

Phylogeography of a shrew-born Hantaviruses in Siberia

Hantaviruses

Natural reservoirs – rodents
Discovered in 1976 in Korea
Disease – HFRS and HCPS

New chapter since 2007:
Natural reservoirs - insectivores
Disease - ?



Thottapalayam (TPMV) virus

- Isolated in 1971 in India
 - Reservoir – Asian house shrew
- Suncus murinus*
- Disease – unknown

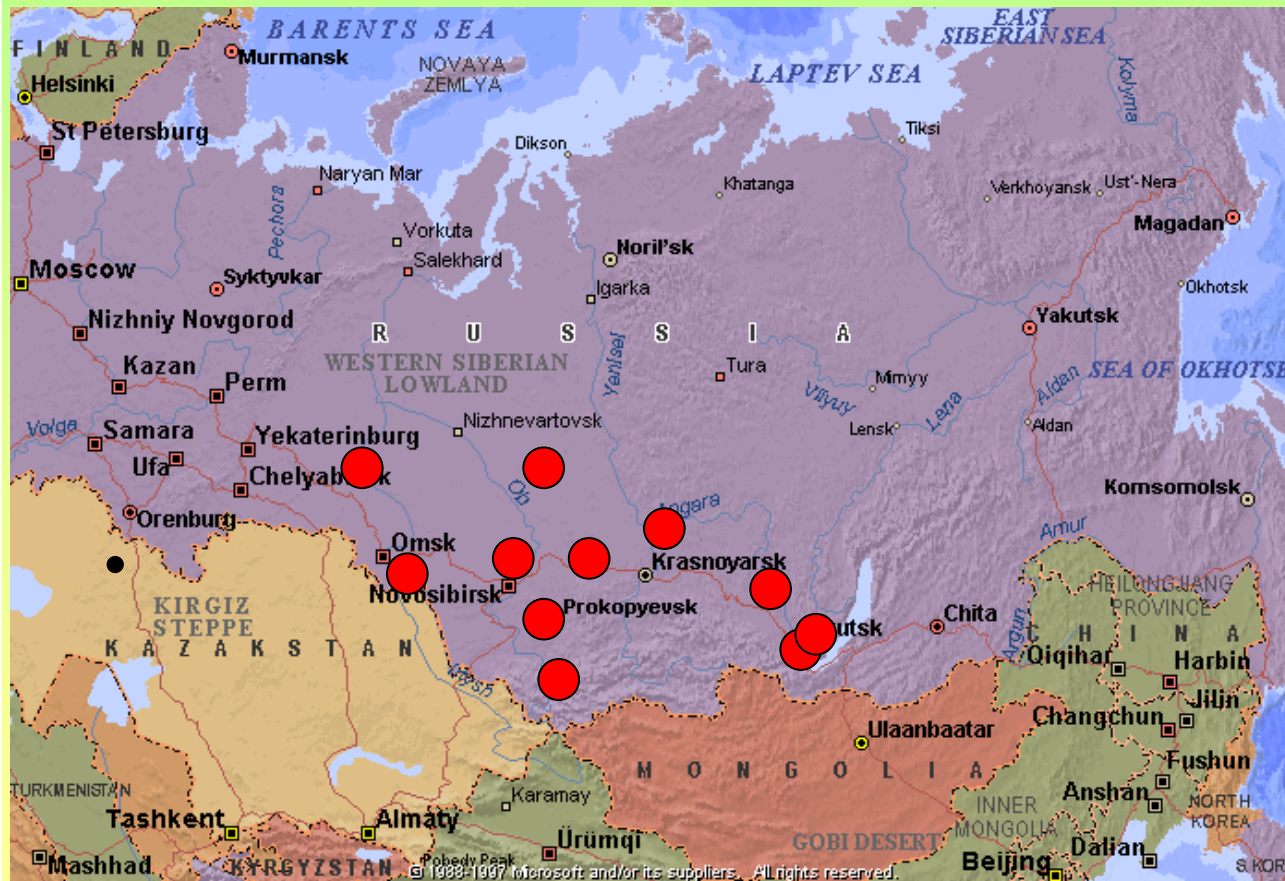


Insectivore-born Hantaviruses and the reservoir animals

Hantavirus	Reservoir hosts	Year, location
TPMV	<i>Suncus murinus</i>	1985, India
RPLV	<i>Blarina brevicauda</i>	2007, USA
CBNV	<i>Anourosorex squamipes</i>	2007, Vietnam
ARRV	<i>Sorex cinereus</i>	2007, USA
JMSV	<i>Sorex monticolus</i>	2007, USA
TGNV	<i>Crocedura theresae</i>	2007, Guinea
SWSV	<i>Sorex araneus</i>	2007, Switzerland
MJNV	<i>Crocedura lasiura</i>	2009, Korea

Task

