

Struggle With Politics

Science journalists observe politically active scientists.
Five stories from five nations.



**World Conference
of Science Journalists**
Lausanne 2019

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Science policy is one of the most under-reported areas in science journalism. The long term project “Struggle With Politics” has tried to change this by pairing journalists with politically active scientists. From June 2018 until May 2019, five journalists followed five scientists in five different countries who have been on a political journey, reporting on the successes and failures of each scientist-activist as they work to educate lawmakers and promote science in political discourse.

The project board awarded the **first prize** to the Indonesian science journalist [Dyna Rochmyaningsih](#) for her story „Advocating international collaboration“. She followed biologist Berry Juliandi who opposes criminal sanctions for foreign scientists breaking the country’s new and stringent rules (page 4).

[Núria Jar](#) from Spain and [Bruno Massare](#) from Argentina share the **second prize**.

Núria Jar’s story „In the midst of political turbulence“ followed Arcadi Navarro who after a long scientific career led the Secretariat for Universi-

ties and Research of the Government of Catalonia. He was involved in politics and policy-making during turbulent times; as Catalonia declared independence from Spain (page 16).

In the story „Opposing as a congressman“ Bruno Massare followed Roberto Salvarezza, a prestigious scientist who decided to get involved fully in politics as a congressman fighting against the progressive reduction of funds for science and the suspension of research programs (page 27).

It was hard to decide on the winners of the project. Every story is unique and fascinating. We can warmly recommend the other two stories for reading: A Canadian biologist steps up to hold the government’s feet to the fire (page 43). And a physicist from Croatia founds a new political party (page 63).

The participating journalists told their story in three parts. The stories are published on www.wcsj2019.eu/struggle-with-politics and now also here in this pdf brochure.

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Project board:

[Hanna Wick](#), freelance science journalist, Zürich, Switzerland
Board member of the WCSJ 2019,
[@sciborg01](#)

[Mandi Smallhorne](#), science journalist, Johannesburg, South Africa
President of the African Federation of Science Journalists, Board member of the World Federation of Science Journalists, [@rainbowinsid](#)

[This Wachter](#) (project lead), audio producer and science journalist, Bern, Switzerland, [@this_wachter](#)

[Fundraising](#): Olivier Dessibourg, co-founder and deputy editor-in-chief Heidi.news, Chairman of the Organizing Committee WCSJ2019, [@odessib](#)

4	ADVOCATING INTERNATIONAL COLLABORATION Indonesia
16	IN THE MIDST OF POLITICAL TURBULENCE Spain
27	OPPOSING AS A CONGRESSMAN Argentina
43	MENTORING FOR EVIDENCE Canada
63	PREPARING FOR ELECTIONS Croatia

ADVOCATING INTERNATIONAL COLLABORATION

Indonesia

by Dyna Rochmyaningsih

The Indonesian government is planning to introduce criminal sanctions for foreign scientists who break the rules. After the General Election that takes place in 2019, the sanctions will become part of the new science and technology law. The biologist Berry Juliandi opposes the new foreign research regulation. He embarked on new ventures in lobbying and networking.



The journalist

Dyna Rochmyaningsih is a freelance science journalist from Indonesia who has written for various international science publications such as Nature and SciDev.net. She is a member of the Society of Indonesian Science Journalists and is an alumna of Science Journalism Cooperation (SjCOOP), Asia, organized by the World Federation of Science Journalists. Dyna received her science degree from the Department of Biology, Bogor Agricultural University near Jakarta. Her work covers a wide range of topics such as health, climate change, science policy, and the intersection between science and religion.



The Scientist

Berry Juliandi is a member of Indonesia's Young Academy of Science (ALMI) and a researcher in the Department of Biology at Bogor Agricultural University. Juliandi is also Head of the Veterinary Stem Cells Laboratory at the University, as well as Chief Editor for the Journal HAYATI Bioscience (Elsevier). He has researched in the field of neuroscience, stem cells, and animal morphometrics. Juliandi has also been active in promoting scientific culture in the public sphere.



Photo: Melvinas Priandana

Part 1

Soft Politics at a Hiatus

Scientist Berry Juliandi doesn't want to deter international researchers from working in Indonesia. That's why he spends a lot of time on lobbying against planned criminal sanctions – too much time, some of his colleagues complain.

Every scientist knows that science is a collaborative effort: it works best when it is done together by many people with different perspectives and nationalities. And Berry Juliandi, a determined Indonesian biologist from Bogor Agricultural University (IPB), understands this very well. The 40-year old scientist has witnessed how hundreds of international research projects have transformed his university to become one of the first-class research centers in Indonesia. In his department, research collaborations with scientists in Japan,

Europe, and the United States have mined high quality PhDs and important scientific discoveries published in high quality journals such as *Nature* and *Cell*. “A good network with foreign scientists is our capital to improve our science,” he says.

Juliandi himself gained a PhD degree from Nara Institute of Science and Technology (NAIST) in Japan, where Noble Prize winner Sinya Yamanaka first investigated induced Pluripotent stem cells (iPs). Here he acquired knowledge and skills that catapulted him to become one of the most highly cited Indonesian young scientist. And he came back to Indonesia at the right time, when Barack Obama's science diplomacy had just started to empower young Indonesian scientists. In 2012, shortly before he and his family moved back to Indonesia, Juliandi was selected to speak at the US-Indonesia Kavli Frontiers of Science

Symposium in Solo, Central Java. On that occasion, the father of four showed up at the podium as a bright and promising young scientist, eloquently presenting his stem cell research. Sangkot Marzuki, the President of Indonesia's Academy of Sciences, was impressed and later welcomed Juliandi as one of the members of Indonesia's Young Academy of Sciences (ALMI). The event was also where he first befriended the US scientists and other prominent Indonesian scientists outside his university, including Laksana Tri Handoko, the current Head of Indonesia's Institute of Sciences. “That event was a crucial point in my career as a scientist,” he says. If it was not for that event, which was a collaboration between US and Indonesia's Academy of Science, Juliandi could not have achieved what he has now: being inside the circle of elite and influential scientists in Indonesia.

The debate

But his beloved country, which endured colonialism for more than three centuries has started to feel threatened by international science. A number of Indonesian scientists have reported their disappointment in foreign researchers who collect biological specimens without informing local authorities, ignore ethical regulations stipulated by local review board, and treat Indonesian scientists as 'unequal partners'.

"Those cases are not justifications to criminalize foreign researchers," he argues. According to Juliandi, these troublesome foreigners are just a tiny part of the total number of foreign researchers in Indonesia. Of 832 publications resulting from international research projects in Indonesia, only 6 % excluded the names of Indonesian scientists. "The good ones are actually the majority," he says.

But the government thinks differently. They are so enraged by these 'colonial' foreign scientists that they plan to give them criminal sanctions: 2 years in jail or 2 billion rupiahs, really hefty fines. These punishments are parts of Indonesia's draft law for science and technology which also stipulates all foreign scientists in the country must submit their raw data, involve Indonesian scientists as equal partners in their research project, and name them in every scientific publication arising from the work.

"These criminal sanctions could hamper international collaboration in Indonesia," says Juliandi. He argues that these punishments could be replaced by other existing laws such as deportation for foreign scientists who don't have research permits, or journal retraction for those who are proven to conduct unfair research collaboration with Indonesian scientists. He also believes that the foreign contribution is crucial for Indonesia's science because foreign research agencies have a higher research budget and more sophisticated technology. He doubts the government will provide the same support. The criminal sanctions need to be removed, "if not, foreign scientists won't be happy working with us," he says. Data from RISTEK has already shown that the trend of international research collaboration is decreasing year by year in Indonesia.

The hiatus

In January, he and some of his colleagues in Indonesian Young Academy of Sciences delivered these arguments to the politicians in the House. But until now they haven't heard back from them.

RISTEK data shows that international research collaboration is decreasing year by year in Indonesia.

To become a law, the draft law needs to pass two phases of deliberation and a plenary meeting in the House. Currently the draft law is still in the first phase of the deliberation, and the last deliberation process was in May. "But there is a rumor that politicians have postponed the first phase of deliberation process," says Juliandi.

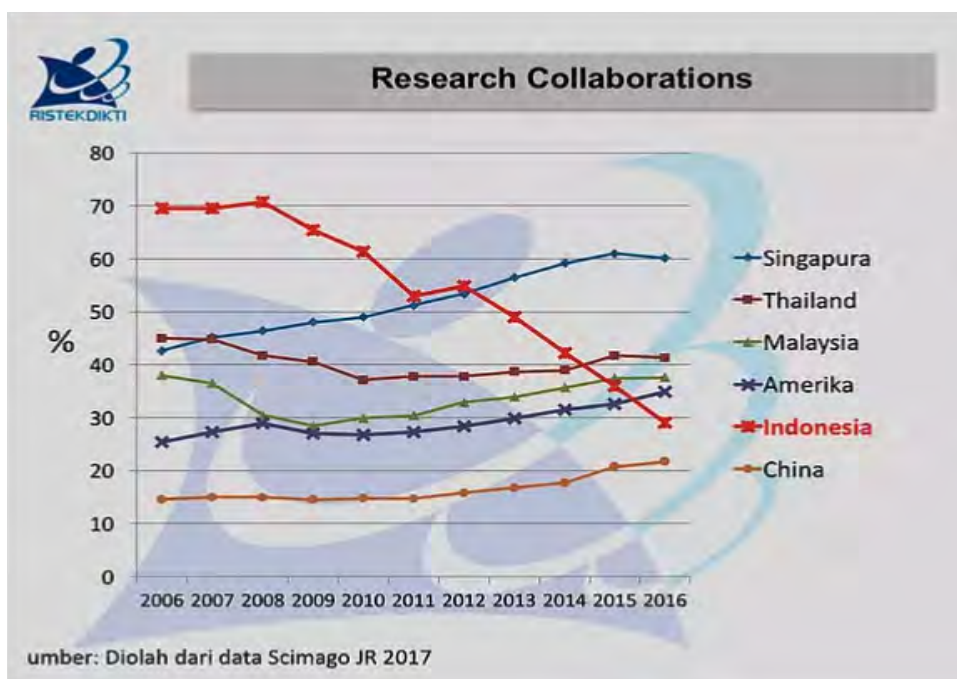
The political climate in Indonesia is heating up as the country heads to the Presidential Election in 2019. Experts say Islamic populism and ultra-nationalism are on the rise in the world's third largest democracy, with local politicians resorting to sectarian and nationalistic rhetoric to get votes. And science is not a 'sexy' political commodity, Juliandi says.

His colleagues in the Academy of Science were also busy with other agendas. "We were supposed to discuss the draft law with politicians in the Academy's office this June, but it has not happened," says Juliandi. But he fully understood the reason behind this delay. "There was just a few of us, and we were so overwhelmed," he says.

But as a single-minded person, Juliandi did not just sit in his office during this hiatus. In fact, he saw this stagnant condition as an opportunity to execute his own strategy in approaching the government and the lawmakers. He calls it "soft politics", which means approaching politically important persons through sincere acts of friendship and brotherhood. Juliandi himself is not a leader of any organization. "I can't use it as a vehicle to bring my ideas," he says. But he has something more powerful: social network and public speaking skills. By using this skills, he easily befriends people who hold crucial positions in the Indonesian government and the scientific community.

Approaching RISTEK

Juliandi's first maneuver was to befriend top officials from the Ministry of Research Technology and Higher Education, commonly known as RISTEK. He knows that Indonesia's President, Joko Widodo, has no interest in science. The Academy of Science has sent a number of letters to Widodo asking for a meeting but the president



has never answered them. “He prefers to meet comedians and celebrities rather than having a serious talk with scientists,” he says.

Given this situation, Juliandi thinks that RISTEK holds the highest authority in shaping Indonesian research ecosystem. It was also Mohamad Nasir, the RISTEK Minister, who signed the controversial draft law and submitted it to the politicians in the House back in 2017. And luckily for Juliandi, he has access to the people in this Ministry.



Juliandi listens intently to Muhamad Dimiyati, RISTEK Director General for Research and Development.
(Photo: Melvinas Priandana)

“It all started in 2015,” he says. At that time, Juliandi was one of very few Indonesian young scientists who had a high impact research publication. For this achievement, RISTEK invited him to review research proposals submitted for RISTEK funding. Since then, Juliandi has been trusted to work with the Ministry on many occasions, such as workshops and meetings related to the national research ecosystem. Here, he built his network with RISTEK officials.

From June to July, Juliandi had a hectic schedule. As requested by RISTEK, he travelled to many cities in Indonesia to speak about the improvement in research quality at local universities, as well as to train local scientists to publish papers in international peer-reviewed journals. In these meetings, he made

friends with local scientists which extended his network in Indonesian scientific community. “The past three months were so dynamic for me. It was exciting to meet new people,” he says.

The criticism

Some of his colleagues in the Department of Biology IPB have concerns regarding these outside-campus political activities. “Berry was one of my brightest

students,” says Bambang Suryobroto, a senior biologist who supervised Juliandi in his early years as a scientist. He remembers how Juliandi told him that he wanted to be a lecturer in the department. “He was so determined. In his early years as a lecturer, the university did not pay him, but he kept on teaching,” says Suryobroto. He was very impressed by his student’s persistence and single-minded character. “But now people are complaining, asking why he is such a wanderer. He is difficult to find on the campus these days,” says Suryobroto. He is very skeptical about Juliandi’s political activism. “He’s lost his focus. This hinders his research and teaching activities,” says Suryobroto.

“They criticize me because they care for me,” says Juliandi. He says all these political activities were done in the semester-break and he will never abandon his main job as a scientist and a lecturer. At the end of July, Juliandi even attended a field course in West Java’s rainforest where he mentored students collecting

insects and analyzing the wing’s morphometrics. “Just let the facts speak for themselves,” says Juliandi.



Juliandi mentored his students in Cibodas Natural Reserve, West Java.
(Photo: Melvinas Priandana)

Juliandi thinks Indonesian scientists should not just stay inside universities doing research and complaining about the poor funding and science infrastructure in the country. “They should reach out to the policy-makers and try to understand the problems,” says Juliandi. In mid-August, Juliandi got a chance to do just this. In a symposium of Indonesian World Class Scholars 2018, he met RISTEK top officials and prominent Indonesian scientists to discuss possible strategies to improve Indonesia’s science. Juliandi chaired a panel in which Muhamad Dimiyati, RISTEK Director General of Research and Development, who sits directly under the Minister of RISTEK, and some respected Indonesian scientists, discussed strategies to improve the state of basic research in Indonesia.

According to Juliandi, RISTEK is already on the right path to improve the general state of Indonesian science. Based on some discussions with his RISTEK friends, the Ministry is actually struggling for better science policies, such as proposing a multi-year funding scheme and simplifying the bureaucracy of research reports to the finance ministry. “But they have mixed support for the criminal sanctions in the draft law,” he says.

Getting along with LIPI

Juliandi then began approaching Laksana Tri Handoko, a physicist who at the helm of the Indonesian Institute of Sciences (LIPI). In the draft law debate, Handoko and some of his colleagues in LIPI are the proponents of criminal sanctions. The institution has experienced a number of cases when they felt 'betrayed' by foreign scientists. Handoko was one of the masterminds behind the draft law. It is also a good coincidence for Juliandi that he had already connected with Handoko at the Kavli conference a few years ago when the physicist led LIPI's laboratory for theoretical physics.

At the end of the conference day, Juliandi made a short trip to LIPI's building and stepped into Handoko's office. He could have met Handoko in the conference hotel earlier that day, but the LIPI chief had asked him to come to his office. The conversation started with some snacks and a little catch-up. For Indonesian scientists like them, discussing the state of Indonesian science is the main course in every dialogue. "We first talked about the next generation of scientists in Indonesia and how the current policy supports them to strive and we finally talked about the draft law," says Juliandi.

Juliandi is keeping the result of this meeting confidential for this early stage of negotiation. However, he can be sure that Handoko agrees that some controversial aspects in the draft law, including the criminal sanctions, need to be reconsidered for further deliberation. "I am optimistic that we will find common ground in the issue," he says.

Juliandi seems very determined about this political strategy. "I think I've reached my target for this period," he says. He predicts the draft law deliberation process will be more dynamic in the next few months. Despite the hiatus, the draft law is listed as one of Indonesia's National Legislative Priorities in 2018. Juliandi's analysis is that Indonesian Democratic Party of Struggle (PDIP), Joko Widodo's political party, seems to take the issue as one of their political commodities. Although science is often neglected by politicians, they do care about the issue of human resources. "And we are going to make this case in the next few months," he says.

Juliandi discusses the state of Indonesia's science with LT. Handoko, the Head of LIPI.
(Photo: Melvinas Priananda)





Photo: Melvinas Priandana

Part 2

Unshakable Optimism

The majority of Indonesian politicians support criminal sanctions for foreign scientists. International scientists are anxious and considering leaving the country if the draft law is passed. But Berry Juliandi, the sanguine biologist, is optimistic that the sanctions will be removed. Is his optimism in this case realistic?

“Don’t worry,” a Whatsapp text just popped up on my phone.

It was a message from Berry Juliandi, the newly elected Secretary General of Indonesian Young Academy of Sciences (ALMI) whom I have been following for months. The previous day, when he was mentoring international students on animal evolution in Belitong island,

he sent me the Inventory Problem List (abbreviated as DIM in Indonesian) of the country’s draft law of science and technology system. The DIM lists all criticism and suggestions made by the lawmakers regarding every article of the draft law, including those governing the practice of foreign research collaboration. “We got this from the Secretariat in DPR,” he said, referring to the country’s House of Representatives (DPR).

I immediately downloaded the DIM, scanned through the hundred-page file, and found a striking line: Of 10 political parties in Indonesia’s House of Representatives, six of them supported the criminal sanctions for foreign scientists proposed by the government, and the rest even suggested for heavier sanctions: two hundred billion rupiahs or 15 million USD must be paid by those who export research materials (both physically and digitally) without a material

transfer agreement. This amount is a hundred times higher than the proposed sanction.

The government says the draft laws are designed to protect Indonesia’s natural resources and to increase local capacities in science and technology. But foreign scientists are obviously anxious. In July, the group of Danish researchers who conducted the high-profile study on the recent evolution of Indonesia’s sea nomads canceled their trip to Sulawesi because they were so rattled that the draft law would be imposed on their controversial study. Other foreigners said they would act similarly if the proposals are passed into law.

Edgar Turner, an entomologist from Cambridge University in the UK who has been conducting a biodiversity research project in Indonesia over the last few years, told me that he would

prefer to do research in Malaysia if the proposals are passed into law. He said the neighboring country is smaller but they are “friendlier” to international science.



Dr. Edgar Turner collaborated with Indonesian researchers to investigate the state of biodiversity in oil palm plantations. (Photo: Eleanor Slade)

“Obviously Indonesia needs to be careful to maintain its rights over its research, its areas, and its biodiversity. That’s all very important. But international collaboration is also very important,” says Turner, who is the Curator of Insects in Cambridge’s Museum of Zoology.

Phillipe Borsa, a marine geneticist from French Research Institute for Development who has conducted research on the genetics of stingray population in Indonesian waters, expressed the same concern. “Indonesia is certainly one of the most difficult countries to do biodiversity research today. And constraints on biodiversity research are counter-productive,” he says, referring to an international study which examined how Nagoya protocol and similar regulations could hamper biodiversity research. He recalled how his partnership with Indonesian researchers suddenly became awkward and lacking in leverage because of “a letter” which, according to him, came from the Ministry of Research. The letter reminded his foreign counterpart to be careful with him as he might “steal Indonesian biological resources”.

Having read all politicians’ supporting statements on criminal sanctions in the DIM, I thought that Turner’s, Borsa’s, and many other’s concerns would likely come true. But Juliandi assured me that there is still a chance to alter the proposals. “It’s just a DIM,” he said confidently in the

Foreign intervention?

The draft law has woken up from its long hiatus. In late August, scientists and policy-makers gathered in a national seminar held by the Ministry of National Planning and Development (BAPPENAS). According to Juliandi, the seminar did not discuss the draft law in particular but it was successful in drawing attention back to it. Daryatmo Mardiyanto, a politician who leads a Special Committee for the draft law deliberation in DPR, told local journalists that the draft law will be finalized by the end of the year.

Juliandi is skeptical about this politician’s claim. Even though the House had succeeded in releasing the problem inventory list in October, there is still a long way to go before it is approved as law, says the soft-spoken and articulate biologist. According to Muhamad Dimiyati, Director General of Research and Development in the Ministry of Research, Technology and Higher Education (commonly known as RISTEK), because the draft law was originally proposed by the government, the DIM needs to go for government scrutiny before it will be deliberated upon by politicians in a plenary meeting in DPR. The scrutinizers come from RISTEK, Ministry of Finance, Ministry of Home Affairs, Indonesian Institute of Sciences, among many others. So, even though public hearings have been closed, “We can still influence them,” he says.

