

Резюмета

на публикациите на доц. д-р Атанас Димов Арnaudов, представени за участие в конкурс за заемане на академичната длъжност „ПРОФЕСОР” в област на висше образование 7. Здравеопазване и спорт, професионално направление 7.1. Медицина по научна специалност „Физиология на животните и човека” в Университет „Проф. д-р Ас. Златаров”- Бургас по обявен конкурс в ДВ бр. 42/28.05.2019 год.

I. Резюмета на публикациите по показател В:

1. Arnaudov At., Il. Velcheva, El. Tomova. Influence of copper and zinc on the erythrocyte-metric parameters of *Carassius gibelio* (pisces, Cyprinidae). I. influence of copper on the erythrocyte-metric parameters of *Carassius gibelio* (pisces, Cyprinidae). Bulgarian Journal of Agricultural Science, 2008, 14, 557–563.

Abstract: Some metric parameters of the erythrocytes (big cell diameter Dc, small cell diameter dc, big nuclear diameter Dn, small nuclear diameter dn) in the blood of *Carassius gibelio* after influence of different copper concentrations were established. The beginning of processes of atrophy in the low copper concentrations and necrosis in the higher copper concentrations were found out. There was an advent of the cell hypertrophy in the higher copper concentrations. The higher copper concentrations also caused anisocytosis.

2. Tomova El., I. Velcheva, At. Arnaudov. Influence of copper and Zinc on the erythrocyte-metric parameters of *Carassius gibelio* (Pisces, Cyprinidae). II. Influence of Zinc on the Erythrocyte-Metric Parameters of *Carassius gibelio* (Pisces, Cyprinidae), Bulgarian Journal of Agricultural Science, 2009, 15, 183–188.

Abstract: Some metric parameters of the erythrocytes (big cell diameter Dc, small cell diameter dc, big nuclear diameter Dn, small nuclear diameter dn) in the blood of *Carassius gibelio* after influence on different Zn concentrations were established. The percentage proportion of the various types of Prise-Jones curves, preliminary constructed, was also calculated. The beginning of processes of cariopicnoses, hypertrophy and anisocytosis were detected.

3. Tomova El., At. Arnaudov, Il. Velcheva. Effects of zinc on morphology of erythrocytes and spleen in *Carassius gibelio*, Journal of Environmental Biology, 2008, 29, 6, 897–902.

Abstract: The influence of increased zinc concentrations (0.1, 0.5, 1.0, 1.5 and 2.0 mg.l⁻¹ ZnSO₄.7H₂O) on the total number and the morphology of the erythrocytes, as well as the processes related to their formation and destruction in the spleen of *Carassius gibelio* were investigated ex situ. It was found that zinc concentrations caused pathological alterations in the erythrocytes that were not identical in the different concentrations – poikilocytosis; ruptures in cell membranes in the concentrations of 0.5 mg.l⁻¹ and 1.5 mg.l⁻¹; cells with double nuclei (symplasts); in the concentration of 1.0 mg.l⁻¹; in the highest concentrations (1.5 mg.l⁻¹ and 2.0 mg.l⁻¹) presence of erythrocytes at initial stage of atypical mitotic division. Against the background of those various alterations, the total number of the erythrocytes in the peripheral blood increased simultaneously with the

increase of zinc concentrations ($p < 0.001$). Morphological alterations in the spleen were also observed, indicating a compensational tendency against the toxic influence of zinc upon the fish erythrocytes – hyperplasia of the red pulp and lack of hemosiderin. These results show that the alterations in the total number and the morphology of the erythrocytes are connected with the relevant compensatory histopathological alterations in the spleen. The use of the ascertained alteration could be valuable in monitoring zinc-polluted waters.

4. Arnaudova D., At. Arnaudov, El. Tomova. Selected hematological indices of freshwater fish from Studen Kladenetsh Reservoir, Bulgarian Journal of Agricultural Science, 2008,14, 1, 244–250.

Abstract: Investigations on the toxic effect of heavy metals upon fish is accompanied by the investigation of changes in some hematological and biochemical blood indices. However, very few publications can be found regarding the combined impact of metals and this effect has been studied particularly by means of *ex situ* analysis and in lesser amount using freshwater basins analysis. The present article provides information for some red blood cell indices of three freshwater fish - bleak (*Alburnus alburnus* L.), rudd (*Scardinius erythrophthalmus* L.) and perch (*Perca fluviatilis* L.) from the Studen Kladenetsh Reservoir (area of the Arda River). The toxic substances in Studen Kladenetsh Reservoir showed that their concentration in the water exceeds acceptable levels. The analysis of all three freshwater fishes inhabiting the Studen Kladenetsh Reservoir registered anaemic changes in the blood regardless of the season. However, each species developed a different type of anaemia – macrocytic hyperchromic type in the bleak, hypochromic type in the rudd and normochromic anaemia, which developed into microcytic normochromic anaemia in winter in the perch. The morphological examination of the erythrocytes of all three freshwater fishes demonstrated a wide range of pathological deviations as well as a large number of „amitotic” erythrocytes in peripheral blood of rudd and perch. These changes also show differences between the species.

