.

The work includes, as a first introductory chapter, basic concepts of ethology and general methods of ethological investigations. The book comprises three sections: 1. Physiology (physiological mechanisms of behavioural patterns), 2. Ontogeny (development of learning of behaviour during individual life), and 3. Evolution (genetic backgrounds of human behaviour, natural selection as a driving force of evolutionary trends in behavioural patterns of vertebrate populations, the phenomenon of ritualization, essentials of sociobiology). The book is provided with examples of research results and with 235 references of further leading special works. A subject index closes the paperback.

BOGDAN STUGREN

Gerhard Jagnow, Wolfgang Dawid, **Biotechnologie. Eine Einführung mit Modellversuchen** *(Biotehnologie. O introducere cu experimente model)*, Ferdinand Enke Verlag, Stuttgart, 1985, 225 pagini cu 56 figuri și 16 tabele.

În timp ce în ultimii ani au apărut manuale vaste despre biotehnologii, pînă acum a lipsit o prezentare concentrată în forma unui manual util și pentru studenți. În cartea de față sînt descrise cele mai importante biotehnologii, arătîndu-se cum produsele obținute prin acestea pot acoperi necesarul multor alimente, furaje, medicamente, materii de bază pentru sinteze chimice, pentru obținerea de energie. Lucrarea cuprinde 5 capitole, urmate de o prezentare succintă a 16 experimente model, de lista materialelor și a culturilor de microorganisme, bibliografie și un index alfabetic.

În cap. 1 se prezintă metode clasice din industria alimentară și a bunurilor de consum în care se utilizează microorganisme. Este vorba în primul rînd de utilizarea drojdiilor în panificație, apoi de obținerea băuturilor alcoolice (vin, bere) prin microorganisme capabile de fermentația alcoolică. Se descrie biotehnologia obținerii oțetului și pe urmă conservarea unor produse prin fermentație lactică.

Capitolul 2 este dedicat celulelor microbiene utilizate pentru obținerea hranei animalelor (drojdii cultivate pe *n*-parafine, bacterii metilotrofe pe metanol), respectiv biotehnologia champignonilor *(Agaricus bisporus)* pentru hrana omului.

Capitolul 3 aduce date referitoare la produșii de metabolism microbian utilizați pentru sinteze chimice. Se explică biotehnologiile cu clostridii pentru obținerea acidului butiric, butanolului, acetonei și izopropanolului. Se descrie apoi formarea microbiană a acidului citric și a altor acizi organici. Se prezintă obținerea pe cale microbiană a etanolului și a metanului ca surse de energie, precum și instalații de producere a biogazului.

În cap. 4 se cuprind metode biotehnice pentru industria farmaceutică, precum și unele cu aplicabilitate în agricultură. Așa de exemplu este tratată biochimia și producerea biotehnologică a unor aminoacizi (acidul L-glutamic, L-lizină, L-triptofan), biosinteza unor antibiotice cu ajutorul micromicetelor, actinomicetelor și bacteriilor (penicilină, streptomicină, bacitracină), obținerea unor vitamine cu ajutorul microorganismelor, folosirea unor microorganisme în producerea dextranului ca substituent al plasmei sanguine,

precum și în sinteza unor hormoni vegetali. Sînt incluse și biotehnologii ce prevăd introducerea microorganismelor în protecția plantelor (utilizarea unor microorganisme sau a unor inhibitori microbieni pentru combaterea unor dăunători), în tratarea semințelor cu bacterii simbiotice, în folosirea unor actinomicete și micromicete simbiotice (cele care produc micorize).

Capitolul 5 aduce biotehnologii care utilizează microorganisme pentru epurarea apelor reziduale, a aerului și pentru reciclarea deșeurilor (compostarea deșeurilor agricole și menajere). În final sînt redate sintetic 16 experimente model, la baza cărora se află folosirea microorganismelor (bacterii, actinomicete, levuri, ciuperci de mucegai).

Lucrarea reprezintă o sursă modernă de informații pentru studenți și specialiști interesați în cunoașterea și aplicarea biotehnologiilor.

MIHAIL DRĂGAN-BULARDA

**Science as a Way of Knowing. II. Human Ecology,** and **III. Genetics,** Edited by J. A. Moore, American Society of Zoologists, University of California, Riverside, 1985—1986.

The series of scientific monographs "Science as a Way of Knowing" comprises various volumes designed to provide background information for teachers and students interested in introductory courses of biological sciences. In this issue, we discuss volume II, dedicated to Human Ecology, and volume III dedicated to Genetics (of 621 and, respectively, 918 pages). Every volume is provided with references (global in vol. II, connected to special chapters in vol. III). The essential feature of the volumes is that the material is not overloaded by facts, but fundamental concepts are deeply discussed and emphasized. This is the typical manner of American universities to elaborate textbooks and monographs.

The volume of "Human Ecology" comprises introductory readings on this discipline (P. R. Ehrlich and A. H. Ehrlich), and articles on various topics: trophic ecology of the mankind (J. L. Fischer), combined chemical/microbiological approach to atmospheric mutagens and carcinogens (J. N. Pitts, Jr.), medical problems in human population dynamics (L. Breslow), theoretical ecology of epidemic diseases (R. M. May), ecological relations of human species and the sea (G. Carleton Roy), and some other subjects.

The volume of "Genetics" is a synthetic work, which reunites classical, old problems (history of Mendelian genetics) with fundamental studies of molecular genetics (M. W. Stickelberger), and the relation of population genetics and evolution (R. C. Lewontin).

BOGDAN STUGREN

**Perspectives in Microbial Ecology,** Edited by F. Megušar and M. Gantar, Slovene Society for Microbiology and Biotechnical Faculty, E. Kardelj University, Ljubljana, 1986, XVI + 684 pages with 368 figures and 262 tables in the text.

The volume represents the Proceedings of the Fourth International Symposium on Microbial Ecology, held in Ljubljana, Slovenia, Yugoslavia, between 24 and 29 August, 1986. It contains two keynote papers, 86 invited papers and 23 contributed papers, elaborated by 203 authors.

The keynote papers have the following topics: "Biochemical ecology of anaerobes" (R. S. Wolfe) and "Microbial ecology and the prepared mind" (H. G. Schlegel).

The invited papers are grouped into many sections: Models in microbial ecology; Extreme environments; Microbiology of wastewater treatment; Phototrophs; Trends in microbiological theory; Unusual microorganisms; Anaerobic interactions and systems; Polar environments; Cycling of elements; Marine microbiology; Actinomycetes; Ecology of fermented food; Microbiology of soil fertility; Fungal ecology; Human pathogens in the environment; New methods; Terrestrial ecosystems; Genetic elements, and Microbial interactions and influences in gastrointestinal tract.

It is evident even from this list of section headings that the invited papers have covered most domains of microbial ecology.

Majority of the contributed papers deal with microbial ecology of soils, natural waters, wastewaters and aquatic sediments. A few papers are devoted to other topics: nitrate reductase and nitrite reductase of different bacterial species; ecology of the seafood and rumen microorganisms and of *Renibacterium salmoninarum* (the causal agent of a kidney disease in salmonids).

Proceedings of the Ljubljana Symposium reflect the recent advances in microbial ecology and will, undoubtedly, stimulate further development not only of the micro-

bial ecology but also of the other branches of fundamental and applied microbiology. This is why I consider that the edition of this valuable work was and remains an important event in the contemporary history of microbiology.

ŞTEFAN KISS

V. M. Balayan, R. M. Korotkii, **Khimiceskii yazyk nasekomykh** (*The Chemical Language of Insects*), VO Agropromizdat, Moskva, 1987, 140 pages with 62 figures.

The research made during the last decades concerning pheromones has materialized not only in several papers of strict speciality but also in a number of books for non-specialists. Writing papers for popularizing science is an extremely difficult task because it is necessary that the researcher possesses not only a good knowledge of the investigated domain but also an artistic talent. Such a book of popularization, which includes rich scientific knowledge, which combines the scientific style with that of the true writer is "The Chemical Language of Insects".