In doing so, The Academy of Science plans to gather together all related stakeholders to discuss the draft law. And this time, Juliandi will have a more strategic position to express his views and opinions. Recently he was appointed as the new Secretary General of Indonesian Young Academy of Science (ALMI). The Young Academy was born following a series of science diplomacy engagements between Indonesia and foreign science academies in the US, Australia, and the UK. From its founding, it has wielded a strong influence on Indonesia’s science policy-making arena. It works closely with the ministries such as BAPPENAS, the Minister of Finance, and the Ministry of Research and Technology (RISTEK), as well as foreign institutions such as the British Council (UK) and Knowledge Sector Initiatives (Australia).

But Juliandi denies that ALMI’s view on international research regulation is triggered by foreigners. “It is our original idea to work against the criminal sanctions,” he says. He thinks that foreign influence is almost zero in this case. Even though the DIM shows support for criminal sanctions, he is optimistic that lawmakers are leaning toward its removal. Despite the DIM, “The most influential people in the working group told me that the article needs to be revised. They are aware that it sends a negative message to foreign countries. They seem to have changed their mind because of our feedback,” he says.

But Borsa, the French scientist, is not convinced. “I am afraid that he may be too optimistic. The draft law resonates with the declarations of a number of politicians and scientists for the last five years; and there’s no doubt nationalism is on the rise in Indonesia, especially in the year that precedes national election,” he said.



Berry Juliandi in an informal talk with his Young Academy fellows. (Photo: Indonesian Young Academy of Science)

„I am an ordinary scientist“

But I trust what Juliandi says. I think he has an impressive ability to convince people. “He looks smart,” says Harry Surjadi, a senior science journalist who heads the Society of Indonesian Science Journalists (SISJ). Last October, Surjadi had a chance to moderate a session with Juliandi during a Wallacea week in Jakarta. It was the first time Surjadi had had a close interaction with the popular biologist, and his first impression was positive. It’s likely that this charisma had convinced the “influential people” with whom he had discussions regarding the draft law.

The biologist easily impresses people whenever he talks at an event. He is knowledgeable, articulate, and sometimes humorous. “When I trained people about scientific writing, I would always get a call the next morning to speak at another workshop in different cities. It is usually the previous workshop participants who invite me,” he says. When he told me this, he was aware that he might sound “narcissistic”, but I found much supporting evidence for his claim. In the last three months, he had traveled to many Indonesian cities and trained people in more than 20 universities, including respected universities such as Bandung Institute of Technology and University of Indonesia.

These frequent contacts with new people have made the sanguine biologist popular. In October, The Conversation Indonesia mentioned Juliandi’s name as one of Indonesia’s most popular scientists in their podcast. He had also been interviewed by local television to give explanations about science in everyday life.

“But I am basically an ordinary scientist,” he says. In between his busy schedule, the biologist still manages to research on his campus. Tempo, Indonesia’s well-respected media, featured him as one of the nation’s brightest minds for his research on the effect of Indonesian traditional herbs on learning and memory. He has also collaborated with scientists at the Faculty of Medicine in the University of Indonesia to investigate the potential of umbilical stem cell for stroke treatment.

The positive polymath

And most impressive of all, he has just received a Wallacea research grant from the UK-Indonesia science and technology collaboration program. Last October, The Newton Fund and RISTEK earmarked 1.25 million USD for his research project entitled Forecasting biodiversity losses in Wallacea from ecological and evolutionary patterns and processes. Juliandi is the youngest grantee; the other four are veteran scientists with professorships on biodiversity.

His research focus is actually animal structure and development, morphome-



trics and stem cells in particular. But he is also tech savvy, he frequently uses R and other software for his morphometrics research and he will apply it in his new research. “We will use computer modelling to forecast how landscape change affects biodiversity levels. This will be useful information for policy-makers,” he says. For this research, Juliandi will collaborate with Professor Justin Travis from the University of Aberdeen, UK.

Juliandi is certainly a rare kind of Indonesian scientist. Besides his stellar performance in research and political activism, the biologist is also the editor-in-chief of Hayati Journal of Bioscience, the first Indonesian journal hosted by international publisher Elsevier. This year, under his leadership, the journal has been endorsed by RISTEK as the best scientific journal in Indonesia. Apparently, in between his busy days of research and politics, Juliandi also manages an international journal. It sounds like an impossible task, but Juliandi says, “I can check emails and manuscripts on my smartphone whether on a train or a remote island.”

I also asked to him whether all his recent achievements related to his political activism, –whether the endorsement of Hayati journal has something to do with his close relationship with RISTEK, and whether the Wallacea grant is given because he is the Academy’s most active member. He answered, “Not at all. All the reviewers are independent. But I do believe that my outside campus activities, my discussions with other scientists

Looking at his insect specimens. Juliandi easily manages switching his time and attention between research and political activism. (Photo: Melvinas Priandana)

RISTEK’s Director General, Muhamad Dimiyati, awarded a Wallacea Grant to Berry Juliandi (third from the right). Both have previously met in person at meetings and conferences. (Photo: Ministry of Research and Technology)



and policy-makers, give me insights on how to do science in Indonesia,” he said.

Maybe it sounds like a hyperbole, but I think Juliandi is today’s Indonesian polymath. I was hesitant to write this word, but the biologist has mastered the science of making friends with influential people, leads a science journal, mentors students, and does high-quality interdisciplinary research at the same time. Now I wonder if Borsa and Turner will change their minds and trust Juliandi’s optimism about the draft law.



Photo: Melvinas Priandana

Part 3

The role of scientists in Indonesian politics

The general election is here. Berry Juliandi is grateful for the current state of Indonesian democracy which allows scientists to freely express their ideas. But even so, he admits that scientists are still powerless in the political sphere. Despite his networking efforts and frequent media engagement, the Indonesian government continues to include criminal sanctions in the draft law.

Shade from the centuries-old giant trees in Bogor covered the city main road. Under the canopy, Berry Juliandi, an optimistic biologist from Bogor Agricultural Institute, was driving his car to Jakarta. He was in a rush to go to the capital because he had an interview with a team of journalists at Tempo, an In-

donesian magazine known for its stark criticism of the government. The recent debate between two vice-presidential candidates dissected strategies to boost Indonesian research and the magazine wanted to hear Juliandi's views on the issue as the Secretary General of Indonesian Young Academy of Sciences.

Juliandi put his car headphones on to answer my call while driving. For safety reasons, I told him that I would prefer to call when he had already arrived in Jakarta. But he said he wouldn't have time; the interview would start soon and once it was done, he would immediately drive back to Bogor for another meeting. "It seems talking-while-driving is the only way," he said.

Juliandi has been a busy man since he decided to take on a role as a scientist-activist. The general election was now only two weeks away and he was

grateful that he could communicate his scientific expertise to the public. Compared with those living in Soeharto's regime (Indonesian second president, 1965-1998), "today scientists have more freedom to speak up," he said. But even so, they are still powerless in Indonesian politics, he admitted. His struggle to remove the criminal sanctions embedded in Indonesia's science and technology draft law will likely be fruitless, since the Ministry of Research and Technology (RISTEK) insists on including them.

Despite their powerless position in the political arena, Juliandi thinks Indonesian scientists should be vocal in promoting science in the public sphere. Science, he says, can still actively influence the public to make a political decision. On March 1, Juliandi delivered a talk in a seminar regarding how fake news and hoaxes were processed in the human brain. Currently, hoaxes and

fake news are creating a dirty political atmosphere in the country. One of the most popular is about Joko Widodo, the current incumbent president. The hoax says he is the child of a communist.

This plays on the feeling of terror evoked in the minds of many Indonesians when they hear the word “communism”. The fear stems from a bloody political upheaval back in 1965 when Soeharto, who was once a military general, accused the Indonesian Communist Party (PKI) of being the mastermind behind the killing of seven military generals. The event was a stain on Soeharto’s authoritarian leadership in Indonesia. During his three-decades-long presidency (1965-1998), the second Indonesian president brainwashed the people into believing that the communist party was totally evil and cruel.

After Soeharto fell, historical records started to reveal the other side of the story. It was found that Soeharto himself was involved in the killing of the seven generals and he was responsible for the mass murder of two million alleged communists in Java, Bali, and Sumatra in the early days of his presidency. Some historians also proved that Soeharto’s anti-communist propaganda had removed virtually one entire generation of intellectuals in Indonesia. At least 299 lecturers and 3464 university students were lost, jailed, or killed, and many Indonesian scientists who were studying in Moscow, Prague, and Stockholm became stateless because they refused to condemn the earlier regime.

Indonesian academics in Prague, Czech Republic (1968).
(Photo: Vice Indonesia)



Today, the situation is very much different. Juliandi, like many other Indonesian scientists, can freely express his ideas to the public. In his talk “The Science Behind Hoaxes” which was delivered in National Library in Jakarta, Juliandi explained that scientific literacy has nothing to do with a person’s susceptibility to hoaxes. Instead, this tendency is ruled by our emotions, especially fear. The fear of communism, which was nurtured during Soeharto’s three decades of propaganda, compounds the hoaxes against Joko Widodo. “When information threatens your belief, your amygdala will quickly respond and it will not be processed to the cortex,” he says.

Juliandi’s explanation of hoaxes was widely covered by many outlets, with some even going viral. Juliandi has been one of the very few Indonesian scientists who has become popular in media. Perhaps this was the reason why Tempo, invited him to their office that morning. We finally talked over the phone while Juliandi was driving his car to Tempo’s office. It was a short talk about the progress of the criminal sanction articles in Indonesia’s science and technology draft law. No significant development had occurred and what Juliandi could do was to influence the politicians in the parliament, the bureaucrats in the ministry of research, and the journalists.

In March 14, Juliandi came back to the Academy’s office at the National Library in Jakarta. This time he got a chance to deliver his arguments against the criminal sanctions for foreign scientists. An articulate scientist, Juliandi confidently took to the seminar stage and declared that all articles in the draft law must

be removed. “This is very discouraging policy,” he said.

Juliandi argued that the core problem of Indonesian governance is a high level of “distrust”. “So the government thinks everything must be fenced and protected by criminal sanctions,” he said. Even before the introduction of this proposal, the government had shown its distrust in the form of a complicated research procedure. Juliandi could still remember when he had had to accompany his Japanese collaborator to report his arrival to police headquarters in Jakarta. “It was a complicated procedure,” he says.



Juliandi talked about the needs to remove the criminal sanctions in front of the members of Academy of Sciences, RISTEK bureaucrats, and the media.
(Photo: Berry Juliandi, personal documentation)

In her blog, Tabitha Kidwell, an American linguist who had done research in Indonesia, said “the amount of paperwork that needs to be completed to live and do research in Indonesia approaches the absurd”. Before she did her research, she had had to visit dozens of government offices to secure permits. “I have a bunch of letters of recommendation and residency and permission, but I’m not exactly sure what they are all for,” she wrote.

The tangled research permit procedure is what makes some scientists fail to secure permits, says Juliandi. Last month, some researchers from Poland were deported from West Kalimantan because they were doing research without the correct visa. Instead of securing permit from RISTEK, the researchers had used tourists visa to enter Indonesia. While



Dozens of permit documents are needed by a foreign scientist to do research in Indonesia.
(Photo: Tabitha Kidwell)

Juliandi agrees that these researchers violated the law, he thinks the government needs to find more welcoming rules which empower research collaboration. “The criminal sanctions must be removed and Indonesia should centralize research permit procedure under one roof,” he says.

But Muhamad Dimiyati, the Director General of Research and Development in RISTEK, told me the criminal sanctions will still be included in the draft law even though the sanctions may be weakened. “We are revising the criminal sanctions articles and we will involve an ethics commission to decide whether or not any international research violates our law,” he says. After the general election this month, Dimiyati will bring the revised draft law to the House of Representatives to be approved by the parliament and signed by Joko Widodo, the incumbent president, by this September.

I informed Juliandi of this update and texted, “Maybe Indonesian scientists are powerless. No matter how much struggle they make, the decision makers are government and politicians. The criminal sanctions will stay in the new rules”. It took him a while to respond to my text: “Well, maybe you are right, but at least we have spoken up and we have records for that. Someday, when somebody asks the role of Indonesian

scientists in Indonesian policies, we can proudly say that we have tried very hard, but the government didn’t listen to us,” he says.

Juliandi, along with the majority of Indonesian scientists is a civil servant who cannot nominate himself as a legislative candidate. Thus, they will never be able to make decisions in the policymaking arena. But for him, this doesn’t mean surrender. “We need more vocal scientists to advocate evidence-based policy. We really need to struggle harder than before,” he says.

IN THE MIDST OF POLITICAL TURBULENCE

Spain

Núria Jar (Journalist)
Santi Trullenque (Photographer)

As a scientist in the corridors of power, Arcadi Navarro is uniquely placed to defend the interests of science. After a long scientific career, he leads the Secretariat for Universities and Research of the Government of Catalonia. He does politics and policy-making in turbulent times, as Catalonia declares independence from Spain. After several months of political uncertainty, everything changes for Arcadi Navarro.



The journalist

Núria Jar is a freelance journalist based in Barcelona. Currently, she writes for La Vanguardia, Muy Interesante, SINC Agency and she has written for the Spanish edition of Scientific American. She also runs a weekly radio section for the most popular radio programme in Catalonia, Via Lliure at RAC1. In addition, she coordinates radio lessons at Master's degree level in scientific, medical and environmental communication at Pompeu Fabra University.



The Scientist

Arcadi Navarro became Secretary for Universities and Research of the Government of Catalonia in January 2016, when Carles Puigdemont was sworn in as president of Catalonia. It was the first time he had held a political position. Professor of Genetics, he was ICREA Research Professor at Universitat Pompeu Fabra (UPF), where he led a research group in Evolutionary Genomics within the Programme of Evolutionary Biology and Complex Systems of the Department of Experimental and Health Sciences, a Department of which he was the Director.



Part 1

The phone-call that changes everything

It rarely happens, but sometimes a journalist is fortunate to be exactly at the right time on the right spot. The beginning of this story is an end. And the main character is Arcadi Navarro, who loves policy-making more than politics.

Barcelona, September 2018

Phone-calls are constantly interrupting our conversation. He warns the voice on the other side of the line that he is surrounded by people and cannot say „exactly“ what he wants because there are journalists in the room. „You know, don't you? It's just like last Monday. The difference is that now we know more,“ he says in code. When he hangs up, he provides the beseeching faces with an answer. „I'm being fired tomorrow,“ he

confesses with a nervous laugh, seven minutes into the conversation.

Population Genetics researcher Arcadi Navarro continues with what has just become his last interview as the Government of Catalonia's Secretary for Universities and Research. The Execu-

The telephone in Arcadi Navarro's office is ringing constantly. In one of the calls, he is told that the new Government will dismiss him the next day.



tive has cleared out all its Departments following regional elections held for the first time by the Spanish Government after Catalan President Carles Puigdemont and his Ministers were removed from office.

One of the most critical dates in this story is 1 October 2017, when Catalonia held an independence referendum, against the Spanish Government's will. On that day, thousands of Spanish police officers, who had been docked on ships in Barcelona Port for several weeks, attacked voters. Figures from the Catalan Department of Health say medical staff treated more than 1,000 people for their injuries.

A passion for politics has always been part of Navarro's life. As a private citizen, he had long been a member of the Unió Democràtica de Catalunya party, until it subsequently morphed into



The Secretariat for Universities and Research is located at the end of Barcelona's Via Layetana, looking out on to the city's promenade.

Demòcrates de Catalunya. Navarro is a founding member. As a politician, however, he considers his time in Government with a degree of astonishment. He describes certain periods as „very tense“ and admits to having had a „hard time“.

At the end of October 2017, the Catalan Parliament launched a unilateral declaration of independence. At the same time, the Spanish Senate activated article 155 of the Spanish Constitution and took control of the region's autonomy. Six days later, nine members of the ousted Catalan Government were sent to prison on remand, on charges of sedition and rebellion. Meanwhile, the heads of the two social movements in favour of independence, who were accused of the same crimes, had been in prison for weeks.

„People I had just been having a meeting with were taken to prison,“ says Navarro, whose position is three rungs below the unseated Minister Josep Rull, one of the seven who remain in jail. „There were times when I really didn't know whether they would take me as well.“

He doesn't want to say anymore with the recorder on.

There is an institutional photograph of Puigdemont in Navarro's office. The former President, along with another six Catalan politicians, went into exile in various European countries to avoid the Spanish courts. The European arrest warrants have now been withdrawn. There is, however, no sign in the office of the new President, Quim Torra, who was sworn in before new elections could be called. Navarro explains that this is because his picture has yet to arrive. Torra was the fourth Presidential candi-

date after Carles Puigdemont, currently in exile in Belgium; Jordi Sánchez, a pro-independence and social leader who has been on remand for almost a year; and Jordi Turull, a former Minister who was incarcerated the day after the failure of the first vote to swear him in as leader.



Arcadi Navarro in his office, working on the computer, with the institutional portrait of Carles Puigdemont and the Catalan flag, the senyera, in the background.

During his time in Government, Navarro says he has been more comfortable with the role of public official than that of a politician. „English is a marvelous language because it has two different terms: politician and policy maker,“ he says. As far as the latter is concerned, Navarro believes that designing strategies and policies should transcend party ideology.

Catalonia has achieved this to some extent in the field of research. The National Research Agreement received all-party approval a decade ago, in an attempt to protect the system. Over the past 30 years, there has been a drive to provide policies and tools to ensure the research system is based on people and not projects, thus attracting both talent and investment. In fact, Navarro defended this very concept in one of his speeches in the Catalan Parliament.



On 2 July, Arcadi Navarro gave his last interview as Secretary for Universities and Research in his office.

During the last round of ERC grants, eight of the 18 Spanish projects selected were Catalan. Scientists have secured 3% of European research funds, ahead of countries such as Austria, Norway, Denmark and Finland. „If it weren't for the European Union (EU), the way the Catalan system is designed means it would have hit a limit,“ says Navarro regarding the „amazing leap forward“ shown by Catalan research.

The latest major restriction placed on science in Catalonia came in the shape of a Ministerial Order from the Spanish Government ahead of the referendum, which took charge of the Catalan Government's accounts and blocked the budget for research centers. Up to 60 institutions – 90% of the university and research community – complained about the move in a letter sent to the ERC President and the EU Commissioner for Research, Science, and Innovation, Carlos Moedas. „If I had been told a year ago that all this was going to happen, I might well have started running for the hills,“ says Navarro.

Two days after the conversation, Navarro is gathering his belongings in one of the referendum ballot boxes. The edge of the box is broken, which Navarro says is the result of blows from the Spanish police's batons. „I came into the job with an 18-month commitment and in the end, it has lasted for more than a year.“



Arcadi Navarro packs away his personal belongings in one of the independence referendum's ballot boxes, after being dismissed from his position.

„I'm relieved.“ He goes on to explain how he is feeling right now. „If I carried on, I would be happy or very happy. Going back to university, on the other hand, would make me very happy or extremely happy,“ as he reflects on his previous position as the Director of the Department of Experimental Sciences

and Health at Universidad Pompeu Fabra (UPF) and a researcher at the Institute of Evolutionary Biology (IBE), which is a joint institution funded by UPF and the Spanish National Research Council (CSIC).

Before taking up his research post once again, Arcadi Navarro will spend the last quarter of the year with his family in Edinburgh, where he carried out his postdoctoral research. In 2014, Scotland voted on independence from the United Kingdom. „I think everything– including borders – is open to democratic discussion,“ he says with conviction. Following his time in politics and now this short sabbatical, Navarro will return to science: an endeavour that believes in taking a systematic approach to the independent thinking that is part of humanity.



Part 2

Destination: resurrection

After being removed from his position as the Secretary of Universities and Research in Carles Puigdemont's Catalan Government, scientist Arcadi Navarro spends four months on sabbatical with his family in Edinburgh. His time in politics was his second expedition into life outside science. He is now getting his strength back, before returning to research.

Edinburgh, November 2018

He chooses a whisky distilled in 2006 and matured for 11 years in a refill ex-bourbon hogshead cask, from a distillery on the southernmost Inner Hebridean island of Islay. From a selection of 300 different whiskies, all similarly

bottled, the tasting note for Navarro's choice is Engaging, exciting or just plain fun. He takes in the aroma, then tastes it, breathes out, and smiles. "Ah, I can feel the happiness coming out." As he puts the glass down on the table, he says that whisky means water of life in Gaelic. A water that cures everything.

Arcadi Navarro became a whisky fan 20 years ago during his first trip to Edinburgh. Back then, he joined the The Scotch Malt Whisky Society and is a member this time around as well.



He jokes, „As you can see, change is essential.“

The last time we saw each other was in Barcelona. On that afternoon in early July, he was dismissed as the Catalan Government's Secretary of Universities and Research and the next morning, he was packing up his things. Arcadi Navarro was in the job for two and a half years and during the period, he had no time to read any scientific articles. Now, the break makes him feel „slightly uncomfortable“ about going back into research, but he knows what it's like to get back into a career. This is his second expedition into life outside science.

Almost two decades ago, Navarro moved to Edinburgh to carry on with his PhD in population genetics following a period in industry. His first stay in Scotland's capital lasted three and a half years, until he had the chance to return



Arcadi Navarro walks around the streets of Edinburgh's Old Town.

to Spain with a contract from the first edition of the Ramón y Cajal grants, which is the Spanish R&D system's leading talent recruitment programme. "I've always come back to life in Edinburgh," he confesses. „I'm like Pavlov's dog. I get here, I smell the smell and start to get into science mode," he says.