Genetic diversity and geographic distribution of a shrew-born hantaviruses in Siberia



Study sites:
7 regions,
11 localities

Altai, Altai Republic,
Novosibirsk, Omsk,
Kemerovo, Irkutsk,
Krasnoyarsk

Materials and Methods

Samples:

Lung tissues

Total: 100

Method: RT-PCR



Sorex araneus

Species	No of RT-PCR tested
Sorex araneus	44
Sorex caecutiens	8
Sorex minutus	9
Sorex tundrensis	14
Sorex sp.	19
Crocedura sibirica	6

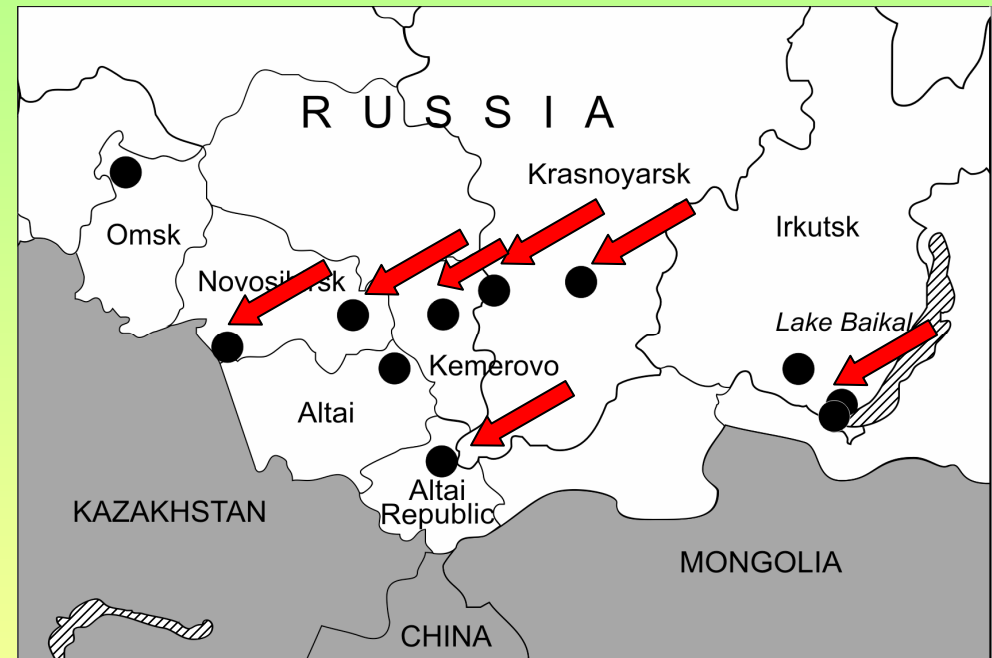


Sorex caecutiens

Results

18 RT-PCR positive shrews in 7 localities

Species	Region, Site
<i>Sorex araneus</i>	Altai Republic
	Kemerovo
	Novosibirsk City
	Novosibirsk, Karasuk
	Krasnoyarsk, Sayan
<i>Sorex caecutiens</i>	Krasnoyarsk, Parnaya
	Altai Republic
<i>Sorex tundrensis</i>	Krasnoyarsk, Parnaya
	Novosibirsk, Karasuk
<i>Sorex daphaenodon</i>	Irkutsk City
	Irkutsk City



