

**THE FINDING OF ANTIBODIES TO NAPLES SANDFLY FEVER (Bunyaviridae: Phlebovirus)  
AND TO JUG BOGDANOVAC (Rhabdoviridae: Vesiculovirus) VIRUSES IN SOUTH-EAST  
SERBIA (YUGOSLAVIA)**

ANA GLIGIĆ and Z. MIŠČEVIĆ

*Institute of Immunology and Virology, Torla, Belgrade and Institute for Medical Research,  
Belgrade, Yugoslavia*

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*Serum antibodies to the virus of Naples sandfly fever and to Jug Bogdanovac virus have been investigated in inhabitants of a registered natural focus of these viruses in Serbia. The presence of specific antibodies and the titres found in some cases indicate that there had been recent infection with these agents in the year of investigation.*

*Key words: virus, antibody, sera, sandfly*

INTRODUCTION

Sandfly fever (formerly Papatasi fever) - a natural focal viral disease - has been known in Yugoslavia since before World War II mostly in Herzegovina, Montenegro, Dalmatia and particularly in Macedonia. After World War II it spread into Serbia. Thus, the first epidemic in this republic, (Karakašević, 1974), which occurred in 1946, involved two thousand cases mostly in East Serbia, but some were recorded in Belgrade, as well. Later, Simić (1951) described an epidemic in 1950 which involved the region of South Banat, with more than 80% of the population affected by the disease in some settlements.

In the interepidemic period and after the epidemics little was done in the field of diagnostics and investigation of sandfly fevers, and sporadic infections with this virus were usually thought of as summer flu or other similar illnesses.

Systematic serological investigations of healthy individuals, initiated in 1976, indicate that the virus of sandfly fever has been permanently present in various parts of Yugoslavia for decades (Terzin et al. 1962, Tesh et al. 1976, Vesenjāk-Hirjan et al. 1980, Šalja et al. 1980).

Isolation of the virus of Naples sandfly fever from the vector *Phlebotomus perfliewi* Parrot, 1930, collected in the region of Dobrič, South-East Serbia (Gligić et al. 1982) only confirmed the serological findings of numerous investigators that there is natural circulation of this virus and that the infection is usually asymptomatic or misdiagnosed. Another virus was isolated from the species *Phlebotomus perfliewi* found in the same region, - namely a rhabdovirus named Jug Bogdanovac (Rhabdoviridae: Vesiculovirus), which was,

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demonstrated to be a new member of the VSV serogroup (Gligić et al. 1983). The region of Dobrič is a former endemic focus of visceral leishmaniasis.

The purpose of this paper is to report the finding of antibodies to the Naples sandfly fever virus and to Jug Bogdanovac virus in inhabitants of the region where the sandflies had been collected from which these viruses were isolated.

#### MATERIAL AND METHODS

During 1982 serum samples from 192 individuals of different ages and both sexes were obtained for an investigation of the presence of antibodies to the Naples sandfly fever and Jug Bogdanovac viruses. The people examined lived in 27 villages in the region.

From each individual 5-10 ml of blood was obtained. Sera were stored at  $-20^{\circ}\text{C}$ , and were inactivated for 15 minutes at  $56^{\circ}\text{C}$  before examination.

The presence of specific antibodies was determined by the complement fixation test (CF). The antigen was prepared according to the method of Clarke-Casals (1958) from the brains of newborn mice infected with V and VI passages of the strain of Naples sandfly fever virus we isolated (Gligić et al. 1982). The reaction was carried out with two complement units and two haemolysin units. A control serum with normal antigen (uninfected brains) and veronal buffer were included. The complement and haemolysin units and the veronal buffer were checked with one negative and one positive serum of known titre. The ingredients were allowed to react overnight at  $4^{\circ}\text{C}$  and the reading was carried out the next day, after addition of the complement system and incubation at  $37^{\circ}\text{C}$  for 30 minutes.

#### RESULTS

Our series included 192 individuals from 27 villages of the region of Dobrič, and specific antibodies were demonstrated in 18 individuals from 11 villages.

The finding of CF antibodies to Naples sandfly fever and Jug Bogdanovac viruses in the sera of 72 individuals from registered foci of these viruses is presented in Table 1.

Table 1. The occurrence of antibodies to the viruses of Naples sandfly fever (NSF) and Jug Bogdanovac (JB) in 72 individuals of different ages in 1982.

Village	No examined	CF test positive		Titre	
		NSF	JB	NSF	JB
Rožina	7	1	—	1/4	—
Krajkovac	8	4	—	1/4 - 1/8	—
Donja Rasovača	2	1	—	1/4	—
Aleksandrovo	5	2	—	1/4	—
Oblačina	6	2	1	1/4 - 1/16	1/4
Azbresnica	7	1	—	1/4	—
Dešilovo	3	1	—	1/4	—
Lepaja	3	1	—	1/4	—
Balajnac	6	1	—	1/16	—

The finding of antibodies to Naples sandfly fever and Jug Bogdanovac viruses in 120 primary school children aged from 7-16 years from natural foci of these viruses is shown in Table 2.

Table 2. The occurrence of antibodies to Naples sandfly fever (NSF) and Jug Bogdanovac (JB) viruses in 120 primary school pupils in 1982

Village	No examined	CF test positive		Titre	
		NSF	JB	NSF	JB
Donja Rasovača	5	—	1	—	1/4
Arbanasce	27	1	1	1/8	1/4
Balinovac	10	1	—	1/4	—
Jug Bogdanovac	16	1	—	1/4	—

In both groups examined, antibodies to Naples sandfly fever virus were demonstrated in 15 individuals (7.8%) and antibodies to the Jug Bogdanovac virus in 3 (1.6%). It is noteworthy that no individual had demonstrable CF antibody to both viruses.

#### DISCUSSION

Since 1976 virological investigations have been an important aspect of the systematic ecological investigations of sandflies initiated in 1969 in a former endemic focus of visceral leishmaniasis in Yugoslavia, the region of Dobrič – South-East Serbia. From the sandfly species *Phlebotomus perfliewi* which is known to be a potential vector of kala-azar, what we assumed to be three viral strains of high infectivity have been isolated (Miščević and Marković, 1983; Živković, 1983; Miščević et al. 1983; Gligić et al. 1981). One of these strains has been identified as the virus of Naples sandfly fever, another as a new member of the VSV group named Jug Bogdanovac and the third is presently being identified (Gligić et al. 1982, 1983).

Antibodies to the Naples sandfly fever virus were found in 15 of the 192 individuals examined, and to Jug Bogdanovac virus in 3.

As the complement fixation test reveals antibodies for only a rather short time after infection, the high titres (1/16) found in some cases indicate recent infection with these agents.

The reaction of inhibition of haemagglutination reveals residual antibodies and therefore it is of no value in the determination of recent infection. However, carried out together with the complement fixation test it would enable us to screen the general immunity status towards these viruses in the region examined.

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NALAZ ANTITELA NA VIRUS NAPULJSKE FLEBOTOMSKE GROZNICE (Bunyaviridae: Phlebovirus) I JUG BOGDANOVAC VIRUS (Rhabdoviridae: Vesiculovirus) NA PODRUČJU JUGOISTOČNE SRBIJE (JUGOSLAVIJA)

ANA GLIGIĆ I Z. MIŠĆEVIĆ

## IZVOD

U radu su prikazani rezultati nalaza antitela na virus Napuljske flebotomske groznice i Jug Bogdanovac virus reakcijom vezivanja komplementa u humanim serumima. Ovi rezultati ukazuju na aktivnost ovih virusa na ispitivanom području.