We meet at 10am on a Monday at The Elephant House, the bar where JK Rowling wrote Harry Potter. He is wearing a check shirt and a hat, two typical Navarro garments when away from public office. He looks more relaxed and has even gained some weight. He arrived in Edinburgh at the end of August with his wife, who works from home, and his son, who is in his first term in a Scottish high school. He has an office at the University of Edinburgh, where he sees some former colleagues and some new ones.

He is spending his days getting up-to-date before returning to Pompeu Fabra University in Barcelona, where he continues to teach a specialist subject remotely – on analysing databases of human genomes and phenomes – on the Master's programme in Bioinformatics for Health Sciences. Most of the time, he reads studies recommended by colleagues and takes a closer look at the new developments in his lines of research, especially human aging. When he previously returned to science, he did not notice the gap, but now everything is progressing faster and three new genetic sequencing techniques have emerged in the time he has been away.

On the weekends, he rests. But, in actual fact, Navarro has had visitors every weekend but one since he arrived. He knows the city well; he has a story for every corner. When he crosses the road without having explained about the next one, he asks himself out loud what



Arcadi Navarro walks along the Royal Mile, with its tens of alleyways, known as closes, which lead to different courtyards.

other stories he can share. He walks quickly, with his head down and his hands together behind his back. Apart from science and politics, he also talks about architecture, history, books and TV series. Right now, he's watching the second season of *The Crown* on Netflix.

We visit the city with the weather on our side. It rains briefly and then the sun comes out. We visit Greyfriars cemetery, walk along the Royal Mile, cross Princess Street, go up Calton Hill and enter the National Museum of Scotland, where the stuffed sheep Dolly is on show. He is fascinated by the fact that the city's great statues are „three Scotsmen from the Enlightenment period who made great contributions to the world": the empirical philosopher David Hume, the economist Adam Smith and the inventor James Watt. At the end of the day, his mobile has registered 18,000 steps and around 12 kilometers.



Dolly the sheep was the first mammal to be cloned from an adult cell in 1996. Now, the animal is on show in her stuffed form at the National Museum of Scotland.

Over lunch, we get a chance to talk more about his recent time as a politician. He says he hasn't thought much about it in recent weeks and that he is making „a conscious effort" not to

follow the news from home, although he admits it is difficult to remain detached. He says our visit has reminded him of that time and that today is the day he has thought about it the most. „You have to metabolize everything you have created and realize that some of the things that happen are no longer your problem," he says of his double sorrow: his experience as Secretary and the application of the Spanish Constitution's article 155, which took control of Catalonia's autonomy.



Arcadi Navarro at the Royal Botanic Garden Edinburgh, where he usually goes for a walk with his family at the weekend.

The responsibility he feels on the inside is somewhat diluted in Edinburgh. „Here, I feel like part of the place, I feel strong. I feel I am part of a large scientific project that has been taking place for generations in a friendly, continuous and successful way. In Barcelona, we scientists know that we couldn't have even dreamed of what we have today and seeing it breaking up in our hands is making us suffer terribly," he opens up at the end of the day, over a glass of whisky.

The waiter at The Scotch Malt Whisky Society knows Navarro by name and shakes his hand as they greet. Last Saturday, he came here for dinner with some friends who were visiting and he'll be back again next Saturday. He was a member of the society when he was first in Edinburgh, when he first got into whisky, and he's back as a member now. He is also living in the same neighbourhood and comes across the same neighbours as 20 years ago. Despite its name, New Town is a residential suburb of elegant houses built in the 18th century to the north of Edinburgh's Old Town.

His colleague Clara Ponsatí lives an hour and a half away. She was Education Minister during the last period of Carles Puigdemont's Government and



**Arcadi Navarro in the window
of a second-hand bookshop in
his neighbourhood.**

Navarro has seen her a couple of times since being in Scotland. The Spanish courts are accusing the University of Saint Andrews Economics Professor of rebellion and misappropriation for her involvement in the unilateral independence referendum in Catalonia. In July, however, the Spanish Supreme Court judge withdrew the European arrest warrant for her extradition after the German courts refused to extradite former President Puigdemont to Spain on charges of rebellion.

Now, Ponsatí is among those most critical of the pro-independence politicians for their lack of strategy. „I share all of Clara’s statements,“ agrees Navarro. Beyond any reproaches for his former Government colleagues, Navarro also remembers that in the summer of 2015 he went on holiday with his family to the Scottish Highlands. „Back then, no one knew what was happening in Catalonia. Now, everyone knows what is happening and they say we are right,“ he says while taking stock. „At least we are present in the offices of the European Union,“ he says, consoling himself.



Part 3

A return to science and calmer waters

Arcadi Navarro has returned to research after a brief and intense period as the Secretary of Universities and Research in the Catalan Government, in a time that saw the independence referendum take center stage. A few months' sabbatical in Edinburgh provided him with some time off between his life in politics and his life in science. He returned to the latter at the beginning of this year.

Barcelona, April 2019

Research is a source of satisfaction for Arcadi Navarro, especially the study of the diversity of life and, more specifically, human life. „You come here and you feel the happiness of being able to

practice science and talk to other people who love science too,“ he says during his ninth week as a researcher at Barcelona Biomedical Research Park (PRBB). The previous three years had seen him put his scientific career on hold to join the Government of former Catalan leader Carles Puigdemont as Secretary of Universities and Research. „I'm starting to feel comfortable,“ he says in his new ecosystem, following a few months' sabbatical in Edinburgh back at the end of 2018. He went to Scotland to get reacquainted with his discipline of population genetics. But his time there was also one of transition, from a life of politics back to a life of science.

At the beginning of 2019, Navarro returned to his position as ICREA research professor in the Experimental and Health Sciences department at Pompeu Fabra University (UPF) in Barcelona, and as a researcher at the **Institute of**

Evolutionary Biology (IBE), a joint institute founded by UPF and the Spanish National Research Council (CSIC). „It was very moving in the beginning, like coming back after a long illness,“ he says of the way he was received by his former colleagues. In his absence, his research group dissolved and his office was moved from the fourth to the seventh floor.

Arcadi Navarro returned to his position as researcher and lecturer at the Institute of Evolutionary Biology in January 2019.



Navarro's previous period as a researcher was fairly prolific and his articles tended to cause ripples in the press. For instance, he was part of the team that retrieved and sequenced the complete genome of a human from 7,000 years ago. He did the same with the **DNA from the inside of a gourd** that had mistakenly been attributed to the French king Louis XVI and that of **albino gorilla Snowflake**, one of the symbols of Barcelona.

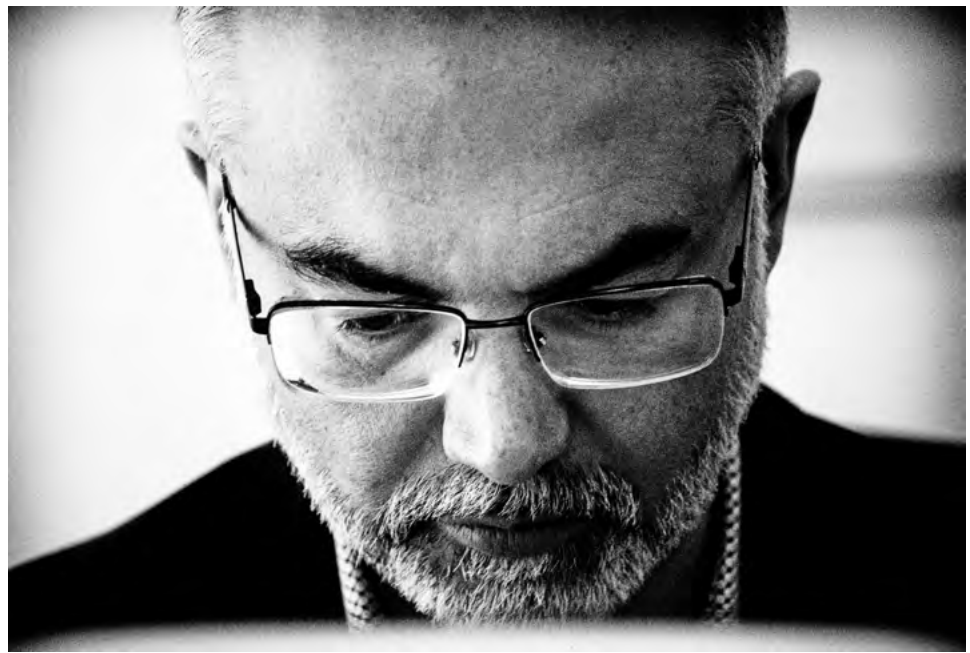


Arcadi Navarro working in his office.

One of the names that always appear in these articles is that of Tomàs Marquès-Bonet. The scientist was Navarro's first PhD student and is now, like his teacher, an ICREA research professor at UPF. A couple of years ago, he was appointed the director of IBE. „Now it's his turn to be boss," said Navarro, as he considers the return to his roots. With no research group of his own, Navarro has joined Marquès-Bonet's comparative genomics lab. And this is where he has his office.

On the shelves are books and objects that tell his story. One of the relics in his office is the Macintosh SEI30 owned by Nick Barton, an evolutionary biologist at the University of Edinburgh. The computer, he says, still works and contains some of his colleague's articles. Relaxed now, he reveals how he used the same model to do his first piece of paid work: the digitization of the Royal Spanish Academy dictionary. „I worked on the letter A," he says with a smile.

Computers are a constant in the biologist's career. On another shelf stands a circuit board from the **Barcelona Supercomputing Center – Centro Nacional de Supercomputación (BSC-CNS)** computer, MareNostrum III. Navarro was a member of the center's board of trustees when he was Secretary of Universities and Research. The super-computer can be found in what is now



Arcadi Navarro reading in his office.

a deconsecrated chapel. He visits the place every week as one of the custodians of the **European Genome-phenome Archive (EGA)**, which keeps the data of 800,000 people from all over the world. „I am more of a computational theorist," he says. „Other people take care of the experimental side."

Barcelona, city of science

More than eight million people visited Barcelona last year, according to figures from the City Council. Many tourists tend to gather the area close to the beach, with its hotels, restaurants and clubs. But there's also science in among the racket. The PRBB helps shape the coast, in a unique building with its wooden façade and an elliptical and truncated cone shape that gradually leans towards the sea. Its hollow interior means the different floors stack in a U-shape around balconies and a central courtyard. More than 1,300 people work in six biomedical research centers within the building, which is part of a complex that also features an animal facility, a hospital, and a university.

In addition to research, Navarro teaches human genomics on the **Master's course in Bioinformatics for Health Sciences at UPF**. Today is his first class, but he already knows the names of many of

his students. He tried to memorize them the day before, and if he can't remember, he asks. Seventeen young men and women sit in the first four rows of the lecture theatre while the back two are empty. He is constantly asking them questions. „Whether they learn or not depends on the relationship they have with me," he says. So far, he's managed to trigger quite a few smiles.



Arcadi Navarro teaches his first human genomics class at Pompeu Fabra University (UPF).

He talks about genetic heritage, Mendelian traits, genetic epidemiology and great scientists such as Ronald A. Fisher. He has a humanistic approach, combining both science and history. One of the anecdotes in the class, however, focuses on FC Barcelona. Navarro tells how he received a call from a **radio programme** asking whether you could clone Leo Messi. After a few hours, several media outlets were featuring his words. The scientist highlights his „favourite", which was published in digital media outlet **El Español**: „Arcadi Navarro, the pro-independence

politician who wants to clone Messi.“ The students laugh and Navarro completes the story. “This is the first bloody time in my life that my brother-in-law who doesn’t bloody care about science, but he is obsessed about [sic] football, think [sic] that I am doing something important”.

The headlines combine football, science and politics. This is because of the independence referendum held in Catalonia on 1 October 2017, when Navarro was a member of Puigdemont’s Government remains a hot topic. The subject has now rekindled people’s interest with the trial of Catalonia’s pro-independence leaders taking place in the Supreme Court. The proceedings started on 12 February and the trial has become a televised spectacle.

He tries not to follow the case too closely because he has friends and acquaintances among the accused. „I am trying not to experience this as if it were a soap opera.“ He adds that he is „angry“ because he believes it is „a terrible injustice“ due to „the absolute lack of independence and the tremendous



Arcadi Navarro in one of the corridors at UPF where he teaches.

bias of the State judiciary’s leaders.“ After his short but intense stint in politics, Navarro believes science has little to learn from that world. On the other hand, he does believe politics could learn a lot from science. „For starters, it could learn to distinguish facts from opinions. Politicians should also learn to openly change their minds when new facts emerge. Politics should show more love for the truth,“ he says, from his new position in calmer waters.



Arcadi Navarro with his mobile on one of the balconies at the Barcelona Biomedical Research Park (PRBB), where a group of researchers have lunch in the sun.

OPPOSING AS A CONGRESSMAN

Argentina

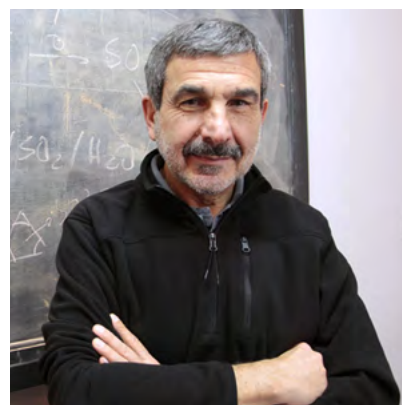
by Bruno Massare

Roberto Salvarezza, a prestigious scientist with experience in management, first in a scientific institute and later in the national administration, decides to get involved fully in politics as a congressman. The progressive reduction of funds for science and the shrinking of the scientific system because of the suspension of research programmes mean that Argentina could enter a new phase of brain drain. Many in the scientific community are organizing themselves into groups that are converging into a national front so that their voice is heard. Salvarezza's role as a congressman will channel the claims of the scientific community.



The journalist

Bruno Massare was born in Buenos Aires, where he currently resides. He is an editor at Agencia TSS (Universidad Nacional de San Martín) and a frequent contributor to *Le Monde Diplomatique* Cono Sur. He teaches at Editorial Perfil-Fundación Favoloro's Diploma of Scientific Journalism. He graduated with a degree in Journalism from Universidad J.F. Kennedy and he's doing PhD studies in Social and Human Sciences at Universidad Nacional de Quilmes at present. He is currently vice president of the Argentine Network of Scientific Journalism (RADPC).



The Scientist

Roberto Salvarezza has a PhD in Biochemistry from the University of Buenos Aires (UBA) and is a senior researcher of the National Council of Scientific and Technical Research (CONICET). In his career he has done outstanding work in the area of nanotechnology and nanoscience. Salvarezza has been a visiting professor and researcher at several European universities and has been involved in the management of national and international projects. In the 2017 national legislative elections, Salvarezza was a national congressman candidate from the Province of Buenos Aires, for the Unidad Ciudadana Electoral Front. After being elected, in December 2017, he added another string to his academic bow by assuming the role of deputy (the lower house) in the National Congress.



Part 1

From Laboratory to Congress

Biochemist, nanotechnologist, former president of the main scientific institution of Argentina and national deputy. Who is Roberto Salvarezza and how did he become the voice of science and technology in the Argentine Congress?

Roberto Salvarezza wrote his resignation letter addressed to the Presidency of the National Scientific and Technical Research Council (CONICET) – the main science and technology agency in Argentina – after the result of the 2015 elections was confirmed: the coalition Cambiemos, headed by Mauricio Macri, was taking over. „I firmly believe in this project of CONICET, which not only does science of excellence, but also works articulately with all the sectors of the State to promote the country’s technological sovereignty and

scientific autonomy. I consider that the new Government that will take office on December 10th does not guarantee the continuity of this model and I shall, therefore, leave my position as a public official,” wrote Salvarezza as a farewell.

His decision contrasted with the path chosen by Lino Barañao, head of the Ministry of Science, Technology, and Productive Innovation – whose status was recently degraded to that of a secretariat, together with other ministries such as Health and Labor – who agreed to continue in office. Salvarezza immediately returned to his position as director of the Research Institute of Theoretical and Applied Physical Chemistry (INIFTA), where he had taken a leave of absence to assume the presidency of CONICET.

For this nanotechnology expert, the move meant returning to the scientific

activity he had put on the back bench due to the demands of managing a complex institution of more than 10,000 researchers. However, that did not imply abandoning politics, but rather the opposite. After his resignation, Salvarezza joined a collective of prestigious scientists and technologists named Argentine Science and Technology (CYTA) – created to resist science underfunding – was voted in by his colleagues as a member of the CONICET board of directors, and was elected deputy for the coalition Unidad Ciudadana.

However, his destiny in politics had been set long before.

A Toy Microscope

Roberto Salvarezza was born in Lanús Oeste, in the province of Buenos Aires, on January 30, 1952. His father was an accountant who worked for an importing and trading perfume company and his mother, a teacher who never practised. He was the youngest son – he has two older sisters – of a suburban middle-class family that moved to the city of Buenos Aires when he was nine years old. „As my father changed his job, we moved to the Once neighborhood, so that he did not have to commute from Lanús to Buenos Aires by train every day. For me, it was not a positive change because I used to spend my days outside playing soccer and riding my bike, and now I lived on the 13th floor surrounded by buildings in a foreign neighborhood,” he recalls.



1954: Holidays in the seaside city of Mar de Plata with parents sisters. (Archive Roberto Salvarezza)

The new environment and the urban life changed the routine of the young Salvarezza, who began to focus more on reading and on playing with a toy microscope his mother had given him, through which he discovered the small scale of some things, like leaves and ants.

As his entrance to high school approached, one of his sisters convinced their father that it might be a good idea to send Roberto to the Colegio Nacional Buenos Aires, a high school that is a symbol of the intellectual elite in the city. He started in 1964 when he was 12 years old. „It was a difficult period, because 2 years later the 1966 coup d'état took place and the atmosphere became very oppressive. At the same time, there was a rising debate about politics and history, which interested me a lot,” he recalls.

But that toy microscope had an impact on his taste for and ease with biology and chemistry, and it joined forces with

the encouragement of a teacher who recommended that he pursue a university career related to biology research. Salvarezza stood out as a good student – despite the fact that he paradoxically failed chemistry one year – and as an athlete on the school's soccer team.

In 1970, several classmates from other shifts enrolled to start Biochemistry at the Faculty of Exact and Natural Sciences of the University of Buenos Aires. One of them was Eduardo Arzt, today a molecular biologist, external scientific member of the German Max Planck Society and director of the Biomedicine Research Institute of Buenos Aires. „Although we already knew each other, we became friends at university. We studied together and Roberto stood out because of his speed, he was very fast and always in a hurry,” Arzt says.



Eduardo Arzt.
(Photo: IBioBA/CONICET)

A few years later, Salvarezza already had a teaching position in General Inorganic Chemistry, which was, with hindsight, the beginning of his specialization in physical chemistry. His commitment to science alternated with an increasingly intense political activity within a highly politicized university. „At that time, studying and political activism in university were not mutually exclusive. In fact, for many of us they were inseparable. I approached the Juventud Peronista – the youth branch of the political party founded by Juan Domingo Perón – became a member of the Student Center and participated in many activities. After Perón died, there came a stage of persecution and violence that forced many of us to leave political activity,” recalls Salvarezza.

During those years, science won over politics mainly as a matter of survival, since in 1976 the bloodiest dictatorship had taken power in Argentina. In 1977, Salvarezza, who had recently



1969: Roberto Salvarezza in the fifth year of the Colegio Nacional Buenos Aires. (Archive Roberto Salvarezza)



2006: At INIFTA's Nanoscopy Laboratory. (Archive Roberto Salvarezza)

2017: At the door of the Congress with his wife and his youngest son, after assuming as a national deputy. (Archive Roberto Salvarezza)



graduated as a biochemist, avoided exile unlike other colleagues. In fact, he scaled down to survive: „I had to leave the University of Buenos Aires because it had become very dangerous since they started informing against those involved in political activities in the workplace. They offered me a job as a technician in a physical chemistry institute in the city of La Plata, INIFTA, and I went there,” he recalls. That safe passage would guide the course of his later career.

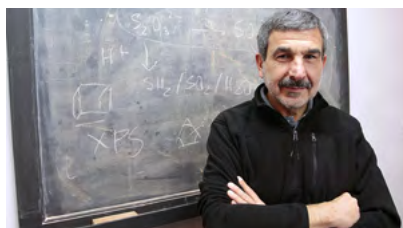
Two Exiles

At INIFTA, Salvarezza started working on a project on microbiological corrosion caused by fungi in aircraft aluminum tanks, a line of research that would become his doctoral thesis in Biochemistry in 1981. That was a year after the birth of his first child, Nicolás. The project also marked the beginning of a pattern in his work: the search for practical applications of scientific knowledge and the transfer of technology to the industry.