Genetic evidence for four different Hantaviruses in insectivores

Viruses

Artybash virus (ARTV)

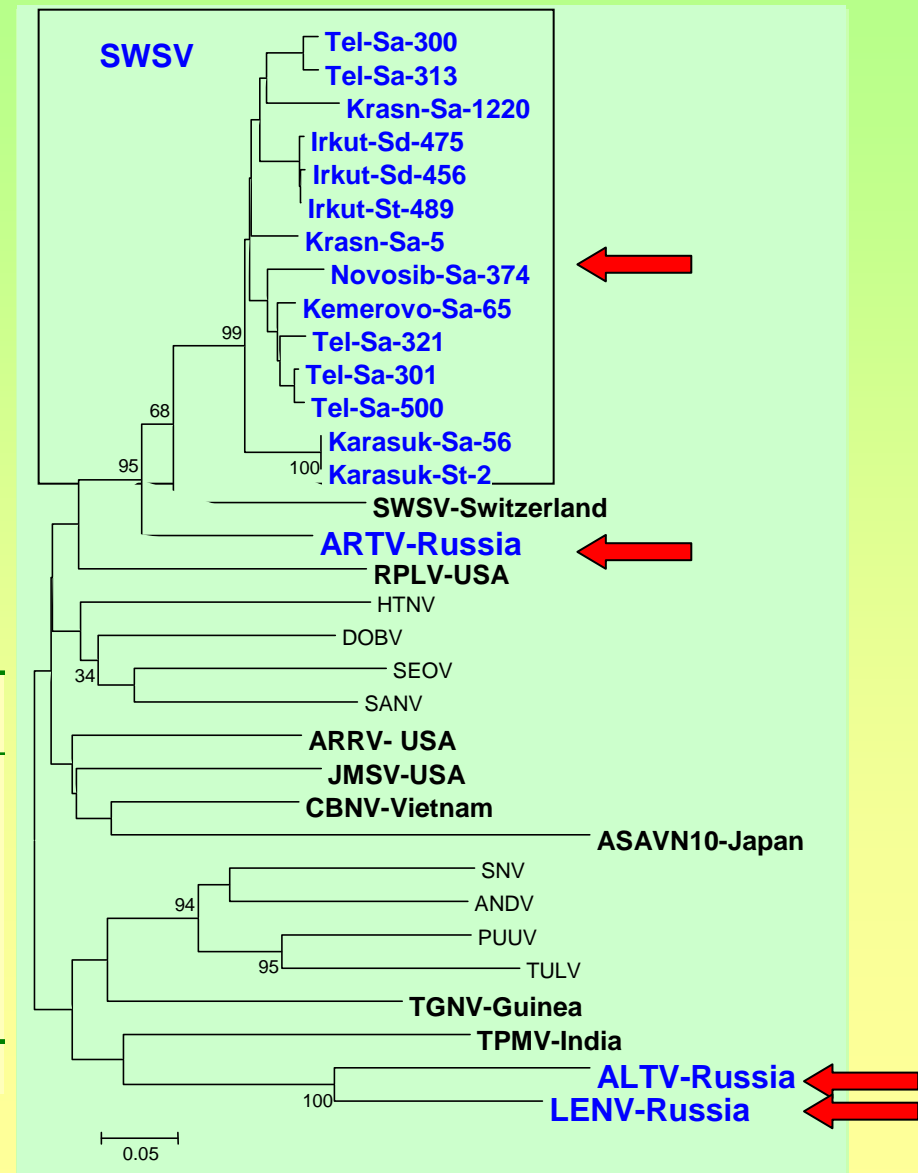
Altai virus (ALTV)

