

Checklist of Gregarines (Apicomplexa: Eugregarinorida and Neogregarinorida) from Bulgaria

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Abstract: The investigations on the gregarine fauna of Bulgaria started about 80 years ago. So far, a total of 61 identified and 8 unidentified species of eugregarines and neogregarines have been recorded. Among them, the new genus *Monocystella* Valkanov, 1935 and 11 new species of eugregarines have been described from Bulgaria as new taxa. The species richness and diversity of the invertebrate fauna of Bulgaria are factors for the species-rich gregarine fauna of this country.

Keywords. Apicomplexa, Eugregarines, Neogregarines, Invertebrates, Bulgaria, Checklist

Introduction

The gregarines (Apicomplexa: Conoidasida: Gregarinasina) are a large and insufficiently known group of protozoan parasites of invertebrate animals, from coelenterates to arthropods. According to PERKINS et al. (2000), the subclass Gregarinasina Dufour, 1828 contains 3 orders, i.e. Archigregarinorida Grasse, 1953, Eugregarinorida Leger, 1900 and Neogregarinorida Grasse, 1953. The latter two are parasites of terrestrial and freshwater invertebrates and have been studied in Bulgaria. According to Clopton (2000), one order of them, Eugregarinorida, comprises about 250 genera and more than 1650 species in world and their number increases every year. The order Neogregarinorida contains many pathogenic parasites of invertebrates (mainly arthropods) and is important from practical point of view.

The studies on the gregarines of invertebrate animals in Bulgaria have started later in comparison with many other European countries. Valkanov (1931) published the first contribution to the study of gregarines from some freshwater turbellarian worms of the country. This intestinal monocystid eugregarine of *Planaria albissima* (Turbellaria) was described as a new species, *Lankesteria arndti* Valkanov, 1931; however, shortly after that, it

was revised and selected as the type species of a new genus and redescribed as *Monocystella arndti* (Valkanov, 1931) Valkanov, 1935. Its place in the system of eugregarines is in the family Lecudinidae of aseptate eugregarines (Valkanov, 1935; Clopton, 2000). About 30 years later, Corbell (1964) published a list of 14 species of septate gregarines observed in some orthopteran insects from Bulgaria, describing 2 new taxa of the genus *Gregarina* Dufour, 1828.

More active studies on the gregarine fauna of Bulgaria started since 1970's when more Bulgarian and foreign researchers have begun their studies on various groups and families of eugregarines and neogregarines from this country. For about 40 years of investigations, more than 30 new publications on the gregarine fauna of Bulgaria were published. Some of them were published in Bulgarian language in national journals, conference papers, bulletins, etc., and remained unknown and inaccessible for the foreign researchers. The aim of the proposed checklist is to summarise the information of the gregarines from invertebrates in Bulgaria until 2014, with the hope to stimulate and facilitate new studies on this large and little-known group of protozoan parasites.

Systematic Checklist

Class Conoidasida Levine, 1978

Subclass Gregarinasina Dufour, 1828

Order Eugregarinorida Leger, 1900

Suborder Aceptatorina Chakravarty, 1960

Family Lecudinidae Kamm, 1922

1. *Monocystella* Valkanov, 1935

1.1. *Monocystella arndti* (Valkanov, 1931) Valkanov, 1935

(Syn. *Lankesteria arndti* Valkanov, 1931)

Hosts: Turbellaria: Tricladida: *Planaria albissima*.

Site: Intestine.

Distribution: Spring near Sofia (Ovcha kupa).

Authors: Valkanov (1931, 1935, 1937, 1942).

Family Lankesteridae Reichenow, 1953

2. *Lankesteria* Mingazzini, 1891

2.1. *Lankesteria planariae* Valkanov, 1931

Hosts: Turbellaria: Tricladida: *Planaria polychroa*, *Dendrocoelum lacteum*.

Site: Intestine.

Distribution: Plovdiv, Varna (Spring near Devnia).

Authors: Valkanov (1931).

2.2. *Lankesteria* sp.

Hosts: Turbellaria: Polycladida: *Leptoplana* sp.

Site: Mesenchyme.

Distribution: Bulgarian Black Sea Coast.

Authors: Valkanov (1931).