While the return of democracy in 1983 was a relief for a badly battered country, Salvarezza's work routine was not easy in the early 1980s. He lived in an apartment in the city of Buenos Aires and had to commute for more than two hours to get to La Plata and then back. His salary was low as a researcher – he had managed to enter the career of CONICET in 1982 – and it was barely enough for a family which had just welcomed newborn twins. The search for a chance to emigrate resulted in a scholarship for post-doctoral studies in the Department of Theoretical Condensed Matter Physics at the Autonomous University of Madrid, which was an opportunity to specialize in scanning tunneling microscopy. „I had to relearn everything. From biology I had moved to chemistry and, when I arrived in Madrid, and I had to dialogue with physicists,” he recalls. Thus, the Salvarezza family moved to Madrid, where they lived from 1988 to 1992. „I was fine, I worked in research and began teaching, but I did not have a permanent position and I always thought about coming back, even though my wife did not agree and my children had adapted fairly well. We finally returned, but I have kept very

close contact with Spanish researchers,” he states.

The return came with a promotion in his career at CONICET (where he became an independent researcher) and the possibility of carrying out the first project for scanning tunneling microscopy in Argentina. „They provided me with support to buy the equipment and I put together a group of three people at INIFTA. It was a cutting-edge research line and even today it is still very important, since it allows us to see the atoms and molecules on the surface,” he says. In 1996, Salvarezza obtained funding to buy a new scanning tunneling microscope and an atomic force microscope with which he created the Nanoscopy Laboratory at INIFTA. The group led by Salvarezza was a pioneer in Latin America, with more than 200 published works in the field.



At INIFTA.
(Archive Roberto Salvarezza)



INIFTA. (Photo: INIFTA)

By the mid-1990s, Salvarezza had moved to Ringuet, on the outskirts of La Plata, after separating from his first wife. Cementing his new relationship, in 1999 his fourth son was born. During those years, he continued the corrosion research line in gas pipelines in the province of Neuquén and in pasteurizing equipment for the dairy industry. However, in those years these activities did not reflect in the career score of a CONICET researcher. At that time, he was also elected

president of the Argentine Physical Chemistry Research Association, and in 2000 he played an active role in the defense of CONICET against what was known as the „Caputo Plan“. Driven by the Secretary of Science, Technology, and Productive Innovation of that time, Dante Caputo, it was an attempt to reform the scientific institute that implied a cut in the researchers' salaries. That fight against a reform the scientific community managed to stop would mark the beginning of his return to politics, but this time from the side of public management.

Science & Politics

In 2003, Lino Barañao, president of the National Agency for Scientific and Technological Promotion (created in 1996 to manage funding for science and technology programs), recommended Salvarezza for the coordination of chemistry project evaluations. „It was a very demanding job. I suggested calling on four international reviewers and only one from Argentina, so I started getting up at 4 a.m. to be able to speak to reviewers who were in Europe. I couldn't break that habit,” says Salvarezza.



Lino Barañao.
(Photo: Pablo Carrera Oser/Agencia TSS)

This new role ran parallel to his scientific career, as he continued to expand his research team at INIFTA. „His working group is like a cluster of smaller groups, some of which are pioneers in nanoscience and nanotechnology in Argentina. His generosity has allowed the crystallization of teams in other parts of the country,” says Félix Requejo, a physicist, specializing in nanostructured materials, who met Salvarezza in 2003 and is currently in charge of INIFTA's management.



Félix Requejo.
(Photo: CONICET)

„Roberto lets others grow, leaves his ego behind in discussions, and does not fear others overshadowing him; it probably has to do with him being a confident and brilliant researcher,“ adds Requejo. „It is a pleasure to discuss science with him and even when an experiment fails he manages to get something good out of it. Moreover, he has a compulsive attitude towards his work: he is obsessed with being productive and is extremely punctual (he always arrives 15 minutes in advance). Anxiety is his worst enemy; I am not sure if it does not make him unhappy to some extent. However, he looks younger than he is. He does not wear glasses, does sports and goes jogging. Evidently, he has been blessed with good health.“

In 2005, Salvarezza was appointed member of the advisory council of the newly created Argentine Nanotechnology Foundation (FAN). Along with information and communication technologies, and biotechnology, the government was beginning to consider nanotechnology a strategic field. „As a result of my work in public administration, and due to a growing debate about the future of science and technology in Argentina, I got involved in politics again. When you start thinking about those issues, you have to ask yourself what kind of country you want. There was always a group of people who believed that Argentina will never be competitive, that science is just a fun experiment to be carried out by the best. Some of us, however, believe that science and technology are tools to make a country competitive and less unequal. Taking part in this discussion means taking a political stance,“ he says.

Two years later, in 2007, President Cristina Fernández de Kirchner created the Ministry of Science, Technology and Productive Innovation.

President of CONICET

In 2010, Salvarezza won the role of director of INIFTA, but he would not remain in this position long: a year later, Minister Barañao asked him if he wanted to be the president of CONICET and he took office in 2012.

After having been a fellow, a technician, a researcher, and the director of an institute, this was the natural final step for him to take. „Not only did he have scientific endorsement, but he also had a political vision of science on which we agreed: the idea that it contributes to the development of the country,“ recalls Barañao. „We also agreed on the need to make the transfer of knowledge, which was not recognized, be taken into consideration in researchers’ evaluations, in addition to their publications. In this respect, our interaction was very positive,“ he adds.

„At first I hesitated, but after discussing it with my wife, I finally accepted. It wasn’t my scientific career that made me doubt since I knew I could continue with both roles: I get up very early in the morning, and there’s always time for science. However, I knew the job would be very demanding. CONICET is a very complex organism: when I left, there were 10,000 researchers and 200 institutes; I started with 180 executive units and when I left, there were 240. It demanded a lot of effort; it was a very stressful time,“ says Salvarezza, who used to devote his nights to answering questions from his students. „He looked skinnier and less healthy; every Friday he visited the lab and I would tell him to take it easy,“ recalls Requejo about those years of fatigue and stress.

During his presidency and as a result of the government’s investment in science and technology, CONICET expanded dramatically: the research staff grew by 10% per year and more than 40 new institutes were created. Moreover, Salvarezza attempted to change its operating logic by associating with the productive sector. CONICET launched calls addressed to specific issues and



As the president of the CONICET.
(Photo: CONICET)

created joint ventures, such as Y-TEC, in association with the renationalized oil company YPF. However, this goal was only partially achieved.

One of the critical comments about Salvarezza’s management that had wider repercussions was the complaint made by Andrés Carrasco, molecular biologist and former CONICET president. According to Carrasco, when he requested to be promoted, he was discriminated against due to his research on the harmful effects of glyphosate, a basic input of farming practice in Argentina. Salvarezza denies the accusation: „When I arrived at CONICET, he had requested a promotion and the committee had denied it. We got together several times and the rejection had nothing to do whatsoever with his research on agrochemicals, which continued during my administration.“

Salvarezza wanted to create state-owned companies in areas such as production of pharmaceutical drugs and plant biotechnology. „It was then that we began to clash; Barañao promoted the idea of the public-private consortiums, but with a larger influence of the private sector. Others, among whom I include myself, believed this scheme had prevented the increase of private investment in science and that State majority was needed.“

Barañao regrets the estrangement from Salvarezza, which started in 2015, before the elections, and deepened when he decided to continue in his position under the new administration. „He couldn’t stand it. He is remarkably consistent and very active politically; I am not like that. He thought that collaboration was impossible with a government like the one we now have.

But when you have a precious asset to protect, you must see beyond ideological consistency; I cannot afford that luxury," says Barañao.

Two days after his resignation from the presidency of CONICET, Salvarezza returned to his position as director of INIFTA.

The Candidate

„It wasn't hard for me to return to INIFTA because I had kept going regularly. I continued working with my group: if I had missed the boat, I wouldn't have published anymore," says Salvarezza, who has more than 340 publications in international journals and holds several patents together with his group.

A few months later, he decided to run as a candidate for CONICET's board of directors for the sector of Exact and Natural Sciences and got the majority of his colleagues' votes. „One thing is not wanting to be a member of the executive power and a very different one is not wanting to be a representative of researchers," he says.

However, the government took more than two years to make his appointment effective, in response to which Salvarezza filed a lawsuit. „It is much appreciated for someone who had a very important political responsibility as head of CONICET to step aside, stand for elections and win them. What they did, not naming him, is shameful," says molecular biologist Alberto Kornblihtt, a professor and researcher (CONICET-UBA) who is also a member of CYTA.



Alberto Kornblihtt.
(Photo: Pablo Carrera Oser/Agencia TSS)

Although justice finally ruled in his favor, the delay prevented him from joining CONICET's board of directors, since politics had opened for him a new space for action: Congress.

In May 2017, a few days before the tickets for the midterm elections were closed, Salvarezza was working at INIFTA and received a call: former president Fernández de Kirchner wanted to see him. He took a bus to Buenos Aires and went to her apartment, where she asked him if he wanted to join her on her ticket. „I told her there were more appropriate candidates, since I do not come from politics; there were people better qualified for a legislative position. I did not want her to make a mistake by choosing me, but she insisted. I went back to La Plata, discussed it with my wife, and said Yes," he recalls.

„Although he had taken part in several political activities and was sometimes asked for information about the scientific sector, he never thought he would be appointed candidate and even less that he would be second on the list," says his son Nicolás, who currently advises him on the communication of his activities as deputy. „He's concerned with people seeing the work he's doing, to show those who voted him that he is working on bills and supporting claims," he says. The electoral campaign was something new for Salvarezza: „We traveled with my car or his and had very few resources. He was completely free to choose which activities he wanted to take part in and in general was very calm. The training in public speaking and dealing with the press he had gained during his presidency of CONICET was helpful."

„He is one of the authors of a paper we have submitted for publication and he remains active, although at a slower pace," says Requejo. „If he wanted to, he could resign from Congress and return to research easily." One of the projects which Salvarezza continues to work in is related to the use of nanotechnology in the area of health and, specifically, to the use of nanoparticles for the treatment of cancerous tumors.

Arzt, his former study partner, called him to congratulate him on winning the elections: „It is good to have someone like him at Congress. His

commitment to science has been transferred to politics and it is a great thing for him to make the voice of science and technology be heard." In addition to being vice president of the Science and Technology Committee, Salvarezza participates in the committees of Health, Education, Human Rights, Energy, and Maritime Interests.

„I'm not a political animal; I do not want to pursue a political career. I feel I am taking part in a political project, like I did when I was at university. I'm in Congress because they have summoned me and I feel good about it, but science is still my thing. What I'm doing now is defending science and giving it something in return," says Salvarezza.



During a speech in the Congress.
(Archive Roberto Salvarezza)

„This ministry was Argentina's commitment to the future," laments Salvarezza, microphone in hand, on September 3rd. This took place in front of the former Ministry of Science, Technology and Productive Innovation during a mobilization of scientists in protest against its degradation to a secretariat, which was decided by the current government as an attempt at saving costs. The reasons invoked in his farewell to CONICET were confirmed explicitly. Now, from his place at Congress, he seeks to make science and technology a priority again.



Photo: Prensa Roberto Salvarezza

Part 2

A Scientist in the Political Maze

Roberto Salvarezza left the laboratory to move into the political arena. A year after taking office as national deputy, how has his entrance into Congress changed his life? A sense of his days as a representative of the science and technology sector and the struggle to resist the Government budget cuts.

“After 12 years of continuous growth and expansion (2003-2015) the science and technology system of Argentina is collapsing due to budget cuts, personnel reductions, breach of assumed commitments in research grants and international cooperation and serious restrictions imposed by the government of President Macri,” reads the open letter from 1200 scientists worldwide, including 11 Nobel Prize

winners, asking Argentina’s president and science and technology authorities “to turn around on these policies to preserve a scientific and technological system that has been a leader in Latin America and to prevent an imminent exodus of scientists.”

During his 2015 presidential campaign, President Mauricio Macri promised that, during his administration, investment in research and development would reach a 1.5% of GDP. However, by 2016, investment was reduced from 0.61% to 0.53%, according to data provided by the Network for Science and Technology Indicators (RICYT). Argentina’s crisis is not only budgetary but also symbolic: the Ministry of Science, Technology and Productive Innovation was degraded to the level of a secretariat, together with other ministries, such as Labor, Health and Culture.



Roberto Salvarezza (first from the right) in a protest against the 2019 budget. Among several legislators he is accompanied by Laura Alonso (second from the left). (Photo: Prensa Roberto Salvarezza)

“The budget cuts to financing programs and to industry-assisting institutions takes us many years back,” says bio-chemist and nanotechnologist Roberto Salvarezza, former president of the Na-

tional Scientific and Technical Research Council (CONICET), the main science institution in the country.

“At first, he was very anxious,” says his son Nicolás, one of his advisers at Congress. “He didn’t understand the logic behind legislative work, committees and bloc meetings. Sometimes, he wanted to come to the office, even when there were no scheduled activities. We worked on projects we knew would not prosper.”

Salvarezza says, “Yes, in the beginning I got very angry when I saw that our projects were not discussed. My outlet is political activism, talking to workers, supporting them in their claims.”

His colleague Laura Alonso, who was also elected national deputy for the coalition Unidad Ciudadana and was undersecretary of university policies during the previous administration, explains, “He has a successful academic career, but his political activism started at a very young age, as well. In my opinion, this is why the transition into legislative work was not very difficult for him. He is a highly capable and committed person. He does all within his reach and gives everything to the task he took on.”

Salvarezza acknowledges that politics is demanding more time than he thought it would, reducing the hours devoted to scientific activities at the Research Institute of Theoretical and Applied Physical Chemistry (INIFTA), over which he presided until he accepted an appointment as a candidate for national deputy in 2015. “Even though we have published some papers and I keep track of every research line, I have been to the laboratory less than I would have liked. It was an intense year in politics,” he says.

Below, four instances of how a scientist operates in the political arena.

First Act: A Day at Congress

Moved by an unknown impulse, Roberto Salvarezza rushes by without saying hello to the few who warily approach him and walks through a hall on the third floor of the annex building of National Congress. “He’s always like

that. He’s in a hurry and sees nobody,” says one of his advisers.

Minutes later, he comes back and warmly greets the group of State workers who came to meet the opposition deputies in search for support to their claims about the reinstatement of laid-off employees out (in INTI alone there were 250 layoffs at the beginning of the year – INTI is the National Institute of Industrial Technology, the main support institution for industry in the country) and the rejection of the adjustment stipulated in the 2019 Budget Act. In 2018, Salvarezza submitted to Congress several projects to avoid layoffs and the funding cuts in Argentina’s science and technology system, that meant that research institutes such as the INIFTA received barely 40% of the allocated budget by December of this year. However, since the ruling party refused to discuss them, none of them were successful.

“We need numbers. We need to know how much is necessary for INTI to keep functioning normally so that we can draw up an alternative proposal and preserve jobs,” he tells Marcelo Isleño, one of INTI’s delegates.



Salvarezza with other deputies from the Judicialist Party-FpV bloc and representatives from other State institutions and companies of the country’s science and technology system. (Photo: Prensa Roberto Salvarezza)

A while later, the meeting starts. Present are deputies from the Partido Justicialista-FpV bloc (to which the Unidad Ciudadana Coalition belongs), INTI’s delegate and representatives from other State institutions and companies within the country’s science and technology system, such as Nucleoeléctrica Argentina (in charge of operating the nuclear power plants), Fabricaciones Militares, the Argentine Service for Health and Agro-food Quality and Río Santiago shipyard. Their main requests

have to do with the layoffs already carried out, those that may take place if the 2019 proposed budget is approved, the incorporation of personnel in management positions with no experience in the area and the suspension of projects due to the budgetary adjustment.

Once the meeting is over, Salvarezza takes the elevator to his office with two of his advisers and they wait for the next meeting, this time with a senior manager of a State-owned high technology company. Before it begins, the national deputy warns us about the confidentiality of this meeting: if the discussion becomes known, they risk retaliation acts against the manager by his superiors. During the meeting, the newcomer says that the Government is reducing their budget, that all projects under development have been interrupted, that there are plans to privatize the company and that the Government has asked them to find new business in order to become self-sufficient and prevent layoffs.

“Is there anything scheduled for tomorrow?” Salvarezza asks his son Nicolás once the meeting is over; together they go over the agenda for the following weeks. Then it’s on to another bloc meeting with teachers, students and representatives from technical schools of the province of Buenos Aires, who report on a project to reform the curriculum of middle technical education which might remove some subjects and reduce the teaching load of others. Moreover, they complain about the underspending of the National Fund for Technical Education and its impact on a province that has 48% of the national enrolment and a poverty rate of 40%. “There are schools without the resources to fix broken equipment and we have classmates who come to school without having eaten,” says one of the students, who represent the student councils of the province of Buenos Aires.

Second Act: A Trip to INTA

At the wheel of his car, Roberto Salvarezza’s anxiety reflects not only in how fast he drives and how he protests against another driver who is slow to move when the traffic light turns green, but also in his impatience in traffic-

jams. He chats with me and his two advisers; he's on the way to give a talk at the National Institute for Agricultural and Farming Technology (INTA) in Castelar, on the outskirts of the city of Buenos Aires. Salvarezza was invited by ATE, a State employee union.



Flyer of the talk of Roberto Salvarezza at INTA.

It is only midday, but he looks tired. Two days ago, he had to travel by car for over eight hours (and as many hours back) to the city of Río Cuarto, Córdoba, where he had been invited by a group of teachers and researchers from the National University of Río Cuarto. He got up at four this morning (a habit of many years' standing) and has already done two interviews today.

With nearly 440 locations all over the country, INTA is the most widely spread institution of the Argentine science and technology sector. It is characterized by combining innovative agriculture and farming research with strong links to both large and small farmers. The budget the Government had put forward for 2019 was not enough to cover the institute's expenses, according to Héctor Espina, its national director. Moreover, INTA may be forced to close some laboratories, where 1800 researchers work. Their pressure resulted in a 400-million addition to the institute's budget; but still, it would not meet all its needs.

After getting off the highway and driving across a long dirt road, Salvarezza stops to buy snacks and a soda for the



Salvarezza is welcomed by more than 80 people, who listen to him closely. Most of them are researchers and fellows, some from CONICET, the institution he presided between 2012 and 2015. (Photo: Prensa Roberto Salvarezza)

traveling party. Once inside INTA, he is welcomed by more than 80 people, who listen to him closely. Most of them are researchers and fellows, some from CONICET, the institution he presided over between 2012 and 2015.

Salvarezza sits at a desk and doesn't use a microphone. He speaks fast and is straightforward with his ideas. He's here because of the bill he drafted to improve the wage and working conditions of a master's degree and doctorate fellows at INTA, who are at a disadvantage with regard to other employees in aspects such as income and labor rights.

A screen on the side shows a live feed of researchers who are listening online from other locations in the institute as Salvarezza explains the project, which aims to replace the current scholarship regime with a fixed-term contract that would equate the fellows' benefits to those of an employee. However, he warns his audience that it is unlikely such a project will be approved by the Budget Committee at Congress. "I will be a national deputy for two more years and I will keep promoting this issue, but the administration has already shown that it is not interested in science and technology. We, the workers in the sector, have to devise a new model and hope for a new Government to come to power in 2019," he concludes.

Third Act: The Science and Technology Committee

It's five o'clock in the afternoon, the time set for the monthly meeting of the Science, Technology and Productive Innovation Committee of the House of Deputies. This is the last one of 2018. The only parliamentarian present is Salvarezza, talking to his adviser Alejandro Ades in a corner about some of the topics that will be dealt with in the meeting. This is the committee in which Salvarezza feels more comfortable, given his career as a scientist and his position as deputy vice president. Notwithstanding his background, he was not given the opportunity to head the committee, as there is an unwritten rule in Congress: new parliamentarians are not allowed to chair committees.

Ten minutes later, Daniela Castro arrives. She is a deputy from his bloc and chairs this committee. Strange though the absence of other parliamentarians may seem, it is their standard practice not to make up a quorum when they are not interested in the agenda. If at least 11 deputies are not present within half an hour, the meeting will be dissolved.



Salvarezza talks with Daniela Castro, deputy from his bloc and president of the Science and Technology committee, while waiting for the arrival of the others parliamentarians. (Photo: Bruno Massare)

The situation is rare considering that the agenda includes various bills introduced by the ruling party and there are no seemingly controversial proposals; the budget reduction in science and technology has already been discussed and is not included in today's agenda.

It's 5:22 pm. Castro, Salvarezza and two other members of the committee – a

ruling party deputy and another from the opposition – are waiting at the table. Some guests have also arrived to make presentations, so the meeting will not be dissolved if there is no quorum after all. It will be held, but its nature will only be informative: the bills won't be released and put on calendar to be debated in a legislative session.

At 5:32 pm, the arrival of more deputies does not change Castro's mood, who in her capacity as chair of the committee states, "Half an hour has passed and we will hold this meeting as informative," but she immediately withdraws and says she had not seen that other parliamentarians had entered the room at the last minute. "I am informed we have reached the minimum number, we are 11." This retraction generates disputes among deputies from different party blocs, who mutually accuse each other of violating the rules of the procedure, as the 30 minutes had already passed, and of refusing to work and debate the bills in the committee. At last, the controversy is settled by the committee's secretary, who assures everyone that the quorum was properly reached. After that, at 5:40 pm, about ten deputies of the ruling party enter the room, already knowing that the meeting will be finally held with a quorum.