The purpose of this book is not only to stress the role of pheromones in the life of the insects but also to underline the function, undertaken by the volatile substances elaborated in plants, in the establishment of the interrelationship insect-plant.

Studying the chemoreceptory organs (which are placed mostly on the antenna), the pheromones and the behaviour of insects, scientists entered the very intimacy of the communication system of the largest class of animals. The understanding, even only partially, of the chemical language of insects, one of the oldest means of communication in the animal world, permitted the researcher, after a synthesis of a series of pheromones (the sexual ones, the aggregation, the trace, and the alarm ones), to draw conclusions concerning the number of insects in populations and sometimes even to adjust it, reducing their number under the economic limit of damage, using this unpolluted means of fight. Applying pheromones in the fight against pest insects proved to be a much more accessible method than using hormones, although these are also used with good results in the case of some species.

Studying the internal mechanisms by which plants defend themselves against the attack of pest insects, it has been ascertained that some of them have chemical components (insect hormones and pheromones, fitoncides, antifeedants, etc.) which give them an efficient protection. Due to these studies, based on old folk practices, the scientists opened a new way of fighting against pest insects, based on the utilization of these substances as non-pollutant "chemical weapons".

We also mention that in the same book other researches are described, which helped the scientists reach certain important discoveries, some of these experiences being nowadays carried out in school laboratories; for instance, the experience that offered the famous French entomologist Fabre the opportunity to identify "the chemical language of insects", a discovery which couldn't have been possible without the profound knowledge of the species he worked with, the butterfly *Saturnia pyri*. In this case, as in many others, it can be seen that great discoveries may appear as the result of a lucky happening; nevertheless, behind it passionate and intelligent work of many years is hidden.

An extremely welcome fact is also that this book contains the names of famous scientists, from ancient times until nowadays, naturalists, biologists, chemists, biochemists — Russians as well as other nationalities that contributed to the study of the volatile substances belonging to insects and plants. Being the beneficiaries of their discoveries, the names of such scientists should be alive in our conscience.

The last chapter of the book, "Let us live together", deals with the necessity of knowing the functioning laws of ecosystems, of the biosphere in general. One of the most important ways of breaking these laws is the unlimited use of the unselective polluting insecticides to completely destroy the pest insects. The new idea is that in order to maintain the equilibrium of the ecosystems the populations of all the species that belong to the ecosystems are necessary; in the fight against pest insects, the purpose is the reducing of their number under the economic limit of damage (not their extermination) by using the "integrated fight", which implies the joint use of insecticides from the second and third generation and of the agrotechnical methods, avoiding the pollution of the environment.

Although for the specialists the book does not reveal new data, its reading may be a spiritual delight, due both to the original outlook that constituted the basis of its conception, and to its literary virtues.

PANTE GHERGHEL

B. Stugren (coordonator), **Ocrotirea naturii. Tradiții, actualitate, perspective** *(Protection of Nature. Tradition, Actuality, Perspectives)*, Editura Dacia, Cluj-Napoca, 1988, 175 pages with 15 figures.

The book consists of a series of articles, some of them taken by its co-ordinator from the classical work of Romanian biology, others from the foreign literature, and a few are signed by contemporary specialists of the Universities in Cluj and Bucharest and of the Institute of Speology in Cluj.

Some of the papers (4) deal mainly with problems concerning the theoretical bases of the preservation of nature. Thus, when reading the pages written by Emil Racoviță (the founder of biospeology) in 1937, one notices that even in those years the protection of nature in our country was scientifically founded. We take the liberty to choose only two quotations regarding the protection of the species: "The ideal protection is only attained when the species, plant or animal, is protected in the form of a large reservation, in its original biotope" and "Any animal or vegetal species may become an important economical factor, whose value could not be visible for the time being but may be brought into light through a new discovery".

The paper written by Alexandru Borza (the founder of the Botanical Garden in Cluj) and presented at the 1st Congress of the Naturalists of Romania (1928) underlines with visionary daremindness the unhappy results that thoughtless exploitation of nature may have, not only from an economic point of view but also from ethical, aesthetic and scientific viewpoints.

An important theoretical contribution is represented by the paper written by the Soviet scientists A. V. Yablokov and S. A. Ostroumov in 1982, "Man and nature. From problems to solutions" which tries to axiomatize the knowledge regarding the protection of nature. We only mention the following quotation: "... it is imperative that the significance of the protection of nature should be taken into consideration when any decision is taken concerning the development of the economy, including the use of natural resources".

Another paper, written by Bogdan Stugren (University of Cluj) about the philosophical implications of the present ecological crisis, reveals the conceptions and attitudes of different civilizations (Near East, Far East, ancient Greece, etc.) concerning the environment.

Among the 13 articles of the book, 9 are important not only from a theoretical point of view, but also for their strongly applicative character. They speak about some important types of ecosystems (delta, flowing waters, sea, forest, urban conditions, and karst geosystem) whose ecological equilibrium is strongly influenced by the anthropic impact.

There are two papers concerned with the Danube Delta. One, published in 1910, belongs to Grigore Antipa. We only mention its title: "Is the draining of the Danube Delta possible?", and the conclusion that follows a methodical argumentation: "... the draining of the swamps of the Danube Delta and their change into agricultural lands is and remains, to say the least, a utopia". Still another statement of Grigore Antipa, who had an extremely important scientific contribution to the improvement of the fish production in the Danube Delta: Danube Delta's swamps "represent the most wonderful piscicultural pools that I know of". The second paper on the Danube Delta "Tendencies in the evolution of the Danube Delta and possibilities of its protection" is written by Nicolae Botnariuc (corresponding member of the Romanian Academy) and Angheluță Vădineanu (University of Bucharest). The work reflects the huge volume of biological information on this unique region of our country. Recent studies reveal that the Delta undergoes a strong process of eutrophication which leads to the flourishing of the waters. The final result is the strong diminishing of the fish production.

The paper by Nicolae Coman (University of Cluj) "Biological modifications in the Mediterranean and Pontic basin under anthropic impact" shows that the same phenomenon of eutrophication also takes place in the sea.

The forest, considered in all its complexity, is the subject of a paper by Emil Pop (former full member of the Romanian Academy). After a thorough analysis that deals with the complex role played by the forest (economic, strategical, that of refreshing the air, fixing of the land disposed in slopes, in hill and mountain regions, adjustment of the flowing water conditions, of the climate, as well as an ethical and aesthetic role), the paper concludes: "... forests are a leading factor in the evolution of our national destiny".

Deforestations have extremely serious consequences in karst zones where they can lead to real "stone deserts", as it is underlined in the paper about karst geosystems written by Gheorghe Racoviță (Institute of Speology, Cluj). The newest and most impor-

tant discovery regarding the cave fauna refer to the migrations it undergoes, through clefts of the earth crust, towards the exokarst environment till the basis of the soil and the other way round in search of an ecological optimum. This statement and the fact that part of the animals in caves eat organic residues taken from the exokarst also by means of clefts prove that in order to protect caves it is absolutely necessary to protect the exokarst environment, too. From a different point of view, one may underline the fact that the study of the animals in caves supplies important general biological data regarding the natural selection and the transformation of living organisms. At the present moment, the caves represent, together with national parks and the great natural reservations, "real laboratories for the study of the interrelations between organisms, between organisms and environment, etc."

But the study of the national parks may also lead to results of great applicative importance, as it is underlined in the paper "National parks as research and documentation archives in the evolution of species" which was published in 1968 by Kai Curry-Lindahl (University of Stockholm). The study of the biological productivity in national parks demonstrates that this is much higher in comparison with the same territory of the savanna, having the same origin as the first. This phenomenon can be explained by the richness and diversity of the vegetation from the national parks, which assures sufficient food for large populations of many species of herbivorous animals as compared to the populations of cows that graze in the savanna whose grass cover is far less rich in species. Moreover, in national parks, the nutrients extracted from plants return in the soil after the death of the animals and the soil fertility remains unchanged.