Family Monocystidae Butschli, 1882

3. *Apolocystis* Cognetti de Martiis, 1923

3.1. *Apolocystis herculaea* Bosanquet, 1894

Hosts: Oligochaeta: Lumbricidae: *Lumbricus terrestris*, *L. rubellus*, *Octolasion lacteum*, *O. complanatum*, *O. transpadanus*, *Dendrobaena octaedra*, *D. platyura*, *D. rubida*, *Eisenia foetida*, *E. tetraedra*, *Allolobophora rosea*, *A. caliginosa*, *A. chlorotica*, *A. dubiosa*, *A. pseudobiserialis*, *A. tuleshkovi*.

Site: Coelom, seminal vesicles.

Distribution: Sofia district, Vitosha Mountains, Black Sea Coast (regions of Varna and Burgas).

Authors: Duhlińska (1973a, 1977a, 1977b, 1980, 1987, 1982).

Prevalence: From 2.3% in *E. foetida* to 19.1% in *A. pseudobiserialis* (Duhlińska, 1980).

3.2. *Apolocystis pilosa* Meier, 1956

Hosts: Oligochaeta: Lumbricidae: *Lumbricus rubellus*, *L. terrestris*, *Octolasion lacteum*, *Allolobophora rosea*, *A. chlorotica*.

Site: Seminal vesicles.

Distribution: Sofia district, Vitosha Mountains, Southwestern Bulgaria, Black Sea Coast.

Authors: Duhlińska (1973a, 1977a, 1980, 1990).

Prevalence: From 6.5% in *O. lacteum* to 30.3% in *A. chlorotica* (Duhlińska, 1980).

4. *Monocystis* Stein, 1848

4.1. *Monocystis caudata* Berlin, 1924

Hosts: Oligochaeta: Lumbricidae: *Lumbricus rubellus*, *Allolobophora chlorotica*, *A. dubiosa*.

Site: Seminal vesicles.

Distribution: Sofia district, Black Sea Coast (Tsarevo, Biala).

Authors: Duhlińska (1973a, 1977a, 1977b, 1980, 1990).

Prevalence: From 10.3% in *L. rubellus* to 40.59% in *A. chlorotica* (Duhlińska, 1980).

4.2. *Monocystis cognetti* Hesse, 1909

Hosts: Oligochaeta: Lumbricidae: *Allolobophora handlirschi*, *Dendrobaena biblica*, *D. veneta*.

Site: Seminal vesicles.

Distribution: Bulgaria (localities not precised).

Authors: Duhlińska (1977a).

4.3. *Monocystis crenulata* Hesse, 1909

Hosts: Oligochaeta: Lumbricidae: *Dendrobaena biblica*, *D. veneta*, *Allolobophora antipai*, *A. handlirschi*, *A. caliginosa*.

Site: Seminal vesicles.

Distribution: Burgas (Brodilovo), Sofia district, Vitosha Mountains.

Authors: Duhlińska (1977a, 1977b, 1980).

Prevalence: From 6.2% in *D. veneta* to 25.6% in *D. biblica* and *A. handlirschi*.

4.4. *Monocystis densa* Berlin, 1924

Hosts: Oligochaeta: Lumbricidae: *Lumbricus terrestris*, *L. rubellus*, *Allolobophora caliginosa*, *A. rebelli*, *A. rosea*, *A. dubiosa*, *A. bulgarica*, *A. biserialis*, *A. rebeli*.

Site: Seminal vesicles.

Distribution: Black Sea Coast (Tsarevo, Kamchia, etc.), Sofia district.

Authors: Duhlińska (1973a, 1973b, 1977a, 1980, 1990).

Prevalence: From 4.1% in *L. rubellus* to 28.4% in *A. rebeli*.

4.5. *Monocystis hirsuta* Hesse, 1909

Hosts: Oligochaeta: Lumbricidae: *Allolobophora chlorotica*, *Dendrobaena octaedra*, *D. attemsi*, *Octolasion rubida*, *O. alpina*, *Lumbricus terrestris*, *L. rubellus*.

Site: Seminal vesicles.

Distribution: Black Sea Coast (more than 10 localities).

Authors: Duhlińska (1977a, 1977b, 1980, 1990).

Prevalence: From 3.1% in *L. terrestris* to 23.1% in *D. rubida*.

4.6. *Monocystis lumbricis* (Henle, 1845)

Hosts: Oligochaeta: Lumbricidae: *Allolobophora chlorotica*, *A. dubiosa*, *A. antipai*, *A. handlitschi*, *A. bulgarica*, *A. biserialis*, *A. pseudobiserialis*, *A. rebeli*, *A. tuleshkovi*, *Octolasion lacteum*, *O. transpadanum*, *Dendrobaena Byblica*, *D. platyura*, *D. rubida*, *D. octaedra*, *D. veneta*, *Lumbricus rubellus*, *L. terrestris*, *L. polyphaemus*, *Eissenia foetida*, *E. lucens*.

