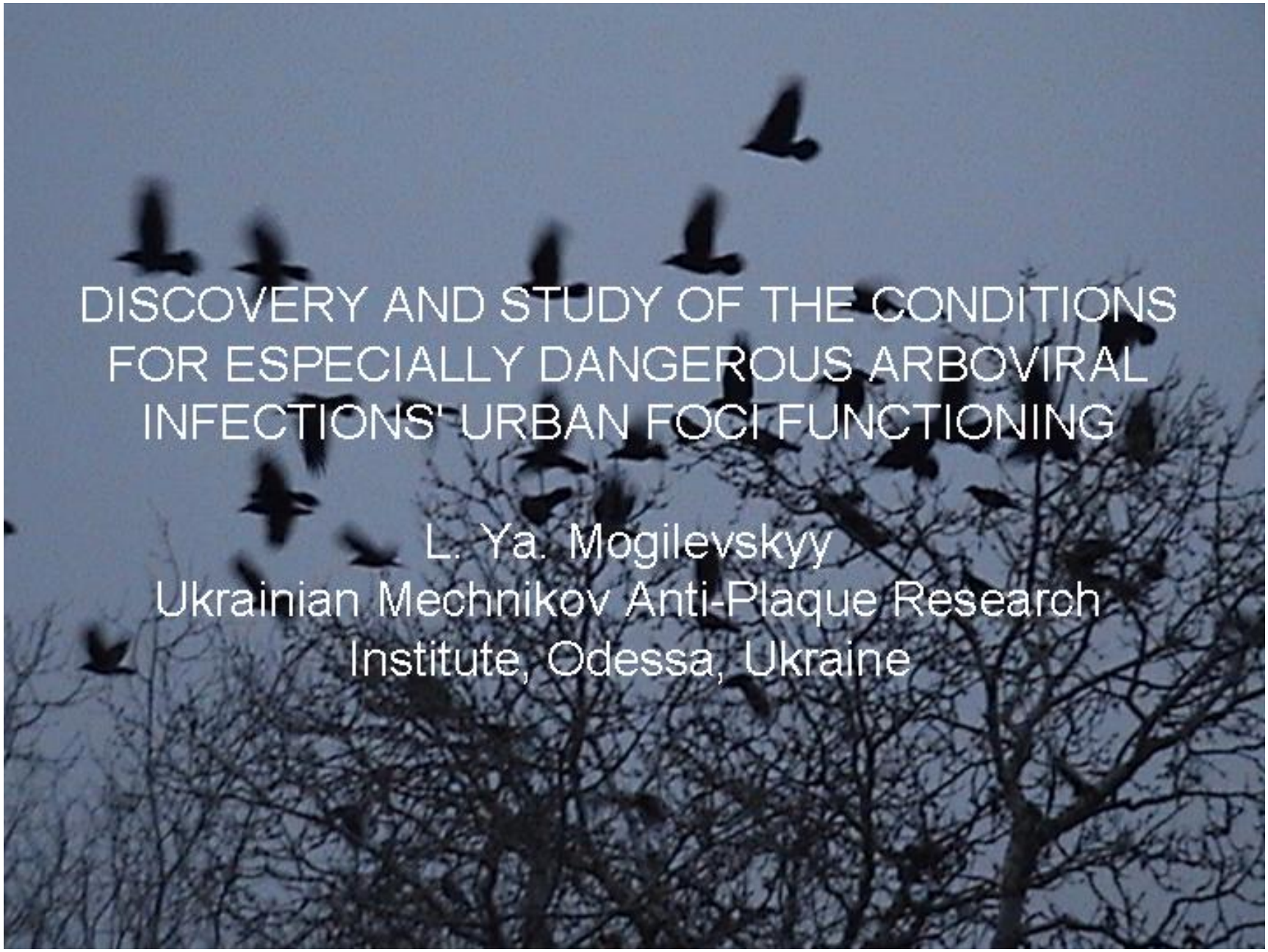

DISCOVERY AND STUDY OF THE CONDITIONS FOR ESPECIALLY DANGEROUS ARBOVIRAL INFECTIONS' URBAN FOCI FUNCTIONING

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INTRODUCTION

Last ten years epidemic outbreaks of arboviral infections are not limited to endemic territories, and have tendencies to expansion on their aerials, widening to new regions and even hole continents. Many scientists point out that habitats of big cities are widely involved in the epidemic process of arboviral infections. For example, West Nile Fever (WNF) almost at one time (1996 –2003) caused complicated epidemic situations in different countries (Romania, Russia, USA, Canada, Israel). All of these outbreaks appeared and got epidemic spread in megapolisies (Bukharest, New York, Volgograd, Astrakhan). All clinical manifest forms were only the iceberg's peak of these outbreaks, because unapparent and light forms of disease were in 100-300 times more then the quantity of hospitalized patients.