5. At. Arnaudov, I. Velcheva, E. Tomova. Changes in the erythrocytes indexes of *Carassius gibelio* (Pisces, Cyprinidae) under influence of Zinc, Biotechnology & Biotechnology equipment, 2009, 23, SE, 167–169.

Abstract: The erythrocytes indexes (MCV, MCH and MCHC) and the type of anaemia on *Gibelio* carp (*Carassius gibelio*) after influence of increasing zinc concentrations (0.1, 0.5, 1.0, 1.5 and 2.0 mg.l^{-1}) were established. Size increasing of the erythrocytes (MCV) and decreasing the haemoglobin concentration in the whole blood (MCHC) and in one erythrocyte (MCH) caused by zinc were found. It was ascertained that the zinc causes a hypochrome type of anemia by all concentrations and was observed the trend of shift from microcyte to macrocyte type when zinc concentration increases.

6. El. Georgieva, I. Velcheva, At. Arnaudov, P. Atanasova. Study the influence of copper on some indices of the hepatic homeostasis of the *Gibelio* carp (*Carassius gibelio*), Journal of Environmental Protection and Ecology, 2012, 13, 3A, 1902–1906.

Abstract: Increasing copper concentration (0.1, 0.5, 1.0 and 2.0 mg.l^{-1}) on morphological and some biochemical parameters of the liver of *Gibelio* carp (*Carassius gibelio*) was studied. It was investigated the glycogen contents in hepatocytes and the

lipid and glucose content of the sera. The simultaneous increase in the glycogen in the hepatocytes as well as lipid and glucose in the blood were found. The role of the increasing of blood lipids for keeping the liver homeostasis of Gibelio carp was discussed. It was supposed that the changes of blood lipids concentration can be used as a biomarker for the purpose of the ecological monitoring of waters polluted with copper.

7. Velcheva Il., At. Arnaudov, El. Georgieva, P. Atanasova. Influence of copper on hepatic morphology of the Gibelio carp (*Carassius gibelio*), Journal of Environmental Protection and Ecology, 2012, 13, 3A, 1928–1932.

Abstract: The effect of increasing copper concentration (0.1, 0.5, 1.0 and 2.0 mg l⁻¹) on morphology of the liver of Gibelio carp (*Carassius gibelio*) was studied. Histopathological alteration in the hepatopancreas (degeneration, necrosis, distorsions in the hepatic blood circulation as well as non necrotic changes in the nuclei) was found whilst subjected to influence of tested concentrations. A clear gradation of degenerative changes was detected. Along with them, compensating changes occur even by the lowest concentration and also were gradual.

8. Zhelev Zh., At. Arnaudov, G. Popgeorgiev, Hr. Dimitrov. Assessment of ecological status of two rivers with different types of anthropogenic pollution in Southern Bulgaria based on the level of fluctuating asymmetry in the populations of Marsh Frog *Rana ridibunda* (Amphibia: Ranidae), Acta zoologica bulgarica, 2012, Suppl. 4, 229–235.

Abstract: The degree of manifestation of the indicators of fluctuating asymmetry (FA) was studied in the populations of *Rana ridibunda* in two of the most polluted river ecosystems in Southern Bulgaria. The integral indicator of developmental stability, evaluation of the ecological condition parallel to the data of physicochemical analysis was performed. It was found that the variations in genetic homeostasis in the populations of *R. ridibunda* in a habitat under conditions of anthropogenic pollution occur independently on the type of toxicants, but the degree of violation expression in the form of FA depends on the nature of the pollution.

9. Zhelev, Zh., G. Popgeorgiev, At. Arnaudov, K. Georgieva, N. Mehterov. Fluctuating asymmetry in *Pelophylax ridibundus* (Amphibia: Ranidae) as a response to anthropogenic pollution in South Bulgaria. Archives of Biological Sciences, 2015, 67, 3, 1009–1023.

Abstract. The aim of this study was to investigate the integral indicator for developmental stability, the fluctuating asymmetry (FA), in the marsh frog *Pelophylax ridibundus* populations that inhabit biotopes of different types (running rivers and still, dam lakes), when exposed to different types of anthropogenic pollution (domestic sewage pollution and heavy metal pollution) in south Bulgaria. A total of 920 *P. ridibundus* individuals were used for FA analyses over three years (2009-2011). Fluctuating asymmetry was defined by 10 morphological traits, using the index frequency of asymmetric manifestation of an individual (FAMI). In closed water basins, regardless of the nature of toxicants, the FA values in *P. ridibundus* populations were statistically lower than those in river populations. The FA values were constantly the highest under conditions of sustained anthropogenic pollution, with high concentrations of toxicants in rivers with domestic sewage pollution and heavy-metal pollution. The results provide

better opportunities to use FA in *P. ridibundus* populations for bioindication and biomonitoring, and for parallel and independent analyses of the physicochemical assessment of the environmental condition.