Site: Seminal vesicles.

Distribution: Sofia district, Black Sea Coast (more than 13 localities), Strandja and Vitosha Mountains.

Authors: Duhlińska (1977a, 1977b, 1980, 1990).

Prevalence: From 1.2 in *A. bulgarica* to 17.2% in *A. tuleshkovi*.

4.7. *Monocystis pyriformis*, Boldt, 1910

Hosts: Oligochaeta: Lumbricidae: *Octolasion complanatum*, *O. lacteum*, *O. transpadanum*, *Dendrobaena alpina*, *D. attemsi*, *D. rubida*, *D. octaedra*.

Site: Seminal vesicles.

Distribution: Black Sea Coast (more than 10 localities), Sofia district, Vitosha Mountains.

Authors: Duhlińska (1977a, 1977b, 1980, 1990).

Prevalence: From 3.9% in *D. alpina* to 32.8% in *O. complanatum*.

4.8. *Monocystis securiformis* Berlin, 1924

Hosts: Oligochaeta: Lumbricidae: *Allolobophora caliginosa*, *A. rebeli*, *A. rosea*, *A. bulgarica*, *A. biserialis*.

Site: Seminal vesicles.

Distribution: Sofia district, Vitosha and Strandja Mountains, Black Sea Coast (6 localities).

Authors: Duhlińska (1973a, 1977a, 1977b, 1980, 1990).

Prevalence: From 14.4% in *A. caliginosa* to 35.3% in *A. rebeli*.

4.9. *Monocystis setosa* Tuzet et Lobatiers, 1964.

Hosts: Oligochaeta: Lumbricidae: *Eissenia foetida*.

Site: Seminal vesicles.

Distribution: Bulgaria (many localities).

Authors: Duhlińska (1977b, 1980).

Prevalence: 100%

4.10. *Monocystis striata* Hesse, 1909

Hosts: Oligochaeta: Lumbricidae: *Lumbricus terrestris*, *Allolobophora dubiosa*, *Dendrobaena*

octaedra, *D. platyura*, *D. rubida*, *D. alpina*, *D. attemsi*.

Site: Seminal vesicles.

Distribution: Sofia district, Black Sea Coast (more than 8 localities).

Authors: Duhlińska (1973a, 1977a, 1977b, 1980, 1990).

Prevalence: From 6.8% in *L. terrestris* to 20% in *D. attemsi*.

4.11. *Monocystis ventriosa* Berlin, 1924.

Hosts: Oligochaeta: Lumbricidae: *Lumbricus rubellus*, *L. polyphaemus*, *Eiseina foetida*.

Site: Seminal vesicles.

Distribution: Black Sea Coast (Rezovo, Tsarevo, Primorsko, Biala).

Authors: Duhlińska (1973a, 1977a, 1980, 1990).

Prevalence: From 11% in *L. rubellus* to 67.5% in *E. foetida*.

5. *Nematocystis* Hesse, 1909

5.1. *Nematocystis lumbricoides* Hesse, 1909

Hosts: Oligochaeta: Lumbricidae: *Allolobophora antipai*, *A. rosea*, *A. handlitschi*, *A. caliginosa*, *A. jassyensis*, *A. bulgarica*, *A. biserialis*, *A. rebeli*, *Dendrobaena byblica*, *D. ribida*, *D. veneta*, *D. octaedra*.

Site: Seminal vesicles.

Distribution: Sofia district, Black Sea Coast (more than 8 localities).

Authors: Duhlińska (1973a, 1977a, 1977b, 1980, 1990).

Prevalence: From 3.8% in *D. byblica* to 12.3% in *A. handlitschi*.

5.2. *Nematocystis magna* (Shmidt, 1854)

Hosts: Oligochaeta: Lumbricidae: *Allolobophora jassyensis*, *A. tuleskovi*, *Octolasion transpadanum*, *O. complanatum*, *Dendrobaena alpina*, *D. attemsi*, *Lumbricus rubellus*, *L. terrestris*, *L. polyphaemus*.

Site: Seminal vesicles.

Distribution: Sofia district, Black Sea Coast (more than 8 localities).

Authors: Duhlińska (1973a, 1977a, 1977b, 1980, 1990).