The study of arboviral infections spread, their epidemiological and epizootological characteristics in the conditions of urban cenosis will allow to make prognosis and prevent epidemiological complications. Megepolis of Odessa and its suburbia is a convenient model because of its special geopolitical situation and its auspicious landscape, climate and faunistic conditions and possibility of new viral infections imported by wild birds by migration cannels that come through this region. From many widely known viruses for investigation epidemiologically significant for Europe viruses that circulate on the territory of Ukraine were chosen – TE, WN, Sindbis, Tigrinya, Congo-Crimea Hemorrhagic Fever (CCHF).

The Goal of Investigation:

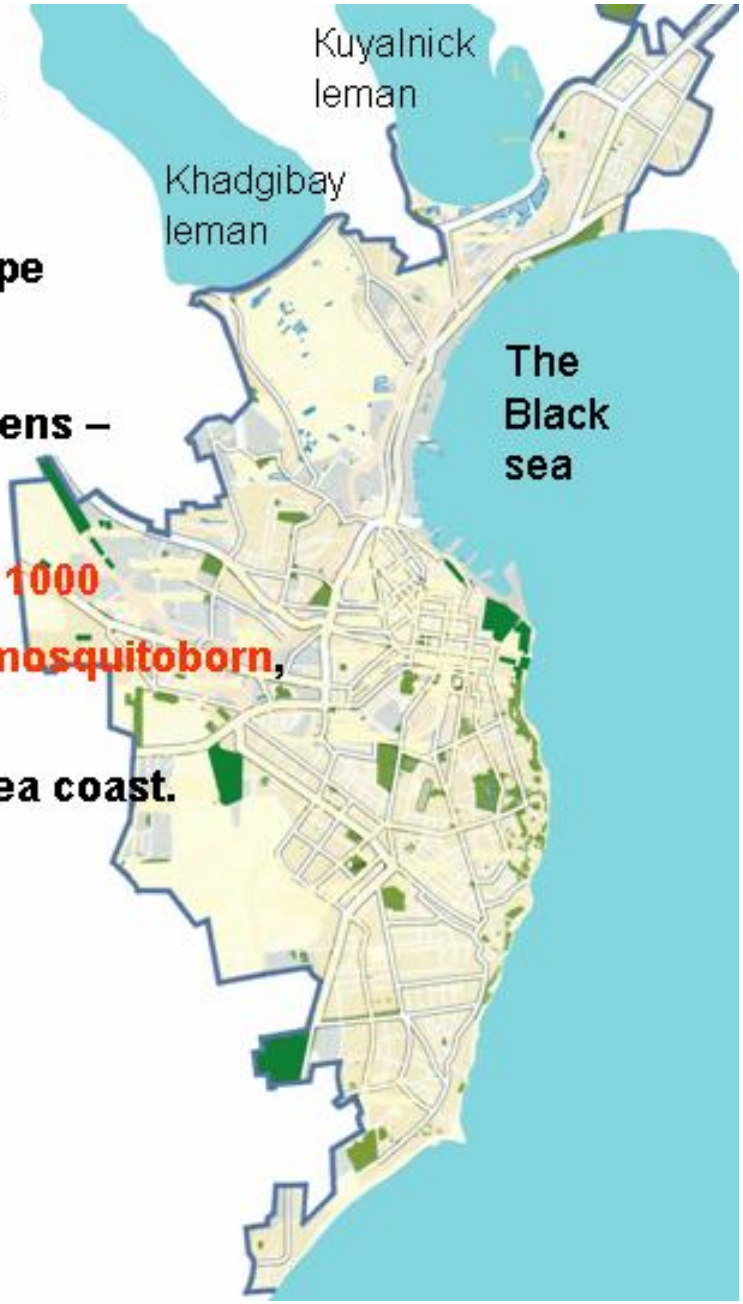
To reveal and study conditions of
especially dangerous arboviral infections' natural foci
formatting and functioning in big city with substantial
recreation burden (on the example of Odessa megapolis).
To detect epidemic significance of synanthrope fauna's
components and of transmitters,
to study morbidity among local population with arboviral
infections,
to mark the ways of epidemic complications risk decrease on
arboviral infections in the condition of urbanization