This is not the case with pastures, in which, if not artificially fertilized, the fertility diminishes little by little until they become devoid of certain elements (Ca, Fe, P, J), a lack that is to be felt in the plants and then in the cows. This is demonstrated in another paper "The climate and the history of mankind", published in 1950 by Julian Huxley (University of London) about pastures. This paper draws attention to the necessity of the rational exploitation of pastures, to the intensification of the studies of grass ecology and genetics with the purpose of their improvement, studies which, as compared to those dedicated to cereals, are fewer in number, although the products which have their origin in grass are diverse and important.

The paper that ends this book is signed by Ana Fabian (University of Cluj). It concerns itself with problems of phytoecology from the urban environment. From this paper, two ideas can be mentioned. The number of spontaneous plants that can be met in the urban environment is more and more diminished. Those that managed to still populate this environment present certain metabolical and physiological adaptations or possess a great ecological tolerance, such as lichens. Especially lichens are very thorough markers of the environmental quality. Their total absence indicates an advanced atmospherical pollution. In some cases, the polluted urban environment may become for plants an even less accessible place than the deserted rocks, frozen in the winter and burning in the summer, from the mountain peaks or the unfriendly desert. A second idea, scientifically presented, is that the green colour of plants is an indispensable condition for the physiological welfare.

At the end of this presentation we remark a final quotation from the paper by Nicolae Botnariuc and Angheluță Vădineanu about the Danube Delta, which is true for nature in general: "to protect does not mean to isolate, or not exploit, it means to interfere and exploit in such a manner that the regeneration of the resources, their quality and the stability of the ecological systems should not be disturbed".

We also add our belief that we have drawn attention upon a noticeable work, which due to its high level of complexity may bring to anybody the satisfaction of a deeper understanding of certain biological processes that take place in that nature in which we live and from which we must not separate.

PANTE GHERGHEL

T. Păunescu, I. Maftei, T. Hossu, T. Moșteanu, **Apifitoterapia** *(Apiphytotherapy)*, Editura Apimondia, București 1988, 112 pages.

Although medical herbs and apiarian products have been used since antiquity for different medical treatments, the idea of using them together as a medicine is somewhat new, *i.e.* from the beginning of the eighties. This idea was formulated by a Romanian pharmaceutics research worker, Tamara Păunescu (Virology Institute in Bucharest).

The difficult road of research, from the idea to its materialization into new apiphytotherapy products (Fobigel T, Ciploment T, Anemosistan T, Protil-Bostat T, Ivstenol T), meant, after a thorough bibliographic research, to perform a very large number of extracts (from various vegetal species and some apiarian products, especially propolis) which, after many trials, have been associated in certain proportions in order to obtain the desired therapeutic effect. The preparations were tested in laboratories on cell cultures and animals, and they were given a proper administration form. Finally, they were experimented in some specialized clinics. Thus, now not only their effectiveness is granted, but also the lack of any negative side effects.

Of the approximately 360 species of medicinal herbs from Romania's flora, the authors used only 14 such as the box thorn *(Hippophaë rhamnoides)*, whose fruit rich in vitamins (C, E, $B_1$, $B_2$, PP) is called "natural polyvitamin", and wild rose *(Rosa canina)*, with a high vitamin C content in the fruit.

About the composition of these new medicines, a fact to be mentioned is that they all contain, in different percentages, propolis extracts. Although many recent papers drew attention upon this valuable secondary beehive product, the results achieved by Tamara Păunescu and her team, the fact that they used it together with plant extracts, added a new value to the product. Thus, apiculturists must grant propolis a special attention, by placing the beehives in zones rich in sources of some vegetal resins (poplar, birch, chestnut, pine, etc.) as well as by stimulating the bees for their gathering.

But the book also underlines the importance of natural resources (substances which are biologically active) existent in some very common species of plants such as the plantain, the wild camomile, the field camomile, the willars and the hedge hyssop.

This new family of medicines permits, for a wide variety of human illnesses (stomatologic, hematologic diseases etc.) as well as for veterinary diseases (nonspecific gastroenterites, etc.), the application of an original Romanian method of treatment — apiphytotherapy, in most cases more efficient and always cheaper than the classical therapy.

The wide range of actions (antibacterial, antiviral, antimycotic, epithelizing, anaesthesic, etc.) of the apiphytotherapy products is due to their rich content in carbohydrates, lipids, proteins, vitamins, flavonones, organic acids, anthocyanins and volatile oils.

The slight shades that fall upon this remarkable work due to some printing mistakes, the fact that some authors quoted in the book were not included in the bibliography (Pora, E. A., 1975, pag. 75, etc.) and the less properly use of certain biological terms (species, pag. 16, paragraph a; genus, pag. 17, lines 14 and 15) cannot alter the admiration and the gratefulness of the reader for the almost 20 years of hard work directed to turning an idea into reality, an achievement meant to give health to human beings and at the same time to assert Romanian pharmaceutics research in the world.

PANTE GHERGHEL

T. Perju, M. Lăcătuşu, C. Pisică, I. Andriescu, G. Mustaţă, **Entomofagii şi utilizarea lor în protecţia integrată a ecosistemelor agricole** (*Entomophages and Their Utilization in the Integrated Protection of Agricultural Ecosystems*), Editura Ceres, Bucureşti, 1988, 242 pages with 144 figures.

Since the unhappy consequences and the limits of the use of the second generation insecticides have become obvious, the concept of integrated control has been substantiated Within the frame of this concept the study of entomophages has disclosed the importance of these animals in maintaining the equilibrium in agroecosystems. Some very effective species became biological agents in controlling insects of great harmful potential In this direction of research, a wide series of studies were undertaken in our country, too.

The authors of this book, university professors in Iassy, Bucharest and Cluj, associating a synthesis of the rich Romanian and foreign bibliography with a long experience of field control, have succeeded in creating an original work which represents a complete novelty.

The book deals only with entomophages belonging to the group of invertebrate animals and contains 6 chapters: General aspects concerning the biological control of pest insects (Chapter I), Morphology, bioecology and systematics of the main entomophages (Chapter II), Entomophages of the main pest insects in cereal plant cultures (Chapter III), natural meadows (Chapter IV), leguminous plant cultures (Chapter V) and in technical plant cultures (potato, sugar beet, sunflower, rape, hemp, cotton, tobacco, hop and poppy — Chapter VI).

The first chapter represents a scientific pleading in favour of the biological control of pest insects and for the limitation of chemical treatments to those with selective effect only. The chapter also underlines the importance of entomophages (predators and parasites) in maintaining the equilibrium of agroecosystems and indicates the ways of increasing their efficacy: their mass breeding and launching in agroecosystems, the creation of ecological conditions most favourable to their protection and multiplication, and in the cases of the species with few natural enemies, their colonization from the regions where they are abundant.

The second chapter describes shortly, following the same plan (diagnosis, biology, ecology and systematics), the most important groups of entomophagous and acarophagous invertebrates.

The next 4 chapters present the main characteristics of the agroecosystems in our country and for the most important pest insects it describes the entomophage complex, with references to diagnosis, biology and ecology. Among the pest insects in our country that attack many species of crop plants surpassing sometimes the economic level of harm, one may mention the aphids. Cereals are attacked by *Macrosiphum avene*, *Schizaphis graminum*, *Rhopalosiphum maydis*; leguminous plants by *Aphis fabae*, *Acyrtosiphon pisum*, *Aphis craccivora*; cotton by *Acyrtosiphon gossypii*; tobacco by *Myzodes persicae* and hop by *Phorodon humuli*. In reducing the number of aphids in the above mentioned crops, an important contribution is brought by a series of predators from the following families: *Coccinelidae (Coccinella septempunctata, Adonia variegata, Propylaea 14-punctata, Adalia bipunctata, Semiadalia undecimnotata*, etc.), *Chrysopidae (Chrysopa vulgaris, C. perla, C. carnea, C. formosa, C. ventralis, C. abbreviata)*, *Syrphidae (Syrphus venustus, Episyrphus balteatus)*, *Nabidae (Nabis ferus, N. pseudoferus)*, *Anthocoridae (Anthocoris sibiricus, Orius minutus)* and *Miridae (Deraeocoris ruber)*.