Prevalence: From 2.7% in *L. terrestris* to 30.3% in *A. tuleskovi*.

5.3. *Nematocystis pilosa* Tuset et Lobatier, 1964.

Hosts: Oligochaeta: Lumbricidae: *Allolobophora antipai*, *A. chlorotica*, *A. dubiosa*, *Octolasion transpadanum*, *O. complanatum*, *Dendrobaena byblica*, *D. veneta*.

Site: Seminal vesicles.

Distribution: Black Sea Coast (more than 5 localities), Sofia district, Vitosha Mountains.

Authors: Duhlińska (1977a, 1977b, 1980, 1990).

Prevalence: From 5.2% in *A. antipai* to 24.8% in *D. byblica*.

5.4. *Nematocystis vermicularis* Hesse, 1909

Hosts: Oligochaeta: Lumbricidae: *Allolobophora antipai*, *A. chlorotica*, *A. dubiosa*, *Octolasion transpadanum*, *O. complanatum*, *Dendrobaena byblica*, *D. veneta*.

Site: Seminal vesicles.

Distribution: Sofia district, Vitosha Mountains, Black Sea Coast (Tsarevo, Biala), Strandja Mountains.

Authors: Duhlińska (1973a, 1977a, 1977b, 1980, 1990).

Prevalence: From 7.4% in *D. byblica* to 22.9% in *A. antipai*.

6. *Rhabdocystis* Boldt, 1910

6.1. *Rhabdocystis pilosa* Meier, 1956

Hosts: Oligochaeta: Lumbricidae: *Allolobophora caliginosa*, *Lumbricus rubellus*.

Site: Seminal vesicles.

Distribution: Black Sea Coast (localities not precised).

Authors: Duhlińska (1977a, 1980, 1990).

Prevalence: 36.6% in *A. caliginosa*, 63.4% in *L. rubellus*.

7. *Rhynchocystis* Hesse, 1909

7.1. *Rhynchocystis cognetti* Bhatia and Chattarjee, 1952

Hosts: Oligochaeta: Lumbricidae: *Allolobophora caliginosa*.

Site: Seminal vesicles.

Distribution: Sofia district, Black Sea Coast (more than 6 localities).

Authors: Duhlińska (1973a, 1977a, 1977b, 1980).

Prevalence: 100%.

7.2. *Rhynchocystis cuneiformis* Ruschaupt, 1885

Hosts: Oligochaeta: Lumbricidae: *Eissenia foetida*, *E. lucens*, *Allolobophora jassiensis*, *A. bulgarica*, *A. biserialis*, *Lumbricus terrestris*, *L. rubellus*, *L. polyphaemus*.

Site: Seminal vesicles.

Distribution: Sofia district, Vitosha Mountains, Black Sea Coast (localities not precised).

Authors: Duhlińska (1980, 1990).

Prevalence: From 2.4% in *L. rubellus* to 22.5% in *E. foetida*.

7.3. *Rhynchocystis piriformis* Berlin, 1924

Hosts: Oligochaeta: Lumbricidae: *Eissenia foetida*, *Allolobophora jassiensis*, *Dendrobaena alpina*, *D. attemsi*, *Lumbricus rubellus*, *L. terrestris*.

Site: Seminal vesicles.

Distribution: Black Sea Coast (6 localities), Sofia district.

Authors: Duhlińska (1977a, 1977b, 1980, 1990).

Prevalence: From 3.2% in *L. terrestris* to 34.2% in *D. alpina*.

7.4. *Rhynchocystis porrecta* (Schmidt, 1854)

Hosts: Oligochaeta: Lumbricidae: *Eissenia foetida*, *Allolobophora antipai*, *A. rosea*, *A. handlirschi*, *A. caliginosa*, *A. jassiensis*, *A. bulgarica*, *A. biserialis*, *A. rebelli*, *Dendrobaena biblica*, *D. veneta*, *Lumbricus rubellus*, *L. terrestris*.

Site: Seminal vesicles.

Distribution: Sofia district, Vitosha Mountains, Black Sea Coast (more than 10 localities).

Authors: Duhlińska (1973a, 1977a, 1977b, 1980, 1990).

Prevalence: From 1.0% in *L. rubellus* to 15.8% in *A. rosea*.