Investigated objects

- **Blood sucking arthropods:**
- **Mosquitoes**
- **Ticks**
- **Birds**
- **Little mammalians**
- **City population (grownups, children, visitors of the ambulatory, patients of infection clinic, blood donors)**

Ecological characteristic of Odessa city

- It is situated in steppe (wild field) and dry steppe
- landscape zone.
- The green zone: 43 parks and little public gardens – 4200 hectares.
- Zone of water and moist biotopes – more then 1000 hectares including more then 100 hectares of mosquitoborn, more then 12 hectares – anapheloborn.
- Recreation zone is situated basely along the sea coast.



Monitoring of epidemiologic significant kinds of carriers and transmitters

176 species of bird are registrated on the territory of the city

The main danger is city dump, where every day hundreds of birds are present: GULLS and CROWS

Except birds little mammalians are the important part of city fauna

On the first place there are: GREY RET, DOMESTIC MOUSE Exactly they format territorial complexes of many urban biotopes in the city. Among those the most epidemiologic significant are basements of many storied houses and near house territories near refuse chutes.

In open biotopes of Odessa 13 species of mosquitoes can be detected

(6 genus)

Specie	Detection Frequency (% from general quantity)
Aedes cantans	0.2
Aedes caspius	11.7
Aedes cinereus	0.04
Aedes excrucians	0.1
Aedes flavescens	6.7
Aedes vexans	1.2
Anopheles hyrcanus	0.1
Anopheles maculipennis	0.2
Culex modestus	1.6
Culex pipiens	93.0
Culiseta annulata	4.3
Mansonia richiardii	2.4
Uranotaenia unguiculata	0.2

There is ecology-faunistic feature of the city – the presence of submerged and underflooded basements in many storied houses, where the mosquito quantity reaches 10-100 thousands on 1 square meter

Mosquitoes multiply and attack people during all year

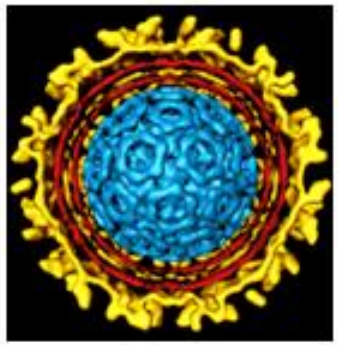
IXODES TICKS

**There are 7 specie of exudes ticks in Odessa,
which belong to 4 genus:**

**Ixodes ricinus, Ixodes laguri laguri, Ixodes redicorzevi;
Rhipicephalus rossicus, Rhipicephalus sanguineus;
Haemophysalis punctata;
Hyalomma p. plumbeum.**

The following agents were detected in studied arthropods:

- Sindbis – mosquitoes *C. Pipiens*,
- WNV - Culex pipiens, Culiseta annulata, Aedes caspius, Anopheles hyrcanus
- TE – in studied ticks that were taken from people.
- Minimum infectious rate (MIR) - 38,89 %