10. El. Georgieva, At. Arnaudov, Il. Velcheva. Clinical, hematological and morphological studies on ex situ induced copper intoxication in Crucian carp (*Carassius gibelio*), Journal of Central European Agriculture, 2010, 11, 2, 165–172.

Abstract: The influence of increasing concentrations of copper sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) on Crucian carp (*Carassius gibelio*) was investigated. The clinical signs, the morphologic changes in the spleen and gills, and the alterations in red blood cells were analyzed. The concentrations tested were respectively 0.1, 0.5, 1.0 and 2.0 $\text{mg} \cdot \text{l}^{-1}$. Various clinical symptoms were observed resulting from damaged oxygen transport, hemorrhages being the most frequent. Also, different concentrations of copper caused three various types of anemia. Pathological alterations caused by compensatory reactions refer to the adaptation of *Carassius gibelio* to the hypoxia, caused by the pathologic changes in gills and the anemia that occurred.

II. Публикации по показател Г

1. D. Arnaudov, At. Arnaudov, D. Kirin, Study on the Toxoplasmosis among wild animals, Experimental Pathology and Parasitology, 2003, 6, 11, 51–54.

Abstract: A study has been made on the spread of the toxoplasmosis among wild animals in Bulgaria and the properties of the isolated stains *T. gondii*. A large spread of toxoplasmosis among wild animals (minks, yaks, wild boars, roes and hares) has been found. For the first time in Bulgaria 12 stains of toxoplasms from wild animals have been isolated – 4 cystogenous and 8 virulent. These stains are virulent not only for the white mice but also for the rabbits and the sheep. By their virulent properties the stains are identical with the etalon stain Rh. Such identity has been found also at defining their immunologic properties.

2. Velcheva I., At. Arnaudov, G. Gecheva, Iv. Mollov. A study of some physiological parameters of three hydrobiotic species under the influence of cooper, Proceedings of the II International Symposium of Ecologists of Montenegro, Kotor, Montenegro, 2006, 155–160.

Abstract: A study on the effects of five increasing copper concentrations on three hydrobiotic species ex situ was carried out. The individuals of this research are gathered from various habitats of the Maritsa River, from unpolluted ponds. The researched indices are as follow: chlorophyll content of the aquatic bryophyte species *Amblystegium riparium*; hematological parameters in the blood samples of *Carassius auratus gibelio* and *Rana ridibunda*, particularly erythrocyte alterations. The current paper commented alterations of the studied parameters depending on the different copper concentrations in the solutions. The results could be used and applied in future biomonitoring surveys of copper contaminated aquatic ecosystems.

3. Arnaudov At., N. Tziporkov, Immunosuppressive activity of fractions of Salmonella choleraesuis, Folia Veterinaria, 2006, 50, 1, 33-36.

SUMMARY

The aim of the investigation was to determine the influence of fractions of pathogen strain *Salmonella choleraesuis* on the immune response of white mice. The fractions were obtained by gel-chromatography of bouillon filtrate of the strain *Salmonella choleraesuis*, isolated from pig, which had died from acute salmonellosis. The elution curve possesses one peak. It was found, that the fractions from the steep acclivity possesses immunosuppressive properties. These fractions have high molecular weight and probably are lipopolysaccharides. They can suppress both the cell-mediated immunity and the primary and secondary humoral immune response against heterogeneous antigens and phagocytosis. We conclude that the development of septicaemia in *Salmonella* infections depends on the functional condition of the macrophages in the *lamina propria* of the gut wall.

4. Arnaudov At. Morphological changes in the skin caused by influence of dialyzable lymphoid cells extract, *Acta morphologica et anthropologica*, 2008, 13, 121–124. Abstract:

A study has been made of the morphological alterations in the skin of guinea pigs, intracutaneously injected with dialyzable lymphocytic extracts with molecular weight of 20 kDa and 10 kDa. It has been found out that the application of the extracts causes various alterations, involving enhancement of vascular permeability in the skin. The morphological basis of alterations is mononuclear infiltration in the dermis. The extracts, obtained from peripheral lymphoid organs, cause more strongly expressed erythrodiapedesis, and the extracts, obtained from blood leucocytes, cause stronger exudation. The substances, causing the skin alterations are with molecular mass ≤ 10 kDa.

5. Arnaudov At. Tissue expression of A and B blood-group antigens in organs of the house mouse (*Mus musculus*) and the wood mouse (*Apodemus sylvaticus*) (Muridae), *Scientific works of University of Plovdiv, Homo*, 2005, 41, 119–129.

ABSTRACT

By the immunohistochemical analysis of samples from liver, pancreas and spleen we studied the tissue expression of A and B blood-group antigens in two species of mice – *Mus musculus* and *Apodemus sylvaticus*. Interlobular space, blood plasma and endothelia of blood vessels and erythrocytes with membrane tagging were positivized in the liver of *Mus musculus*. In *Apodemus sylvaticus* – single bile ducts. Hepatocytes were permanently negative to A and B blood-group antigens. Acinar epithelial cells in pancreas of both mice species also expressed the antigens we studied, possibly in connection with the mechanisms of secretory formation. A large number of lymphoblasts of lymphoid follicles were positivized in the spleen. The intensity of antigenic expression in *Apodemus sylvaticus* was higher.