8. *Zygocystis* Stein, 1848

8.1. *Zygocystis cometa* Stein, 1848

Hosts: Oligochaeta: Lumbricidae: *Allolobophora rosea*, *A. caliginosa*, *A. chlorotica*, *A. dubiosa*, *A. bulgarica*, *A. biserialis*, *A. pseudobiserialis*, *A. rebelli*, *Dendrobaena platyura*, *D. alpina*, *D. attemsi*.

Site: Seminal vesicles.

Distribution: Sofia district, Vitosha Mountains, Black Sea Coast (many localities).

Authors: Duhlińska (1977a, 1977b, 1980).

Prevalence: From 2.8% in *A. caliginosa* to 17.01% in *A. pseudobiserialis*.

8.2. *Zygocystis legeri* Hesse, 1909

Hosts: Oligochaeta: Lumbricidae: *Allolobophora handlirschi*, *Dendrobaena byblica*, *D. veneta*.

Site: Seminal vesicles.

Distribution: Vitosha Mountains.

Authors: (Duhlińska, 1980, 1990).

Prevalence: From 18.3% in *D. biblica* to 54.6% in *D. veneta*.

8.3. *Zygocystis pilosa* Hesse, 1909

Hosts: Oligochaeta: Lumbricidae: *Allolobophora antipai*, *A. handlirschi*, *A. jassiensis*, *Dendrobaena byblica*, *D. veneta*.

Site: Seminal vesicles.

Distribution: Sofia district, Vitosha and Strandja Mountains, Kresna, Black Sea Coast (more than 5 localities).

Authors: Duhlińska (1977a, 1977b, 1980, 1990).

Prevalence: From 10.5% in *D. veneta* to 29.4% in *A. antipai*.

Suborder Septatina Lankester, 1858

Family Actinocephalidae Leger, 1892

9. *Amphoroides* Labbe, 1899

9.1. *Amphoroides polydesmi* (Leger, 1892)

Hosts: Myriapoda: Diplopoda: *Polydesmus complanatus*.

Site: Intestine.

Distribution: Sofia district (Gorna Bania).

Authors: Golemansky and Lipa (1991).

Family Dactylophoridae Leger, 1892

10. *Grebnickiella* Bhatia, 1938

10.1. *Grebnickiella gracilis* (Grebnicki, 1873) Bhatia, 1938

Hosts: Myriapoda: Chilopoda: *Scolopendra cingulata*.

Site: Intestine.

Distribution: Petrich (Rupite).

Authors: Golemansky and Lipa (1991).

11. *Fonsecaia* Pinto, 1922

11.1. *Fonsecaia polymorpha* Pinto, 1922

Hosts: Myriapoda: Diplopoda: *Oxydus (Orthomorpha) gracilis*.

Site: Intestine.

Distribution: Sofia (University of Forestry, Greenhouse).

Authors: Golemansky (2010).

Family Gregarinidae Labbe, 1899

12. *Gregarina* Dufour, 1828

12.1. *Gregarina acridiorum* (Leger, 1893), Labbe, 1899

Hosts: Insecta: Orthoptera: *Calliptamus italicus*, *Chortipus* sp.

Site: Intestine.

Distribution: Razlog, Samokov.

Authors: Golemansky et al. (1966, 1998).

12.2. *Gregarina blattarum* Siebold, 1839

Hosts: Insecta: Blattoidea: *Blatta orientalis*, *Blatella germanica*.

Site: Intestine.

Distribution: Sofia.

Authors: Lipa et al. (1991).

12.3. *Gregarina boevi* Corbell, 1964

Hosts: Insecta: Orthoptera: *Edipoda germanica*, *E. minuta*, *Sphingonotus coeruleus*, *Chortipus dichrous*, *Chortipus* sp.

Site: Intestine.

Distribution: Burgas, Samokov.

Authors: Corbell (1964), Golemansky et al. (1966), Lipa et al. (1998).

12.4. *Gregarina culleata* Geuss, 1969

Hosts: Insecta: Trichoptera: *Limnophilus* sp.

Site: Intestine.

Distribution: Teteven (Vassilievo).

Authors: Lipa et al. (1991).

12.5. *Gregarina cuneata* Stein, 1848

Hosts: Insecta: Coleoptera: *Tenebrio molitor*, *T. obscurum*, *Tribolium confusum*, *Palorus depressus*, *Ptinus furi*, *Calandra granaria*, *C. orizae*, *Attagenus piceus*, *Anthrenus* sp.

Site: Intestine.

Distribution: Sofia, Plovdiv, Russe, Svishtov, Dolen Dabnik, Kneja, Lukovit, Elin Pelin.

