***Table 1.*** **Molecular weight of phages polypeptides**

| | Molecular weight, kd | | | | | |
|---|---|---|---|---|---|---|
| Lane № / Band № | 1 | 2 | 3 | 4 | 5 | 6 |
| | Marker (kd) | Isolate 3 | Isolate 4 | Isolate 8 | Isolate 9 | Isolate 11 |
| 1 | 116 | 116,851 | 118,147 | 118,554 | 119,376 | 108,931 |
| 2 | 66,2 | 107,935 | 108,805 | 109,82 | 109,878 | 94,187 |
| 3 | 45 | 72,461 | 71,389 | 72,079 | 72,039 | 71,304 |
| 4 | 35 | 56,273 | 55,573 | 57,559 | 57,337 | 44,247 |
| 5 | 25 | 43,275 | 43,196 | 43,412 | 46,986 | 39,842 |
| 6 | 18,4 | 34,356 | 34,292 | 39,877 | 43,182 | 37,099 |
| 7 | 14,4 | 20,427 | 20,371 | 34,477 | 34,54 | 30,808 |
| 8 | | 19,139 | 19,081 | 32,128 | 20,208 | 16,873 |
| 9 | | 18,579 | 18,519 | 20,048 | 18,43 | |
| 10 | | | | 18,4 | | |

Research of protein composition of virions by electrophoresis system Laemmli allowed to set specific features among phages. Similarity of profiles identified polypeptides were characterized for all phages. Maybe, first passages on some bacteria-hosts influenced on phages. As seen in Fig. 1, phages formed two conventional groups according to the virions morphology and to the bacteria strains at which they were isolated (tracks 2, 3, 4, 5 – the first group; track 6 – the second group). Differences were observed mainly on the composition of minor polypeptides within the group of phages depending on thesource ofvirus isolation.Isolates №3 and №4 have a similar polypeptide composition by number of proteins and in molecular weight (may belong to the samebasicgroup) which differs from the polypeptide of isolates №8 and №9 thatwere isolatedfrom another source (moss).

A difference in composition of minorproteins within the group of phages suggests the impact of restriction – modification system or recombination processes in the host cells. In our opinion, the presence of minor differences in each studied phages may be result of mosaic theory of DNA phages evolution. Evolution of phages is associated with horizontal transfer of certain genetic modules [6]. Active phages, which take part in recombination exchanges, are source of genetic modules [7].

**Conclusions.**Phages, which were studied, have a high rate of similarity. Phages could get individual features by mutation or by exchanging DNA modules with other phages within their areal. In consideration of phages were isolated from nature, these results can reflect some evolutionary process in phage population.

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**N. Matvienko, N. Kharkavliuk**

## FISH RNA VIRUSES

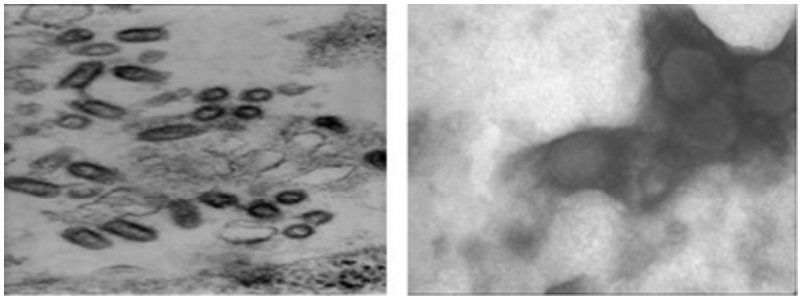
***Было проведено обследование рыб из разных ферм и водоемов Украины на наличие вирусной инфекции. Получены изоляты вирусов весенней виремии карпа (SVCV) и инфекционного панкреотического некроза (IPNV), а также изучены их биологическте свойства на культуре клеток. Для молекулярной диагностики SVCV, методом ПЦР, подобрана пара праймеров.***

***The fish from different farms and water bodies of Ukraine were observed for the presence of viral infection. Spring viraemia of carp virus (SVCV) and Infectious pancreatic necrosis* virus *(IPNV) were isolated and their biological properties were investigated. The pair of primers was designed for PCR identification of SVCV in fish clinical material.***

The main objectives of ichtyopatological research at this stage of development of Ukrainian aquaculture are studies of epizootic situation in fish farms in current environmental conditions, prevention of fish diseases and their early diagnostics based on modern techniques. Especially dangerous viral pathogens of fish are a group of RNA-containing viruses such as rhabdoviruses, which include the spring viraemia of carp virus (SVCV), virus haemorrhagic septicemia (VHS) virus and infectious hematopoietic necrosis of tissue (INN). It is important to mention also another representative of this group – aquabirnavirus, which causes salmon pancreas disease (IPNV) [1,2].