Lena virus (LENV)

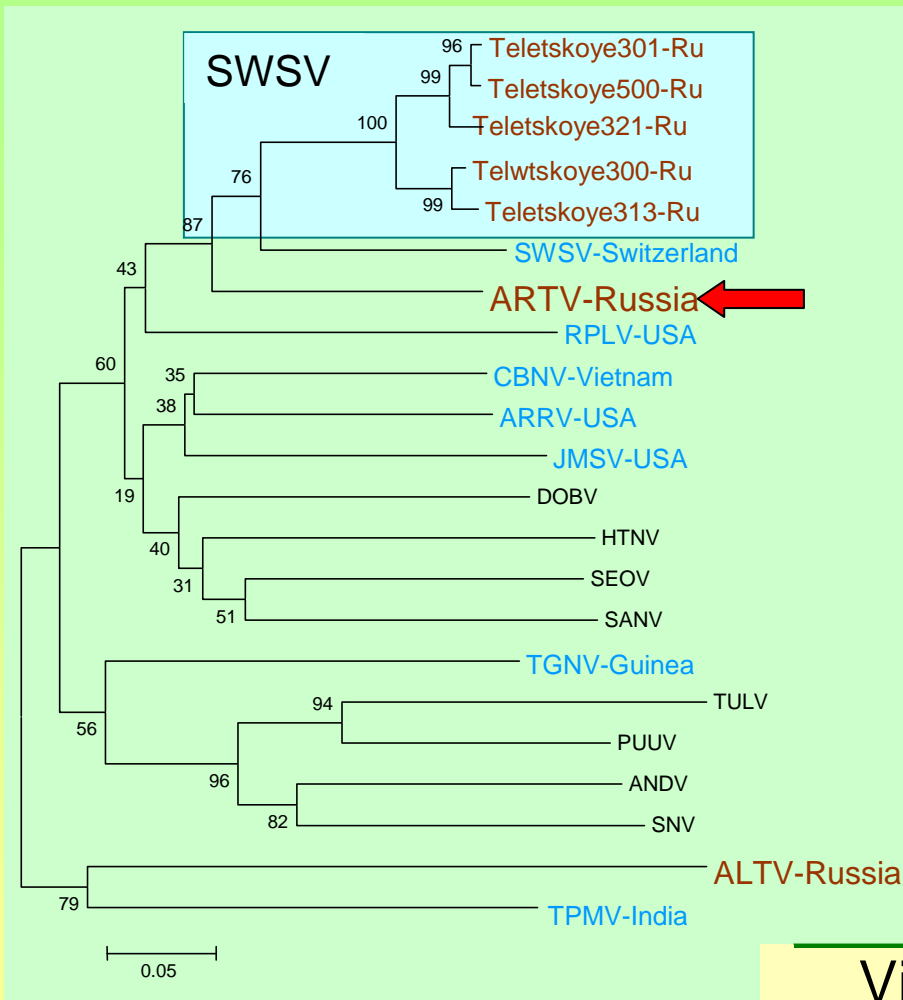
SWSV, Siberian strains

L segment divergence (%)