Authors: Golemansky & Duhlińska (1982), Duhlińska & Golemansky (1984b).

12.6. *Gregarina grylli* Corbell, 1964

Hosts: Insecta: Orthoptera: *Gryllus campestris* - larvae, *G. bimaculatus*, *Modicogryllus frontalis*.

Site: Intestine.

Distribution: Gabrovo, Shumen, Petrich (Rupite).

Authors: Corbell (1964), Golemansky et al. (1996, 1998).

12.7. *Gregarina minuta* Ishii, 1914

Hosts: Insecta: Coleoptera: *Tribolium castaneum*, *T. confusum*, *Tenebrionides castaneus*.

Site: Intestine.

Distribution: Russe (Dve mogili, Ivanovo), Sofia, Plovdiv, Lukovit, Rumiantzevo, Tshomakovci, Resselets.

Authors: Golemansky & Duhlińska (1982, 1984b).

12.8. *Gregarina polymorpha* (Hammerschmidt, 1838) Stein, 1848

Hosts: Insecta: Coleoptera: *Tenebrio molitor*, *Tribolium confusum*, *Tenebrionides mauretanicus*.

Site: Intestine.

Distribution: Russe, Polski Trambesh, Dve Mogili, Roumiantzevo, Resselets, Tshomakovci, Dolen Dabnik, Plovdiv, Sofia, Lukovit, Teteven (Vassilievo).

Authors: Golemansky & Duhlińska (1982), Duhlińska & Golemansky (1984).

12.9. *Gregarina rigida* Ellis, 1912

Hosts: Insecta: Orthoptera: *Calliptamus italicus*, *C. italicus* var. *marginelus*, *Edipoda germanica*, *E. minuta*.

Site: Intestine.

Distribution: Gabrovo, Preslav, Burgas.

Authors: Corbell (1964).

12.10. *Gregarina steini* Berndt, 1902.

Hosts: Insecta: Coleoptera: *Tenebrio obscurus*, *Tribolium confusum*, *T. castaneum*, *Tenebrionides mauretanicus*.

Site: Intestine.

Distribution: Sofia, Plovdiv, Polski Trambesh, Rumiantzevo, Dolen Dabnik, Tshomakovci, Teteven (Vassilievo).

Authors: Golemansky & Duhlińska (1982), Duhlińska & Golemansky (1984).

12. 11. *Gregarina troglaphili* Golemansky and Lipa, 1991.

Hosts: Insecta: Coleoptera: *Troglophilus neglectus*.

Site: Intestine.

Distribution: Rhodope Mountains (caves “Karnata” and “Imamova dupka”).

Authors: Golemansky & Lipa (1991).

12. 12. *Gregarina typographi* Fuchs, 1915

Hosts: Insecta: Coleoptera: *Ips typographus*, *I. sexdentatus*.

Site: Intestine.

Distribution: Vitosha Mountains, Rhodope Mountains.

Authors: Takov et al. (2006), Takov et al. (2007).

Prevalence: From 9.0 in *I. typographus* to 27.4% in *I. sexdentatus*.

12. 13. *Gregarina vittata* (Rauchalles) Geus, 1969

Hosts: Insecta: Trichoptera: *Limnophilus* sp. – larvae.

Site: Intestine.

Distribution: Teteven (Vassiliev).

Authors: Golemansky & Duhlińska (1991).

12. 14. *Gregarina* sp. 1

Hosts: Insecta: Orthoptera: *Platycoleis tessellata*, *Chortyppus brunensis*, *Acrotylus patruelis*, *Ephippiger* sp.

Site: Intestine.

Distribution: Gabrovo, Bourgas.

Authors: Corbel (1964).

12. 15. *Gregarina* sp. 2

Hosts: Insecta: Coleoptera: *Tenebrio obscurus*.

Site: Intestine.

Distribution: Teteven (Ribaritsa).

Authors: Golemansky & Duhlińska (1982), Duhlińska & Golemansky (1984b).

12. 16. *Gregarina* sp. 3

Hosts: Insecta: Trichoptera: *Limnophilus* sp. – larvae.

Site: Intestine.

Distribution: Teteven (Vassiliev).

Authors: Golemansky & Duhlińska (1991).

12. 17. *Gregarina* sp. 4

Hosts: Insecta: Orthoptera: *Pezotetrix giornae*.

Site: Intestine.

Distribution: Petrich (Kresna valley).