SVCV causes carp spring viraemia. The disease occurs as an epizootics type, is characterized by the development of septic process and ends with high fish mortality reaching 30-40% and sometimes 70% [3]. Reproduction of SVCV occurs in the endothelial cells of blood capillaries, hematopoietic tissue and nephrons. Infectious pancreatic necrosis virus was isolated from young rainbow trout (*Oncorhynchus mykiss*) held under intensive rearing condition. As his infection develops in trout, following pathological sings are recorded: disorders of motor coordination, skin darkening, significant pathological changes in the pancreas, liver, spleen and other parenchymal organs, and mortality of fish juveniles reaches 50-70%.

An optimal composition of the buffer was selected for preserving virus during its transporting to the laboratory. Electron microscopic investigations demonstrated that IPNV is an icosahedral-shaped virus appearing as a six-sided structure having 65-85 nm in diameter (*Fig.1*).



a b

**Fig.1. Transmission electron micrographs of the SVCV isolated from carp (*Cyprinus carpio*) (a) and IPNV isoladet from rainbow trout (*Oncorhynchus mykiss*) (b)**

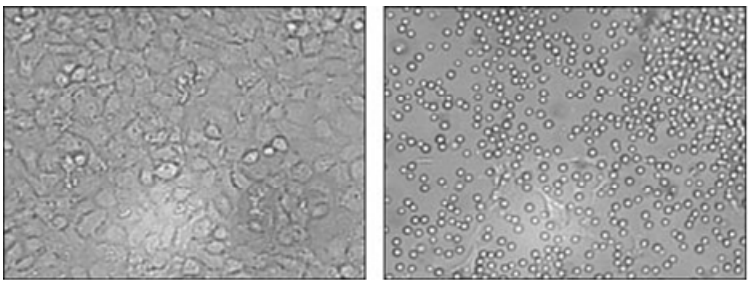
Virus identification was made using enzyme-linked immunosorbent assay (ELISA) on the TestLine systems and using PCR method (RT-PCR) [4].

**Material and methods.** The materials for virological studies were selected at fish farms and natural water bodies of different regions of Ukraine. Most viral isolates were isolated from carp fry andrainbow trout yearlings with signs of viral lesions. Isolation and identification of viruses were carried out with the aid of classical virology methods.

Isolates of SVCV and IPNV were identified and investigated. For PCR analysis, including RNA isolation, cDNA synthesis, amplification and detection, we used "Kit-A" and "Revertaza-L" (AmpliSensyTM, Russia)kits.The setting reaction was carried out according to manufacturer's protocols. Detection of results was performed by electrophoresis [5,6].

For the selection of the most efficient primers, we performed a comparative analysis of nucleotide sequences in the region, which encoded the RNA-dependent DNA polymerase and used the "Vector" software [7,8].

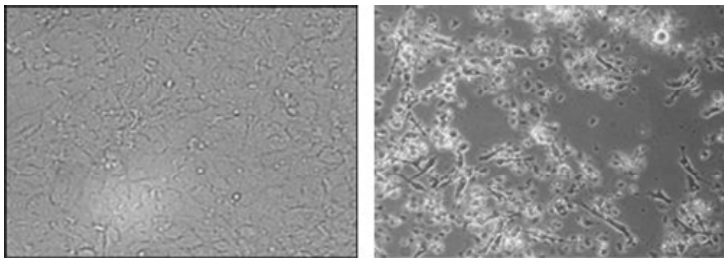
**Results and discussion.** Cultural properties of SVCV were investigated on cell lines EPC, BF-2 and FHM. A reproduction of the SVCV was accompanied by a distinct cytopatohenic action and led to the complete destruction of monolayer within 5-7 days, virus titers were thus $10^{6,4-7,5}$ $TCID_{50}$/0,1ml, optimum cultivation temperature is 19-22 °C (*Fig.2*).



a b

**Fig. 2.The cytopathology of investigated cell lines after infection by SVCV. Normal monolayer of EPC (a) and after infection with carp rhabdovirus (b)**

Studiers of IPNV cytopatohenic were performed on cell lines BF-2, FHM, RTG-2. The first morphological changes were observed within 24 h after inoculation. At the same time advancing complex degenerative processes that accompanied the advent of the cell vacuoles, granularity, cells retained elongated shape or rounded. Titer of virus was $10^{5.2-6.4}$ $TCID_{50}$/0,1ml (Fig3).



a b

**Fig.3. The cytopathology of investigated cell lines after infection by IPNV. Normal monolayer of FHM cells (a) and after infection with aquabirnavirus (b)**

When studying physical and chemical properties of SVCV, we found that the treatment with chloroform and warming up to 56 ºC results in completely loss of viral infectious activity. It was shown that the virus is resistant to pH ranging from 3.0 to 10.0.