Predatory entomophages also play significant role in reducing the density in soil of those pest insect populations that attack the root system in cereals (*Agriotes lineatus, A. obscurus*, etc.), in hop (*Triodia sylvina*), in poppy (*Stenocarus fuliginosus*) or the leaves and inflorescence in rape (*Meligetes aeneus*). The most important natural enemies of these pest insects are some carabid species of the genera *Carabus*, *Bembidion*, *Harpalus*, *Calosoma*, *Amara* and some chilopods (e.g. *Polydesmus complanatus*).

In destroying certain pest insects such as the cereal bug, the straw wasp, the corn borer, an important role is played by some parasite species. Bug eggs are sometimes parasitized up to 90% by *Telenomus chloropus*, *Trissolcus simoni*, *T. grandis (Scelionidae)*. *Collyria coxator* and *C. puncticeps (Ichneumonidae)* may harm up to 95% of the larvae of *Cephus pygmaeus* and in the case of the corn borer submitted to experiments of biological control with *Trichogramma chilonis (Ichneumonidae)* a coefficient of 84% parasitism was recorded. Sometimes up to 60% of the larvae of pea weevil (*Bruchus pisorum*) are parasitized by *Triaspis thoracicus (Braconidae)*. The clover flower weevil larvae have been found to be parasitized by *Pseudotorymus apionis (Torimidae)*, *Triaspis caudatus (Braconidae)* and *Spintherus dubius (Pteromalidae)* in the following proportions: 50, 40 and 30%, respectively. *Hexameris albicans (Mermithidae)* has been recorded in hill regions with 85% parasitism in *Leptinotarsa decemlineata* larvae. The populations of sunflower seed moth are strongly reduced by *Apanteles lactaeus (Braconidae)*. Density of the cabbage weevil populations is reduced sometimes under the economic level of harm by parasitic hymenoptera. Thus, in *Ceutorrhynchus napi* up to 95% of the larvae are destroyed by *Tersilochus fulvipes (Ichneumonidae)*. In the case of the hemp moth (*Grapholitha delineata*), a special place in the complex of entomophagous parasites is occupied by *Scambus nigricans (Ichneumonidae)*, which parasitizes up to 30% of the larvae.

The book ends with a short synthesis concerning the protection and utilization of entomophages in the field cultures. This synthesis, elaborated by the co-ordinator of the book, Professor Teodosie Perju, contains the most important recommendations addressed to the agricultural practice in the light of the latest information on the ecology and biology of entomophages: use of the crop rotation, repeated loosenings of soils cultivated with root crops, cultivating of melliferous plants in plots intercalated among other cultures, plantation of forest belts for protection, etc. This range of measures ensure a high density of the entomophagous populations which may keep phytophagous pest species under control.

PANTE GHERGHEL

N. W. Moore, **The Bird of Time. The Science and Politics of Nature Conservation — A Personal Account,** Cambridge University Press, Cambridge — New York — New Rochelle — Melbourne — Sydney, 1988, XXII + 290 pages and 47 figures in the text.

The work is really a personal account, not a textbook or a monograph on nature conservation, the problems of natural resources and natural sanctuaries being seen by the eyes of a zoologist, who dedicated his life for nature conservancy and, especially, bird protection. The work is composed of 4 parts: I. Time and conservation; II. The past — experience from conserving habitats; III. The past — experience from controlling disease and pollution; IV. Towards the future.

The book is mostly concerned with British landscapes and their living world. The author's optic is that of an evolutionary time, the time in which species evolve, survive, and disappear. When conservation is put in its evolutionary context we find ourselves challenged by new and awesome responsibilities — concludes the author the first part of his book. The second part deals with the history of natural habitats and ecological crises produced by unreasonable management of land and water. Part III deals with diseases and pollutants as well as their effects on the health state of our environment. Part IV is an esquisse on the future of the conservationism in Britain especially and, generally, in the whole biosphere. The book comprises 173 references and a subject index.

BOGDAN STUGREN

G. Vogel, H. Angermann (Herausgeber), **Atlas zur Biologie** (*Atlas of Biology*), *Bd. 1—3* (Volumes 1—3), Deutscher Taschenbuch Verlag, München, 1988.

This work is neither a textbook, nor a vulgarization booklet of biological sciences. It is a three-volume paperback, which comprises essentials of all topics of biological disciplines in the good tradition of small encyclopaedical dictionaries based on the principle *multum in parvo*. Every volume comprises pages of text and coloured plates, placed side by side, and subject index and indexes of plant and animal names.

Volume 1 of 112 pages of text and 111 pages of coloured plates deals with general features of the living cells and tissues, the biology of *Procaryota*, unicellular algae, and *Protozoa*, organs and organ systems in plant and animal bodies, and a special section on the organization of vertebrates. The volume contains also text and plates about DNA as the genetic blueprint of individual development in plant and animal kingdoms (developmental biology of the genes), reproductive systems and biology of reproduction in plants and animals.

Volume 2 of 108 pages of text and 109 pages of coloured plates deals with general ecology, synecology and human ecology (including problems of nature conservation and environmental protection and management), and also with human and animal physiology (hormonal mechanisms, sensitive organs, functional patterns of the nervous system) and elementary topics of ethology.

Volume 3 of 71 pages of text and 72 pages of coloured plates deals with classical and molecular genetics, microevolution, and speciation, transspecific evolution, and the origin and evolution of man, and finally with systematics of plant and animal kingdoms.

The coloured plates are beautifully drawn by artists Inge and István Szász, on the basis of sketches made by the authors. Volume 3 is provided also with literature for all the three volumes and authors' index.

BOGDAN STUGREN

J. Dupayrat, **Dictionnaire chimique et technologique des sciences biologiques anglais/français** (*English/French Chemical and Technological Dictionary of Biological Sciences*), Éditions Lavoisier, Paris, 1988, 140 pages.

Owing to the fact that modern life sciences are largely based on chemical ideas and results of chemical investigations of living matter, and that researches in molecular biology are carried out by means of sophisticated technology, the reunion of terms of chemistry and technology used in life sciences in an original dictionary will be helpful for scientists, working both in the field of biology, agricultural and environmental sciences, and in the field of medical sciences (human and veterinary). This dictionary elaborated by J. Dupayrat is an unusual dictionary. Terms are neither defined nor explained. Only the French correspondents of

English technical terms are given. And that is the main value of this work. In big English/French dictionaries, the English special scientific terms are often not translated. But the main flow of scientific information in life sciences is published in English. French speaking scientific workers in life sciences have often difficulties to find the right word in French for a certain English technical term. Romanian technical nomenclature in life sciences is generally of French origin also. Therefore, once a chemical or technological concept is translated from English into French, one could find more easily a Romanian equivalent for it, than translating it directly from the English original.

In my opinion, this dictionary is good also as a working instrument for use outside France and the French Commonwealth of Nations, for instance in countries with Latin-based languages. And Romanian is a neo-Latin language.

BOGDAN STUGREN

Heathcote Williams, Des Baleines *(On Whales)*, traduit de l'anglais par Jacqueline Ollier, Editions Aubier, Paris, 1988, 191 pages with 78 coloured pictures and 42 figures.

This book is not a scientific monograph. Neither is it a vulgarization book of science. It is a selection of coloured pictures of cetaceans and their habitats, and of photographs of objects and events related to the life of cetaceans, making thus an excellent album. Such a work is of great interest for everyone who wants to get more knowledge about the "whale nation" (this being the original title in English of the album published by Jonathan Cape Ltd., London, 1988). The album comprises two sections.

Section one tells about the everyday life of whales and dolphins, their various activities in the ocean. Coloured pictures and figures, beautifully drawn, are explained in short texts written in poetical prose. This section has more pictures than text. Some plates show the reproduction in the blue whale *(Balaenoptera musculus)*, the unsurpassed giant of the ocean. It is a unique record in world scientific pictures. A photograph reproduces a fragment of a magnetic tape, where the love song of this species is recorded.

Section two has more text than pictures. The text is made of citations from scientific books and articles and from mass media with information about whales. It is an original lecture about the nature of whales, their evolution and adaptation to the life in oceans, about biology and sociobiology of the cetaceans, their communication system and highly evolved mind. Finally, the section deals also with the history of whale hunting and the irrational killing of whales by men. It is a well documented discourse for whale conservancy, against poachers of whales in the oceans the world over. There is also a note (p. 169) that Romania belongs to the countries which banned since 1968 dolphin hunting in the Black Sea.