Virus	ARTV	ALTV	LENV	SWSV
ARTV	-	39	37	19 - 20
ALTV		-	25	37 - 40
LENV			-	36 - 37
SWSV				1 - 9



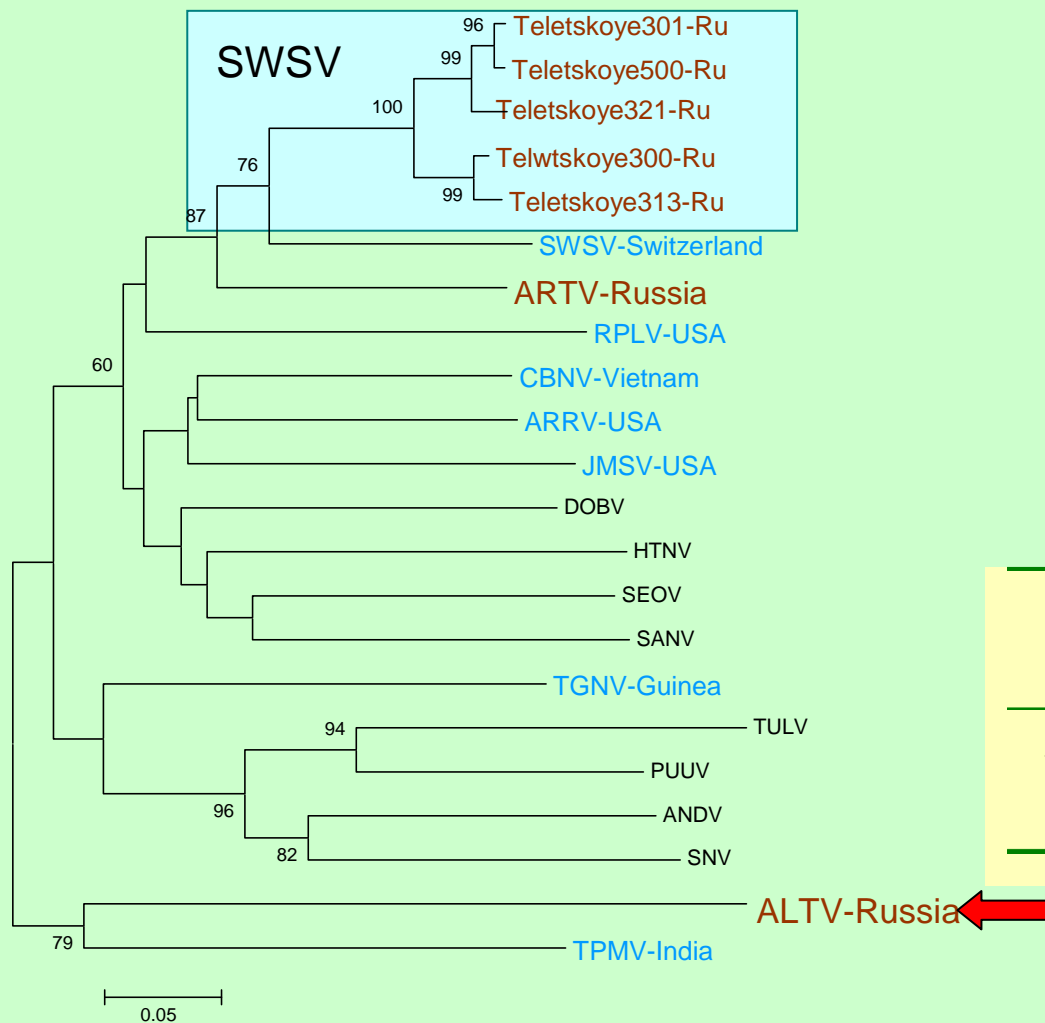
New Hantavirus Artybash (ARTV) in *Sorex caecutiens*



L segment divergence (%)

