

## RESEARCH ARTICLE

(Open Access)

**Freshwater Coleopters in the middle flow of Shkumbin river.**

JAKOV OGA\*, ZISO THOMOLLARI, PEÇI NAQELLARI

Department of Biology, Faculty of Natural Sciences. University of Elbasan "Aleksander Xhuvani", Albania

\*Corresponding author e-mail: [jakovoga@yahoo.com](mailto:jakovoga@yahoo.com)**Abstract**

In this article we present some results of the study of water coleopters (hard wings insects). They have an important influence (impact) on the environment and in food chains of animal creatures for their role in the decomposition of organic matter and especially fish food. They also are indicators of freshwater pollution. This study is realized during the year 2011- 2012 in the middle flow of the river Shkumbin, from Elbasan to Librazhd. Methodology used consists in the ground expeditions in lentic and lotic habitats and also in laboratory study. Types of findings associated with systematic, bioecological and zoogeographical data. Provided data are for 17 species of coleopters finding in studied region.

**Keywords:** Coleopters, systematic data, bioecological data, zoo-geographical data, lotic habitat, lentic habitat.

**Introduction**

Given that studies of freshwater sheathed wings of foreign and local authors are relatively few and following a more comprehensive study carried out in the 2000-2005 period, we thought to continue the work on limited areas.

Freshwater sheathed wings represent one of the most important groups of macro invertebrates of water. Their study has scientific importance, because freshwater are viewed in many aspects as aquatic reserve, environment and biodiversity of animal species it contains, qualities and organoleptic parameters, physico-chemical, microbiological, pollution level etc.

During the work were organized expeditions in waters of different areas in two districts: in Elbasan district, where most of them are carried out and also in Librazhd district.

**General phyto-geographic characteristics of Shkumbin valley***a. Geographical location, landscape and climate.*

Shkumbin is 181 km long and its watershed 2444 km<sup>2</sup>. The top of Shkumbin starts with the sources and after passing a deep valley descends over 50 km to Labinot Fushe. Most of this area belongs to crenon and ritron.

The middle part starts from Labinot Fusha until after Rrogozhine passing through Elbasan, Papri and Peqin area. It belongs to potamon. Shkumbin then

flows into the Adriatic Sea near Divjaka Forest and Karavasta Lagoon. This part is called the estuary. In the first part of the river and in the affluent of Shkumbin, the landscape is rugged and very mountainous and hilly. The waters have large slope that favors erosion. In many areas there are forests and bushes. Climate of upper Shkumbin valley is variable, but becomes more severe as we go eastward and altitude. The average annual temperature is 13.8°C in Librazhd and 10.9°C in Stravaj.

*b. The vegetation*

During conducted expeditions are evaluated the phytocenoses of main types including Mediterranean forest and shrub area and oak area. The vegetation of the area of forests and Mediterranean shrublands (Shkumbin Valley, Byshek, Mirake, Librazhd, etc.) consist of tree species like gender: *Pinus*, *Plantanus orientalis*, *Alnus*, *Tamarix parviflora*, *Populus*, *Salix*, *Olea europaea*, *Ulmus*, *Pistacia* etc. Shrubs are represented by *Erica arborea*, *Arbutus unedo*, *Myrtus communis*, *Vitex agnus-castus*, *Phillyrea latifolia*, *Olea oleaster*, *Rubus ulmifolius*, *Spartium junceum*, *Paliurus aculeatus*, *Crataegus monogyna*, *Rosa canina* etc. In the area of oak as sub forest element can mention *Carpinus orientalis*, *Rosa canina*, *Malus sylvestris* etc.

The hygrophilous and hydrophilic vegetation plays an important role in aquatic ecosystems. It directly or indirectly provides food and shelter for a large number of organisms such as insects, fish, birds, etc. The hygrophilous and hydrophilic vegetation is estimated in accompaniments or micro-phytocenoses

in the water's edge of rivers, streams, springs, streams, lakes, ponds, reservoirs, swamps, etc. The vegetation in these accompaniments is represented by herbaceous plants heavily rooted by the bushy tree species and type of algae Chlorophyta, Bacillariophyta etc. From hydro and hygrophilous plants of the Shkumbin valley can mention: *Tamarix parviflora*, *Platanus orientalis*, *Alnus glutinosa*, *gjinia Salix*, *Populus*, *Phragmites australis*, *Typha latifolia*, *Equisetum palustre*, *Tussilago farfara* etc

### c. Publishing of foreign and Albanian authors for R. Coleoptera

For water insect's families R. *Coleoptera* taken in this study, we have the data for Albania and the region of study for following the authors: [1, 5, 9] and the authors of this article [8, 10].