BOGDAN STUGREN

**Science as a Way of Knowing. V. Form and Function,** Edited by J. A. Moore, American Society of Zoologists, University of California, Riverside, CA, 1988, being volume 20 (1988) of the "American Zoologist", with papers presented at the Annual Meeting of the American Society of Zoologists, December 1987 in New Orleans, 366 pages with 119 figures and 8 tables in the text.

The Form and Function problem is the subject of an old controversy in conceptual biology. Charles Darwin discussed it from the viewpoint of his theory of the survival of the fittest. Eminent biologists from the 19th century and the first half of the 20th century dedicated comprehensive works of comparative anatomy of vertebrates to this topic. Philosophers of various schools have written essays over the almost scholastic question which one is the primary agent of organic evolution — the form, as it was generally admitted by morphologists, or the function, as it was stated by physiologists. But finally ... *et adhuc sub judice lis est.* Therefore, it is not an unusual event that in 1987 a community of outstanding scientists contributed a volume to this problem.

The volume reviewed here unifies a high diversity of articles. A fundamental article about understanding nature (J. A. Moore) outlines the evolution of ideas about the form — function relation, both in science and in philosophical thinking and mythical knowledge of various civilizations the world over. The main conclusion is that the molecular blueprint of life, *i.e.* the structure of DNA presents at biochemical level its essential stability. The hope that there is "something else" beyond the appearances of molecular patterns is thus rejected as an illusion. The feature of this article is unique; it links

cultural and scientific ideas, the form — function problem becoming a component of general knowledge of human culture in a certain epoch.

Other articles deal with examples illustrating the form and function complex from the viewpoint of animal and human physiology (I. Deyrup-Olsen), or with the place of form and function in the collegiate biology curriculum (W. H. Mayer), or with gastric digestion (this being a reprint of a classical medical paper from the beginning of the 19th century by W. Beaumont, a U. S. Army surgeon). Other topics are: the re-union of morphology and physiology in the complex adaptive mechanisms of form — function relation in animal organisms (S. A. Wainwright), population biology mechanisms by which lizards and snakes became adapted in the process of evolution (C. Gans), structural and functional determinates of the metabolic rate (A. F. Bennett), physical principles of aquatic locomotion in vertebrates (P. W. Webb), principles of functional morphology in vertebrates (M. Hildebrand), evolution of air breathing mechanisms in vertebrates (K. F. Liem), endocrine aspects of homeostasis (J. C. Kltenbach), and the analysis of the form of some early paleozoic fossils in order to detect the functions of these organisms disappeared long ago (C. S. Hickman). A concluding paper by W. A. Mayer deals with the perspective of the SAAWOK (Science as a Way of Knowing) Symposia to provide a conceptual framework for biological sciences in education and research. Technical aspects of the use of films and videotapes in illustrating form and function (N. Hart and G. Anderson) are also not neglected. An author and subject index closes the volume.

BOGDAN STUGREN

V. Vančura and F. Kunc (Editors), **Interrelationships between Microorganisms and Plants in Soil.** Academia Publishing House of the Czechoslovak Academy of Sciences, Praha and Elsevier Science Publishers, Amsterdam, 1989, 492 pages with 132 tables and 88 figures.

The volume comprises most of the oral and poster communications presented at an international symposium, organized by the Czechoslovak Society for Microbiology and held at the Liblice chateau near Prague, on June 22–27, 1987. It consists of Preface written by the Editors, Introductory lecture delivered by M. J. Lynch, 64 papers, Index of organisms and Subject index.

The 64 papers are grouped into 4 sections. Each section is headed by invited lectures from outstanding specialists.

Section I, "Symbiotic microorganisms and plants", covers two great topics: Rhizobia (8 papers) and Mycorrhizal fungi (15 papers). Within Section II, 24 papers deal with the "Associative microorganisms of the root system". Section III, "Soil-borne phytopathogenic and phytotoxic microorganisms" and Section IV, "Biological preparations stimulating growth and improving health conditions of plants" consist of 9 and 8 papers, respectively.

The volume is a very valuable work. It presents the most up-to-date information on the interrelations between microorganisms and plants in the rhizosphere and on the possibility of utilizing some microbiological preparations to improve plant growth, health and yields. All topics are strongly related to the problems of soil fertility and crop production, and are, therefore, important for society at large.

The volume is addressed to a broad circle of readers: soil microbiologists and biochemists, plant physiologists and pathologists, ecologists as well as specialists in agronomy, forestry and environmental protection

ȘTEFAN KISS

Hartmut Bick, **Ökologie. Grundlagen. Terrestrische und aquatische Ökosysteme. Angewandte Aspekte** *(Ecology. Fundamentals. Terrestrial and Aquatic Ecosystems. Applied Aspects)*. G. Fischer Verlag, Stuttgart–New York, 1989, 327 pages with 105 figures and 17 tables in the text, and 16 coloured plates.

More than 30 years after the fisrst edition of the „Fundamentals of Ecology" by E. P. Odum (1957), which was the first work in world literature dealing with the theoretical framework of the systemic ecology, there is always room for new patterns in discussing fundamentals of ecology. It means that ecology as a system of theories did not attain its last frontier. Ecological ideas evolve together with the evolution of scientific information in this field. Surprisingly enough, textbooks of ecology with new patterns of the matter were not published in the U.S.A., the homeland of systemic ecology. Until now, such books were published only in

Europe. Such one is the textbook of H. Bick. The author is an agricultural ecologist, a professor at the University of Bonn.

It is a unique work in the German language ecological literature, because it comprises a large area of both theoretical and applied problems of ecology, written by a single author, not by an author team. Professor Bick has done an incredible work: in only 327 pages, the textbook deals with general concepts of ecology and with biogeographical backgrounds of synecology, describes structures and dynamics of selected terrestrial, inland water and marine ecosystems, too. It is really a little encyclopaedia of ecological sciences. Nothing is forgotten there: neither special topics as the ecology of parasitic life forms, nor applied ecological disciplines (forest ecology, agroecology a.o.), or the theory of island biogeography. The usefulness of this work bears on the fact that it is a small textbook of normal size, not loaded with a heavy lot of data, not exceeding in the number of tables. Instead, it points out essential facts and ideas, being an excellent textbook for basic knowledge in ecology. Twenty pages are dedicated to literature, with titles distributed accordingly to the chapters of the textbook. A subject matter index and indexes of German vernacular and scientific names of plants and animals, respectively, close the textbook.

BOGDAN STUGREN

Karl-Franz Busch, Dietrich Uhlmann, Günther Weise (Herausgeber), **Ingenieurökologie** (*Engineering Ecology*), 2. erweiterte Auflage (second enlarged edition), G. Fischer Verlag, Jena, 1989, 488 pages with 198 figures and 67 tables in the text.

Engineering ecology is the technological transcription of ecological knowledge and principles. That is the definiton of engineering ecology in this book, edited by three professors from the Technical University of Dresden. The work was done by 71 authors, all of them working in research network and university education in Germany. Engineering ecology is also an "interdisciplinary science", because its aims are to draw blueprints of management and controlled structures and dynamics of natural ecosystems, both aquatic and terrestrial, and of agroecosystems and forest cultures (sylvoecosystems). Another aim of this technological science is to find optimal procedures for men's actions in practice in order to abolish the environmental crisis of modern society, to stop harmful effects of natural or technogenic catastrophic events in the environment. Since engineering ecology is the science and technology of ecological prognoses, which are always linked to environmental risks, environmental engineers must appreciate the degree of such risks and the probability of success. Therefore, in engineering ecology, higher mathematics, computer technics and Monte Carlo methods are needed. Further, as the work reviewed here shows it in theory and practice, such tasks need a large amount of information from the field of physical geography, agricultural and forestry sciences, geochemistry, and the chemistry of air and water, soil science, microbiology.