The agenda for the day does not seem to be the right fit for the tension, nor the crisis faced by the Argentine science and technology sector after the budget reduction. The requests for reports of the executive branch and the resolutions to recognize leading scientific figures are followed by debates over bills to promote astronomic tourism and to declare the province of Misiones "Province of Maker Culture" (the idea that everyone is able to build or solve a problem with technology, according to the bill) that was questioned because legislative texts cannot be written with words in another language, among other reasons. The deputy who presented it could not explain why it could not be written in Spanish.

"Nothing significant is achieved in a Congress where any proposal submitted is going to be blocked, as has happened with numerous bills aimed at preventing budget reductions or layoffs, or ensuring funds for science. The activity in the committees is dra-

matically reduced to simply discussing draft declarations of endorsement and requests of reports," says Salvarezza, resigned.



At 5:40 pm, about 10 deputies of the ruling party entered the room already knowing that the meeting will be finally held with quorum. (Photo: Bruno Massare)

Fourth Act: Political Tribune

The Instituto Patria – a kind of think tank of Kirchnerism created after the party left office towards the end of 2015 – issued a public notice on the suppression of ministries undertaken by coalition Cambiemos during 2018, giving the reason of reducing public expenditure. Therefore, former ministers Carlos Tomada (Labor), Daniel Gollan (Health) and Teresa Parodi (Culture), along with Roberto Salvarezza (Science, Technology and Productive Innovation), were summoned as speakers.

Salvarezza's case was special as he had not been minister, but only the head of CONICET. "I am a sort of undercover agent because I was not the minister, but he cannot be present," he jokes about the now degraded secretary of Science, Technology and Productive Innovation, Lino Barañao, who was the minister during the Kirchnerist administration and today works for Cambiemos.

Before a full house, Salvarezza will, as the first speaker, act as a militant. He is introduced as an example of political commitment for having resigned to his public office after the results of the elections were known. He gives a 10-minute speech, shorter than those that will follow it. At times, he speeds up and, regardless of the context, refers more to data than emotions.

His presentation begins with an overview of the creation of the Ministry of Science, Technology and Productive Innovation in 2007 on President Cristina Fernández's initiative. "A process to revive science and technology was undertaken as part of an inclusive political project for the nation, which depends largely on knowledge in order to grow. This culminated in the creation of the ministry. Its effacement, during the current administration, marks the end of a different process: the destruction of the science and technology system," he states.



Salvarezza at Instituto Patria. He's introduced as an example of political commitment for having resigned to his public office after the results of the elections were known. (Photo: Instituto Patria)

As the former head of CONICET, Salvarezza decides to review the growth achieved by that institution during the Kirchnerist period (2003-2015). "In the beginning, there were approximately 3500 researchers and the staff demographic was older. At the end of 2015, we had 10,000 researchers and a much younger staff on average. In 2003, there were 1800 fellows, and we ended with 11,000. We began with around 100 institutes and ended with over 250," he recalls.

"The administration admitted the science and technology system had been a feat of the previous Government and that is why they offered Barañao the option to continue in his position. They recognized that we had been successful." In addition, he added, "Later on, we realized that this appreciation

had been a sleight of hand, part of the cynicism that characterizes this administration.”

Salvarezza gave the example of the cuts in investment in science and technology that followed, which were included in the national budget. “When we left, the investment in science and technology represented 1.53% of the national budget. The following year, it was reduced to 1.4%, this year it is 1.22% and the next it will be around 1.1,” he warned. “Both science and technology have come to play a secondary role in public policies. They no longer constitute an input for development because we currently follow a national model centered on the primary economy and the financial sector,” he said.

Epilogue: Cancelled Act

On Tuesday 20 November, Salvarezza had been invited to give a talk at the Management Office of Research and Application of the National Atomic Energy Commission (CNEA). His presentation, called “Dismantling the scientific and technological system: Challenges posed in return to a path towards growth and expansion,” was canceled not long before the appointed time by the authorities, who also cancelled another activity in the Atomic Center of Bariloche scheduled for the same week.

“The authorities think that a deputy from the opposition should not give that kind of talk in the headquarters of the CNEA, but I believe they should also see me as the vice president of the Science and Technology Committee of the House of Deputies,” says Salvarezza.

The topics Salvarezza could not deal with include the impact of the 2019 budget, which was finally approved in Congress and which implies a cut in investment in the science and technology system. Even if the budget increases from ARS39,000 million to ARS 47,000 million for next year, it has in fact been reduced by approximately USD 800 million, as the result of inflation and the national currency devaluation.

A year after having taken office as deputy, Salvarezza considers that in Congress “the balance is negative, as the ruling party has rejected all the initiatives we have introduced to maintain the science and technological system running.”

“Do you find this discouraging?” I ask.

“I always compare situations to what we lived through during the military dictatorship and that means nothing is discouraging. This is a battle we are fighting to create the necessary conditions to enable us to win next year’s elections and retrieve investment in science and technology,” he says.

In addition, from a political point of view, he states: “My assessment is optimistic as we were able to give a voice and a sounding box to the conflicts and the requests of those who have suffered worst under budgetary reduction.” He predicts he’ll be working on two bills for 2019: the creation of an investigation office into the impact of agrochemicals and their use, and new legislation on science, technology, and innovation that would improve the current law (enacted in 2001) and ensure funds for this sector.



Salvarezza in an open forum in the square in front of the National Congress in which he spoke about the consequences of the 2019 Budget. (Photo: Prensa Roberto Salvarezza)



Photo: Hernán Reig

Part 3

The Political Mind of a Scientist

In an environment of budget cuts and loss of opportunities for scientists in Argentina, Roberto Salvarezza is trying to give voice in the Congress to the demands of the scientific community and is working on formulating proposals to revive the area of science and technology in the face of the upcoming elections. How do his passion for science and his political aims coexist?

It is noon on Monday at the Institute of Theoretical and Applied Physical Chemistry Research (INIFTA) in La Plata, capital city of the province of Buenos Aires. Roberto Salvarezza leans back in one of the well-worn chairs at the institute's Nanoscopy Laboratory, where he has worked as a researcher and leader

in the years he was not part of the public administration, such as when he presided over the National Scientific and Technical Research Council (CONICET), the main Argentine research body. "These are the same chairs we had when we created the laboratory in 1993," he says. "The chairs of Leloir[he is referring to the Argentine biochemist Luis Federico Leloir, who was awarded the Chemistry Nobel prize in 1970] were like these. He had a chair bound with wire which he wouldn't replace, to show austerity," he adds.

Inside the laboratory, we're surrounded by the artifacts that, in a way, set the course of his career as a researcher in the field of physical chemistry of materials and nanotechnology: the scanning tunneling and atomic force microscopes. They started being installed when he came back to Argentina after having spent four years in Spain, where

he had travelled to pursue his postdoctoral studies. It is the main laboratory in Argentina in that field and it provides services to other research institutions in the country.

Since he took office as deputy for the coalition Unidad Ciudadana in December 2017, Salvarezza has seldom visited INIFTA. "Although I have kept active and we have three or four papers about to be published, the number of hours I was able to devote to science was reduced. I particularly concentrated upon monitoring the topics I had already opened and on the requests for paper reviews, which are time-consuming but allow me to think of new proposals for my research group," he says.

At the beginning of December of last year, Salvarezza was the opening speaker at the annual meeting of the Argentine Biology Society, which took

place at the Institute of Biology and Experimental Medicine (IBYME), a research centre of CONICET in the city of Buenos Aires. There, he made a presentation on the implementation in nanomedicine of the molecular assemblies on which he has been working since 2010. These materials of nanometric scale (one nanometer is equal to a 10-millionth part of a centimeter) can be used in photothermal therapies in which they are brought to an excited state, triggering the release of a drug in a tumor. They can also be used in different types of sensors, including detectors of poisonous gases and even disease diagnostic techniques.



“Although I have kept active and we have three or four papers about to be published, the number of hours I was able to devote to science was reduced,” says Salvarezza. (Photo: Hernán Reig)

“We have been working in a glyphosate sensor – a broad-spectrum herbicide widely used in Argentina and qualified by the World Health Organization (WHO) as **‘probably carcinogenic’** – and the problem we have is that it is a very small molecule, making it difficult to detect. To do it, a chromatographer is required and in Argentina there is only one at the National Institute of Agricultural Technology (INTA). That is why all the samples used to carry out studies end there. We want to build a portable sensor so as to take samples and carry out the analysis in situ. The system would work with an antibody attached to a nanoparticle, but we have not yet found a good antibody to react to glyphosate. We depend on the work of immunologists,” he says.

Here is where the job of the scientist merges with that of the politician. Salvarezza was the center of a controversy during his presidency at CONICET, when researcher Andrés Carrasco ac-

cused him of preventing Carrasco from being promoted due to his research on glyphosate – which Salvarezza firmly denies, as we related in the first part of this story. Last March, he presented a bill to create an observatory of agrochemicals in Congress.

“It is a bill which I believe can have wide support in Congress, even by the ruling party, because it implies finding information and monitoring the use of agrochemicals in general, not only of glyphosate, and it would make universities and research centers able to contribute all they have been producing on this topic that causes much concern in Argentina. It has nothing to do with what happened with Carrasco, who politicized a complaint which he shouldn’t have made to me. Nobody is going to be able to find any statement on my part in support of the use of glyphosate or fumigations,” he says. This was not the case with president Mauricio Macri, **who has recently spoken** against a court decision made in the province of Entre Ríos establishing an exclusion zone around rural schools of 1000 meters for herbicides terrestrial spraying and 3000 meters for aerial spraying.



The INIFTA is a small gray building in the city of La Plata where about 240 people work. (Photo: Hernán Reig)

Wandering Science

At INIFTA, a grey building from the seventies where around 240 people work, budget cuts made in the area of science and technology in Argentina have had an impact even in its cleanliness. “Today, only common areas, such as stairs, corridors, and bathrooms, are cleaned. The 5000 square meters of laboratories are currently cleaned by the researchers themselves. I wash the dishes at home and I think that’s fine, but a researcher is paid to do

research,” he complains. The current budget of the institute – which depends on both the National University of La Plata and CONICET – is one third of that of 2017 in nominal terms. Last year alone, inflation in Argentina was of 47.6%, the highest figure of the last 27 years.

“There is discouragement among researchers as wages are devalued. Doctoral fellows earn wages that are close to the poverty line and, in the face of the 1800 new doctors we are going to have this year, the number of positions that are opened to become a CONICET researcher are only 450. Add to this the crisis of the science and the university sectors, which don’t have the capacity to absorb them, in addition to those who were left out of last year’s call, there is no other option but to leave the country or find a different job,” he says.

A few days later, on April 5th, the results of the **last call to become CONICET researcher** were made known. For the 450 positions, 2595 doctors had applied. The result means that only 17% of the graduate and postgraduate scientists – whose training was funded by the Government and, thus, represent a loss of a human resource in which it has invested for years – were given a position. This happens in the midst of an economic crisis which means the private sector is not growing enough to absorb them, something that in Argentina does not even happen in times of economic bonanza.

“This isn’t a crisis, it’s a policy. This Administration believes that the State is inefficient and needs to be smaller. As a result, investment in science and education falls. It’s not just an economic circumstance, but a planned decrease,” says Salvarezza. CONICET’s budget for 2019 is 17,000 million pesos (about 400 million US dollars), which represents a setback to levels that resemble the situation of 2011. However, there is an aggravating factor: this year 95% is allocated to salaries and scholarships, resulting in a drastic reduction of money for other expenses.

Since 2016, CONICET’s research staff has grown at an annual rate of 2.5% to 4%, regardless of the 10% forecast in the Innovative Argentina 2020 plan. “They tell us they want to be modern, but some of the countries this admi-

nistration looks up to have four times the number of researchers we do. In Argentina, there are three researchers for every thousand economically active people, while Spain has six; Australia, nine; and Israel, twelve. We should be growing a lot more,” he says.



Salvarezza in front of the INIFTA, where they face serious budgetary problems like the rest of the Argentine scientific system. (Photo: Hernán Reig)

In the rest of the science and technology system, the cuts translated into restructuring processes and layoffs – as happened at the National Institute of Industrial Technology (INTI) and INTA – or the cancellation of programs – as was the case of the National Atomic Energy Commission (CNEA) and the National Space Activities Commission (CONAE). Salary loss, as a result of the inflation rate outstripping wage increases, was another variable for budget reduction from 2016 onwards. For this year, the budget for the National Agency for Scientific and Technological Promotion (ANPCyT), the main – and virtually only – source of funding for research projects was cut by 52%.

The collapse of the science sector is also symbolic: in 2018, the Ministry of Science, Technology and Productive Innovation was degraded to the level of a secretariat, as was the case with the former ministries of Labor, Health, and Culture. Since then, the now secretary of Science, Technology and Productive Innovation, Lino Barañao, has been reporting to the minister of Education.

“Today, our interlocutor is someone who isn’t part of our community, someone who has to deal with issues that go from schools’ infrastructure to scientists’ requests,” says Salvarezza. And he adds: “The administration

had to rent an old European satellite so as not to lose the orbital position that should have been occupied by ARSAT-3, which wasn’t built due to budget cuts. We are on the verge of a brain drain while the administration favors a model based on primary commodities, agriculture, oil, and mining. Their model of a country doesn’t need scientific knowledge.”

The Scientist, the Politician

“It is my second year as a national deputy, so I’m still more a scientist than a politician,” Salvarezza tells a group of researchers from the Argentine Society of Clinical Investigation (SAIC) during a meeting the institution organized to hear his proposals for science and technology in view of the upcoming elections. Salvarezza is the first political party representative with whom the more than 800 members of this society are planning to meet. “It is a matter of years. I am more adapted to the scientific world. I am a scientist in politics, not a purebred politician,” as he said later on.

During his presentation, Salvarezza puts forward some of the projects on which he is working for 2020: recovering the ministerial state for the Secretariat of Science, Technology and Productive Innovation; increasing investment for science in the national budget; raising researchers’ wages; starting to increase the number of positions available for CONICET’s research career to prevent the exodus of young scientists; developing a plan to federalize the science system; and securing, by law, funding for the science sector.



Salvarezza was the opening speaker at the Annual Conference of the Argentine Society of Biology that took place in the Institute of Biology and Experimental Medicine (IBYME). He spoke about the applications in nanomedicine of the molecular assemblies on which he has been working since 2010. (Photo: Sociedad Argentina de Biología)

Several of these proposals are condensed in the bill for science and technology which the deputy is drafting. Its basic principles are that the State should resort to the science and technology system as its first strategic advisor, that funds for science should be guaranteed in the long-term, and that the work of the sector should be designed in accordance with all national development plans.

“The lack of joint planning with other ministries and the isolation of the science and technology sector was a flaw of the Administration I was part of. The country has to set its priorities, and science must contribute to their implementation, without neglecting the system as a whole, since we never know what the country will need in the future,” says Salvarezza, who is also working with opposition politicians to reach consensus on a consolidated proposal for the science and technology sector with the upcoming elections in mind.

“I will be where they ask me to be,” says Salvarezza when asked whether he sees himself as a candidate for the Ministry of Science for an opposition front. “I believe I have to be useful for the political project I belong to, since I am part of a collective. If not, I will continue as a deputy [his term of office ends December 2021]. I don’t have a personal ambition. I do believe that science must be reinstated as a ministry, and the sector should be led by someone who understands it, someone with specific expertise in the science sector,” he adds.

“How has my life changed since my launch into politics?” Salvarezza repeats the question and sits back once more on the well-worn chair next to the microscopes. “I always liked new challenges. This is why I accepted CONICET’s presidency and then being appointed a candidate for national deputy. I feel renewed with every project. Moreover, it’s time to leave INIFTA to the younger generations. At the same time, I feel I’m doing things I should have done in the seventies, but halted due to political persecution. It is a way to resume my commitment to society, which wasn’t a priority during the development of my scientific career. During this period, I have developed a more comprehensive approach to



On March 28th, during a protest mobilization against the dismissals and budget cuts in the National Institute of Agriculture Technology (INTA). On the flyer is written: „There are not too many workers, there are too few public policies.“ (Photo: Prensa Roberto Salvarezza)

science, less corporatist. My vision of the country as a whole, taking into account areas such as health, education, energy, and human rights, is now stronger. I have learnt what to discuss, what the country needs. Before, I had a more reduced vision of the State; broadening it has made me a better person. I arrived in Congress with the goal of representing the science and technology area under a political project. I cannot think of one without the other. When I leave, I will be able to tell if I have succeeded.”

MENTORING FOR EVIDENCE

Canada

by Lesley Evans Ogden

A strong role for science in policy-making was an explicit promise of the new Canadian government under Prime Minister Justin Trudeau. Now, to ensure government makes good on that promise, Canadian scientists are stepping up to hold the Trudeau government's feet to the fire. Biologist Wendy Palen and the organization Evidence for Democracy (E4D) are two of the players taking on that role. The story will drill into Palen's role as a mentor and role model for young scientists and colleagues in Canada as well as in the United States where federal scientists are today facing similar restrictions as Canadian scientists experienced years before.



The journalist

Lesley Evans Ogden is a freelance science journalist based near Vancouver, British Columbia, Canada. She reports mainly on ecology, conservation biology, quirky animal behaviour and environmental health, but also explores the intersection of science, human rights, policy, and the challenges of freelancing. She leapt from scientist to science journalist after an MSc, PhD, and postdoctoral research in bird ecology. Lesley later completed Science Communications and Investigative Journalism programmes at the Banff Centre in Alberta, Canada, and continues to avidly pursue professional development opportunities. Her clients include Natural History, BioScience, BBC, New Scientist, Scientific American, Mosaic, Storyboard, Science, Nature, CBC, Undark, Science News and others.



The Scientist

Wendy Palen is a freshwater ecologist at Simon Fraser University in Vancouver, British Columbia. She is Chair of the Board of Directors for Evidence for Democracy (E4D). This non-profit organisation is non-partisan, focusing on evidence-based decision-making without supporting any one political party. Palen is also Assistant Director of the Liber Ero Fellowship Program, a post-doctoral fellowship that supports early-career scientists in tackling Canadian conservation problems. A key goal of the program is training scholars to more effectively communicate their research applications beyond the ivory tower – to the wider world.



Photo: Lesley Evans Ogden

Part 1

Evolution of a Politically Engaged Scientist

Wendy Palen combines being a passionate biologist with fighting for evidence in policy making. Her decision to engage in the policy sphere was motivated in part by a recent political situation – when scientists were muzzled by government.

On a high rocky bluff as the evening light wanes, I arrive sweaty and panting from a 10-mile climb. Despite her heavier pack filled with camp gear plus electronic weigh scales and tools, my smiling hiking companion, Wendy Palen, has barely broken a sweat. I calm my laboured breathing as she points into the distance towards the far side of a turquoise lake half darkened with shadows. “Our campsite is just over there,” she says before her gaze shifts to the left. There, a distant black fuzzy blob moves slowly beside the water.

“Hello bear,” calls Palen nonchalantly, in a singsong voice, as if chatting to a friendly neighbour.

It’s September 2016, and Palen, an ecologist at Simon Fraser University in Vancouver, British Columbia, has invited me along on an amphibian research expedition in the Seven Lakes Basin of Washington’s Olympic National Park.

Palen is totally at ease in this remote natural habitat. Here, for the nearly two decades since graduate work during her doctorate at the University of Washington, she has monitored the impacts of a duo of environmental predicaments. This cluster of small ponds and wetlands is home to the Cascades frog (*Rana cascadae*), found only in islands of high elevation habitat in the United States, from northern California to northern Washington.

On the trail near the campsite, after setting up our temporary camp, Palen explains the back country toileting procedures: poop in the outhouse, but pee on the trail. Outhouse tanks of solid waste are flown out by helicopter, she explains, adding that when peeing, I should watch out for mountain goats. These formidable horned invaders – introduced to Olympic National Park for the benefit of recreational hunters in the 1920s – are known to pursue and pester peeing hikers to lick salts from their urine, a hircine habit that hasn’t always ended well for human visitors.

As for the twin troubles facing the high elevation hoppers that Palen studies here, the first is invasive frog-hungry fish. Rainbow trout were introduced to these remote lakes for the benefit of recreational fishing, first backpacked in, later carpet bombed into mountain lakes by repurposed military aircraft

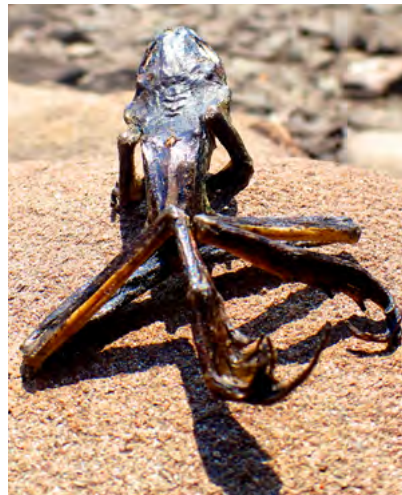


Palen beside one of the small lakes in the Seven Lakes Basin of Olympic National Park where she has monitored Cascades frogs (*Rana cascadae*) since 2000. Palen and research assistant Robin Munshaw weigh, measure, insert tracking tags, and release frogs so they can monitor their populations. (Photos: Lesley Evans Ogden)

Palen's temporary frog research hub – a back country campsite in the Seven Lakes Basin in Olympic National Park, Washington State, USA. (Photo: Lesley Evans Ogden)



as far back as the 1940s. Fish are not naturally found in these mountain-top wetlands. So, when trout arrived, they feasted on everything they could find. Cascades frogs and their tadpoles got hammered. Since fish have moved in, it's only the smaller shallower, often ephemeral wetlands that can support these cold-adapted frogs. But the double whammy comes because now, small pond refugia are themselves being squeezed. Climate change is desiccating or shortening the wet season for these smaller waters, leaving frogs high and dry. In the exceptionally dry summer of 2015, Palen's then graduate student Amanda Kissel discovered some frogs completely dried out – parched to crunchy dead shells.