West Nile Virus RNA is detected in 7,8 % of mosquito pools

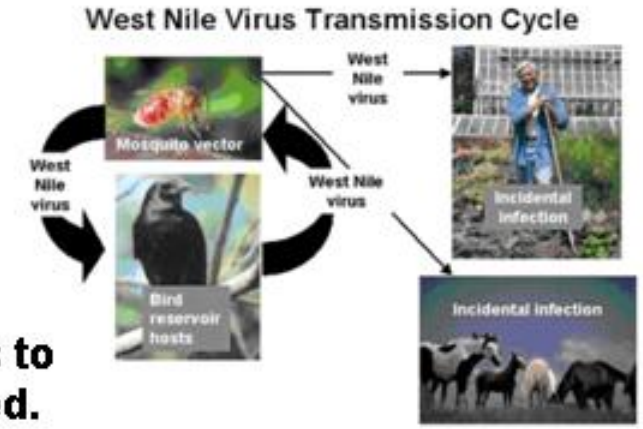
Biotopes	Quantity of tested		Positive samples	MIR, %
	ex.	Samples		
Closed	6483	108	6	0,09
Opened	1005	45	6	0,60
Total	7488	153	12	0,16

This data give evidence about WNV presence in opened and closed biotopes, which may have epidemic significance during urban arboviral foci forming

Results of laboratory investigations of birds

In birds antigens of arboviruses were detected: **Sindbis, Tyaginya, Inko, West Nile**

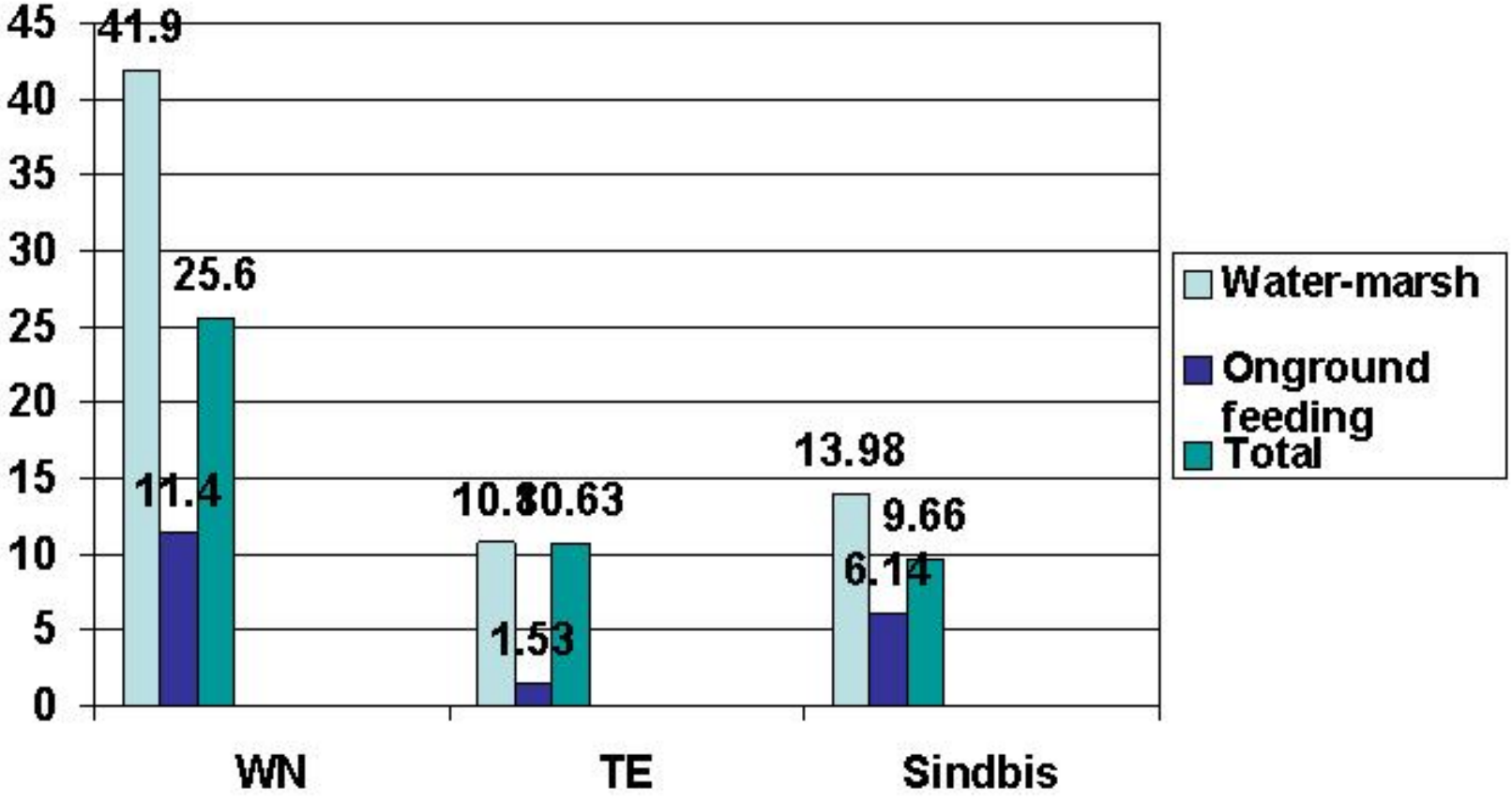
In 16,7 % of tested water-marsh and onground feeding birds WNV RNA was detected



