

Results of algae viruses search in human clinical material

O.A. Stepanova¹, Ye.V. Solovyova², **A.V. Solovyov**³

¹ A.O. Kovalevsky Institute of Biology of Southern Seas, NAS of Ukraine
2, Nakhimov Ave., Sevastopol, 99011, Ukraine

² V.K. Gusak Institute of Urgent and Reconstructive Surgery, AMN of Ukraine
47, Lenin Ave., Donetsk, 83045, Ukraine

³ M. Gorky Donetsk National Medical University
16, Ilyich Ave., Donetsk, 83003, Ukraine

Summary. For the first time from a clinical material were isolated algae viruses. This fact testifies about probable role of algae viruses in a human pathology and establishes a new unknown ways in ecology of marine viruses and demands the further extended researches.

Keywords: viral ecology, algae viruses, clinical material.

Introduction. Viruses are the most abundant and least studied group of all hydrobionts. Currently there are evidences about evolution of viruses, changes in virulence and transfer of viruses between ecosystems [1-3]. In this connection we have a necessity to estimate comprehensively the ways of alien (allochthonous) viruses for aquatic ecosystem from land to hydrosphere, and also to study pollution of land and terrabionts (organisms from a land) by viruses of hydrosphere (autochthonous), since this party in circulation of viruses practically is not investigated, though currently is urgent and live issue [4].

The results, received by us earlier, showed the contamination by viruses from a land of water, marine sediments, mollusks and fishes of Black Sea environment from 2,1 to 74 % [5, 6]. This fact gave us suggestion about an opportunity of their adaptation to the new hosts — hydrobionts. Our experiment carried out in laboratory conditions has confirmed adaptation of viruses from a land to marine environment and hydrobionts [7]. Thus, for the first time we

proved, that the contamination by viruses of a land of hydrosphere has potential danger not only for the people (in cases of their infecting through marine food, bathing etc.), but also for hydrobionts. This virus exchange in a nature results in occurrence of «new viruses» and they may be potentially dangerous for organisms of a land and hydrobionts.

People have a real opportunity to contact with marine viruses which can have the implantation into their mucous and this situation can be during recreation, fishing and another economic activity. Whether the marine viruses will be destroyed as a result of human immunity or they will find other way of a survival such as adaptation, latent or acute infection? Currently we haven't the answers for these questions.

The purpose of our study was the search of marine viruses in the human mucous with determination of their possible role in human pathology. So for the first time we carried out the search of algae viruses in a clinical material (cervico-vaginal secretion) from the women which had a recreation on the Black Sea beach 2-5 months ago before their gynecological diseases had beginning.

Materials and Methods. We studied 41 united samples prepared from 182 clinical materials

* Corresponding author.
Tel.: +38050-8833984
E-mail address: solar-ua@ya.ru

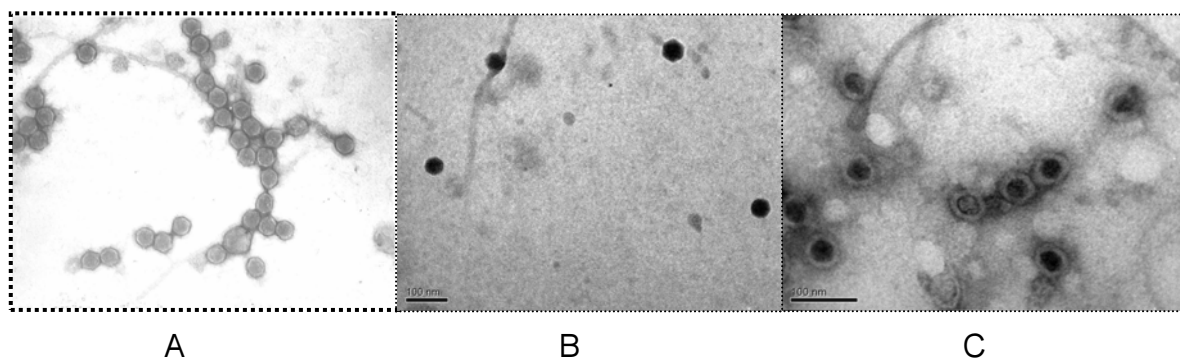


Fig. 1. The electron-microscopy pictures of virions TvV (A) — TvV-S20, PtV(B) — PtV-SI18 and DvV(C) — DvV-SI2. Virions have an icosahedral forms with size 56-58, 45-48 and 50-53 nm for TvV, PtV and DvV [8, 9].