6. Ципорков Н., Ат. Арnaudов. Върху състава на диализуем левкоцитарен екстракт, Научни трудове на УХТ–Пловдив, 2008, LV, 2, 295–298.

Резюме:

Чрез HPLC – хроматография е изследван състава на заешки антисалмонелен диализуем левкоцитарен екстракт. В активният пик след хроматография върху Sephadex G-25 количеството на азотните бази и нуклеозидите нараства в пъти докато нуклеотид-монофосфатите намаляват. Абсорбционният индекс A_{260}/A_{280} на пречистеният препарат (около 2,0) се запазва.

7. Velcheva П., Е. Tomova, D. Arnaudova, Ат. Arnaudov. Morphological investigation on gills and liver from freshwater species from “Studen kladenec” Dam lake, Bulgarian Journal of Agricultural Science, 2010, 16, 3, 364–368.

Abstract:

The histostructure of gills and liver (hepatopancreas) of the bleak (*Alburnus alburnus* L.), rudd (*Scardinius erythrophthalmus* L.) and perch (*Perca fluviatilis* L.) inhabiting the dam “Studen Kladenets” was studied. Histopathological changes were found in the liver (hepatopancreas) and gills of all three investigated fish species. The morphological alterations in the liver were mainly degenerative, but necrotic and hyperemic changes in the parenchyma were also found. Morphological changes in gills are of hypertrophic type, most likely of a compensatory type.

8. D. Arnaudova, Ат. Arnaudov, Em. Sapundzhiev. Metabolic glycogen activity in hepatocytes of fish from a water source containing heavy metals, Acta Morphologica et Anthropologica, 2011, 17, 114–118.

Abstract:

By a histochemical research it was investigated what the glycogen concentration in the hepatocytes of three species freshwater fish (bleak, perch and rudd) is. By this it is proven that there is bioaccumulation of lead, zinc and cadmium in their livers as a result of the fish's inhabiting water basins containing the same metals.

It was established that heavy metal bioaccumulation in the fish liver causes decrease of glycogen and its uneven distribution in the organ compared to fish in clean water basins. Resulting from the presence of heavy metals, species peculiarities in the disorders of glycogen metabolism were found.

9. П. Velcheva, Ат. Arnaudov, Ел. Georgieva. Influence of Zinc on gill morphology of Gibelio carp (*Carassius gibelio*), Ecologia Balkanica, 2010, 2, 19–23.

Abstract: The influence of increasing concentrations of Zinc sulfate ($Zn SO_4 \cdot 7H_2O$) on the hystostructure of Gibelio carp gills was investigated. Changes were observed even in the lowest concentration (0.1 mg.l^{-1}) – degenerating, cirulation and hyperplastic processes. With the increasing of the Zinc concentration, the hyperplasic processes were predominant over the degenerating and cirulation ones.

10. Arnaudov Ат. Serological survey for *Brucella ovis* dissemination among goats (*Capra aegagrus hircus*), Journal of Central European Agriculture, 2012, 13, 1, 188–192.

Abstract: By complement fixation test 230 blood samples from goats and he goats were examined for presence of antibodies against *Brucella ovis*. 134 blood samples were from goats (23 of them were from slipping goats) and 96- from he goats. The animals come from private farms in the Plovdiv and Pazardzhik regions (Southern Bulgaria). 10.87% of

all tested blood samples contain antibodies against *Brucella ovis*. Differences in the percentage of the positive reagents of different goat categories were found. The highest percentage was among slipping goats (39.13% towards to 11.71% among the healthy goats and 3.13% among he goats). It can be concluded that goats play an important role in the epidemiology of the of the disease. The greatest risk is slipping goats bred together with sheep flocks.

11. Арnaudов Ат. Съвременни аспекти на разпространението и контрола на особеноопасните зооантропонози, Управление и образование, 2012, 8, 3, 82–85.

Abstract: This article presents etiological and epidemiological description of emerging and reemerging zoonoses. The main focus is on the transmitting factors of the disease among which vector disseminator and foodstuffs are the most significant. In addition, some aspects of disease control have been described.

12. Arnaudov At. Epizootical and epidemiological features of brucellosis in Bulgaria, Journal of Bioscience & Biotechnology, 2014, SE ONLINE 141–143.

Abstract: The spread of brucellosis in domestic animals and humans was studied during the period 1988 - 2013. The study found that over a fixed period of time the disease in domestic animals was primarily manifested as an epizootic with *Brucella* which are non-pathogenic or low pathogenic to humans - *Brucella ovis*, *Brucella suis* and *Brucella canis*. During the period June 2006 - December 2008, infection of sheep and goats with *Brucella melitensis* was found in 16 villages of 4 districts. The infection has probably been imported from Greece in 2005 as a result of unauthorized transportation of goats.