The matter of this work is divided into 5 chapters, as follows: system analysis in ecology; ecological indicators of actual state of the environment and of its possible future transformations; prognoses of ecosystem behaviour (based on experimental data and mathematical models); selected technologies for practical working in the environment; selected problems of the dynamics of ecological resources and economical policy of resource exploitation.

The richness of this work in facts and ideas on this topics surpasses all other books on related subjects in German and English literature. Despite the fact that this second edition has only about 60 pages more than the first one, it comprises many new topics, for instance problems of urban ecology, military and civilian aspects of radioactive technologies and their risks for people's health, technologies for removing from the environment the large scale of effects of oil escaping accidents. In comparison with the first edition, the editors have reorganized the whole matter of the book. As far as I know, this is the only textbook of engineering ecology published in Europe. I also never heard of such a textbook published in the U.S.A., where a lot of monographs on special problems of environmental sciences were published.

The humanitarian message of this work means that there are many projects of engineering ecology in Europe which can not be carried on without international co-operation between interested nations.

BOGDAN STUGREN

W. Dunger, H. J. Fiedler (Herausgeber), **Methoden der Bodenbiologie** (***Methods in Soil Biology***), Fischer Verlag, Jena, 1989, 432 pages with 99 figures, 17 plates and 39 tables in the text.

The work edited by W. Dunger and H. J. Fiedler is a kind of encyclopaedia of research methods in soil biology, which is written both for researchers in soil biochemistry and microbiology and for soil zoologists. One of the editors (W. Dunger) is a zoologist, the other one (H. J. Fiedler) a forest scientist who studies forest soils and habitats. Together with other 17 authors from Germany, Hungary, Czechoslovakia and Northern Ireland, they have done a modern synthetic work, dedicated to a comprehensive exposé of methods and technics used today in all fields of soil biology. The book comprises 5 chapters, as follows: a short introduction (an unusual feature in German textbooks) (chapter 1); general instructions for laboratory and field works in soil biology, statistics applied to pedobiological experiments, measurement of physical, chemical and plant-sociological parameters of the habitat, detailed description how to collect and transport soil samples to the laboratory, and how to store and conserve soil samples before working with this material (chapter 2); microbiological methods in soil studies (chapter 3); special methods of zoological studies of the soil community: technics for identification of activity and population densities of soil animals, quantitative samplings and analysis of soil fauna; labor equipment for sample analysis, for differentiation of soil invertebrates from soil particles, special apparatuses for field researches in soil zoology, principles and methods of studies of the productivity of soil animals and their energetic equivalents, and, finally, special methods for various kinds of soil animals (chapter 4), optimization of soil productivity and agricultural fertility by means of protection and management of soil invertebrates, complex problems of soil biology (chapter 5).

The literature comprises 40 pages. This section is divided into 5 sub-sections, according to the 5 chapters of the textbook. The work is provided also by authors' and subject indexes.

In my opinion, this work will be useful for zoologists working with soil habitats, for soil microbiologists and plant physiologists.

BOGDAN STUGREN

**Social Odours in Mammals**, *Volumes* **1** *and* **2**, Edited by R. E. Brown and D. W. Macdonald, Clarendon Press, Oxford, 1985, 506 pages with 77 figures, 38 plates and 33 tables (Volume 1), and 275 pages with 56 figures, 18 plates and 30 tables (Volume 2).

Studies on the part played by odours in animal intra- and interspecific communication have increased widely all over the world, due to their scientific significance and the possibility of applying their results in every-day life, mainly in the biotechnical control of pest species. Chemical communication has been revealed in all phyla of the animal kingdom, starting with protozoa and ending with mammals. Special attention has been paid to insects (among invertebrates) and mammals (among vertebrates), due to the importance of the species in these two classes.

The two volumes mentioned above comprise 20 synthesis papers on chemical communication in mammals. The first volume starts with a classification of the chemical substances secreted by mammals and discharged into the environment, where they are detected by other specimens of the same species or by other species. The classification derives from the impact these substances have upon the *receptive specimens*, and from their belonging to certain systematic categories. These chemicals, also called chemical messengers, achieve intra- and interspecific communication.

Another chapter describes the glands secreting the odours and their location in the tegument or within several other organs such as: respiratory organs, urogenital organs, the digestive tube.

The following 19 chapters, in both volumes, describe the system of chemical communication (histological structure of glands, structure and physiology of the scent organ and the biological significance of odours). Descriptions are provided for the following groups of mammals: *Monotremata*, *Marsupialia*, *Insectivora*, *Macroscelidea*, *Scadentia*, *Chiroptera*, *Tubulidentata*, *Proboscidea*, *Hyracoidea*, *Myomorpha*, *Sciuromorpha*, *Hystricomorpha*, *Lagomorpha*, *Perrisodactyla*, *Artiodactyla*, *Carnivora*, *Cetacea*, *Pinnipedia*, *Sirenia*, *Edentata*, *Phnolidota*, *Arthropoidea* and Primates.

The presentation of each systematic category starts with the histological description of scent glands which secrete odours. Their occurrence in the anatomic structures is then presented, together with

the secretion process and the periods for physiological activity during ontogenesis, as well as the histological and physiological structure of olfactory organs and the behavioural changes induced by odour communication.

The two volumes reviewed here are an extremely important bibliographical source for biologists interested in mammalian behaviour and in the part played by scent stimuli during various biological activities.

NICOLAE TOMESCU

H. P. Saluz, J. P. Jost, **Biomethods, *Vol. I*, A Laboratory Guide to Genomic Sequencing: the Direct Sequencing of Native Uncloned DNA,** Birkhäuser Verlag, Basel, 1987, 163 pages, including 24 figures.

This book is a laboratory bench manual, offering theoretical background, experimental protocols and possible trouble-shooting, from A to Z, in one of the most powerful techniques in studies on nucleic acids.

The authors, Hans Peter Saluz and Jean—Pierre Jost, both at the Friedrich Miescher Institute in Basel, Switzerland, have a strong experience in this field, being those who have developed this technique, first described by G. M. Church and W. Gilbert in 1984.

Genomic sequencing is an invaluable tool in studying methylation of nucleic acids and nucleic acid-protein interactions in the living cells. Most of the information concerning these aspects is lost during molecular cloning and *in vitro* studies. Now, it is possible a closer look at a gene in its normal environment. This method combines the chemical DNA sequencing procedure of Mayam and Gilbert with the detection of specific DNA sequences by electroblotting and indirect end-labelling by hybridization. It is possible to detect even a single methylated base in a given gene, to detect allelic polymorphism and point mutations without having to isolate and clone all the alleles of interest.

The trouble-shooting guide at the end of the book helps the researcher to avoid the numerous pitfalls that may be encountered in the laboratory work. The authors hope that publishing such a laboratory guide will encourage a future development of this technique and adapting it to other research domains.

NICOLAE COMAN
and
MIRCEA PODAR

**9 Mezhdunarodnyi Simpozium "Rekul'tivatsiya landshaftov, narushennykh promyshlennoi deyatel'nost'yu", Sbornik dokladov,** *Tom I—III* (*The 9th International Symposium "Recultivation of Landscapes, Damaged by Industrial Activity", Transactions*. Volumes I—III), Redaktor (Editor): Sebestyén Tóth, Gödöllői Agrártudományi Egyetem Kutató Intézete, Kompolt, 1988, 476 pages (Vol. I—II) + 158 pages (Vol. III), including 110 tables and 23 figures.

The Symposium, held at Kompolt and Gyöngyös (Hungary) in 1988, was organized by the Kompolt Research Institute of the Gödöllő Agricultural University. The three volumes of the Transactions comprise 77 papers presented by authors from Bulgaria, Czechoslovakia (Czech and Slovak Republic), GDR (Germany), Hungary, Poland, Romania, USSR and Yugoslavia, and published in Russian with English summaries or in English with Russian summaries.

The papers cover a wide range of topics related to the recultivation of territories disturbed by mining and processing of ores and other raw materials as well as by other industrial activities.