(cervico-vaginal secretion) from women (from Donetsk, Ukraine) with 3 different gynecological diagnoses — colpitis (36 samples), uterus fibroids (63 samples) and erosion of uterus cervix (83 samples). Each of 41 samples consisted of clinical materials of 2-5 women with the same diagnosis. All 182 women were on Black Sea beaches 2-5 months before beginning their diseases. For isolating algae viruses of *Tetraselmis viridis* (TvV), *Phaeodactylum tricornutum* (PtV) and *Dunaliella viridis* (DvV) from clinical material we used the patented method (patent 65864A UA, N2003065499).

Results and Discussion. We carried out the search of algae viruses of *Tetraselmis viridis* (TvV), *Phaeodactylum tricornutum* (PtV) and *Dunaliella viridis* (DvV) in a clinical material because earlier these viruses were isolated from Black Sea environment [8, 9]. Some properties of these viruses were studied and described that

gave the basis to including them in family of Phycodnaeviridae. According the literature data it's known about more closely related to each other among members of Phycodnaeviridae. Moreover, they are more closely related to the herpesviruses than to other dsDNA viruses including poxviruses, baculoviruses and African swine fever virus [10]. The main cause of algae viruses search in clinical material was connected with this information — close relation of algae viruses with some dsDNA viruses — pathogenic for people herpesviruses.

On the fig. 1 are established the electron-microscopy pictures of isolated and studied Black Sea algae viruses.

The results of search of algae viruses in clinical material from women are shown in same Table.

During this study after 7-10 days of contact the material with algae we did the «blind» inoculations (sowings) in cases of absent oppression

Table

Results of infecting fluid algae cultures by clinical material (cervico-vaginal secretion) from women which were on Black sea beaches 2-5 months ago before beginning their diseases

Diagnosis (primary number of samples)	Number of united samples	N of inoculation	Results of infecting fluid algae cultures (growth or oppression with lysis of algae cultures) and isolation of algae viruses		
			<i>Tetraselmis viridis</i>	<i>Dunaliella viridis</i>	<i>Phaeodactylum tricornutum</i>
colpitis (36) uterus fibroids (63)	11c 14f	1	Growth	Growth	Oppression
		2	-«-	-«-	-«-
		3	-«-	-«-	-«-
		4	-«-	-«-	-«-
erosion of uterus cervix (83)	16e	5-10	-«-	-«-	-«-
Isolation of algae viruses from 41 united samples			No virus	No virus	16 PtV were isolated: 6 among 11c; 5 among 14f and 5 among 16e