Virus	SWSV Switz	shrew- born	rodent- born
ARTV	23	25 - 31	27 - 34

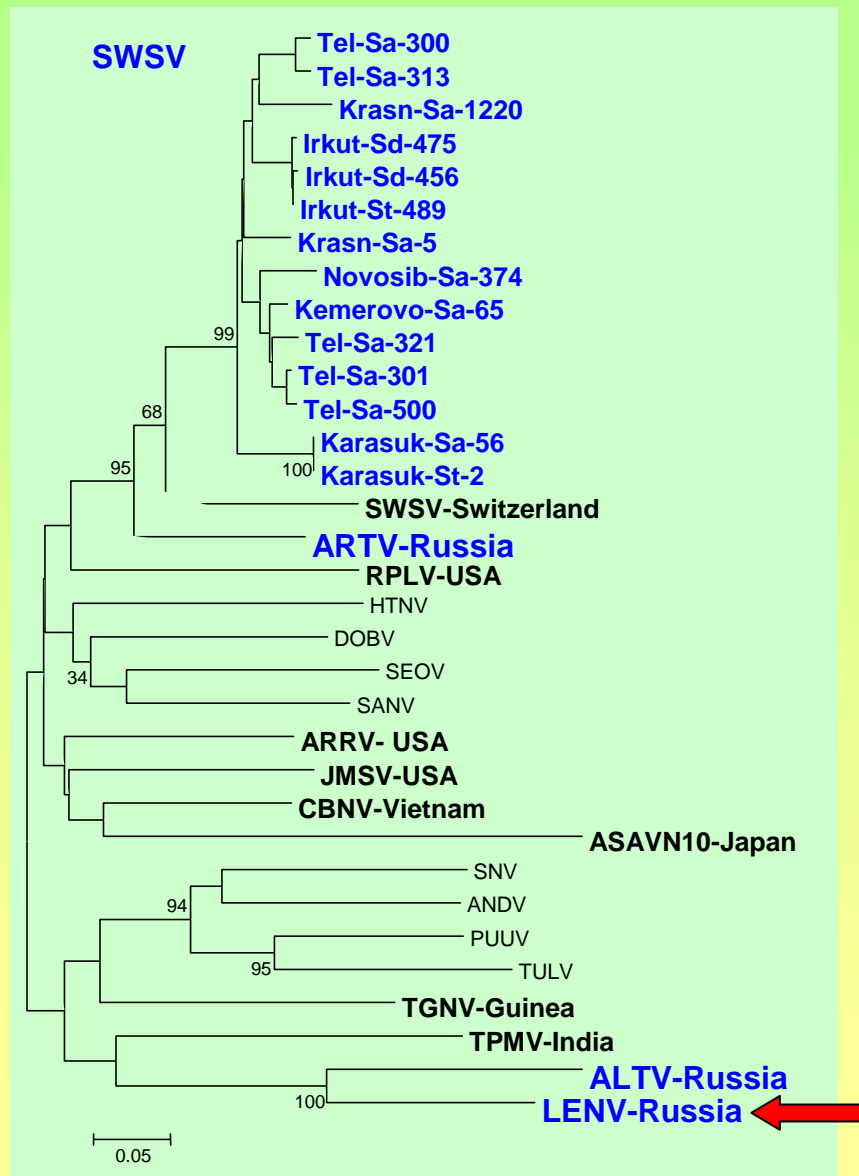
New Hantavirus Altai (ALTV) in *Sorex araneus*



L segment divergence (%)