In 64,0 ± 5,00 %of tested birds antibodies to WN, TE and Sindbis viruses were revealed.

In 7birds' species WN infection was confirmed by RNA detection in the brain by RT-PCR and by antihemagglutinins detection in blood sera (including pigeons living in Odessa)

Frequency of WN, TE, Sindbis antibodies discovery in different ecological groups of birds



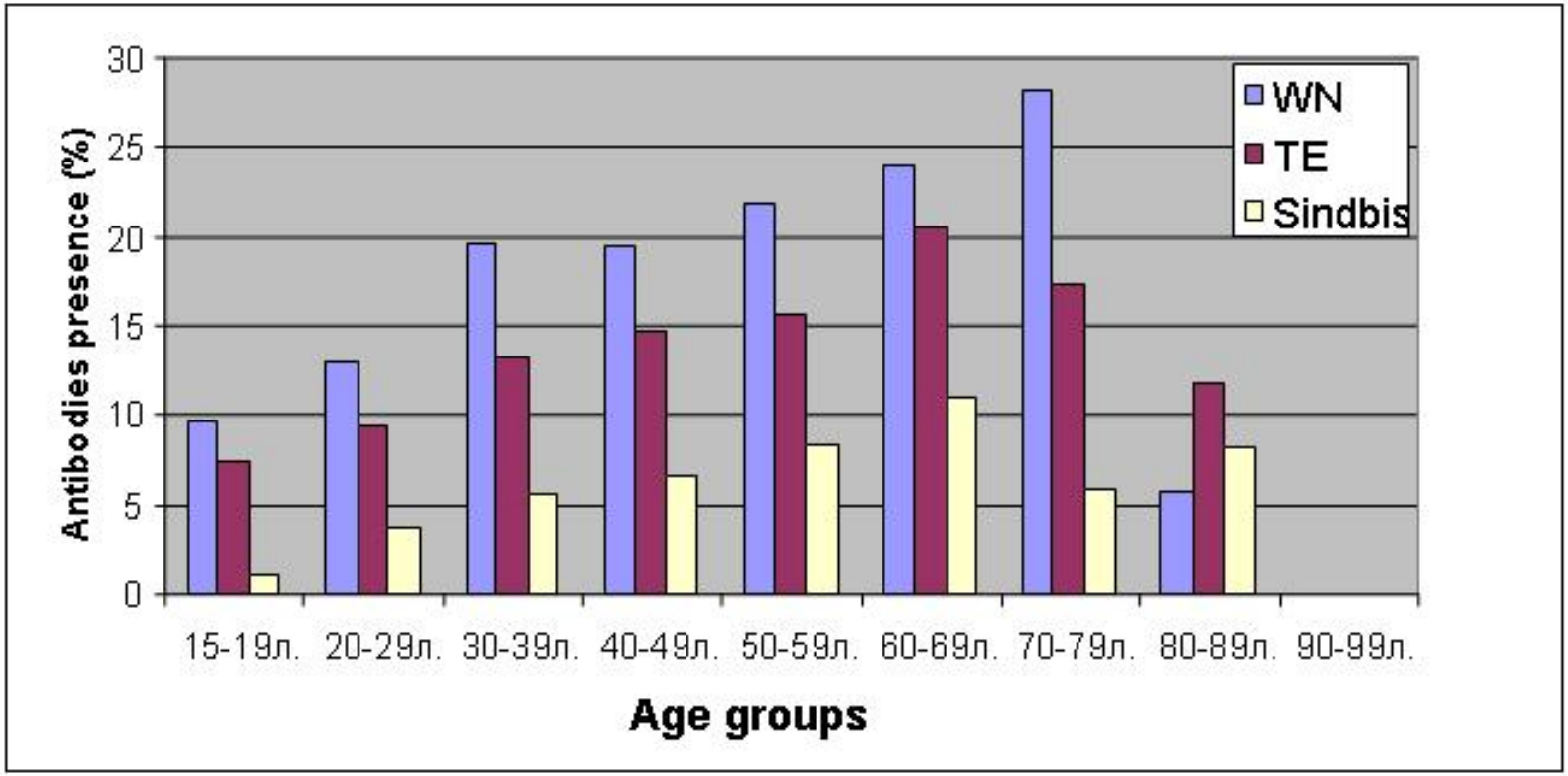
Results of serological investigations of little mammalian