The dry summer of 2015 was deadly for some Cascades frogs in the Seven Lakes Basin, where their wet habitat became parched. (Photo: Amanda Kissel)

The search for solutions

But Palen is not just studying problems. In every project she takes on, she is doggedly searching for solutions. In this case, to provide park managers with options for tackling amphibian declines, Palen and collaborators are combining their hard-won frog population data with climate projections to model which lakes are the most cost-effective priority areas for fish removal. In quiet moments between days of frog catching, tagging, measuring, and monitoring Palen sometimes dips her own fly fishing rod into these waters, pulling out a few trout of her own. She muses to me that it would be fun to tie a fly with mountain goat hair – using one invasive species to snare another.



Palen fly-fishing in the Seven Lakes Basin where she studies frog populations. (Photo: Robin Munshaw)

This amphibian conundrum – the squeezing of Cascades frogs in an ecological vice – is one of many wicked problems that Palen takes on by means of strategic, systems thinking. Following postdoctoral research at University of California-Berkeley, Palen took up a professorship at Simon Fraser University (SFU) in Burnaby, near the city of Vancouver, in 2007. In collaboration with three other SFU faculty, Palen co-founded the Earth to Ocean research group in 2010. Within that multi-scientist group, Palen has been part of a collaborative effort to help students “communicate their science in ways that I don't see at a lot of in other PhD level programs,” says Kissel, who now works for Conservation Science Partners, a US-based non-profit scientific collective.

Palen's quest to encourage communication and collaboration – to make research matter in the wider world – goes far beyond her academic home turf. Atop Burnaby mountain, where the utilitarian concrete of the 60s-built Simon Fraser university contrasts starkly with the stunning background of Vancouver's north shore mountains, an aboriginal frog design hangs framed on Palen office wall. Here, she runs a laboratory of graduate students and postdoctoral fellows, teaches and provides work experience for undergraduates, and heads multiple research collaborations. But her sphere of influence extends well beyond this academic realm. Palen is deeply engaged in communicating science – not only hers, but that of others – strategically nudging at policy pivot points outside the ivory tower.

Pushing for evidence-based policy in Canadian government

In Canada and the US, Palen “has her finger in almost every pot that has anything to do with science and policy,” says Katie Gibbs, Executive Director of Evidence for Democracy (E4D), a not-for-profit organization that took root in the era when Canada’s government, under Prime Minister Stephen Harper, was muzzling federal scientists. In what many scientists now reflect on as a dark time in Canadian history for science and democracy, the Harper government became infamous for requiring high level approval for scientists to deliver “approved lines” to media while flanked by bureaucratic babysitters, sometimes stalling media access to government scientists until news windows had passed, or outright forbidding scientists to speak to journalists about their work. The cases later investigated and confirmed by Canada’s federal Information Commissioner, were numerous. In 2011, for example, top bureaucrats silenced government fisheries scientist Kristi Miller (now Miller-Saunders) from speaking about her work as her salmon virus research was published in *Science*, a muzzling story broken by Canadian science journalist Margaret Munro.

“The muzzling of federal scientists was an issue I took real notice of,” says Palen. Others did too. On July 10, 2012, Canadian scientists protested en masse with a rally. “Death of Evidence,” a mock funeral in the nation’s capital, was co-led by Gibbs, then a University of Ottawa doctoral student studying endangered species legislation. Satellite marches were held across the country. Alarmed by muzzled federal scientists alongside funding cuts and closure of scientific libraries, the wave of protest thrust Canadian science into the spotlight as never before. Palen was in the field studying frog survival during that summer of scientific discontent, but she followed the news closely from afar. At that time, she says, “a sense of responsibility took hold for me.”

With momentum from the nation-wide protest, Gibbs, who defines herself as a “recovering scientist” in her LinkedIn tagline, co-founded Evidence for Democracy (E4D). E4D is a non-profit, non-partisan organization advocating for evidence-based policy-making, and holding politicians to account for doing

so. In the run-up to Canada’s federal election of October 2015, “The role of science and science integrity issues was a top tier part of the political platforms of the Liberals and NDP [New Democratic] parties in a way that I think no one really anticipated, and Evidence for Democracy worked really hard to have that happen,” says Palen.

“One of the lessons learned from that muzzling time was that academic colleagues had a real opportunity to speak up for their [silenced] counterparts in government agencies – to be that more independent voice calling attention to what was going on and the way that science was being manipulated,” says Palen. Evidence for Democracy, she explains, was a natural outgrowth of that sentiment, and has been a catalyst for big changes in Canada’s public conversation. In the 2015 federal election, Canada brought in a new Liberal government under Prime Minister Justin Trudeau, ousting incumbent Conservative leader Stephen Harper. An explicit promise of the new government was a strong role for science in policy-making. Now, in tallying a score sheet on those scientific election promises, Evidence for Democracy is holding the Trudeau government’s feet to the fire. It engages in regional science integrity issues as well. Eager to participate, when an opportunity arose to join Evidence for Democracy as Chair of its Board of Directors in November 2015, Palen jumped at it. The Board plays a key role in E4D’s strategic decision-making. “That’s really where Wendy plays into it,” Gibbs says.

A report card for Canada’s new government

How has science integrity fared under Canada’s new Trudeau government? Elected on a platform of making science, and open communication for scientists, a priority, results have been mixed, reported Gibbs, Palen and five colleagues, speaking at a session on US and Canadian science integrity at the North American Congress of Conservation Biology (NACCB) held in Toronto, Ontario in July 2018.* There, Gibbs, the session’s opening speaker, outlined that under Trudeau “there absolutely has been a lot of progress... but there is still work to do.”

Gibbs, speaking for E4D, voiced concern over recent government funding cuts to climate and ozone monitoring research and noted that in a survey of Canadian government scientists conducted a year ago, over half still felt unable to speak freely. Nevertheless, explains Gibbs, when a similar survey of government scientists was conducted under the Harper government, that number was 90%, hinting at progress. Shortly after the conference, a new set of scientific integrity guidelines was introduced in a model policy for Canada’s federal departments. How that policy translates into practice remains to be seen. E4D had earlier collaborated with the Professional Institute of the Public Service of Canada (PIPSC), the union representing most scientists in government labs, in a campaign that successfully saw science integrity elements enshrined in worker collective agreements.

Palen, speaking at the NACCB session, introduced herself as “an academic scientist, but I try to keep one or more feet planted firmly outside the walls of academia, working on conservation science policy issues,” she said, highlighting that advocacy for science ought not to be “a four letter word.” Science advocacy “is a social and public responsibility for many of us that are funded by public dollars,” she said. Reflecting on the recent history of Canadian politics, covering what she termed the “low lights” of the Harper era – government science job losses, research library closures, erosion of environmental policies affecting environmental assessments, fisheries, and species at risk – Palen struck a hopeful note too. Restoring and improving federal environment legislation under today’s more supportive government may be “a once in a generation opportunity for Canada,” she said.

But lest scientists think that a governmental shift lets them off the hook for continued pressure on advocating on a role for science at the policy table, in her conference abstract, Palen did not mince words:

Three years after the election of a center-left Liberal government, Canada remains at a crossroads, as campaign promises have run up against powerful industries, and commitments to reduce carbon emissions, protect biodiversity, and reform environmental assessment

practices languish. However, commitments to restore scientific integrity and increase transparency are progressing, and these offer hope for meaningful reform through improved public debate, even where governmental leadership is lacking.

From the stage, in Palen's confident yet slightly enigmatic manner – friendly yet assertive, hopeful yet concerned – she voiced a report card on how well the Trudeau government has done on meeting its scientific promises. While celebrating some hopeful progress – appointment of a Chief Science Advisor, modest improvements in integrity protections for government scientists, marginal improvements to environmental legislation – she has major concerns too. When it comes to meeting its international climate change commitments under the Paris Agreement, Canada, Palen points out, is “not even close to meeting any sort of target that's even the least ambitious target that we have,” she says. Palen highlights that extraction of Alberta's oil sands are a significant contributor to Canada's emissions overshoot, and notes that the possibility of a climate change agreement between Canadian provinces now looks bleak. Oil sands and pipelines – a political hot potato in Canada – are another of Palen's pet projects of policy and personal engagement. On Burnaby Mountain, the site of rallies against expansion of the existing Kinder Morgan Alberta-to-British Columbia pipeline, Palen has been known to show up on the protest line.

“The mobilization of the scientific community has to happen as much or more now, with a supportive government, than it does when it's under attack,” urges Palen. When it comes to standing up for science, she cautions, “the race is long and apparently never ends.”

Mentoring a new generation of politically engaged scientists

Early in her research career, Palen cut her teeth on controversy. Her early graduate research challenged the work of more senior and mainly male colleagues on the idea that ultraviolet light was a major contributor to global amphibian declines (her studies showed it

was not). Palen also engaged with the State of California when her collaborative research revealed that altered flow imposed by dams was a key driver of declines for the California-listed Foothill yellow-legged frog. But scaling up from single-species issues to bigger problems – things she describes as “the Godzilla issues of our time,” – says Palen, “requires a really different approach to how we think about science, and how we think about scientists.”

After the election of President Trump, as it became clear that federal scientists in the United States were facing issues of government muzzling, manipulation, and funding cuts, Palen penned an op-ed in the New York Times. There she told her US colleagues not to feel disempowered, and not to disengage. “Things can get better,” she told US scientists. And “as a scientist, there are things you can do to help.”

Palen has increasingly taken on a role not only as a voice for her science, but as a voice for science in the policy realm in general. Palen is “a really big mentor to a lot of young conservation scientists who are very involved in political policy work, particularly through the Liber Ero program,” Gibbs says. Palen, she says, has had a role, beyond just E4D, in shaping the whole ecosystem of scientists – particularly conservation scientists – engaging in the policy process.

Palen is Assistant Director of the Liber Ero Fellowship Program, a privately funded post-doctoral fellowship that supports early-career scientists tackling Canadian conservation problems. Palen was a key founder of the program, along with fellow SFU faculty Jon Moore, Nick Dulvy and University of British Columbia evolutionary biologist Sally Otto. The program, modeled after the US-based Smith Fellowship Program, trains a cadre of eight scientists at a time – in staggered four-per-two year cohorts. Fellows conduct conservation and management-related research, with targeted communications and leadership training opportunities for the group given by assistant director Palen and director Otto twice annually.

Speaking to me in a conference side room on a hot, humid Toronto day, Palen munches on lunch from a vegan take-out restaurant across the street

from the Westin Harbour Castle hotel. Apologizing for sniffing – she has a cold that later turns out to be pneumonia – she explains that a key goal of the Liber Ero program is training scholars to more effectively communicate their research applications to the wider world. Palen, as one of the mentors and facilitators at the twice-annual program retreats, sees her role with the fellows as “planting seeds.”

Liber Ero fellow Aerin Jacob, a scientist with the Yellowstone to Yukon Conservation Initiative, recalls being a little in awe when she first saw Palen present at a conference in 2014. Struck by this young, dynamic female speaker, Jacob admits she was “a nervous fan girl” lurking in the back of the room. Since then, Palen has become a trusted mentor. In October every second year, Liber Ero fellows meet in Ottawa where the aim is to snag coveted meetings with Members of Parliament or their staff. During her fellowship, Jacob was working on ocean acidification and climate change, and it was suggested that she arrange a meeting with the federal all-party climate change caucus. “I was pretty intimidated to go and do that,” says Jacob, but Palen offered to go with her. “It made such a big difference,” says Jacob, “because I knew she wasn't going to dominate the meeting... yet I knew if I was stumbling she would pick up on that, and be able to support in a way that wasn't going to upstage me – wasn't going to make me look like I didn't know what I was talking about,” says Jacob. As an early career researcher, Jacob says, it's super important to know that somebody has your back.

Aerin Jacob (left) and Wendy Palen (right) at a Liber Ero Fellows retreat in Déljine, Northwest Territories. (Photo: Sheila Colla)



Jacob was lead author on a November 2016 Young Scientists Open Letter to Prime Minister Justin Trudeau, copying six other federal Cabinet Ministers, concerning the scientific rigour of environmental assessments.

“...we are concerned that current environmental assessments and regulatory decision-making processes lack scientific rigour, with significant consequences for the health and environment of all Canadians,”

... outlined Jacob and a dozen others on her organizing team. The letter was later co-signed by over a thousand others. That letter was one of Jacob's policy engagement projects during her Liber Ero fellowship, and Palen, says Jacob, was one of the key people who helped me figure out what I was going to do. Palen, she says, said yes to “everything from ‘can you read my fifteenth draft?’ to ‘can you practice an interview with me?’” Palen would role-play and “grill me” like a journalist, says Jacob.

Recalling a recent presentation at the Whyte Museum in Banff, Alberta, Canada's oil-rich province, Palen spoke in tandem with her personal and professional partner Tom Sisk, Olajos-Goslow professor of environmental science and policy at Northern Arizona University. Jacob describes Palen as a remarkable speaker not only because of what she says, but how she delivers it. On stage, Palen is “friendly and open, but you're not going to push her around,” says Jacob. Palen holds her ground, smiles, explain things, genuinely listens to other points of view and engages in a healthy debate, “but she's no shrinking violet,” says Jacob. She holds Palen up as a valuable role model – a woman in science who knows her stuff, speaks about it with enthusiasm and passion, displays genuine comfort talking to people, and can bring a whole room together.

Modest is a word that many use to describe Palen, including her doctoral student Rylee Murray. Murray came to her lab via a circuitous route. One of Palen's graduate students was on a recruiting drive for assistants, but mistakenly gave their pitch in a protein biology lab instead of the intended invertebrate zoology class. Intrigued by the opportunity, and “so tired of working with clear, colour-

less liquids,” Murray says, he started volunteering in her lab. That volunteer work evolved into a paid lab manager and field assistant position, followed by a Master's with Palen and now a PhD. “Her energy was so exciting I got wound up in it,” he recalls, adding that “there's always a fire under our feet with Wendy.”



Palen assists her graduate student Rylee Murray capture tadpoles in the fall. (Photo: Amanda Kissel)

As for how he and Palen get along, he says they haven't yet butted heads. But, says Murray, she doesn't shy away from academic arguments. Sometimes, he says, “when you're sitting there watching her and another grad student argue it out, you feel like crawling out the back of the room,” he laughs. But it's nothing personal, he adds. When people are headstrong in their ideas they may engage in academic disagreements, “which I think Wendy loves,” he says.

In a discipline where scientists have traditionally restricted their battles to those within science and not stuck their neck into the political realm, Palen is part of a new generation breaking new ground. But why engage so vigorously and enthusiastically outside of the walls of academe?

“I think scientists, supported by public money, have a responsibility to offer up perspectives, especially when we can see that the science that can support more effective decisions is either being missed, or misinterpreted,” says Palen. “That compels many of us to action.” But though Palen pluralizes her plattitudes, there are few academic scientists in Canada as politically engaged, passionate, strategic, connected, and shrewd as Palen at making sure science has a voice at the decision-making table.

But this new model of politically engaged scientist can sometimes come at

a professional price. Political activities and active media engagement, “are not necessarily looked upon kindly by some peers, regardless of career stage,” says Jacob. And yet, she adds, “it is so important to do it and we need to have models of people doing it ... so that the next generation of scientists is more willing to engage.”



Wendy Palen and Sally Otto lead the Liber Ero fellows in a brainstorming session. (Photo: Jean Polfus)

During a Liber Ero Fellows retreat in Délı̄ne, in Canada's Northwest Territories, Palen and fellows set up tables at a local school, where students and the public could talk to fellows about their research. (Photo: Sheila Colla)





Photo: Lesley Evans Ogden

Part 2

Taking Science to Policymakers: Politicians are People Too

Wendy Palen is a scientist plugged into Canadian environmental policy at local and national levels. She's also a mentor to young scientists who want their science to reach beyond the ivory tower and have a voice at a much broader level.

It's October 2nd, 2018, and Wendy Palen is back in her office at Simon Fraser University after summer conferences, teaching a conservation field course on the rugged Pacific coast, and a brief respite from work in the wilds of Alaska. Palen is back to teaching introductory ecology, mentoring grad students and postdocs and keeping tabs on the trajectories of policy issues. Pinned along the window behind her standing desk is a prayer flag for Bears Ears National

Monument. Made by an artist friend of a friend, she tells me, the flags were a fundraiser for this Utah land sacred to Native Americans. Formerly protected, and now in jeopardy, it's one of the first conservation casualties of the Trump era.

But much of the work she has flagged to focus on now is located north of the 49th parallel separating the US from Canada. Palen updates me on her many fingers in Canadian policy pies. Nationally, she's got her eyes on new legislation on environmental assessment being discussed in the Canadian Senate. Provincially she's keeping an eye on the Evidence For Democracy (E4D) campaign on Professional Reliance – the system by which professionals hired by the natural resource industry evaluate and manage public

health and environmental risks. These engagements are on top of her research and teaching duties – things enough to keep most mortals busy. Palen's level of political involvement and energy level lately has been less than she would like. After multiple rounds of antibiotics, she's still fighting a chronic infection that just won't go away. Nevertheless, Palen continues to mentor a cadre of postdoctoral fellows in her role as Assistant Director of the Liber Ero program, focused on training young Canadian conservation scientists to make their work count beyond the ivory tower.

Policy on Professional Reliance – dry but far-reaching

Professional Reliance is a pretty dry issue as policy issues go. But engaging in seemingly dry policy issues is the specialty of this aquatic ecologist. Professional Reliance is essentially about land management, something Palen is passionate about as someone well versed in how ecosystems and species suffer when land is degraded, altered, or lost. British Columbia (B.C.), the province where Palen works, is known for its rugged mountains, vast coastline, and iconic inhabitants like grizzly bears, orcas, eagles, and salmon. (Palen would like you to know it has cool amphibian life too). British Columbia has the highest biodiversity in Canada. It's also rich in natural resources like trees, coal, copper, natural gas, gold, nickel, and iron. Development and operation of industrial activities like mining, forestry, and oil and gas affect biodiversity, environmental health, and often human health too. And right now in British Columbia, when a new development is proposed or an existing one needs monitoring, the industry hires consultants to conduct assessments of their potential or ongoing impact.

As E4D cites in their press release:

The “professional reliance” model was adopted by the former B.C. government in the context of an extensive plan to reduce “red tape” by eliminating environmental and health protection laws and concurrently reducing, by over 25 percent, B.C.’s civil service professionals responsible for stewarding and policing B.C.’s natural environment.

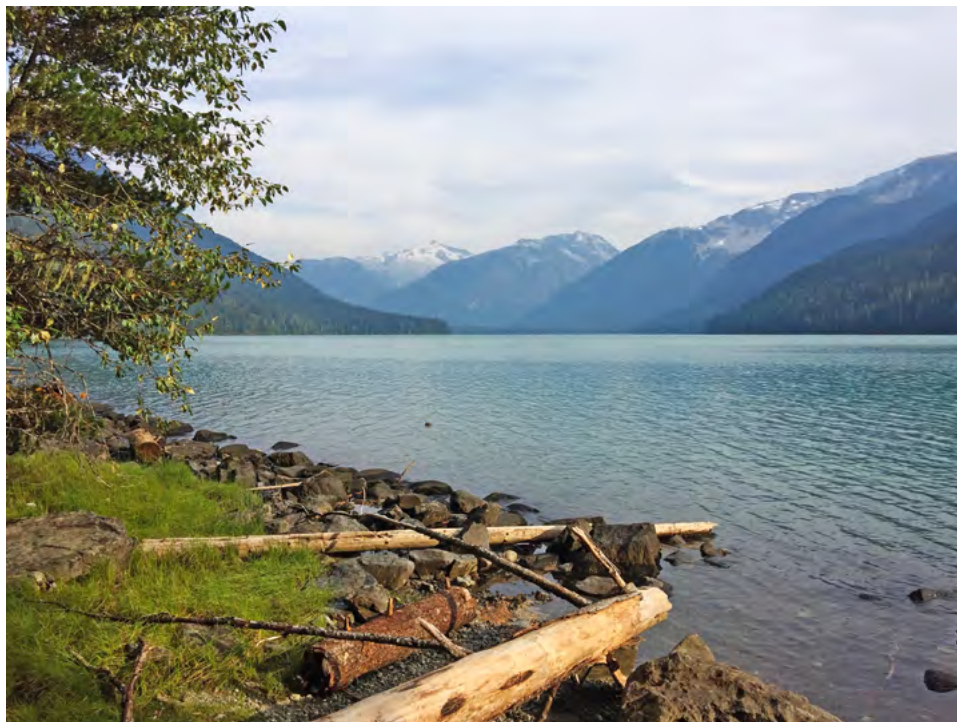
As British Columbians have seen from incidents like the Mount Polley mining disaster in Central British Columbia, where a copper and gold mine tailings pond flooded into nearby lakes and rivers in 2014, unenforced standards and compromised compliance systems can have disastrous consequences. In October 2017, British Columbia's Minister of Environment and Climate Change Strategy George Heyman announced that an independent review would investigate professional reliance in the natural resource sector, and evaluate its standards. That report was released in June 2018, and formed the centre of E4D's campaign to address inherent conflicts of interest within the system,

plus problems like lack of transparency and oversight.

