had low levels of antibodies to all three types of polioviruses, only a small percentage (1.4% -2.8%) of subjects had high titers of antibodies, antibodies to polio type were absolutely absent.

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DISTRIBUTION OF CACTUS VIRUS X IN SOME BOTANICAL GARDENS OF UKRAINE

Проведено обследование растений семейства Cactaceae в коллекциях Никитского ботанического сада и ботанического сада Харьковского национального университета имени Н.В. Каразина. Описаны симптомы инфицированных растений. Свойства возбудителей исследовали с помощью растений-индикаторов, непрямого ИФА и трансмиссионной электронной микроскопии. Опираясь на серологические, биологические и морфологические характеристики изолированного вируса, мы можем предположить, что данный патоген является родственным X вирусу кактуса.

Screening of Cactaceae on virus diseases in the collections of Nikitsky Botanical Garden and Botanical garden of Karasin's Kharkiv National University has been conducted. Different symptoms were detected on virus-infected plants. To define properties of the indicated pathogen methods of host assay, indirect ELISA and transmission electron microscopy were employed. Basing on serological, biological and morphological properties, we suggest that isolated virus is related to Cactus virus X.

Introduction.The culture of cactuses in modern floriculture occupies one of leading places. In accordance with literary data about 10 viruses are able to affectthe members of *Cactaceae* family: *Cactus virus X, Schlumbergera virus X, Opuntia virus X, Zygocactus montana virus X, Saguaro cactus virus, Sammons' Opuntia virus, Cactus virus 2 (CV2), Cactus mild mottle virus, Impatiens necrotic spot virus* and *Tomato spot wilt virus* [3,4]. Among them *Cactus virus X* is one of most dangerous. *Cactus virus X* is transmitted by mechanical inoculation, grafting and by contact between plants. [1,5,6]

Materials and methods. We have been collected plants with virus-like symptoms: *Mamillaria microhelia, Ausrocylindropuntia tunicata, Monvillea sp., Sulcorebutia sp., Bolivicereus samupatanus, Opuntia sp., Ferocactus sp., Thelocactus chrenbergii, Trichocereus bridgesii, Mamillaria magnimamma, Agave furcrea, Opuntia sp., Cereus sp., Astrophytum capricorne, Cereus sp., Astrophytum myriostigma, Astrophytum myriostigma v. nudum* from greenhouse collection of Nikitsky Botanical Garden and *Ritterocereus pruinosus* from the collection of Karazin' Botanic Garden of Kharkiv National University. Infectivity of disorders was confirmed proved using indicators plants typical for majority cactus viruses such as *Chenopodium murale, Datura stramonium, Gomphrena globosa, Nicotiana rustica*. Virus identification was carried out using indirect ELISA [2]. Same samples of plants of *Cactaceae* family were analyzed in electron microscopy at 30,000 magnification. [7]. Electrom microscopic examination we conducted with an Jem electron microscope. Crude sap preparations were negatively stained with 2% uranyl acetate.

Results and discussion. Cactus plants demonstrated different symptoms of virus infection. On some plants (*Mamillaria microhelia, Ferocactus sp., Thelocactus chrenbergii, Trichocereus bridgesii, Mamillaria magnimamma, Agave furcrea, Opuntia sp., Cereus sp., Astrophytum capricorne, Cereus sp., Astrophytum myriostigma* from greenhouse collection of Nikitsky Botanical Garden and *Ritterocereus pruinosus* from the collection of Karazin' Botanic Garden of Kharkiv National University) we observed mosaic symptoms, on other plants (*Ausrocylindropuntia tunicata, Monvillea sp., Sulcorebutia sp., Bolivicereus samupatanus, Opuntia sp., Astrophytum myriostigma v. nudum* from greenhouse collection of Nikitsky Botanical Garden) – symptoms of necrosis (Fig.1,2).

Fig.1. Necrosis on the stem *Astrophytum myriostigma v. nudum*

Fig.2. Mosaic on the stem *Ferocactus sp.*

To define biological properties of the pathogens, we conducted a host assay using indicator plants. Indicator plants were inoculated with sap obtained from cactus plants demonstrating virus-like symptoms. Necrotic local lesions observed on *Chenopodium murale* and *Gomphrena globosa* were typical for Cactus virus X (CVX) [5,6]. In indirect ELISA we observed positive reactions with sap *Mamillaria microhelia, Sulcorebutia sp., Bolivicereus samupatanus, Opuntia sp., Ferocactus sp., Mamillaria magnimamma, Opuntia sp., Cereus sp., Astrophytum capricorne, Astrophytum myriostigma* and *Ritterocereus pruinosus* with antiserum to Potato virus X (PVX, which is serologically related to Cactus virus X).