Results of biochemical studies allow considering increase the formation of lipid peroxidation products in the body of a carp affected by SVCV as one of the links in the pathogenesis of the disease.

We matched pairs of primers that allow specific identification of SVCV in clinical material from fish. The comparative analysis of nucleotide sequences in the region encoding the RNA-dependent DNA-polymerase of birnaviruses. Primers for PCR synthesized from two conserved regions flanked by variable segment gene VP2 IPNV strain N1 (568-585 nd and 164-184 nd) through assumptions that our isolates belong to the European serotype.

Was investigated the biological characteristics of isolates of two major viruses of fish belonging to the group of RNA-containing viruses.

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## POLIOVIRUS INFECTION PROBLEMS IN UKRAINE

***Поскольку на сегодня прекращение циркуляции вирусов полиомиелита в мире остается актуальным вопросом, для контроля над состоянием защищенности населения Украины от полиовирусной инфекции, исследовано уровень антител в сыворотке крови здорового населения, а также проведен сбор данных по проведению вакцинопрофилактики у детей согласно с календарем прививок.***

***Since cessation of world's poliovirus circulation remain topical issue today, levels of antibodies in the blood serum of healthy population was investigated and was conducted data for vaccineprophylaxis in children. Those studies was developed for Ukrainian population security from poliovirus infection.***

Polio – an acute infectious disease characterized by general toxic symptoms and CNS injury by type of peripheral flaccid paresis and paralysis. Poliovirus, the causative agent of poliomyelitis, is a human ***enterovirus*** and member of the family of ***Picornaviridae***. There are three types of viruses: Type I (strain Brunhilde), type II (Lansing strain), type III (strain Leon). They are quite persistent in the environment.

Comprehensive study and scientific reasoning of the epidemiological surveillance system of poliomyelitis was the key to its eradication in most parts of the globe [1, 2].

But the problem of polio at present certainly not solved [3, 4]. This is evidenced by the epidemic, which in recent years there in the world and even in countries where for many years they were not registered [5, 6, 7].

For some infectious diseases, including polio, the main means of prevention is vaccination.

Maintaining the status of Ukraine as a territory free from polio depends primarily on the state of immunization of infection, as measured level of specific population immunity, and the percentage of people exposed to polio infection.

The **aim** of this work was to assess the levels of antibodies to the vaccine strains of polioviruses 1, 2, 3 types in human blood serum, as well as studies of the vaccineprophylaxis in Ukraine.

**Materials and methods**. Materials: serum of healthy people aged over 25 years living in different regions of Ukraine;data on vaccination in children from different regions of Ukraine. Methods: micromethod of neutralization reaction in cell culture Hep-2 [8].

***Results and discussion***. According to data obtained from regional SES Ukraine during 2009-2011., the analysis of the success of polio vaccination in children was conducted. Full vaccination complex involves the introduction of inactivated and oral polio vaccine to children less than one year, 18 months, revaccination at 6 and 14 years. Established in 2011, the percentage of children who received the vaccine was the lowest compared with 2009 and 2010. (Fig. 1.). It is shown that the level of polio vaccination of children is not satisfactory, because this figure should not be less than 95% for epidemiological welfare.

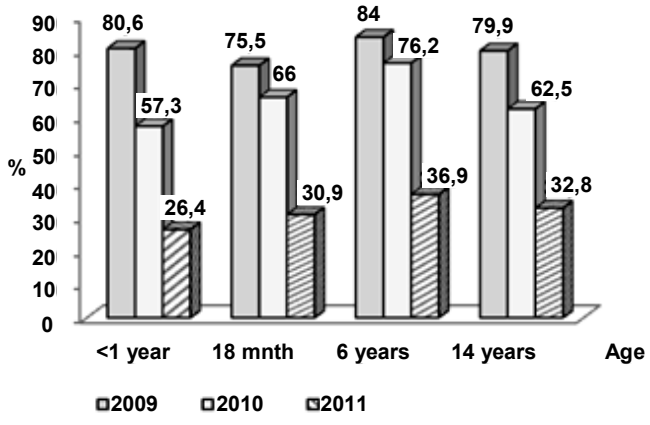


**Fig. 1. The status of vaccination in children in 2009-2011**

It was shown that index of antibodies to polioviruses 1, 2, and 3 types were at a sufficient level in children under 15 years. For example, 60.4% of children had sufficient antibody levels (1:16-1:64) for type 1 poliovirus (Fig. 2.). In type 2 polioviruses this figure was 61.4%, for type 3 polioviruses – 57.5%. However, high antibody titers (1:128-1:256 and above) to type 1 polioviruses was observed only in 29.9% of individuals, to type 2 polio virus – 28%, to 3 types – only in 14.5% of children.