For the first time antibodies to WN virus were revealed in grey rat from basements, where WN virus infected mosquitoes were discovered

Population immunity index in city inhabitants to arboviruses:

WN			TE			Sindbis		
Tested	Positive		Tested	Positive		Tested	Positive	
	Abs	% ± m		Abs	% ± m		Abs	% ± m
3487	666	19,1±0,6	3486	455	13,1±0,6	2823	155	5,5±0,4

Antibodies discovery frequency to WN, TE and Sindbis viruses in different age groups



Hemagglutinanting antibodies to WN, TE and Sindbis viruses revealing in infectious patients with different clinical manifestations

Clinical manifestations	Tested	Including positive					
		WN		TE		Sindbis	
		абс.	% ± m	абс.	% ± m	абс.	% ± m
CNS damage	141	50	35,5±4,0	17	12,1±2,7	3	2,1±1,2
Fever	63	30	47,6±6,3	8	12,7±4,2	1	1,6±1,6
Others	23	2	8,7±5,9	0	0	0	0
Total	227	82	36,1±3,2	25	11,0±2,1	4	1,8±0,9

WN virus antibodies revealing in groups of infectious patients and in city inhabitants

	WN			TE			Sindbis		
	Tested	Positive		Tested	Positive		Tested	Positive	
		Abs.	% ± m		Abs.	% ± m		Abs.	% ± m
City inhabitants	3487	666	**19,1±0,6***	3486	455	13,1±0,6	2823	155	5,5±0,4
Infectious patients	227	82	**36,1±3,2***	227	25	11,0±2,1	227	4	1,8±0,9

*t=5,04

CONCLUSIONS

- **In big cities good conditions can appear for urban arboviral foci forming.**
- **Revealed seropositivness to WNV of grey rats gives evidence of possibility for these animals to be involved in arboviruses circulation, to create additional reservoirs for arboviruses and real presuppositions for infection transmission chain realization by mosquito-rat-mosquito-man cycle.**
- **For the first time in Ukraine detected infection of basement mosquitoes Culex pipiens pipiens f.molestus with WN virus points out, that they are the component part of parasite systems, which are being formed in urban biotopes, and increase agents potential connected with possibility of infecting people all year round**
- **WN, TE and Sindbis antihemagglutinins, revealed in donors and fever patients, show active enough arboviral circulation among city population and ability to cause arboviral infections.**
- **Intensive circulation of WNF agent on the territory of Odessa city, as possibly on the territories of some other south cities, dictates the necessity of obligatory arboviral infections' monitoring.**