The Editor delineates the following grouping of the topics:

— basic principles of landscape planning of the damaged territories;

— recommended methods for mine-technical recultivation helping the biological recultivation;

— possibility to use remote sensing (aerial and space) instruments for photointerpretation of landscape-damaging processes and state of recultivation;

— researches in soil science, agrotechnics, afforestation and water management as related to recultivation;

— recultivation of fly ashes and of spoils from tailing ponds;

— economic efficiency of the methods and equipments of recultivation;

— role of the computer technique in the recultivation processes.

The Transactions are an up-to-date and complex source of information for those

interested in the recultivation of overburdens and spoils resulted from strip and deep mining and other industrial activities. Many biologists (soil microbiologists and enzymologists, botanists, zoologists, ecologists, experts in environmental protection) will also find the Transactions a stimulating work for research, as recultivation (reclamation) efficiency largely depends on biological factors and recultivation should ensure ecological stability and restoration of microbial, plant and animal life.

ŞTEFAN KISS

STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXXV, 1, 1990

# CRONICĂ

## Întîiul congres al naturaliştilor din România după Marea Unire

Evenimentul politic de desăvîrşire a statului naţional unitar român în 1918 a adus cu sine o seamă de metamorfoze importante şi în viaţa culturală a poporului român, constînd, în primul rînd, din numeroase ctitorii de instituţii româneşti. Astfel, în inima Transilvaniei s-a constituit, în toamna anului 1919, a treia şcoală superioară românească — după cele de la Iaşi şi Bucureşti.

Spun mărturiile scrise ale acelor ani că entuziasmul dădea strălucire epocii, iar solemnitatea evenimentelor era emoţionantă.

Un reputat scriitor contemporan vorbeşte despre „o nobilă emulaţie intelectuală ce a urmat unirii din 1918, tinerii agregaţi, docenţi şi profesori români au ilustrat timp de vreun deceniu un sublim front intelectual, de elevaţie, morală; cei mai buni dintre ei au constituit, apoi, o virtuoasă generaţie de maeştri" (Ana Blandiana).

Clujul universitar din acea vreme s-a bucurat, norocos, de contribuţia la organizarea noii universităţi româneşti a multor nume de prestigiu ale culturii noastre, care stau consemnate în studii şi cronici, măgulind mîndria noastră naţională prin faima lor europeană. În domeniul ştiinţelor biologice, gloriile şcolii clujene româneşti în faza sa de început sînt savanţii Emil Racoviţă, Victor Babeş, apoi Ioan Grinţescu, Alexandru Borza, Ion Şcriban, Dimitrie Călugăreanu, Ioan Popescu Voiteşti, iar printre primii absolvenţi ai universităţii româneşti se numără ca o eminenţă Emil Pop, savantul renumit din perioada contemporană generaţiei sale şi a noastre.

Biologii clujeni — români ardeleni sau veniţi din Principate — se organizează şi se avîntă în studiu, se afirmă ca specialişti, înfiinţează institute şi instituţii (ne gîndim în primul rînd, la Institutul de Speologie al lui Emil Racoviţă, care este primul de acest gen în lume; la Grădina botanică a Universităţii clujene, în ctitoria lui Alexandru Borza, care ajunge la scurt timp, şi se menţine multă vreme, cea mai faimoasă din estul Europei), editează reviste şi alte publicaţii, se introduc discipline noi în învăţămîntul universitar după modelul unor renumite instituţii academice europene sau al vechilor universităţi româneşti de la Iaşi şi Bucureşti.

La Institutul Botanic era sediul mişcării pentru protecţia naturii din ţara noastră, cu un „birou ştiinţific" al Comisiei monumentelor naturii, condus de Alexandru **Borza**.

La Cluj s-a înfiinţat şi a funcţionat foarte activ „Societatea de ştiinţe din Cluj".

Efervescenţa începutului alimentează tonic activitatea de-a lungul anilor; experienţa prin munca entuziastă se acumulează îmbelşugat şi faima universităţii clujene se încheagă şi se consolidează trainic.

În 1928, la 10 ani după Marea Unire, din iniţiativa şi prin munca pasionată şi devotată a şcolii clujene de biologie, în colaborare cu celelalte ramuri ale ştiinţelor aplicate ale biologiei (medicină, farmacie, agronomie, silvicultură) se organizează aici primul Congres al Naturaliştilor din România, prezidat de Emil Racoviţă, avînd ca secretar ştiinţific pe Alexandru Borza, iar ca subsecretar pe Emil Pop.

Cadrul cultural—academic era, aşadar, pe deplin propice pentru ca tînărul centru universitar al Clujului să adăpostească o manifestare ştiinţifică de anvergura unui congres naţional în care să se întîlnească naturaliştii din toate provinciile ţării întregite.

În cuvîntul său din şedinţa de deschidere a Congresului, ministrul Instrucţiunii Publice de atunci a spus: „Alegînd Clujul ca sediu al acestui congres, sînt convins că aţi voit nu numai să aduceţi acestui centru de înaltă cultură românească omagiile oamenilor de ştiinţă din cele patru unghiuri ale României întregite, dar aţi voit în acelaşi timp să afirmaţi încă o dată voinţa neclintită a neamului nostru de a întări prin cultură ceea ce am cîştigat prin drepturile noastre seculare şi prin jertfe şi sîngele vărsat din abundenţă pe cîmpul de luptă" („Întîiul Congres Naţional al naturaliştilor din România". Cluj, Ed. Soc. de Ştiinţe, 1930, p. 19).

Într-adevăr, la acest congres sînt prezenţi naturalişti din învăţămîntul universitar şi preuniversitar, muzeografi, medici umani şi veterinari, farmacişti, agronomi, silvici, — membri ai grupărilor naturaliste de pe întreg cuprinsul patriei întregite. Pro-

fesorul Andrei Popovici—Bâznoşanu — preşedintele Societăţii Naturaliştilor din România — citează un mare număr de societăţi şi asociaţii din ţară, care fiinţau în acel moment în diverse localităţi, precum şi organul lor tipărit.

Rememorarea acestui important eveniment ştiinţific din istoria biologiei în România întregită se dovedeşte a fi nu numai un act de respect şi veneraţie pentru înaintaşii noştri în domeniul ştiinţelor naturii, — adeverind aforismul eminescian că „fiece popor şi fiece epocă stă pe umerii vremilor trecute" sau judiciosul gînd al lui Nicolae Bălcescu: „Instituţiile părinţilor noştri sînt baza instituţiilor noastre" —, dar este şi un act de cultură naţională cu care ne mîndrim, pentru că acest congres a fost primul bilanţ al rezultatelor în domeniul cercetării ştiinţifice naturaliste şi al organizării învăţămîntului biologic în provinciile româneşti după marea unire şi prima autoritate ştiinţifică colectivă pentru legiferarea măsurilor pentru ocrotirea naturii şi organizarea Parcului Naţional Retezat, precum şi a rezervaţiilor naturale pe pămînt românesc, toate discutate într-o atmosferă de imens entuziasm, de înaripare juvenilă pentru progresul ştiinţei româneşti, şi cu un devotament de o fidelitate exemplară faţă de noile aşezăminte academice din tînăra Românie întregită.

Dată fiind această multiplă semnificaţie a primului congres naţional al naturaliştilor din România, care a prefigurat direcţiile moderne în dezvoltarea ştiinţelor naturale ca domeniu de cercetare, de învăţămînt şi de valorificare a acestor cunoştinţe teoretice în practica vieţii cotidiene (agricultură, silvicultură, farmaceutică etc.), Facultatea de Biologie, Geografie şi Geologie de la Universitatea care a adăpostit Congresul din 1928, împreună cu filiala din Cluj a Societăţii de Ştiinţe Biologice şi cu instituţiile locale de profil (Centrul de Cercetări Biologice, Institutul de Speologie) au organizat, în toamna anului 1988, un Seminar ştiinţific cu comunicări care au pus în lumină aportul precursorilor la progresele înregistrate de ştiinţa românească de atunci şi pînă acum, în această peste o jumătate de veac.