Authors: Golemansky et al. (1996, 1998).

12. 18. *Gregarina* sp. 5 (c.f. *typographi* Fuch, 1915).

Hosts: Insecta: Coleoptera: *Ips acuminatus*, *Orthotomicus proximus*, *Crephalus saltuarias*, *Pytiogenes chalcographus*, *Polygraphus subopacus*, *Criphalus saltuarius*, *Hylurgus ligniperda*.

Site: Midgut lumen.

Distribution: Rhodope Mountains, Vitosha Mountains.

Authors: Takov et al. (2007).

Family Cephaloidoridae Kamm, 1922

13. *Heliospora* Goodrich, 1949

13. 1. *Heliospora longissima* (Siebold, 1839) Goodrich, 1949

Hosts: Crustacea: Amphipoda: *Gammarus fossarum*.

Site: Intestine.

Distribution: Teteven (Vassiliev).

Authors: Golemansky & Duhlińska (1982).

Family Leydianidae Kudo, 1954

14. *Leydiana* Watson, 1915

14.1. *Leidyana ephestiae* Daviault, 1929

Hosts: Insecta: Lepidoptera: *Ephestia kuhniella*.

Site: Intestine.

Distribution: Teteven (Vassiliev).

Authors: Golemansky & Duhlińska (1991).

14. 2. *Leydiana gryllorum* (Cuenot, 1887) Watson, 1916

Hosts: Insecta: Orthoptera: *Gryllus bimaculatus*, *Modicogryllus frontalis*.

Site: Intestine.

Distribution: Cerven briag.

Authors: Golemansky et al. (1996, 1998).

14.3. *Leydiana* sp.

Hosts: Insecta: Lepidoptera: *Pallorus depressus*, *Ephestya kuhniella*.

Site: Intestine.

Distribution: Lukovit (Roumiantsevo), Tshomakovci.

Authors: Golemansky & Duhlińska (1982), Duhlińska & Golemansky (1984b).

Family Stylocephalidae Ellis, 1912

15. *Stylocephalus* Ellis, 1912

15.1. *Stylocephalus longicollis* (Stein, 1848) Watson, 1916

(Syn.: *Stylorhynchus longicollis* Stein, 1848)

Hosts: Insecta: Coleoptera: *Gnaptor* sp.

Site: Intestine.

Distribution: “Everywhere in Bulgaria”.

Authors: Valkanov (1942).

16. *Lepismatophila* Adams et Travis, 1935

16. 1. *Lepismatophila plusiocampae* Tashev and Golemansky, 1973

Hosts: Insecta: Diplura: *Plusiocampa bureshi*.

Site: Intestine.

Distribution: Caves: Temnata dupka and Zidankata near Lakatnik.

Authors: Tashev & Golemansky (1973).

Family Actinocephalidae Labbe, 1899

17. *Pyxinia* Hammerschmidt, 1938

17.1. *Pyxinia frenzeli* Laveran and Mesnil, 1990

Hosts: Insecta: Coleoptera: *Attagenus piceus*.

Site: Intestine.

Distribution: Teteven (Vassiliev).

Authors: Lipa et al. (1991).

18. *Steinina* Leger et Duboscq, 1904

17.2. *Steinina ovalis* (Stein, 1848) Leger et Duboscq, 1904

Hosts: Insecta: Coleoptera: *Tribolium castaneum*.

Site: Intestine.

Distribution: Russe (Ivanovo, Cervena voda), Lukovit (Roumiancevo, Resselets), Teteven (Ribaritsa), Pleven (Pelovo).

Authors: Golemansky & Duhlińska (1982), Duhlińska & Golemansky (1984b).
Family Didymophyidae Stein, 1848

19. *Rotundula* Goodrich, 1949

19.1. *Rotundula gammari* (Diesing, 1848) Goodrich, 1949

Hosts: Crustacea: Amphipoda: *Gammarus fossarum*.

Site: Intestine.

Distribution: Teteven (Vassiliev).

Authors: Lipa et al. (1991).

Family Stenophoridae Leger et Duboscq, 1904

20. *Stenophora* Labbe, 1899

20.1. *Stenophora beroni* Golemansky, 1973

Hosts: Myriapoda: Diplopoda: *Balkanopetalum armatum*.

Site: Intestine.

Distribution: Cave “Kolobata” near Belidiehan.

Authors: Golemansky (1973).