As the system currently functions, explains Palen, it's ripe for abuse. Proponents – entities or organizations or corporations that are intending to develop something – hire certified environmental consultants, foresters, or geologists to write their reports or permit applications or environmental assessments. These professionals are accredited by the Province of British Columbia and sign on to a code of ethics. But they work for private consultants, outside of government, whose communications are not subject to access to information laws, Palen notes.

“It's not that any one of those individuals that are certified professional biologists or foresters, or geologists have low integrity,” Palen says. Rather, she explains, it's that they are put in a position where the power and monetary differential between them and the organizations they work for, or the companies that are applying for development

British Columbian mountains, lake, and timber, near Whistler.
(Photo: Lesley Evans Ogden)



permits, are orders of magnitude apart. Add onto this non-disclosure agreements that prevent individuals from speaking about unprofessional or unethical behaviour during contracts they worked on, and you have a very pervasive problem, Palen says.

As for whiffs of change, she is hopeful that her comments, submitted during the government's open comment period, and Evidence for Democracy's work to raise the public consciousness on this issue, might help to see standards revised. “It sounds like the government is actually making noises that they are going to change that system... with some substantial additional protections put into place,” says Palen.

One solution that stands out for her is the idea of an independent, third party review of documents, and an arm's length relationship between consultants and companies who hire them. When it comes to a consulting company evaluating – for industry – the environmental and human health impacts of things like

mines, drilling, natural gas plants, “There shouldn’t be an opportunity for that to be a two-way conversation,” says Palen.

As for creating that arm’s length relationship, “there are lots of different models for how to do that,” she says. “Canada is a little bit – a lot – behind in terms of what is best practice around the world.”

Palen is also plugged into a new project planned by E4D: fact checking of campaign messages and rhetoric in the run up to Canada’s next federal election. “In terms of caring about facts and evidence in public discourse and dialogue... an important goal for our organization right now, is to be a positive force for credible information, and maybe that means calling out information very quickly – real time – that’s being used in promotional campaigns, and social media,” she says. “Are we going to allow campaigns of fear and misinformation to lead us to these darker places that we’re seeing in other parts of the world?” she wonders. The political pendulum, suggests Palen, could swing in Canada just as it has elsewhere.

Taking science, and scientists, to policymakers

Palen is also helping the Liber Ero postdoctoral fellows she mentors prepare for a November trip to Ottawa, Canada’s national capital and the hub of political power. Preparation has taken place over months, and for some, years. Fellows have been briefed at a Liber Ero retreat in Banff, Alberta, last spring by Palen’s partner and colleague Tom Sisk, Olajos-Goslow Chair in Environmental Science and Policy at Northern Arizona University, who introduced the idea of the ‘issue attention cycle.’ It’s a conceptual model that gets fellows thinking strategically about where, when and how to engage in policy relevant to the issues they are working on. And Palen and Liber Ero Director Sally Otto have helped fellows think about their conservation focus in the context of who is talking about it.

For whatever issue fellows focus on, Palen encourages them to think:

“Does the public care about this already? Do they know it’s a problem? Or

is this an issue that everybody knows about and thinks is solved? Or is this an issue that is...at the crux right now, like plastics.” Ocean plastics are a hot topic now in Canada. “They are in an action phase,” explains Palen. Fellows are coached to better understand the landscape of their issue; how to figure out who to approach, who’s on what side, and dig into who is plugged into a network. Palen is excited by how well prepared the fellows are this year.

In terms of issues the postdocs are taking to Ottawa, they include ocean plastics, salmon, shark and bird by-catch in fisheries, polar bears, species at risk, invasive species and house cats, water quality and coastal health, indigenous community environmental change monitoring programs. “It’s a pretty inspiring bunch,” she says.

“I really enjoy helping the fellows think bigger about their issues, so it’s not just about walking in a room and saying ‘here’s what my science is, I do this, I collected this data, and I’ve come to this conclusion.’ It’s thinking about being a voice for the science at a much broader level. They don’t necessarily have to advocate for a policy position, but they can be an advocate for the state of our understanding of an issue that does have policy ramifications,” she says.



Liber Ero Fellows with Sally Otto and Wendy Palen outside the Houses of Parliament in Ottawa, Canada, November, 2018. (Photo: taken by passerby)

Scientists on Parliament Hill

For Liber Ero postdoctoral fellow Emma Hodgson, the focus for her Ottawa visit is Canada’s new, and not yet finalized, Environmental Assessment Act. Her current research concentrates on figuring out the best management of fisheries resources that have cultural,

ecological and social importance. In fisheries, “we need to understand what impacts are, and how they might affect populations, to then incorporate that into management planning,” she says. She works on whitefish in the Gwich’in settlement area of Canada’s Western Arctic. “It’s an important food fish in the region,” she explains. Hodgson works with community members to measure fish captured in their nets, using that data to understand populations, fish migration, and shifts due to climate change. A second branch of her work with Jon Moore, aquatic ecologist and Liber Ero Chair of Coastal Science and Management at Simon Fraser University, is focused on how estuary change impacts salmon populations.

“I think a lot about cumulative effects,” she says, and that’s the focus of her Ottawa brief. It’s referencing the idea that individually, any one project might not have large environmental impacts, but collectively, the picture changes. In the new impact assessment act currently being discussed in the Senate, she has suggestions for changes. “Broadly, there are inconsistent methods,” she explains.

In Ottawa, Hodgson met with Senator Rosa Galvez and staffers to talk about the need for a trigger for regional assessments. Galvez, also a scientist -- an expert in pollution control and impacts -- is a member of the “Independent Senators Group,” a new cohort of Senators unaffiliated with any one political party, created in 2016 as part of the Trudeau government’s commitment to reducing partisanship in the Senate, the Canadian government’s “Upper house” whose role includes reviewing and revising legislation

“If there are multiple projects proposed in a region, or if a region has already changed a lot and there are new projects [proposed], at what point do we need to decide we need to think about this as a whole system, rather than a project by project basis? There are no triggers for how regional impacts are currently conducted,” Hodgson says.

Palen thinks a lot about cumulative effects and their policy ramifications too. Often, “it’s not about yes or no to any one thing. It’s about what does this mean collectively when we add it all up,” referencing international climate policy or meeting other national or

international policy commitments. “If you make all those decisions as one-off decisions,” says Palen, “you often end up some place that you never intended to be.”



Palen introducing the Liber Ero Fellowship Program to civil servants in Ottawa at a networking event.
(Photo: Aerin Jacob)

Asked about what she’s learned from Palen in preparation for her Ottawa visit and policy brief, Hodgson diplomatically says it’s hard to separate what she’s learned from Palen versus Liber Ero program Director Sally Otto, since the two mentors work so closely together. But Palen has helped facilitate connections and conversations, and bringing in other experts, Hodgson explains. “One of the things I really admire is that she’s a really strong female academic, and I don’t have a lot of female academic mentors that I’ve done research with,” she says.

Hodgson also values how Palen encourages self-reflection. In thinking about goals for her own research, and its policy implications, “What excited me is, Wendy is very strategic, and it started to help me think about ways that I can be more strategic [too]” says Hodgson.

Otto, theoretical biologist at the University of British Columbia, echoes this point, articulating that fellows really value Palen for her depth of knowledge of conservation science, “but she can also suggest directions that people might not be thinking about,” she says. One of those is to not assume they’re headed for academia. “Just having an academic leader who’s not drunk the Koolaid about how fantastic being a professor is,” says Otto, is really valuable in mentoring the fellows.

Asked if she’s seen Palen frustrated about particular policy issues, Otto says

yes. Palen’s reaction to the Canadian government buying a pipeline is one example. Despite the Trudeau government’s promise to show leadership on climate action, their risky financial decision to buy the Trans Mountain pipeline for \$4.5 billion dollars has left many in the Canadian and international scientific community scratching their heads. “Once you’ve bought a pipeline you become part of the oil industry yourself, and therefore have less ability to transition away from that industry,” says Catherine Potvin, Canada Research Chair in Climate Change Mitigation and Tropical Forest at McGill University. “You want to say you’re a climate hero and you buy a pipeline?,” she adds, “Where are we? It’s confusing.” So Palen is by no means alone in her frustration over this issue. But, says Otto “I think some people just throw up their hands and walk away.” Palen, she explains, doesn’t do that. “Her reaction is, ‘we need to do more.’”

For their Ottawa trip, most Liber Ero fellows arranged meetings in pairs – for mutual support – with MPs, Senators, staffers, or public servants to present briefs related to their policy issue. The group met with Mona Nemer, Canada’s Chief Science Advisor, a position Canada’s Liberal Government introduced as part of their campaign commitment to giving science a stronger voice. Fellows also had a tour of the House of Parliament and Senate, hosted by Member of Parliament Richard Cannings, New Democratic Party Critic for Natural Resources.

Cannings, a long-time ally of the Liber Ero program, is, not coincidentally, a conservation scientist and bird biologist himself. “He always sponsors us to have passes to question period,” Palen explains, “so we get to watch adults behave like kindergarteners for an hour,” she laughs.

“He really appreciates what the fellows are trying to do,” says Palen. Cannings is also inspiring to the fellows as someone that “understands the science, deeply cares about conservation and sustainability, and got himself elected,” she says. “We have several fellows or former fellows who have inclinations in that direction. I would not be surprised in the next few years to see some of them running for office.”

Reaching Cannings in the five minutes he can spare before House duty, speaking to me by phone from the House of Commons in Ottawa on November 28th, he provides his own take on the Liber Ero visit.

“This government has increased funding for scientists, we’ve unmuzzled our federal scientists,” says Cannings, though the latter is something some Canadian journalists still dispute for departments like Parks Canada. But if more funding and less muzzling is to be effective, says Cannings, “we still have to listen to scientists.”

“We have to listen and hear what they have to say about their results, what they have found, and what that means or should mean for our policies,” he says. “Sometimes they produce data that we might not want to hear about,” he adds, referencing the recent IPCC report, and Canada’s sluggish policy action on climate change.



MP Richard Cannings, Senator Diane Griffin, and Liber Ero Fellows at the House of Commons in Ottawa.
(Photo: Sarah [Sally] Otto)

Asked about the importance of mentors like Palen to help scientists interact with policy-makers, he says, “I think it’s really important... As a scientist who has moved into politics, I used to think ‘well, if people only knew the facts, they would change their minds.’” He’s since realized that data doesn’t move people. “You need to hit people in their hearts as well as their minds,” he says. So teaching scientists to frame their messages to policymakers not just in dry data is really important. “When you are a scientist, your job is to come up with questions, do the studies, try to find the results, and report those out in a very

scientific way, but reporting them out in a meaningful way to policy-makers or the public is a very different thing,” he says.

Taking the ‘hitting people in their hearts,’ seriously with some levity on Parliament Hill, Cannings sends out a comical Tweet from the House of Commons. His photograph is of the fellows each miming the organism they study while seated in the House. Fellow Aerin Jacob, miming a caribou, (sitting next to Emma Hodgson, miming a fish), was nominated by the fellows to occupy the Prime Minister’s seat.



MP Richard Cannings Tweeted this photograph of the Liber Ero Fellows in the House of Commons, with the caption: “If all MPs were biologists and had to act like their study animals to vote.” (Photo: MP Richard Cannings)

As for the lasting impacts of their Ottawa retreat, Palen says learning for fellows comes in multiple forms. “Sometimes they can build really great relationships from these meetings, and they persist beyond our time in Ottawa. And other times they go in and have a meeting and it’s maybe not so constructive and they got dismissed really quickly. And that’s kind of interesting as well.”

One of the revelations Palen and her mentees take away from their meticulously planned trip is simple, yet critical for making science count in the political realm: “You put on the fancy clothes and go to Ottawa,” says Palen, “and realize that these people you see on TV and are quoted in the newspaper... They’re just people too.”



Photo: Lesley Evans Ogden

Part 3

Countercurrents

As an academic with a passion for seeing science and evidence as a foundation for policy-making, Wendy Palen often has to push against institutional inertia. Involvement in the policy sphere at provincial and federal levels requires a combination of strategic collaboration, scientific integrity, savvy communication skills, and dogged determination, all of which she is determined to pass along to the next generation of young scientists.

It's February 5th, 2019, and Wendy Palen is already thinking ahead to October when Canada is holding a federal election. "It is going to get really exciting in the next six months," she says. "There are so many things

happening in the run-up to the federal election that I'm really interested in." The rise of populism. Misinformation, and how much that has played into the public dialogue around politics in North America and Europe. That's something she's actively engaged in strategizing about and making plans to address as Board Chair with Evidence for Democracy (E4D), where she works with Executive Director Katie Gibbs. Gibbs co-founded the non-profit in 2012 during Prime Minister Stephen Harper's Conservative government when scientists felt that science, and evidence-based decision-making, was under threat from their federal government. Now, in the run-up to the first election after Liberal Prime Minister Justin Trudeau's 2015 win, "We're trying to figure out how we support evidence and information and knowledge transfer in a way that is honest, and real, combatting some of

the trends that we've seen elsewhere," says Palen.

The E4D plans for educating the Canadian public on how to push back against misinformation, and fact checking of political parties and pundits, are still emerging. "I don't have the answer, but we're going to be really in that space," Palen says.

Right now, the space we're in is her office. A noticeable addition to Palen's office furnishings since my last visit is a dried cane toad mariachi band she's inherited from a retiring colleague cleaning out his office. Fitting for this ardent amphibian conservation scientist, it's creative up-cycling of actual demised toads. The species is a classic example of unintended consequences. Intentionally introduced to Australia in 1935 in efforts to control a native pest infesting sugar plantations, cane

toads quite happily expanded their diet beyond the beetle larvae humans had chosen for it to eat. Now the invasive toxic toad is widespread.



Palen's gifted cane toad mariachi band.
(Photo: Lesley Evans Ogden)

Acting with insufficient evidence is something Palen actively sets out to avoid. Using pure science and decision analysis to test assumptions and answer applied questions is a through-line of her research. For example, Palen has been actively involved in informing endangered species legislation in the Province of British Columbia. Here, despite being the most biodiverse province in Canada with the country's most species at risk, there is as yet no provincial endangered species law. Palen played what she calls a minor role as part of a panel that released a set of recommendations for development of such a law, in October 2018. The team urged scientific rigour, transparency of decision-making, and an evidence-based approach to recovery. Palen also serves as "the lone academic" on the federal recovery team for the Oregon Spotted Frog. Aptly named *Rana pretiosa*, meaning 'precious frog,' it's a species getting more precious all the time. The species is in "terrible shape," Palen says. "We're trying to make the best of all bad decisions," she says, figuring out how to take limited conservation dollars and opportunity to have the best possible outcome for Canada's most endangered amphibian.

In tackling the enormous challenges of biodiversity loss, a species-by-species approach, she admits, is not ideal. In the science of conservation, problems pop up faster than a game of whack-a-mole – or perhaps more fittingly, whack a frog.

Setting priorities on policy projects

Acknowledging that the problems of conservation are ever-expanding and the scope of environmental policy to address such problems so far-reaching. How does Palen prioritize which projects are important?

"That's the hardest part," she says.

For Palen, it comes down to two things.

One is intellectual. Is there a good chance the project will have an impact? Does it have a clear target? Is the timeline right? These are the questions she considers.

The second decision criteria is "much more from the heart," says Palen. "It's who asked me to get involved. Are these people I really care about?" If they are passionate about what they do, she finds that enthusiasm infectious.

"With the kind of daunting things we work on, it's all pretty depressing. So I want to work with people that I find inspiring, and who I like to work with, who are nice people, motivated for the right reasons and generous and considerate in how they show up, in groups." Those considerations wouldn't have been her first concern straight out of grad school, she admits. Now, she has realized, "this is what you end up doing with your life," so spending that time with "real allies," people she sees eye to eye with, is important.

Do those two distinct reasons for saying yes to projects ever create an intellectual conflict?

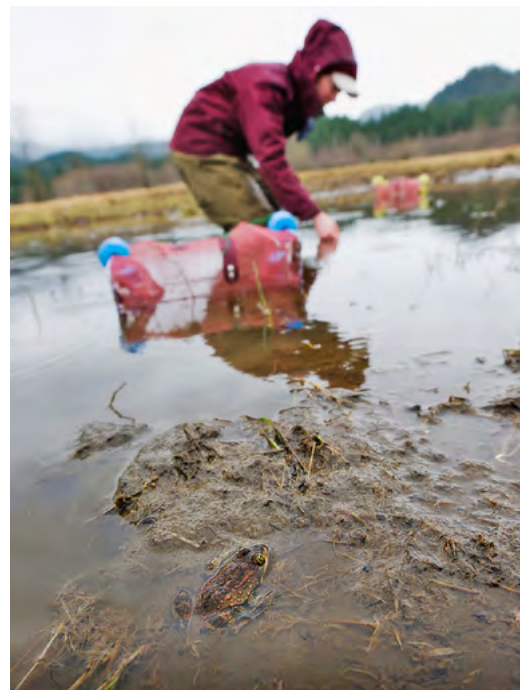
Yes, admits Palen. "Oregon spotted frogs were like that." As scientists, it's really clear that single species conservation is not the way forward. We don't have the time, energy, resources, money, to save every species one at a time. So when a colleague invited her to sit on the species recovery team, "I immediately had my intellectual sceptical hat on," says Palen. That inner voice was saying 'this is not going to be a good use of my time.'

"But she was so persuasive, and she's such a wonderful person, and I wanted to work with her," says Palen. That

passionate, persuasive colleague was Purnima Govindarajulu, conservation specialist at the British Columbia Ministry of the Environment. "When Purnima asks me to do something, it's really hard for me to say no," Palen says with a sigh-giggle.

She finds Palen persuasive too. And "super enthusiastic," says Govindarajulu. Once the two started talking, they discovered a shared passion for applying science to policy. With that, combined with similar backgrounds in amphibian conservation, says Govindarajulu "we just hit it off like a house on fire." Their convivial collaboration continues after more than a decade.

In endangered species conservation, where data needed for decision-making is often lacking, "sometimes expert opinion is the only thing we can do," Govindarajulu explains. But "given that we all come with strong biases, it's good to convert them into scientific hypotheses, and confirm or recalibrate our thinking on recovery."



Mark recapture for Oregon Spotted frogs.
(Photo: Andrew Wright)

Palen has been able to help fill some of those Oregon spotted frog knowledge gaps to better inform policy-makers about where to get the most bang for their buck. An example of this was testing assumptions around headstarting. Headstarting is a practice where wild eggs are collected and grown in captivity, then released. Headstarting is often assumed to be a cost-effective conservation strategy. But for this species, that assumption was untested. So Palen's former doctoral student Amanda Kissel, now Lead Scientist with Conservation Science Partners, studied these frogs, found in just a few wet pockets of southern British Columbia. Contrary to assumptions, they calculated that for the same investment dollars targeted at reducing extinction risk, captive breeding is twice as effective as head starting. Kissel, Palen and Govindarajulu published their cost-benefit analysis in *Ecological Economics*.

Policy work and applied conservation is "a slow process," says Govindarajulu. Involving multiple stakeholders, it's difficult to implement. As part of the recovery team, Palen and her team liaise with First Nations, government biologists, academia, land owners, Department of National Defence, local government, planners, park staff, Environment and Climate Change Canada, and zoo personnel. "Many academics really don't want to wade into that because it takes time and effort in building the relationships and working over years," says Govindarajulu.

"For a young researcher going for tenure, it might have been a lot easier [for Palen] to work on simpler projects, but she didn't shy away from taking on something that's pretty complex," says Govindarajulu. Working over years to build and foster relationships, "Wendy never shies away from that," says Govindarajulu. "For me, working within government, on implementation – the work on the ground – that's so essential. We really appreciate academics who take the time and effort to participate in these things."



Oregon spotted frog fieldwork.
(Photos: Andrew Wright)



Palen pointing out one of the frogs she and Dan Greenberg have been studying in climate change experiments.
(Photos: Lesley Evans Ogden)

Navigating the science policy bridge

Many academic scientists, "aggressively just want to 'stay pure' and not get into the messy world of politics," says Jeff Kinder. Palen, he observes, is willing to bridge that divide.

Jeff Kinder is Director of the Canadian Science Policy Centre in Ottawa, Ontario. He is one of the policy experts that Liber Ero fellows interact with during their trip to Ottawa to learn about government policy. Palen mentors postdoctoral fellows as Assistant Director of the program. Kinder was formerly a research physicist working in a government lab, but says that he realized that policy work suited him better. Each year during the Liber Ero Ottawa visit, he provides fellows with a training session he calls "How government works 101."

