

Guardians of the Formula: Yugoslavia's nuclear ambitions and its dire consequences

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Set in the first decade of the Cold War, *Guardians of the Formula* is a cautionary tale about Yugoslavia's dangerous efforts to expand its nuclear energy industry and the pioneering efforts of a French medical scientist to save a group of irradiated Yugoslavs.

Directed by Dragan Bjelogri?, a popular Serbian film and television actor, the two-hour drama, is based on Vuk Ršumovi?'s semi-fictional book *The Case of Vin?a*. The movie was first released in Serbia in late October 2023 and then throughout the former Yugoslavia, winning awards at numerous international film festivals over the past year.

The film begins in October 1958, after a Yugoslav scientist and three of his students were contaminated in a catastrophic accident at the Vin?a Research Institute's nuclear reactor, located about 12 kilometres from Belgrade.

Bjelogri?'s movie is an intelligent, humane and disturbing work about this little-known event but one that needs some historical context.

The newly established Federal People's Republic of Yugoslavia, headed by communist party leader and former partisan fighter Josef Broz Tito, emerged from the heroic mass struggle waged against the murderous Nazi occupation of the country and its fascist Croatian Ustaše and far-right Serbian Chetnik allies during World War II. An estimated 1.2 million people, half of them civilians, were killed in the conflict.

Tito refused to subordinate his government to the post-WWII counter-revolutionary arrangements worked out between the US, Britain and the Soviet Stalinist bureaucracy to reassert imperialist dominance in the Balkans.

Attempting to balance between imperialism and the Soviet Stalinists, Tito promised that his government would institute workers' control and socialist reforms. While Tito's leadership of the partisan struggle and the post-war unification of Yugoslavia gave his government a popular base of support, it could not overcome the country's limited economic development. This no doubt compelled it to hastily expand its nuclear power industry, one of the factors that led to the reactor disaster.

Notwithstanding Tito's promises, Yugoslav workers were prevented from creating genuine institutions of workers' control. The regime degenerated into a police state with Tito

becoming the arbiter of conflicts between competing national and ethnically based sections of the bureaucracy. The politically unstable and economically unviable character of these arrangements came to the fore after Tito's death in 1980.

Guardians of the Formula opens with atomic scientist Dragoslav Popovi? (admirably portrayed by Radivoje Bukvi?) and three of his students arriving in France and being admitted to the famous Curie Institute in Paris, France, following the Vin?a accident.

While their condition is grim, Derval (Olivier Barthélémy), a French secret service agent, insists that Dr Georges Mathé (Alexis Manenti), the leading doctor at the institute, comply with French government demands and treat the seriously ill victims. Mathé, who vehemently opposes the development of atomic weapons and is suspicious about what had happened at Vin?a, refuses at first.

"Do we know what they were doing in that reactor?" he says. The agent responds with a "what do you think?" sort of smile but insists Mathé think about France's prestige in radiological research and re-consider. Mathé even tells Popovi? at one stage, "You don't deserve to be saved."

Much of the film occurs inside the Curie Institute and follows the intense and difficult struggle to treat of Popovi? and his students. These scenes are combined with frequent flashbacks, from Popovi?'s point of view, to the experiment-gone-wrong. Early on we learn that Yugoslav authorities had not provided the scientist with the correct fuel.

The flashbacks also highlight the dilemmas facing Popovi? prior to the Vin?a accident. He is being pressured by senior figures in Yugoslavia's political bureaucracy, who want him to undertake a nuclear experiment in the hope of quickly expanding the embryonic industry. At the same time, he is being criticised by Pavle Savi? (Miki Manojlovi?), his former professor, for helping the government in this reckless project. "I know what the end goal is from all of this," says Savi?.

Shortly after arriving at the French research institute, the Yugoslav patients begin coughing up blood and losing their hair. It is soon discovered that they had been exposed to astronomical levels of radiation.

The health of Života (Ognjen Mikovi?), one of the students,

drastically worsens and he dies in one the film's the most heart-wrenching moments.