During the period 2005-2008 in Bulgaria were found 120 cases of brucellosis in humans in 13 districts of the country. Most of the cases were registered in the Haskovo and Sliven districts. The disease has occurred among workers in animal farms in Greece; however, a connection between the epizootic and the epidemic process has been established in several areas of the country.

13. Arnaudov D., At. Arnaudov. Isolation of *Toxoplasma gondii* from domestic and wild animals, Proceedings of the Balkan Scientific Conference of Biology, Plovdiv, Bulgaria, 2005, part II, (Eds.: B. Gruev, M. Nikolova, At. Donev), 41–47.

Abstract: 52 strains of *Toxoplasma gondii* with different virulence have been isolated from various domestic and wild animals. In most cases of isolation of toxoplasms (84.31%) it was about cystogenic strains, which are avirulent for the white mice. The virulent strains have been isolated mainly from hares. They caused acute toxoplasmosis among inoculated experimental animals (white mice, rabbits and pregnant ewes that had aborted).

Under epidemiological investigation it has been found that *Toxoplasma gondii* was a mean causing agent of abortions among ewes. The cats play important role in epidemiology of toxoplasmosis among the sheep. The wild animals perform an important role as a natural reservoir of *T. gondii* and a potential source of invasion with toxoplasms to the domestic animals and the man. All isolated strains are immunologically identical in between them, as well as with the sample strain Rh.

14. Timoshok N., N. Spivak, V. Zoltzenko, At. Arnaudov. Interferon- γ and its inductors. A review. Proceedings of the Balkan Scientific Conference of Biology, Plovdiv, Bulgaria, 2005, part II, (Eds.: B. Gruev, M. Nikolova, At. Donev), 48–54.

Abstract: Interferons (IFN) are regarded to the class of cytokines and are the family of proteins, which possess antiviral, immunomodulating and antiproliferative activity. It permits to refer them as polyfunctional bioregulators of wide spectre of action. Of many years experience of IFN preparations use in clinical practice permitted to determine its effectiveness for prophylaxis and treating of viral, bacterial and some of oncological diseases. At the same time there is the other alternative way of obtaining all positive IFN effects in organism and deprivation of peculiar to IFN preparations. The idea of such approach brings to action the own interferon-productive organism system: while using interferon inductors. At present this method has got the name "endogenic interferogenesis". The possibility of use of such method has become obvious after IFN synthesis discovery practically by all organism cells. It is necessary to mention the fact that owing to crossing of IFN gene activation ways as well as a number of cytokines, the IFN inductors also induct tumor necrosis factor synthesis and interleikins, which play an important role in organism immunoreactiveness regulation. Purposeful skring among the wide spectrum of high and low molecular combination of natural origin as well as synthetically one having revealed some preparation with high chemical-theurapeutical index, permitted to consider them as possible for use in medical practice. Thus, the broad studying of potential interferon inductors with the purpose of their instillation of the most perspective in medical practice is the actual trend of modern virology and immunology.

15. Arnaudov D., At. Arnaudov, D. Kirin, S. Gospodinova. Ixodidae ticks of small ruminants in the region of Parvomay, Southern Bulgaria, Bulgarian Journal of Agricultural Science, 2014. 20, 3, 590–594.

Abstract: The species composition and the distribution of ticks from the family *Ixodidae*, invading domestic goats (*Capra aegagrus hircus*) and sheep (*Ovis aries*) near Parvomay (region of Plovdiv) were studied. The indicators of an invasion (extension invasion and intensity of invasion) and the seasonal changes in the invasion of goats and sheep by tick species were found out. The daily activity of *Ixodes ricinus* in a habitat near the Gradina village was observed. 637 specimens of goats and 810 specimens of sheep from 12 farms in different villages in the Parvomay Municipality were examined, the study was conducted in all four seasons. It is found out that goats and sheep in the regions investigated is invaded by 7 species of ixodidae ticks – *Rhipicephalus bursa*, *Rhipicephalus sanguineus*, *Ixodes ricinus*, *Dermacentor marginatus*, *Haemaphysalis sulcata*, *Haemaphysalis punctata* and *Hyaloma plumbeum*. The predominant invasive species in both animals is *Rhipicephalus bursa*. The maximum of invasion in both host species was identified – in the spring by *Ixodes ricinus* and *Dermacentor marginatus*; in the summer – the species *Rhipicephalus bursa* and *Rhipicephalus sanguineus*; in the spring and autumn seasons – by *Haemaphysalis sulcata* and *Haemaphysalis punctata*. Single specimens from the species *Hyaloma plumbeum* were found in March and November. Changes in the daily activity of ticks of the species *Ixodes ricinus* were reported – related to the fluctuations of temperature and relative humidity and the solar radiation.

16. Arnaudov At., D. Arnaudov. Ixodid ticks on domestic ruminants: an ivestigation in the valley of Maritsa river in Plovdiv region, Bulgaria, Acta Zoologica Bulgarica, 2017, Suppl. 8, 221–226.