Comparing the results of bioassay and ELISA tests we further focused on samples of *Mamillaria microhelia, Sulcorebutia sp., Bolivicereus samupatanus, Opuntia sp., Ferocactus sp., Mamillaria magnimamma, Opuntia sp., Cereus sp., Astrophytum capricorne, Astrophytum myriostigma* from collection of Nikita Botanical Gardenand *Ritterocereus pruinosus* from the collection of Karazin' Botanic Garden of Kharkiv National University. These plants were probably infected with CVX. To confirm our assumption about CVX infection and to study the morphology of the pathogen we carried out transmission electron microscopy. In sap of all plants we registered filamentous virions with size 580×13 ± 2 nm (Fig.3), which is typical for *Cactus virus X.*

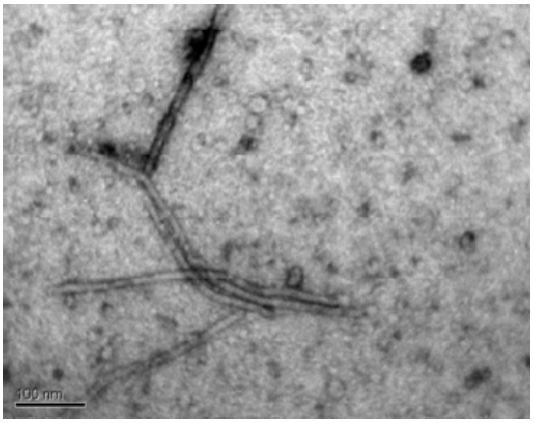

Fig.3. Electron micrograph of flexible particles from plant material from *Ferocactus* sp.

Summarizing the obtained results it is possible to assert that collectionsof Nikitsky Botanical Garden and Botanical garden of Karasin's Kharkiv National University were contaminated by Cactus virus X. Exchange collection material without testing on virusinfection, can increases chances of uncontrolled distributionof viral infections. Some infections are symptomless. In this case the asymptomatic virus infectionin cactus makes a danger because these plants can become thesource of distribution pathogens in collections. In addition,cactuses could support reproduction of viruses other typesof plants and, thus, be the reservoirs of plant virus infections.A timely exposure and permanent control of the stateof population of these cultural plants is the obligatory link ofthe system of their protecting from this group of pathogens.

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ELECTRON MICROSCOPY AND BIOLOGICAL PROPERTIES OF THE PATHOGEN AFFECTING *PLATANTHERA BIFOLIA*

Проведено обследование больных растений Platanthera bifolia, отобранных в Канивском природном заповеднике. Была доказана инфекционность сока, а также возможность механической передачи вируса. Методом трансмиссионной электронной микроскопии в образцах пораженных растений были выявлены сферические вирусоподобные частицы, диаметром около 50 нм. Согласно морфологическим особенностям, вирус, выделенный из растений Platanthera bifolia, может принадлежать к семейству Caulimoviridae.

The plants of Platanthera bifolia collected in Kaniv National Reserve were observed. The infectivity of plant sap and viral capability to transmit in mechanical manner were confirmed. The spherical particles with diameter about 50 nm were observed in preparations from symptomatic leaf tissue in transmission electron microscope. According to viral morphology the pathogen of Platanthera bifolia may be a member of Caulimoviridae.

Introduction.*Orchidaceae* Juss. is one of the biggest families of flowering plants which includes about 35 000 species. They can be found all over the world excluding deserts and Polar Region [2]. Viral diseases of orchids are known from the middle of XX century [4]. Until now more over 30 viruses of orchids have been described [8, 10]. The majority of these viruses were detected as pathogens of tropical orchids which are cultivated *in situ*. On the other hand the viruses of terrestrial orchids of temperate zone are studied not enough. The infection of *Cypripedium* sp., *Orchis sp.*, *Ophrys* sp. by T*obacco rattle* (TRV) and T*urnip mosaic virus* (TuMV) were described [5]. Also the antigens