The guilt-ridden Popović relives the nuclear disaster, recalling his frantic appeals to the Vinča staff to wash his irradiated students who can't stop throwing up. The flashback to this desperate moment at the Yugoslav nuclear reactor brought to this reviewer's mind some of the descriptions of the aftermath of the US atomic bombing of Hiroshima and Nagasaki in August 1945.

An important strength of *Guardians of the Formula*, whether in flashback mode or at the French hospital, is its counterposing of the self-sacrificing responses of the lower strata of scientists, doctors, nurses and French medical donors, with the calculating coldness of the higher ups.

Relations between Popović and state officials prior to the Vinča accident are generally tense and unpleasant.

Yugoslav Vice-President Leka Ranković (played by Bjelogrić, the film's director) is a menacing presence. Ranković, who was also the head of Yugoslavia's secret police, sends spies to watch Popović's every move, threatening him with dismissal unless he accomplishes a successful nuclear chain reaction in time for President Tito's possible arrival at the facility.

The French state is equally shown in an unfavourable light. Derval, the French secret agent who demands Mathé treat the patients, is not motivated by the worsening health of the Yugoslavs or the international standing of French medical research. His concern is how he can interrogate the radiated scientist and his students about Yugoslavia's nuclear program.

Derval even threatens the tight-lipped Popović, telling him that medical treatment will be withheld if he doesn't reveal what was happening at the nuclear reactor.

Mathé eventually decides to treat the desperately ill Yugoslavs, first with blood transfusions, but this fails.

The only way they will survive, he concludes, is with bone-marrow transplants, something he has only ever performed on mice, all of whom died. His superior is horrified by the notion and forbids the procedure. Mathé ignores this and goes ahead. Disturbing scenes portraying the painful process of extracting bone-marrow samples from their sternums follows.

Guardians of the Formula briefly references popular opposition to nuclear war with one scene showing French protesters chanting "Stop the Cold War" and "We don't want nuclear war."

But publicity in the French media about the plight of the radiated scientists inspires ordinary citizens, including a young perfumery worker Odet Dragi (Anne Serra), a car mechanic and his wife, and a gardener, to assist, first with blood donations and later bone marrow. The film shows French donors bonding with the young Yugoslav scientists, sensitively dwelling on their empathy and self-sacrifice.

Mathé's decision to proceed with a risky procedure, that if

successful would represent a major medical advance, is paralleled with Popović's previous attempts to make a nuclear breakthrough in Yugoslavia.

The earlier conflict between the two men, which partially echo the Cold War tensions of the time, eventually dissipates as they discover their underlying common humanity.

Popović learns of Mathé's role in the French resistance and asks him about it. "I have always been on the side of science and humanity," the doctor replies.

In another scene, Popović explains that he is the son of a victim of the horrific 1944 carpet bombings of Belgrade by the British and American war planes, justified as necessary to drive out the occupying Nazis and their local fascist allies.

Belgrade residents initially welcomed the British and US aid until their warplanes rained down tons of bombs on the city. Mathé is shocked by Popović's story, who dryly says, "In our country we have five seasons: winter, spring, summer, autumn and bombing."

Guardians of the Formula provides only limited context to the complex historical and political issues underpinning the drama. Its principal focus is on the growing unity of the nuclear and medical scientists—Popović and Mathé—and the courage and self-sacrifice of all those involved in what was the first ever bone-marrow transplant.

The thread of international solidarity between scientists, medical workers and ordinary people, often against the direct demands of the Yugoslav and French political hierarchy, powerfully underpins Bjelogrić's film.

In one of the film's final moments Popović tells Mathé, "Existence is not just a dot in time, it's a process. One man helps another just like that without any interests or ulterior motives... one man will risk everything he has, even his own life so that another may live. We are alive because someone has passed on to us the strength and love of someone else and we will pass it onwards."

Performances in *Guardians of the Formula* are uniformly strong, and the score is superb, adding the necessary intensity and sense of foreboding, interposed with more soothing and delicate moments.

Bjelogrić's compelling film is a valuable companion piece to Christopher Nolan's *Oppenheimer* and one that will strike a chord with millions of people internationally amid the escalating imperialist aggression across the Middle East and against Russia and China, and the real danger of a nuclear third world war.



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