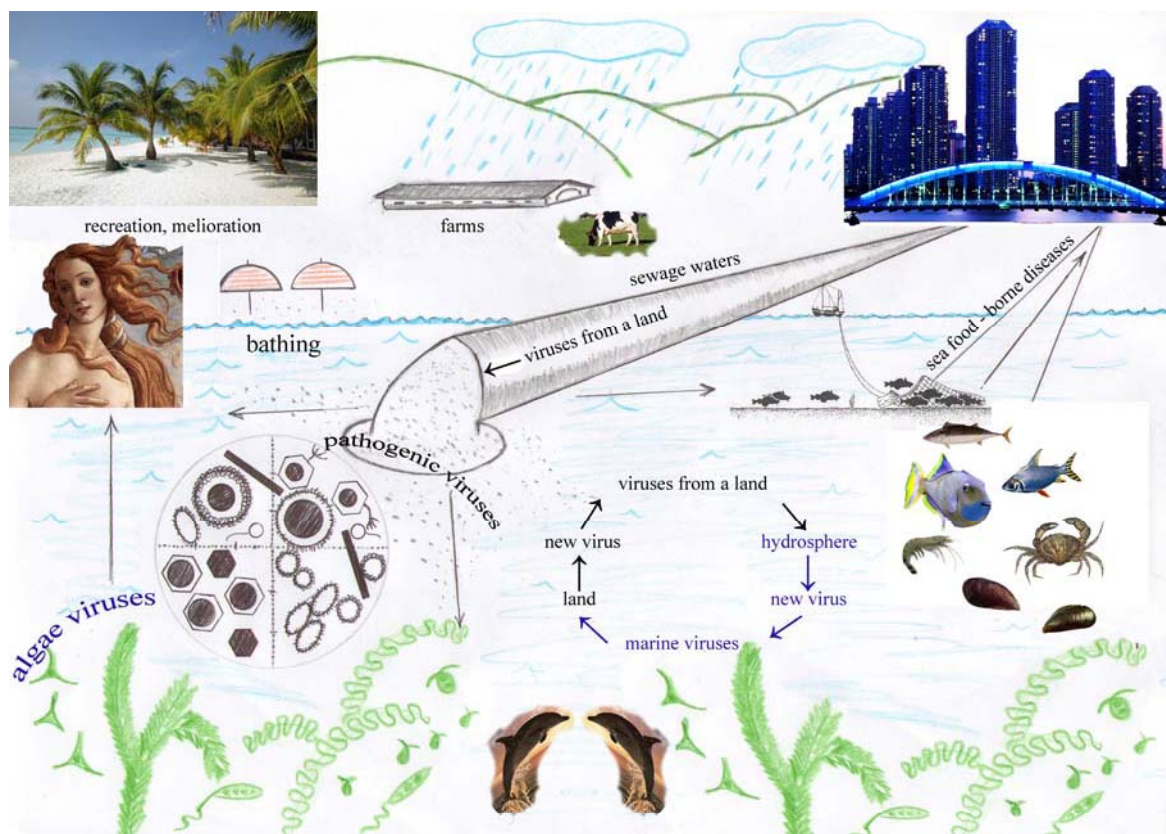


Fig. 2. Contamination of hydrosphere by viruses from a land and pollution of land by aquatic (marine) viruses as reflected of our hypothesis of an exchange of viruses.

(lysis) of algae cultures in first, second, third and next inoculation (from 1 to 10 inoculation). However we observed the oppression of algae culture growth with subsequent lysis only at use for infection (inoculation) by a researched material of algae culture *Phaeodactylum tricornerutum*.

The first inoculation of culture *Phaeodactylum tricornerutum* by a researched material resulted in display of an oppression of growth of culture with further lysis in 7-10 days. Further inoculations (sowings) with passages material have determined a stable latent period (or incubation period) about 2-4 days, as was earlier defined for different variants PtV, which were isolated from samples of water and mussels of Black Sea environment [6-9].

In a result the study of 41 united samples has allowed to isolate 16 variants of *Phaeodactylum tricornerutum* algae virus and no any virus variant to microseaweed *Tetraselmis viridis* and *Dunliella viridis*. Thus, about 40 % of the investigated united clinical samples were contaminated by marine virus — PtV — alga virus of *Phaeodactylum tricornerutum*.

For the time being we don't know about the role which this virus has in gynecological diseases, but we think that this fact of discovery of algae viruses in clinical material of women is very interesting and it is an evidence of a new unknown ways in ecology of marine viruses.

Thus, our hypothesis of an exchange of viruses between a land and hydrosphere [7] has received one more acknowledgement (confirmation) — fact of drift (fact of inoculation) of marine viruses in organism of the inhabitants of a land with possible (probable) development of a new ecological niche (women's vagina) and new host — man, that is reflected in a fig. 2.