Abstract: The species composition, distribution, seasonal dynamics and indices of infection of ixodid ticks parasitizing sheep *Ovis aries* (L., 1758), goats *Capra aegagrus hircus* (L., 1758) and cattle *Bos taurus* (L., 1758) in four municipalities near Maritsa River in Plovdiv Region were studied. In 2011-2016, 584 sheep, 521 goats and 114 cattle were tested at several locations. The overall condition and the condition of the skin and visible mucosal surfaces of animals were observed. Eight ixodid tick species parasitizing domestic ruminants were recorded. *Rhipicephalus bursa* (Canestrini & Fanzago, 1877) was the most widespread tick in the region and the predominant species on sheep and goats, and *Hyalomma plumbeum* (Panzer, 1796) predominated on cattle. Some differences in the indices of infection and seasonal dynamics of the spread of ixodid ticks were observed on the different species of domestic ruminants. There were no serious changes in the overall condition and the condition of the skin and visible mucosal surfaces of the infected animals.

17. Arnaudov At., Zh. Kostova. Dialysable leukocyte extracts in immunotherapy. Biotechnology & Biotechnological Equipment, 2015, 29, 6, 1017–1023.

Abstract: Dialysable leukocyte extracts (DLE) are complexes consisting of a large number of low-molecular-weight substances. These extracts have immunomodulatory properties, which are mainly attributed to small peptides commonly referred to as 'transfer factor'. This review focuses on the characteristics of DLE with transfer factor activity, together with the methods for their preparation and purification. The opportunities for applying the extracts for immunotherapy purposes against various diseases in humans and domestic animals are also discussed. Their ease of preparation and relatively low cost combined with the rapid positive effect they produce will make DLE subject to application in medicine in the future, including their use against new nosological entities.

18. Arnaudov At, D. Arnaudova. Changes in blood cells of carp (*Cyprinus carpio* L.) under the influence of increasing concentration of nickel, Scientific works of the Union of Scientist in Bulgaria-Plovdiv, Series C Technics and Technologies, 2017, 14, 210–213.

Abstract

The impact of increasing concentrations of nickel (Ni) on the morphofunctional characteristics of carp (*Cyprinus carpio* L.) erythrocytes and leukocytes was studied. In the erythrocytes, poikilocytosis and nuclear changes were established in all studied treatment groups. Under the influence of the lowest concentration (equivalent to 25% of the threshold limit value (TLV)) erythrocytes with a rounded form were observed in the blood smears. At higher concentrations, the poikilocytosis was expressed in the presence of both rounded and elongated shapes in the blood smears. The nuclear changes were expressed by the presence of lobbed and budded cores. Under the action of the highest concentration (at TLV), pyknotic nuclei were observed as well. The percentage of micronuclei was low. The fish leukocytes were of lymphocytic type. In the researched group which was treated with the highest concentration, the number of monocytes and neutrophils was found to be increased, probably due to increased tissue decay.

19. Arnaudova D., D. Boyadjieva-Doychinova, At. Arnaudov. Changes in blood cells of carp (*Cyprinus carpio* L.) under the influence of increasing concentration of lead,

Scientific works of the Union of Scientist in Bulgaria-Plovdiv, Series C Technics and Technologies, 2019, 17, 188–192.

Abstract

The impact of increasing concentrations of lead (Pb) on the morphofunctional characteristics of carp (*Cyprinus carpio* L.) erythrocytes and leukocytes was studied. In the erythrocytes nuclear changes were established in all studied treatment groups. Under the action of the highest concentration, the nuclear changes were expressed by the presence of round and swollen erythrocytes and cores. The fish leukocytes in the researched group which was treated with the highest concentration, the number of monocytes and lymphoblasts was found to be increased, probably due to increased tissue decay.

20. Arnaudov At. Blood indices in samples from striped mice (*Apodemus agrarius* Pallas 1771) inhabiting a protected area “Tsalapitsa rice fields”, Scientific works of the Union of Scientist in Bulgaria-Plovdiv, Series C Technics and Technologies, 2019, 17, 197–201.

Abstract

The investigation involved several blood indices in samples taken from 10 female specimens of the striped mice species (*Apodemus agrarius*) inhabiting a protected area «Tsalapitsa Rice Fields». Red blood cell indices (haemoglobin content, haematocrit and erythrocyte diameter) were within the normal physiological range and erythrocytes presented with normal morphology. White blood cell differentials were of the lymphocyte type (63.5% lymphocytes) while the percentage of monocytes was relatively high (5.5%). There were also isolated lymphoblasts and monoblasts, as well as phagocytic neutrophils. Eosinophil counts and especially basophil counts were low. All blood films showed the presence of bacteria (bacteraemia). It was concluded that environmental factors do not cause anaemia-related changes, apparently due to the good adaptability of striped field mice. The increase in lymphocyte and monocyte generation as well as the activation of phagocytic neutrophils is the probable reason why the microorganisms present in the blood did not result in apparent symptoms of infection and why their activity was only limited to asymptomatic carriage. The very low basophil count is another circumstantial evidence of exposure to the effects of environmental stressors.