### d. General information, ecological biology and geographical zoology

Sheathed wings constitute, in terms of number of species, the main order of insects. About 2 - 15% of sheathed wings types may be considered as aquatic.

Food of larvae is different: herbivore, detritivor, algivor and carnivores. No larvae apply a filter when feeding as previously believed.

Adults have rodent oral apparatus, some are ravenous (*Dytiscus* and *Gyrinidae*), but most are more detritivor-algivor.

Most Adephaga adults keep air under wings which is renew after coming to the surface to breathe with the help of the lower abdominal area that has dense hairs and forms a plastron that function as physical bronchi.

Life usually lasts a year, but adults of *Dytiscidae* may live a few years.

Sheathed wings colonize almost all continental waters. According to environments where they meet can be acidophil, euophile, iliophile, limnophile, reophile, silikophile, hemophilic, tyrfobionde and tyrfofile. Many of the species that has relatively large body are in varying degrees of risk for extinction and are inserted into the red books in many countries. Genders *Dytiscus*, *Rhantus*, *Graphoderes*, *Hydrophilus*, *Helophorus* and *Limnebius* are the most endangered. Adults can temporarily leave the water and fly (*Dytiscidae* and especially *Gyrinidae* ).

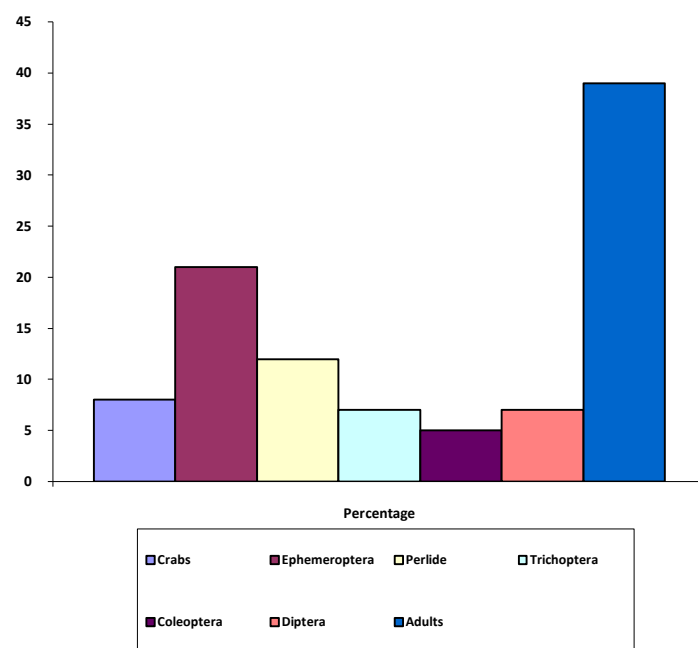
Sheathed wings originate from their formation regions and sub regions zoo-geographically different: Holarktck Region, Palearctic, Eurosiberic, Eurasian, Euro-Mediterranean, Mediterranean, Mediterranean -

makaronezic, EuroCenterAsia- nordetiopic, Balkan and Illyrian - Pontic, Euroanatolic.

### Macro-invertebrates and man

In its relations with nature, man is concerned for those who are directly visible: in general to the field of freshwater, fisheries and pollution. Based on this fact, macro-invertebrates, like other organisms, are less known. But they constitute a core group especially at the following three points: the transformation of organic matter, feeding the fish and pollution.

A significant part of the leaves of the trees fall or are taken from wind in freshwater. These leaves are not destroyed in the aquatic environment quickly under the action of microorganisms such as bacteria and hifomicets. Macro-invertebrates break these leaves into smaller elements (as does micro-fauna of the earth) thus facilitating the action of microorganisms. The process is generally faster in the flowing waters than in the stagnant waters, because in these latter, the collection of organic waste is very fast leading to the phenomena of anaerobia and slowing decomposition of organic matter.