Lucrările seminarului au fost deschise de o impresionantă evocare a personalităţii ştiinţifice şi sociale a lui Emil Racoviţă — prezenţă de înaltă prestanţă în congres (Dan Coman); a fost apoi analizată problematica de botanică (Ioan Pop, Ioan Hodişan, Felician Micle), precum şi cea de zoologie (Gheorghe Racoviţă, Nicolae Tomescu, Dan Munteanu) expusă la congres şi perspectivele dezvoltării ulterioare a cercetării botanice şi zoologice româneşti; s-a reliefat semnificaţia întîiului Congres al naturaliştilor din România pentru dezvoltarea şcolii româneşti de biologie (Ana Fabian); s-a evocat dezbaterea amplă în congres a ideii de organizare a muzeelor naturaliste şi a rezervaţiilor naturale, a Parcului Naţional Retezat, a grădinilor botanice din România (Felician Micle, Ioan Gergely, Pante Gherghel), premise pentru promulgarea ulterioară a legilor privind ocrotirea monumentelor naturii în România şi dezvoltarea instituţiilor pentru cultivarea respectului faţă de natura patriei; s-a semnalat lansarea la congres a ideii de abordare ecologică a cercetării biologice în România (Bogdan Stugren, Vasile Cristea). Decanul Facultăţii a prezentat, ca încheiere, problematica de paleontologie şi geologie abordată la congres şi semnificaţiia acesteia pentru şcoala geologică românească (Iustinian Petrescu).

Simpozionul a luat sfîrşit cu o gală de diapozitive pe una din cele mai dezbătute probleme ale societăţii contemporane: ocrotirea naturii din mediul nostru înconjurător; frumuseţea imaginilor, împreună cu comentariul, pe cît de documentat pe atît de fermecător şi captivant (Iosif Viehmann), a fost o veritabilă încîntare intelectuală pentru toţi participanţii.

Ocrotirea naturii în România a devenit o mişcare cultural-ştiinţifică în plină prosperitate, împlinind ceea ce spunea Alexandru Borza în congres, într-o idee de răsunet patriotism cuceritor: „Va trebui să insistăm ca toate legile şi acţiunile întregii noastre administraţii de stat să fie pătrunse de principiile protecţiei Naturii. Numai astfel vom putea lăsa urmaşilor noştri o Românie tot aşa de bogată în frumuseţi şi comori naturale, de importanţă etică, estetică, ştiinţifică şi economică, pe cum am moştenit-o de la înaintaşi şi cum o cunoaşte întreaga lume ştiinţifică" (Al. Borza: „Problema protecţiunei naturii în România", op. cit., p. 118).

Dacă vreme de 4 decenii am păstrat doar în visurile noastre generoasele idei emanate din munca şi clarviziunea înaintaşilor, este acum prilejul să dovedim, prin fapte, că truda lor nu a fost în zadar, că vrem şi trebuie să fim o generaţie tînără într-o nouă Românie.

ANA FABIAN

**The Botanical Garden at Its 70th Anniversary**

The Botanical Garden, conceived by its founder Professor Alexandru Borza as a

didactic—scientific and cultural—instructive institution, wholly fulfils by its achievements the scopes it has been created for.

Stretching over 14 ha, it comprises several departments (ornamental, phytogeographic, Romanian flora, economic, systematic, medicinal) and two large hothouses with a surface of 3 500 m², preserving valuable collections of equatorial, tropical ,subtropical, Australian and Mediterranean plants.

Although small in number, the group of researchers working here have succeeded in carrying out, together with the teaching staff at the University, several interesting studies on the flora and vegetation in our country.

At the same time, the Botanical Garden has been keeping up its role as an active factor in nature protection. It has acquired new significance as a "gene pool": it preserves the genes of a large number of species, some of which are extremely rare, on the verge of extinction. In this respect, it is intended to enlarge the collections, which already amount to more than 10,000 taxa from all over the world.

As mentioned before, the Botanical Garden also plays an important part in educating and instructing the visitors for the love and respect of nature. The public (hundreds of thousands visitors per year) discovers here the beauty and variety of the vegetal world.

The almost 8,000 specimens exhibited in the Botanical Museum provide a valuable source of information for those interested.

The Botanical Garden houses the Herbarium of the University (the largest in the country) comprising almost 650,000 sheets of pressed plants from the world flora.

The Botanical Garden carries out a tight scientific collaboration with other units at home and abroad, keeping in touch with more than 500 similar institutions from more than 100 countries.

For the exchange of publications, it uses its own magazine "Botanical Contributions", a yearly volume which helps to turn into good account researches in plant biology and to spread the Romanian scientific knowledge all over the world. The Seed Catalogue, also published yearly, is used in the exchange of seed and plants with Botanical Gardens on the five continents.

We, who now benefit by these spiritual treasures, are deeply grateful to the founder of this institution and to all those who have made possible this achievement, being fully aware, that, in our turn, we must carry on the task of permanently renewing its treasures.

*Image from the Botanical Garden, Cluj.*

Data on the activity of the Botanical Garden, as well as certain moments in Professor A. Borza's activity and contribution to the setting up of this institution were presented in a Symposium held at the Botanical Garden.

IOAN HODIŞAN

**The 4th Symposium on Plant Tissue and Cell Culture**

The Biological Research Centre in Cluj-Napoca organized the 4th National Symposium on Plant Tissue and Cell Culture, on the 7th—9th of December, 1989. The same centre had organized the first symposium of this kind in Romania, in 1981.

This symposium gathered more than 137 specialists from the whole country. They presented — orally or as posters — 79 papers (including review papers) and 3 films. One of the films — the one that presented the electrofusion process using original apparatuses — was made by us.

The specialists who took part in this symposium work in research centres or universities (teaching biology, agriculture and pharmaceutics). There were chemists, physicists and students from these fields among them, too.

The symposium was called "*In Vitro* Explant Culture — Its Present and Future". This title allowed the presentation of papers having a large range of topics. Most of the papers dealt with the reaction of different explant types under various culture conditions. It was demonstrated that this reaction depended on the nature of the explant used, on the culture media, the culture conditions etc. Many papers also presented problems related to the micropropagation of ornamental plants (such as carnation, chrysanthemum, *Freesia*, *Gloxinia*, *Euphorbia*, rose, *Nephrolepis*, cactus, etc.), of fruit trees and shrubs, of grapevine, potato, sugar and fodder beet, as well as of gymnosperms, acacia, medicinal herbs, forage plants, etc. Many papers presented the results of cell cultures that were intented to produce phytopharmaceutical compounds. Fewer papers dealt with problems concerning protoplast culture and electrofusion techniques. One of the fundamental research topics — without an immediate practical application — we studied was the response of different types of cultures (soybean, clover, alfalfa and carnation calluses; potato, carnation and chrysanthenum meristems; clover and alfalfa cell cultures; wheat protoplast culture) to *cryopreservation* in liquid nitrogen. We also studied *senescence* and *vitrification* phenomena. Great interest was also raised by the papers that dealt with new culture methods using agar substitutes (substances that replaced partly or totally the agar) and with the double-layer technique (*i.e.* with the culture on solid and liquid media, simultaneously). We have been using this technique since the foundation of our laboratory in the Biological Research Centre in Cluj-Napoca. As a matter of fact, we injected the liquid medium into the culture vessels, long after the initiation of the culture (consisting for instance in *Cymbidium* protocorms, or potato explants).

This symposium also celebrated 15 years since the first laboratory for plant tissue and cell culture had been founded in Romania, in the Biological Research Centre in Cluj.

On the occasion of this anniversary we shall publish a volume with the proceedings of this national symposium.

DORINA CACHIȚĂ-COSMA

R.A.I. I. „ARDEALUL", Cluj-Napoca, cda 412.

În cel de al XXXV-lea an (1990) *Studia Universitatis Babeş-Bolyai* apare în următoarele serii:

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Dans sa XXXV-e année (1990) *Studia Universitatis Babeş-Bolyai* paraît dans les séries suivantes:

mathématiques (trimestriellement)
physique (semestriellement)
chimie (semestriellement)
géologie (semestriellement)
géographie (semestriellement)
biologie (semestriellement)
philosophie (semestriellement)
sociologie-politologie (semestriellement)
psychologie-pédagogie (semestriellement)
sciences économiques (semestriellement)
sciences juridiques (semestriellement)
histoire (semestriellement)
philologie (trimestriellement)

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