21. Penkov D., At. Arnaudov, M. Nikolova. Dynamic of some basic blood indices in Guinea fawl, Trakia Journal of Sciences, 2019 (in press).

Abstract:

A monitoring study of some main blood parameters on a flock of free-range grown guinea fowls has been conducted.

The following results (depending of sex and laying intensity) have been established: Hemoglobin content – between 145.8 (males - before peak of laying intensity) and 98 g/L (females - before peak of laying intensity), Hematocrit content – between 43.8 (males - before peak of laying intensity) and 28.8% (females - before peak of laying intensity), glucose – between 11.7 (males - before peak of laying intensity) and 8.24 mmol/L (females – end of laying period) and total protein content – between 5.86 (females - peak of laying intensity) and 3.30% (males - peak of laying intensity).

22. Arnaudov At. Hematological and blood biochemistry values in Indian buffalo (*Bubalus bubalis*) from the Plovdiv region I. Red blood cell indices, Научни трудове на ПУ «П. Хилендарски», 2004, 40, 73–80.

ABSTRACT

In specialized literature the data for the hematology values of Indian buffalo (*Bubalus bubalis* L.) are comparatively scarce. In Bulgaria in the last decades analyses of this kind are generally missing.

The present article provides information for the red blood cell indices of the female lactating Indian buffalos *Bubalus bubalis* L., of the Murrah breed from the Plovdiv region.

Typical for the red blood cell values of the tested individual *Bubalus bubalis* L. are the high levels of hemoglobin (9.99 ± 1.09 mmol/l) and hematocrit (0.474 ± 0.057 l/l) at normal count and comparatively small diameter of erythrocytes – $5.43 \pm 0.86 \times 10^{12}/l$ and $5.3 \pm 0.21 \mu\text{m}$ respectively. No deviations were recorded in the morphological characteristics of erythrocytes (terete, normochrome cells; low level of anizocytosis; lack of poikilocytosis, cells with inclusions in the protoplasm and reticulocytes). These values condition the high tissue metabolism and this is probably significant for the high working capacity and great physical strength of the Indian buffalo.

23. Arnaudov At., G. Dobrev, K. Atanassova. Hematological and blood biochemistry values in Indian buffalo (*Bubalus bubalis*) from the Plovdiv region II. Blood biochemistry values, Научни трудове на ПУ «П. Хилендарски», 2004, 40, 6, 81–90.

ABSTRACT

Some biochemical blood indices of female lactating Indian buffaloes (*Bubalus bubalis* L.) that inhabit the vicinity of Plovdiv were investigated.

It was found out that the sera of the tested animals possess high protein content (109.76 ± 17.28 g/l), which is in positive correlation with the high hemoglobin content. The sera of the buffaloes contain 6 well distinguished protein fractions, three not so well distinguished, as well as three fractions with esteratic activity. The globulin fractions have identical molecular mass, bigger than 150 kDa.

The content of glucose and total bilirubin is low – 1.403 ± 0.91 mmol/l and $2.97 \mu\text{mol/l} \pm 1.38$ respectively, while the triglycerides content is comparatively high (1.62 ± 0.75 mmol/l). The total lipids content varies within large range – 420–890 mg/%.

24. Арнаудов Ат. Биохимични и хемокоагулантни проучвания на екстракти от слюнчени жлези на *Ixodes ricinus* и *Rhipicephalus bursa* (сем. Ixodidae), Научни трудове на ПУ «П. Хилендарски», 2005, 41, 13–22.

Abstract: The present article provides information about the protein content, activity of esterases and anticoagulant properties of the salivary gland extracts (SGEs) of the ixodid ticks *Ixodes ricinus* and *Rhipicephalus bursa*, inhabiting the vicinity of Plovdiv. Partial similarity between the proteins in SGE from these species has been found. Analysing the results for the esterase activity of the tissue extracts of the both species can be assumed that *Ixodes ricinus* is less resistant towards chemical and biological xenogenic influences, in view of the fact that it possesses only one esterase fraction with low intensity.

SGEs from both tick species possess high anticoagulant activity – their injecting to Wistar rats induces prolongation of the bleeding time and the prothrombin time.

We came to the conclusion that the inhibition of the host prothrombin activity is the main mechanism of the anticoagulant action of the SGEs of the *Ixodes ricinus* and *Rhipicephalus bursa*.

25. Арнаудов Ат., Кр. Арнаудова, Фенотипни и функционални проучвания на левкоцити на индийския бивол (*Bubalus bubalis*) от района на гр. Пловдив, Научни трудове на ПУ «П. Хилендарски», Animalia, 2005, 41, 6, 149–158.

ABSTRACT

The morphological, as well as some phenotypic and functional characteristics of the leucocytes of the Indian buffaloes (*Bubalus bubalis*) that inhabit the vicinity of Plovdiv were investigated.