**Figure 1.** Percentages of macro invertebrates in trout food regime.

In our area most fish food are supplied by micro invertebrates, for fish larvae from the new stages of macro invertebrates and for adult forms of fish from larvae and adults of macro invertebrates. (Figure 1)



Like all living things, macro invertebrates are sensitive to chemical pollution of any kind as to eutrophication as well as to the small percentage substances. Macro invertebrates do not participate directly in the phenomena of self-purification carried out mainly by microorganisms (mostly bacteria), but present a different sensitivity to the kinds of pollution and they can be used as an indicator of it.

Macro invertebrates participate in the cycle of many parasites as intermediate carrier.

Direct relations between man and macro-invertebrates can be of two types: negative reports for the man and positive reports especially related to fishing.

there are many types of hematofage spreading parasites

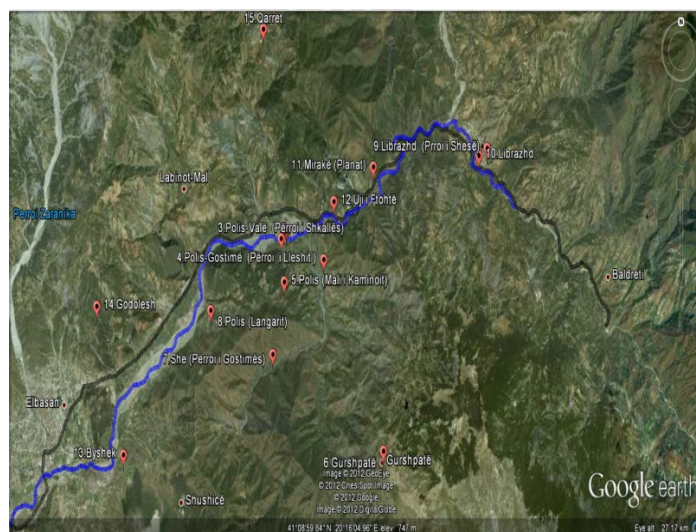
Sometimes form massive population prohibitive for the human economy.

- Serve as favorite foods for fish and delicious bait for fishing with clasps by amateurs.

### Material and Methods

Study area was defined Shkumbini river in Elbasan-Librazhd area.

The expedition was conducted for a period of approximately one year starting from 2.07.2011 to 10.02.2012. On the ground are conducted 15 different expeditions



**Figure 1.** Map of Shkumbin Valley and expeditions stations



**Figure 2.** Water environment, Mirake



**Figure 3.** Water environment, Librazhd



**Figure 4.** Water environment, Byshek

Habitat where specimens are collected is: under stones at water coast, between plants, below branches and fallen trees in the water. Has given good results even mowing within the water no matter what will fall into the net.

Flowing waters represent lotic habitats. Although the total amounts of freshwater represent a small part in volume, in terms of water renewal time it is very fast and therefore they are more oxygenated waters.

### Conservation techniques

For most adults of sheathed wing with small body and larvae, the best conservator environment is alcohol 75°. Preliminarily those are placed for awhile in hot water up to 80-90°. For large adults (Dytiscidae, Hydrophilidae) further collection is done in the dry. Individuals are permeated with needle or stick to thin papers. In such way we can save the defining traits.

### Results and discussion

From the definition were resulted the following types for aquatic Coleoptera:

Family: *Gyrinidae* Thomson, 1860

Gender: *Gyrinus* Linnaeus, 1758

1. *Gyrinus marinus* Gyllenhal, 1808

Dimensions: 6.7 – 7.3 mm

Number of specimens studied: 6. Founded: 1 spec in Polis Vale 14.07.2011 (T = 25°C, pH= 6.7), 2 spec. in Polis Gostime 15.07.2011 (T = 20°C, pH= 6.5) 2 spec in Godolesh 23.09.2011 (T = 16°C pH = 6.7 ), 1 spec. in Byshek 17.09.2011 (T = 12°C, pH = 6.5).