20.2. *Stenophora bulgarosomae* Golemansky, 1973

Hosts: Myriapoda: Diplopoda: *Bulgarosoma bureshi*, *B. meridionale*.

Site: Intestine.

Distribution: Caves “Lednica” near Vratsa and “Yagodinska peshtera” (Rhodope Mountains).

Authors: Golemansky (1973), Golemansky & Lipa (1991).

20.3. *Stenophora gervaisiae* Golemansky and Lipa, 1991

Hosts: Myriapoda: Diplopoda: *Gervaisia costata*.

Site: Intestine.

Distribution: Cave “El Kjupria” (Rhodope Mountains).

Authors: Golemansky & Lipa (1991).

20.4. *Stenophora juli* (Frantzius, 1846) Labbe, 1899

Hosts: Myriapoda: Diplopoda: *Pachyjulus hungaricus*.

Site: Intestine.

Distribution: Vitosha Mountains (Bistrice).

Authors: Golemansky & Lipa (1991).

20.5. *Stenophora nematoides* Leger et Duboscq, 1903

Hosts: Myriapoda: Diplopoda: *Oxydus (Orthomorpha) gracilis*.

Site: Intestine.

Distribution: Sofia (University of Forestry, Greenhouse).

Authors: Golemansky (2010).

20.6. *Stenophora robusta* Ellis, 1912

Hosts: Myriapoda: Diplopoda: *Oxydus (Orthomorpha) gracilis*.

Site: Intestine.

Distribution: Sofia (University of Forestry, Greenhouse).

Prevalence: 46% from 122 specimens.

Authors: Golemansky (2010).

20.7. *Stenophora serboiuli* Golemansky and Lipa, 1991

Hosts: Myriapoda: Diplopoda: *Serboiulus speleophilus*.

Site: Intestine.

Distribution: Cave “Vodna Pech” near Vidin.

Authors: Golemansky & Lipa (1991).

20.8. *Stenophora typhloiuli* Golemansky and Tashev, 1973

Hosts: Myriapoda: Diplopoda: *Typhloiulus bureshi*.

Site: Intestine.

Distribution: Cave “Temnata Dupka” near Lakatnik.

Authors: Golemansky & Tashev (1973).

20.9. *Stenophora* sp.

Hosts: Myriapoda: Diplopoda: *Typhloiulus bureshi*.

Site: Intestine.

Distribution: Cave “Temnata Dupka” near Lakatnik.

Authors: Golemansky & Tashev (1973).

Order Neogregarinorida Grasse, 1953

Family Lipotrophidae Grasse, 1953

21. *Farinocystis* Weiser, 1853

21.1. *Farinocystis tribolii* Weiser, 1953

Hosts: Insecta: Coleoptera: *Tribolium obscurum*, *T. confusum*, *T. castaneum*, *Tenebrionides mauretanicus*.

Site: Fat body, haemolymph.

Distribution: Pleven (Pelovo), Lukovit (Roumiantsevo, Resselets), Teteven (Ribaritsa, Vassiliev), Russe (Dve Mogili, Ivanovo), Dolen Dabnik.

Authors: Golemansky & Duhlińska (1982), Duhlińska & Golemansky (1984).

22. *Mattesia Naville, 1930*

22.1. *Mattesia dispora Naville, 1930*

Hosts: Insecta: Lepidoptera: *Ephestia kuhniella*, *Galleria melonella*; Insecta: Coleoptera: *Calandra granaria*, *Tribolium obscurum*, *T. castaneum*.

Site: fat body.

Distribution: Pleven (Pelovo), Kneja, Lukovit (Roumiantsevo, Resselets), Russe, Teteven (Ribaritsa), Comakovci.

Authors: Golemansky & Duhlińska (1982), Duhlińska & Golemansky (1984a), Duhlińska (1986), Lipa et al. (1991).

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Conclusion

The analysis of the published contributions to the gregarine fauna of Bulgaria shows the presence of a total of 61 identified species of 22 genera and 13 families of the orders Eugregarinorida and Neogregarinorida. Nevertheless, the limited number of examined hosts, mainly of the groups of earthworms and insects, the number of the firstly described new species (11) is comparatively high. The number of unidentified gregarines (8) is also high. These results are indicators for the presence of a reach and diverse gregarine fauna in the country. The higher biodiversity of the invertebrate fauna of Bulgaria in comparison with those of West and Central Europe is a natural prerequisite for a reach and original parasitic fauna.

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Received: 18.03.2015

Accepted: 25.05.2015