It was found out that the white blood cells count in the peripheral blood of the animals is $9.95 \times 10^9/l$. White blood cell differential counts indicated predominantly lymphocytes, with mean proportion of 54.50%. 19.5% of the lymphocytes formed E-rosettes (respectively CD2 cells), and 8% formed active (early) E-rosettes.

Both types of leucocytes of the Indian buffalo (*Bubalus bubalis*) possess high functional activity – great degree of phagocyte activity of the neutrophils and the monocytes, active E-rosettes, presence of lymphoblasts, plasmatic cells and monocyto blasts. Possibly, this high physiological activity that has been established has a certain considerable role for the resistance of *Bubalus bubalis* towards various parasitic and infectious diseases.

26. Zh. Zhelev, At. Arnaudov, G. Popgeorgiev. Linear dimensions within populations *Pelophylax ridibundus* (AMPHIBIA, ANURA, RANIDAE) from habitats with different levels of anthropogenic transformations in the region of Plovdiv, Southern Bulgaria, *Trakia Journal of Sciences*, 2013, 1, 28–32.

Abstract: Major morphometric measurements (Length of body (L), Tibia (T), Femur (F)) in *Pelophylax ridibundus* from populations inhabiting two bodies of water in the outskirts of Plovdiv: one relatively clean and the other - polluted with pesticides, were analyzed. In both populations, independent of the characteristics of the living environment, there is clear sexual dimorphism - females are superior to males in size. When living in conditions of pesticide contamination, statistically reliable reduction of body size in both sexes of *P. ridibundus* is found.

27. Zhelev Zh, At. Arnaudov, P. Boyadzhiev. Colour polymorphism, sex ratio and age structure in the populations of *Pelophylax ridibundus* and *Pseudepidalea viridis* (amphibia: anura) from anthropogenically polluted biotopes in southern bulgaria and their usage as bioindicators, *Trakia Journal of Sciences*, 2014, 1, 1–12.

Abstract: This work presents data on the occurrence of colour polymorphism, sex ratio and age structure (among adult individuals actually involved in the breeding process) in populations of two tailless amphibian species – *Pelophylax ridibundus* and *Pseudepidalea viridis* inhabiting anthropogenically polluted biotopes in Southern Bulgaria. The habitats are adjacent to the reservoirs “Rozov Kladenets” (pollution of household waste origin: nitrite nitrogen, suspended solids and of industrial origin: coal

dust, sulfates) and “Topolnitsa” (heavy metal pollution). It was established for both biotopes with *P. ridibundus* populations that the individuals with the *striata* morph predominate in both sexes. In *P. viridis* populations, in the two sexes, individuals with morphs A and C predominate. In the biotope contaminated with heavy metals (the “Topolnitsa” reservoir) the female individuals predominate in both tailless amphibian populations. In both biotopes the main part of the breeding marsh frogs are of the middle age group (2+). While in the “Rozov Kladenets” reservoir the males predominate in this age group, in the “Topolnitsa” reservoir predominate the females. In animals of the senior age groups in both biotopes predominate the females (mainly of the 3+age group). In *P. viridis* populations in both biotopes among the breeding animals (in both sexes) predominate individuals from the 2+ and 3+ age groups. In both amphibians, animals of the age groups 4 + and 5 + are very rare (females). It was found that under bad living conditions in ponds used for reproduction, the populations of both tailless amphibians grow better in the area of the “Rozov Kladenets” reservoir.

28. Арнаудов Ат., Н. Ципорков, Проучване върху периферни лимфоидни органи на антиген–стимулирани животни, Научни трудове на ПУ ”П. Хилендарски”-Пловдив, Биология, Хомо, 2003, 39, 6, 65–72.

ABSTRACT

It was determined some physio-chemical and immunological parameters of peripheral lymph origins of antigen-stimulated animals. The content of protein and ribose and ratio A260/280 varied, depending on the kind of animals and type of the origins (spleens or lymph nodes). It was detected one additional protein fraction with m.w. 10 kDa–20k Da in the rabbit’s spleen. After antigen stimulation it was found in the peripheral lymph origins transfer factor activity and specific antibodies in low titers.

29. Arnaudov At. Immunotherapy with dialyzable leukocyte extracts containing transfer factor (Chapter 14), In: Immunotherapy-Myths, Reality, Ideas, Future, InTech Open, 2017, 325–344.

Abstract: Dialyzable leukocyte extracts (DLE) are complexes consisting of a large number of low molecular weight substances. These extracts possess immunomodulatory properties, which are mainly attributed to small peptides with molecular weight of 3.5–6.0 kDa called “transfer factor.” This chapter reviews the nature and immunological characteristics of DLE containing transfer factor (TF), their mechanism of action and the possible uses as immunomodulators in human and veterinary medicine. A main advantage of TF-preparations as immunotherapeutic agents is that they induce a rapid immune response against the pathogen (within 24 h) and thereby reduce the time for the patient immune response by 9–13 days. The low level of difficulty of the process of obtaining protocols determines their relatively low cost and the possibility to combine them with other therapeutic agents during treatment makes them subject to medical applications in the future, including against some new diseases.