2. *Gyrinus dejeani* Brylle, 1832

Dimensions: 6 – 6.3 mm

Number of specimens studied: 10. Founded: 3 spec in Polis Vale 14.07.2011 (T = 25°C, pH= 6.7), 2 spec. in Polis Gostime 15.07.2011 (T = 20°C, pH= 6.5) 2 spec in Godolesh 23.09.2011 (T = 16°C pH = 6.7 ), 3 spec. in Byshek 17.09.2011 (T = 12°C, pH = 6.5).

Family: *Dytiscidae* Westwoud 1839

Gender: *Hydroglaphus* = Guignotus Houlbert, 1934

3. *Hydroglyphus pusillus* Fabricius, 1777

Dimensions: 2.1 – 2.3 mm

Number of specimens studied: 5. Founded: 3 spec. in Mirake Planat 27.09.2011 (T = 21°C, pH = 7.5), 2 spec. in Byshek 17.09.2011 (T = 11, pH = 6.5)

Gender: *Hydroporus* Clairville, 1806

4. *Hydroporus pubescens* Gyllenhal, 1808

Dimensions: 4 mm

Number of specimens studied: 1. Founded: in Byshek 17.09.2011

Gender: *Scarodytes* Gozis, 1914

5. *Scarodytes halensis* Fabricius, 1787

Dimensions: 4.3 – 4.8 mm

Number of specimens studied: 3. Founded: 3 spec. in Byshek 17.09.2011 (T = 18°C, pH = 6.5)

Gender: *Nebrioporus* = *Potamonectes* Zimmerman, 1921

6. *Nebrioporus luctuosus* Aube, 1836

Dimensions: 5.1 mm

Number of specimens studied: 5. Founded: 2 spec. in Polis Gostime 15.07. 2011 (T = 23°C, pH = 6.5), 3 spec. in Polis Shese 17.07.2011 (T = 20°C, pH = 6.8)

7. *Nebrioporus suavis* Sharp, 1882

Dimensions: 4.8 – 5 mm

Number of specimens studied: 5. Founded: 2 spec. in Polis Gostime 15.07.2011 (T = 20°C, pH = 6.5), 3 spec. in Perroi i Shese (Polis Vale) 25.09.2011 (T = 18°C, pH = 6.8).

Gender: *Laccophilus* Leach, 1817

8. *Laccophilus hyalinus* De Geer, 1774

Dimensions: 4.5 – 5 mm

Number of specimens studied: 15. Founded: 5 ekz. in Polis Gostime 15.07.2011 (T = 23°C, pH = 6.5),

Gender: *Agabus* Leach, 1817

9. *Agabus bipustulatus* Linnaeus, 1767

Dimensions: 9.8 – 11.5 mm

Number of specimens studied: 31. Founded: in Polis Vale 13 spec., in Gur Shpate 13 spec., in Godolesh 5 spec.

10. *Agabus didymus* Olivier, 1795

Dimensions: 8 – 8.1 mm

Number of specimens studied: 5. Founded: 2 sp. in Polis Vale, 1 sp. in Mirake, 2 sp. ne Byshek.

11. *Agabus biguttatus* Olivier, 1795

Dimensions: 9 mm

Number of specimens studied: 7. Founded: in Kaminoi mountain 3 sp., in Godolesh 4 sp.

Gender: *Hydaticus* Leach 1817

12. *Hydaticus leander* Rossi, 1790

Gender: 11 mm

Number of specimens studied: 1. Founded in Mirake 1 sp.

Family: *Hydrophilidae* Latreille, 1802

Gender: *Helochaeres* Mulsant, 1844

13. *Helochaeres obscura* Muller, 1776

Dimensions: 4.6 – 5.9 mm

Number of specimens studied: 16. Founded: in Polis Vale 6 sp., in Kaminoi mountain 9 sp., in Byshek 1 sp.

Gender: *Laccobius* Erichson, 1837

14. *Laccobius bipunctatus* Fabricius, 1775

Dimensions: 2.4-2.8 mm.

Number of specimens studied: 9. Founded: in Kaminoit mountain 4 sp., in Godolesh 5 sp.

15. *Laccobius gracilis* Motschulsky, 1855

Dimensions: 2.4 – 2.8 mm

Number of specimens studied: 5. Founded: in Polis Vale 5 sp.