Virus	TPMV	shrew-born	rodent-born
ALTV	36	37 - 40	39 - 44

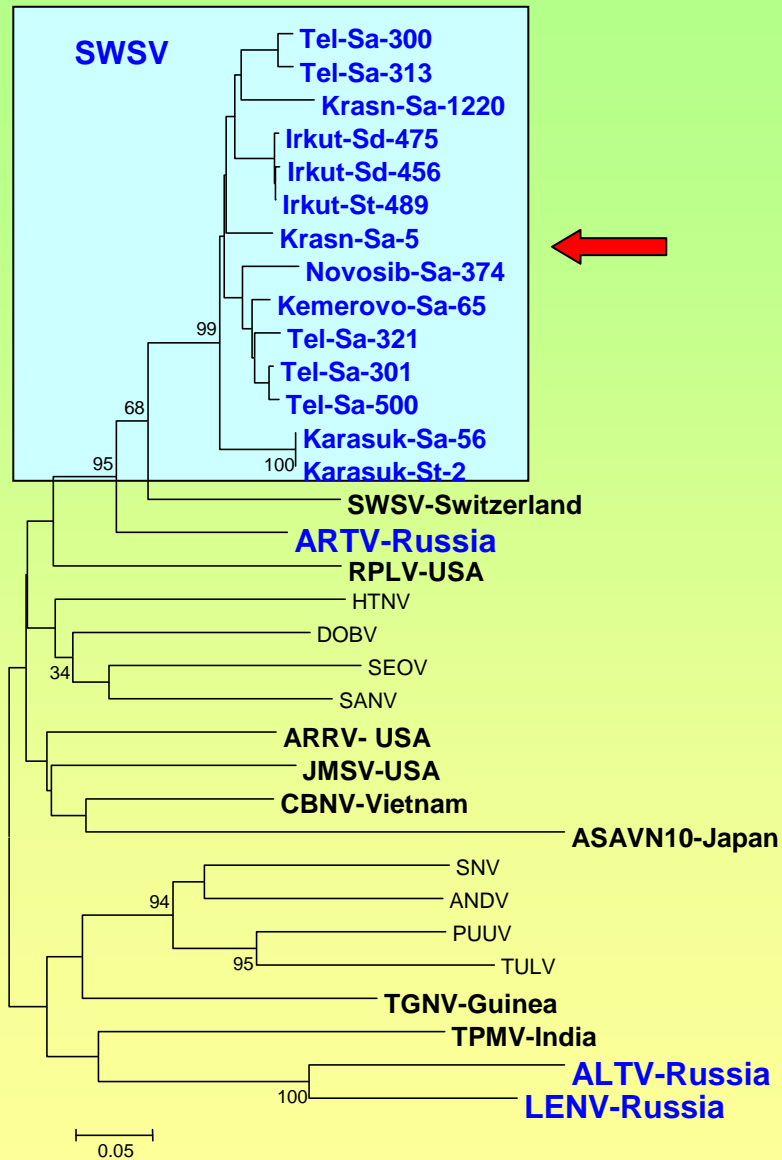
New Hantavirus Lena (LENV) in *Sorex caecutiens*



L segment, divergence (%)

Virus	SWSV	shrew-	rodent-
	Switz	born	born
LENV	37	35 - 45	37 - 42

SWSV, Siberian strains



L segment, divergence (%)

Virus	SWSV	shrew-	rodent-
	Switz	born	born
SWSV	17 - 21	25 - 36	27 - 36

SWSV strains detected in Sorex shrews in Siberia

Genus species	Site
<i>Sorex araneus</i>	Republic Altai
	Kemerovo
	Novosibirsk City
	Novosibirsk
	Krasnoyarsk
<i>Sorex daphaenodon</i>	Irkutsk City
<i>Sorex tundrensis</i>	Irkutsk City
	Novosibirsk



SWSV

☞ Reservoirs – three closely related shrew species

☞ *Sorex araneus*

☞ *Sorex tundrensis*

☞ *Sorex daphaenodon*

Geographic distribution

Virus	Location
SWSV	Siberian part of Russia from Novosibirsk to Irkutsk Switzerland, Finland, Hungary
ALTV	Altai Republic
ARTV	Altai Republic
LENV	Krasnoyarsk region Sakha Republic

Summary

- Genetic evidence of soricid-associated hantaviruses in Siberia
- Three new hantaviruses: ARTV (*S. caecutiens*), ALTV (*Sorex araneus*), LENV (*S. caecutiens*)
- SWSV circulation in three closely related *Sorex* sp.:
Sorex araneus, *Sorex tundrensis*, *Sorex daphaenodon*
- 7 new foci, including two in suburbs of Novosibirsk and Irkutsk Cities

Future studies

Background: SWSV foci in suburbs of two big cities



Task: Pathogenicity for humans



Materials: Collection of human sera samples from Irkutsk foci

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Thank you for attention