Conclusions. For the first time from a clinical material were isolated algae viruses. This fact testifies about probable role of algae viruses in a human pathology and establishes a new unknown ways in ecology of marine viruses and demands the further extended researches. The received results are the new acknowledgement of our hypothesis of an exchange of viruses between a land and hydrosphere. From positions of public health services the revealed facts require the

further extended researches in view of the various physiological statuses of the women (immunity, hormonal background) and with positions of ecology situation of their environment (dif-

ferent pollution of cities, regions, ponds and etc.).

Надійшла в редакцію 19.10.2011 р.

Результати пошуку альговірусів у клінічному матеріалі людей

O.A. Степанова¹, E.B. Соловйова², **A.B. Соловйов³**

¹ Інститут біології південних морів ім. О.О. Ковалевського НАН України
проспект Нахімова, 2, Севастополь, 99011, Україна

² Інститут невідкладної і відновної хірургії ім. В.К. Гусака АМН України
проспект Ленінський, 47, Донецьк, 83045, Україна

³ Донецький національний медичний університет імені М. Горького
проспект Ілліча, 16, Донецьк, 83003, Україна

Резюме. Уперше з клінічного матеріалу ізольовано альговіруси. Цей факт свідчить про можливу роль альговірусів у патології людей і визначає нові, раніше невідомі шляхи в екології морських вірусів, припускаючи подальше розширення досліджень у цьому напрямі.

Ключові слова: вірусна екологія, альговіруси, клінічний матеріал.

References

1. Ecology of Marine Viruses (Banyuls-sur-mer, 19-22 March 2003). — Monaco, 2003. — 94 p. — (CIESM Workshop Monographs N21).
2. Raven J.A. Aquatic viruses: the emerging story // Journal of the Marine Biological Association of the United Kingdom. — 2006. — Vol. 86, No 3. — P. 449-451.
3. Proposal for SCOR WG to investigate the role of viruses in marine ecosystems // Proceedings of the Scientific Committee on Oceanic Research (Venice, Italy, Sept. 2004). — Baltimore (USA), 2005. — Vol. 40. — P. 66-70. — (Annex 4).
4. Olga Stepanova, Stanislav Sholar. Contamination of hydrosphere by viruses from a land and consequence from that // International Conference «Man and Environment: Enemies or Friends?», Naukograd, Pushchino, June 22-24, 2011. — Research centre «Bioresources and ecology». — P. 229-232.
5. Stepanova O.A. Contamination as a step to viral evolution // 30th Pacem in Maribus: intern.conf. A year after Johannesburg: Ocean Governance and Sustainable Development: Ocean and Coasts — a Glimpse into the Future. (Kyiv, Ukraine, Oct. 27-30, 2003). — Kyiv, 2004. — P. 735-737.
6. Stepanova O.A. Ecology of allochthonous and autochthonous viruses of the Black Sea. — Sevastopol: World (Express print), 2004. — 308 p. (in Russian)
7. Stepanova Olga. The ecology of viruses of marine organisms in the Crimean region. — Manuscript: 03.00.16; Taras Shevchenko Kyiv National University, Kyiv, Ukraine. — Kyiv, 2007. — 42 p. (in Russian)
8. Olga A. Stepanova, Arkadiy F. Frolov, Victoriya I. Zadorozhna. Isolation of *Tetraselmis viridis*, *Phaeodactylum tricornutum* and *Dunaliella viridis* Viruses from Black Sea Environment (Poster), http://scor-viral-ecology.dbi.udel.edu/SCOR2009_meetingprogram.pdf.
9. Sholar S.A., Stepanova O.A. Isolation of algae viruses from Black Sea environment near Sevastopol (in 2002-2010) // Biology of internal waters: materials XIV of a School-conference of young scientific (Boroc, October 26-30, 2010). — Yaroslavl: Print house, 2010. — P. 183-190. (in Russian)
10. Suttle C.A. Viral diversity and its implications for infection in the sea // Ecology of marine viruses (Banyuls-sur-mer, 19-22 March 2003). — Monaco, 2003. — P. 73-75. — (CIESM Workshop Monographs No 21).