Family *Helophoridae* Leach, 1815

Gender: *Helophorus* Fabricius, 1775

16. *Helophorus liguricus* Angus, 1970

Dimensions: 6.5 – 7.3 mm

Number of specimens studied: 3. Founded: in Godolesh 1 sp., in Byshek 2 sp.

17. *Helophorus nubilus* Fabricius, 1776

Dimensions: 2.8 – 3.1 mm

Number of specimens studied: 1. Founded: in Byshek 1 sp.

#### *Results systematic study of aquatic insects R/ Coleoptera*

From the taxonomic data analysis study shows that in the studied region are represented:

For R/ Coleoptera: 4 Family, 11 Gender and 17 species.

Fam: Gyrinidae with 2 species, Fam: Dytiscidae with 10 species, Fam: Hydrophilidae with 3 species, Fam: Helophoridae with 2 species

#### *Zoo-geographical analysis of species R. Coleoptera*

For definition of the fauna elements which include water sheathed wings of our country (for studied families) were based on data [1, 2, 3, 4, 5, 6, 7, 8, 9, 10].

Sheathed wings of our country studied by us originate from these regions and subregions:

Euro-Mediterranean 3 species, Holarctic 2 species and other areas 1 specie.

It turns out that in our study area predominate species with center formation in Mediterranean sub-region or around it as the Euro-Mediterranean, mediterranean-makaronezic, mediterranean-etiopic, Atlanto-mediterranean, Iliro-pontic with 7 species. Many species have Holarktike backgrounds (2), Palearktike (1), Euro-Asian and Central Euro-Asian (2).

## Conclusions

During this study were determined 17 species belonging to four families, 11 genera and 1 order as follows:

Family Gyrinidae: 1 genus with 2 species.

Family Dytiscidae: 7 genus with 10 species.

Family Hydrophilidae: 2 genus with 3 types.

Family Helophoridae: 1 genus with 2 species.

Families that have the largest number of species in our study are Fam. Dytiscidae with 10 species and Fam. Hydrophilidae 3 types. Hydrophilid sheathed wings are indicators of water pollution from mercury.

Currently there are no studies on families that have representatives in the plants near the water, on the wet shores such as families Chrysomelidae, Staphylinidae, Curculionidae and many others.

Study of larvae is almost untouched by authors who have announced so far and by us. Therefore this is a vast field of study.

## References

1. Csiki E.: **Allatani kutatasai albanian.-Explorationes zoologicae ab E. Csiki in Albania peractae.** Budapest. 1940
2. Franciscolo E. M.: **Fauna D' Italia- Coleoptera Haliplidae, Hygrobiidae, Gyrinidae, Dytiscidae.** Edizion Calderini Bologna. XIV. 1979
3. Kirejcuk G. A., Brama H. B., Shatrovski G. A.: **Opredelitjel vodnih zhukov Rossii – Semejstvo Haliplidae, Hydraenidae, Hydrochidae, Helophoridae, Hydrophilidae, Dytiscidae.** 2001
4. Lacej A.: **Koleopterofauna e Malësisë së Madhe.** PhD Dissertation. University of Tirana, Tirana, Albania. 2005
5. Murraj XH.: **Disa rezultate mbi studimin e rendit të krahëfortëve (Coleoptera) të vendit tonë.** In: UT Buletin 1. Tirane. 31-46
6. Naqellari P.: **“Të dhëna mbi vegjetacionin dhe florën e liqeneve të Dumresë”.** In: Studime biologjike 2001, 5-6, 217-220
7. Olmi M.: **Fauna D' Italia- Coleoptera Dryopidae- Elmidae.** Edizion Calderini Bologna. 1976
8. Oga J., Thomollari Z.: **Studimi i flatrafortëve dhe gjysëmflatrafortëve te ujërave të ëmbla.** Rama Graf. 2007
9. Paparisto A.: **Kontribut në njohjen e flatrafortëve të Ulëtisrës bregdetare shqiptare.** PhD Dissertation. University of Tirana, Tirana, Albania. 2001
10. Thomollari Z.: **Entomologjia.** “SEJKO”. 2001