"The fellows are coming from the sciences and don't necessarily have a background in government," he says. He also helps fellows understand how to communicate their scientific results in a way that decision-makers can digest. "It's trying to bridge the divide between science and policy."

There's a long-standing notion in academia that scientists should do science, and leave policy up to the policy experts.

“Argh,” sighs Kinder. “Yes, I hate that.”

“It’s still a very prevalent view,” he says. “But it’s evolving.”

There’s a growing interest in science policy among academics, he explains, and a demand for it too.

“Granting councils that provide the funding for academic research are asking more and more for things like knowledge mobilization plans,” and asking how researchers are going to communicate their findings “in ways that go beyond just traditional research communications to your peers,” he says.

But for academics, navigating the science-policy bridge is not without challenges. “There are quite a few barriers,” says Kinder. One of them is a familiarity issue – knowing where to plug-in, and who to talk to. Another challenge is around communications. Compared with writing a technical article for a scientific journal, “you need a very different skill set to write a plain language summary for a two-page briefing note for a decision-maker,” he says. There is also an issue of timing. Scientists may be working on experiments or research for months or years. But there tend to be very short, specific windows to inform decision-making. “So you have to act very quickly,” he says, and “the difference in time frame can be a barrier.”

There are also geographic barriers. Canada is a huge country, and policy at the federal level is primarily done in the nation’s capital, Ottawa, Ontario. So building relationships to facilitate science-policy integration, says Kinder, “can be difficult to do when people are so widely dispersed across the country.” From Ottawa, for example, Simon Fraser University, in British Columbia, is over 3500 kilometres away.

Those challenges, says Kinder, make Palen “refreshing.”

“She’s the kind of scientist we need more of. A stellar academic scientist who produces excellent research but is also very engaged with helping to influence policy and is open to that relationship.”

He is struck by how passionate she is about helping fellows and students understand that it’s not just about what goes on in the lab or field, but that they are part of society, says Kinder, “and they can give back and contribute to where Canada is going.”

“A lot of academics,” says Kinder, “just don’t think that’s something they should be doing.”

A critical mass

All five of the principal investigators in the Earth to Ocean Group that Palen is part of at Simon Fraser University are involved in policy-related activities. These range from marine spatial planning issues to endangered species to salmon research at the science-policy boundary. Indeed, the idea of sharing support for engaging their science beyond the ivory tower is the reason Palen co-created the Earth to Ocean group. “These are all things that we care deeply about,” says Palen, and “we want to share that with our students. We want them to feel some support... and not just feel like they have to go to their discipline-specific conference and talk to the 22 other people who care about the... aromatic structure of dissolved organic carbon,” she laughs. “I was that person when I was a graduate student,” she adds.

When it comes to extending academic research to policy-related activities, Simon Fraser University Dean of Science Paul Kench acknowledges there is a tension and anxiety faced by faculty invested in that space. From his viewpoint, doing better at sending signals to faculty that such work is valued is important. He encourages faculty to document and highlight outreach and policy-related activities, but acknowledges that it’s difficult to demonstrate the value of such work quantitatively. “It’s much easier to tot up a list of publications, and impact factors and those sorts of things,” he says.

And Palen does continue to tot up a list of solid scientific publications, some pure science, some in the policy realm. Recently she’s been co-author on several collaborative works, such as papers led by Liber Ero Fellows like Laura Coristine, on **how Canada can**

better meet its commitments around designating protecting areas, and on how Canada’s globally disproportionate share of ecosystem values gives it the capacity to be a ‘conservation superpower.’

Palen also contributed to a **team paper in the UBC Law Review** on environmental assessment and the role of science in decision-making

She co-authored a **perspectives piece published in March 2019 in Science** with her doctoral student Dan Greenberg, on the global rise of chytrid infection in amphibians, and she is **co-author on work led by Amanda Kissel** on climate change impacts on Cascades frog populations in Olympic National Park, where Palen has conducted research since her graduate school days.



Palen in the frog lab with her student Dan Greenberg.
(Photo: Lesley Evans Ogden)

New beginnings

As for new beginnings, recently she has been applying for a grant to investigate a policy issue that lacks rigorous scientific testing: the death-by-a-thousand-cuts idea of cumulative effects. It’s the idea that any one development project might not have devastating environmental impacts on its own, but when the collective impact of multiple projects in the same region are not considered, serious negative impacts may be missed. Canada’s new environmental assessment legislation, the Impact Assessment Act, still under review by the federal government as part of Bill C-69, includes what Palen calls “enabling language” on cumulative effects. What this means in practice is more nebulous.

So Palen has an ambitious plan that involves a proposed research project engaging with stakeholders including British Columbia's provincial government, NGOs, and BC Hydro, among others, to better understand cumulative effects. Her ambition is to build decision support tools – for hotspot areas, like where there are multiple mines and renewable energy projects proposed or already built — in places like northwestern British Columbia's trans-boundary watersheds that span the Canada-US border.

It's easy to criticize and say we're not calculating cumulative effects well, explains Palen, but we need solutions that answer the question: if we were to improve things, how would it be done?

She had hoped to have personal input on improvements to the bill too. But, underlining that policy timelines can be tricky to adapt to, she was given only 48 hours' notice about a request to testify in front of the Senate committee considering Bill C-69, on Monday April 8th, 2019. Unable to attend because she was away in Arizona taking a recertification course for wilderness medicine, Palen is disappointed by the missed opportunity.

As for the Liber Ero program, they've recently welcomed a cohort of five new fellows, which is "always an exciting time," she effuses. Palen is excited about the conflict resolution facilitation session that will be featured at their next retreat.

Academic freedom versus flood, and breaking the traditional mould

Palen is grateful for the academic freedom that comes from her academic position, but admits that with that freedom comes a tendency to be juggling too many things.

Though Palen has her fingers in many science policy pies, her partner and professional colleague Tom Sisk notes that Palen is no pushover in terms of the kinds of policy-related activities she chooses to take on. In fact, on their first meeting, Sisk says Palen was "pretty sceptical" about joining the research group he was trying to recruit her to

join. At the time, in 2010-2011, Sisk was on sabbatical at the University of British Columbia from his position Northern Arizona University where he is the Olajos-Goslow Chair in Environmental Science and Policy. Sisk was looking for scholars based in Canada willing to help spearhead a rigorous look at the impacts of rapid expansion of Alberta's oil sands. Initially reticent, Sisk says Palen quickly went from reluctant joiner to a leader moving things forward.

While acknowledged by many of her peers as a powerhouse for getting things done with or without help, Sisk says Palen also has "a very collaborative spirit."

"She always gravitates towards inclusion and recognizing that one person can't do a whole lot on their own and that you're always better cooperating, collaborating and building relationships."

How does Palen prioritize the overwhelming number of things she takes on?

"To be totally unfiltered," says Sisk, "I think that's one place where she's not as great... She's really committed to a lot of things, and she doesn't necessarily step back and say 'What are the most important things I can do with this amount of time?'" he says. "Her tendency is to say, 'Who's the next person I can help? Or what's the next project that needs my input?'" says Sisk.

As for Palen, how well supported does she feel by her host university in terms of her science and environmental policy-related activities?

"At a macro-level, the university is very supportive," she says. That's something she knows is not always the case, casting her mind eastwards at some of her colleagues that work at universities in Alberta. "SFU does do a very good job of saying 'we are the engaged university' – creating space for difficult conversations," she says.

That engagement beyond the ivory tower, or "getting off the mountain," in this case, since Simon Fraser University is situated on Burnaby Mountain, is partly what attracted Paul Kench to the university where he began in

September 2018 as the new Dean of Science. Lured from the University of Auckland in New Zealand, Kench studies coral reef geomorphology and how climate change affects coastal processes.

Kench hasn't yet met Palen, and is unfamiliar with her work. But as to his macro level, first impressions of the university, "what sets us apart, at least in intent, is wanting to have an impact on society at all levels, including policy," he says. His work too has often involved work with community. Research that involves developing partnerships, rather than the traditional "linear information flow" of academia, he says, is extremely challenging, timing consuming, costly, and under-resourced. "Funding mechanisms that we typically have access to don't... necessarily appreciate the fact that we're trying to work with community and multi-disciplinary teams," says Kench. But federal funding agencies in Canada, he says, are slowly moving in that direction.

Though Simon Fraser University uses the tagline "The engaged university," something the Faculty of Science embraces, at least at the top, lower down the chain of bureaucracy, there is not a lot of encouragement, and not a lot of support," for policy-related activities, says Palen. Such activities are not always appreciated.

Shortly before she went up for tenure, Palen gave a talk about her work on renewable energy, mentioning what an education it was to engage with multiple stakeholders including the province's electricity provider, BC Hydro. In the question and answer session afterwards, one of her colleagues asked her "in a pretty pointed way," says Palen, "whether I thought that [public policy engagement] was part of my job description as a faculty member."

"There was a bit of a barb there," says Palen.

So one of the things she shares with the Liber Ero Fellows, in training them about the difficulties of navigating the science to policy bridge, is the value of their network – the people and colleagues and friends they can look to for support "in those moments when colleagues don't really understand what we do and why, and it hurts," says Palen.

At the micro level, within the dynamic Earth to Oceans (E2O) research group at Simon Fraser University, Palen says she feels very well supported. Co-founded by Palen and a group in which is she one of five principal investigators, the Earth to Ocean lab is a powerhouse of change-makers whose science and its impacts flow well beyond the mountain.

Right across the hall, for example, is Nick Dulvy, Co-Chair of the International Union for the Conservation of Nature Shark Specialist Group. “He works at this really global scale,” says Palen, attending CITES meeting where there are often complicated, weighty, controversial conversations going on behind the scenes between nations. “So him having that experience, and me having these experiences of working more regionally or nationally, we can compare notes, and then when we get bogged down with the micro stuff here in our department — with our colleagues who just don’t understand — we have that as a pressure release valve, and place to look for support.”



Earth to Ocean Principal Investigators, minus Palen. From left to right John Reynolds, Isabelle Côté, Jon Moore, and Nick Dulvy.
(Photo: Lesley Evans Ogden)

That’s sometimes easier said than done, given the volume of projects and policy work the group is involved in. Finding the time to fit everything in, including policy-related meetings, can be particularly hard, explains Dulvy, who has just returned from an angel shark conservation policy meeting in Tunis, Tunisia. It’s April 3rd, 2019, and I’ve come up to the university to meet with Kench, and use the opportunity to try to find Palen, who I have not managed to reach by email. That’s been a not uncommon occurrence over the past year that I’ve been following her activities. Palen is not at her office, and

Dulvy, across the hall does not know her whereabouts. As I continue my search, he says, half-seriously, half in jest, “If you figure out how to track her down, we’d all like to know.”

On a more serious note, Dulvy is acutely aware of the workplace challenge of “persuading our colleagues of the legitimacy of what we do.” In academia, he explains, there are only three things officially in the scope of work: research, teaching, and service. “Normally when people think of service they think of departmental committees and so on,” he says. “Technically there is no real scope to do this kind of work as service, so it’s only now with the change of SFU’s vision to engage in the world that suddenly these activities are rated and valued. For a long period of time, they were not. So having supportive colleagues that value that type of contribution has been really important,” he says, pointing to Palen and his other E2O colleagues.



E2O faculty (from right: John Reynolds, Wendy Palen, Jon Moore, Isabelle Côté, Nick Dulvy), and (second from left) colleague Larry Dill at a Community Leadership Award dinner.
(Photo: Nick Dulvy)

With the increasing awareness of climate change, Dulvy points to more and more academics getting engaged in policy work – internationally, and locally – and even running for political office. “People see that we’re getting consulted by MPs and other decision-makers who are seeing that it is valuable for society,” he says.

“It takes academia a long time to catch up to what is legitimate academic enterprise,” he adds.

For years, says Dulvy, “this has been the wallpaper of our lives,” referring to the fact that for academics that want to see their science do more than collect dust

on the shelves of academic libraries and be read by a handful of colleagues, “we’ve all been trying to do this stuff off the side of our desks.” Not technically paid or rewarded or supported for this work, it’s only recently they’ve reached a critical mass of acceptance. “For junior faculty like Wendy, that’s been particularly hard,” says Dulvy.

The challenges of navigating the science-policy space from the not-always-supportive environments of academia appear to be one of the drivers for Palen’s strong motivation to see the generation of scientists succeed more easily. One of Dulvy’s postdoctoral fellows, and a current Liber Ero Fellow, David Shiffman is grateful for new portals to a network of support and policy learnings, including his mentorship by Palen. No stranger to engaging with the public as a well-known blogger as well as shark expert, Shiffman first heard Palen speak at a conference. While many researchers talk about how their research might have policy or management relevance, Shiffman was struck by how Palen provides examples of the practical tools needed for science-policy engagement.

Hints from the past, challenges of the present

Wading into muddy waters, and standing her ground against a strong countercurrent, were things Palen started doing early in her career, as a graduate student. Cognizant of amphibian declines across the globe, many researchers had converged on the idea that perhaps an excess of ultraviolet light was the culprit.

Putting this hypothesis to the test, Palen studied 136 frog breeding sites in the northwestern US. She determined that in 85% of the ponds frogs were inhabiting, waters were too murky for ultraviolet light to penetrate enough to do damage. For researchers who had built careers around this line of study, this young female graduate student took them aback, says her former lab-mate Amanda Stanley. “Wendy handled this with a great deal of courage and forthrightness,” says Stanley, who is now Executive Director of COMPASS, a US-based non-profit, non-advocacy organization focused on conservation science communication.

Palen's determination and drive was one of the first impressions she made on her then lab mate, and now colleague and friend Stanley. Palen was the fourth graduate student to arrive in the lab of Daniel Schindler, then a new professor at the University of Washington, where Stanley was already working. We were all crammed around this little table, with a whiteboard, in the Lake Washington lab Schindler had taken over, with cabinets archiving a half-century of lake data, Stanley recalls. Palen came in with an immediate intensity. "So smart, and so motivated," Stanley recalls. "It was clear right from the get-go that she's super driven."

Palen apparently wasn't short of drive as a kid either. Her family, she admits, has a newspaper clipping that speaks to her youthful resourcefulness. That article is about Palen selling insects out of her locker in grade 6, "to kids who weren't as enthusiastic as I was about a semester-long insect collection assignment," she chuckles.

But that energetic drive has been challenged over the last seven months with health issues – her own but also those of her family. "It's complicated," she says. What seemed like a bad cold when I spoke to her back in July 2018 at the North American Congress for Conservation Biology in Toronto turned into seemingly pneumonia, and now, despite "specialist after specialist," says Palen, a mystery illness that is still not diagnosed. It's taken a toll on her ability to juggle all that her academic, policy-related and mentoring activities entail.

Restructuring her teaching load into an intensive short course instead of a term-long commitment, is part of her experiment in trying to get better. Still though, in terms of the illness that plagues her, there are "no real satisfying answers," she says, so it's "pretty frustrating."

The health setback has made her think a lot about the cost of all she takes on, and the risks of de-prioritizing self-care. "I've been doing a little bit of reflecting," says Palen. "Knowing how stressed I was when I got sick back in July." Ironically, the stress came in part because of trying to negotiate a more flexible work schedule. "You look back

and you say, 'this is probably a product of the way you've literally run-run-run-run-run.'"



Palen in her office, February 2019.
(Photo: Lesley Evans Ogdén)

"All of this has made me think about some of the unintended costs of what we do," she says. And it's given her an appreciation of her colleagues in the environmental non-governmental organization world, who deal with burnout in a really big way.

We have this culture of "there's so much to do." She recognizes the idea that 'we have to be better at saying no.' At the same time, says Palen, "when you work on things that are really important, 'saying no has a cost – a social cost, a cost to your students, to the next generation of scientists, to your community of colleagues, and the people you try and support with your work.' So her scaled down energy level, she admits, and recognizing she's not invincible, has been hard. "It's been a bit of a wake-up call for me," she says.

Reflections

In terms of talking to policy-makers versus talking to scientists, Palen says the evolution of her thinking has "moved from believing that more science will help solve the problem, to recognizing that science in service of communities solving their own problems is the only way forward." It's rare that there's this missing piece of science, and you

go out and do the science and then it helps solve the problem. "It almost never works that way," she says.

"Real change has to come from communities having some sense of ownership, and first, a desire for the information, and then a sense of ownership over the information. And it all involves this messy stuff of human values.

„So, I'm always going to try to play that role of providing what I think is credible information. And following my nose in terms of being interested in projects where I do think there's a gap, or a missing part of the story, or conversation that's not being had. But I think lasting change in terms of policy, that has to come through this completely different avenue, where engaging with different stakeholders, or communities, or sectors, and enabling them to take some ownership over the information that we maybe already have, is where I've seen real progress. That's a big shift because it's not how we do our science. We're not trained to convene groups of stakeholders. That's not our profession. But it's arguably where we could have the most impact."

In the preceding generation, most great ecologists, Sisk muses, were driven by the intellectual challenges of understanding the diversity of life and evolution and why the living world is the way it is. Palen, he says, is part of "an early generation of ecologists choosing to contribute to the betterment of the world."

"She strives to reach far beyond academia.

"Her real commitment to policy is toward the importance of advocating for science. That science is the thing that will really help us to make better decisions. She's less keen on being prescriptive about what policy outcomes should prevail than she is in advocating for being smart, and using the information that science has given us."

Palen is determined to "continue to encourage other scientists to make this leap." In terms of tips for others wanting to leap into the science policy fray, she has been thinking about how to 'bottle that' for her students, collaborators and colleagues, and working more systematically "to make engagement with the policy process something that we teach."

In a moment of reflection as she reaches out for a just-before-deadline interview with me on April 15th, 2019, Palen leaves me with something she and Sisk discussed last week:

“Imagine if we were to take as much time thinking carefully and thoughtfully through how our work might affect policy and dialogue as we do, say, on study design or experimental design.”

That is what she’s thinking about most urgently, right now.



Palen and salamander.
(Photo: Lesley Evans Ogden)



Palen and Munshaw hiking down
from the Seven Lakes Basin.
(Photo: Lesley Evans Ogden)

Prologue

Casting my mind back to our 2016 trip to her Cascades frog research site in the Seven Lakes Basin in Olympic National Park in Washington State, there aren’t many other human beings around in the backcountry where we are camping and scrambling up and down heathery slopes to ponds and small lakes. Where we do come across other hikers though, Palen is always engaging. Congratulating a lesbian couple celebrating their wedding anniversary. Helping out a fly fisherman she sees trying to snag a trout in a pond she knows has no fish — pointing out a better fishing spot nearby. After packing up to leave, a millennial hiking with her boyfriend strikes up a conversation with Palen on the trail down to the parking lot.

Within minutes of chit chatting, her temporary trail companion, already mesmerized, is asking Palen if she is taking new graduate students. The morning before we hike out, I ask Palen if she doesn’t feel the cold as she wades, bare footed, save some sandals, into a freezing cold pond in search of frogs with the zeal of a 10 year old. Her assistant Robin Munshaw, wading in the same pond, is wearing neoprene booties. “I think I may have done some nerve damage to my feet over the years,” says Palen. She says she doesn’t really feel the cold. Or perhaps it’s more a case of mind over matter. Either way, in both mountain frog research, and navigating the science-policy divide, it’s an advantage to not get cold feet.

PREPARING FOR ELECTIONS

Croatia

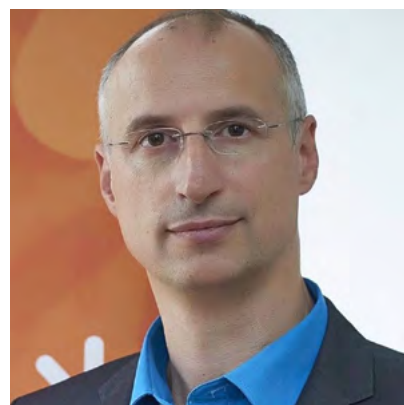
by Vedrana Simičević

In a country which has one of the smallest gross domestic expenditures on research and development in Europe and where scientists often refuse to be part of the public discourse for fear of losing their positions, Ivica Puljak, is one of those rare academic figures who are not scared to criticize the government. Together with his wife, he was one of the founders of the political party “Pametno” (“Smart”). The party is strongly orientated towards science, education, and technology transfer. In the last national election Pametno didn’t make it to parliament. But they haven’t given up, and they are preparing for the elections for the European Parliament in 2019 and for the Croatian parliamentary election in 2020.



The journalist

Vedrana Simičević is a long-time Croatian journalist and editor at the Croatian daily newspaper Novi list. She is a psychologist by education. As a journalist Vedrana has specialised in science, social issues and social phenomena like migration, nationalism, xenophobia and democracies. Other topics of interest include culture, different field stories and outdoor sports. In 2018 she won the national award for the best journalistic work about environment protection. Recently she started contributing to international outlets, including Science and New Scientist.



The Scientist

Ivica Puljak, professor of physics at Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture in Split, is one of the best known Croatian physicists, with an impressive international career mostly connected with the CERN and the search for the Higgs-Boson at CMS. He is one of the most cited Croatian scientists; he was a guest scientist at CERN and a guest professor at Ecole Polytechnique in Paris; he is also a member of the international MAGIC collaboration.

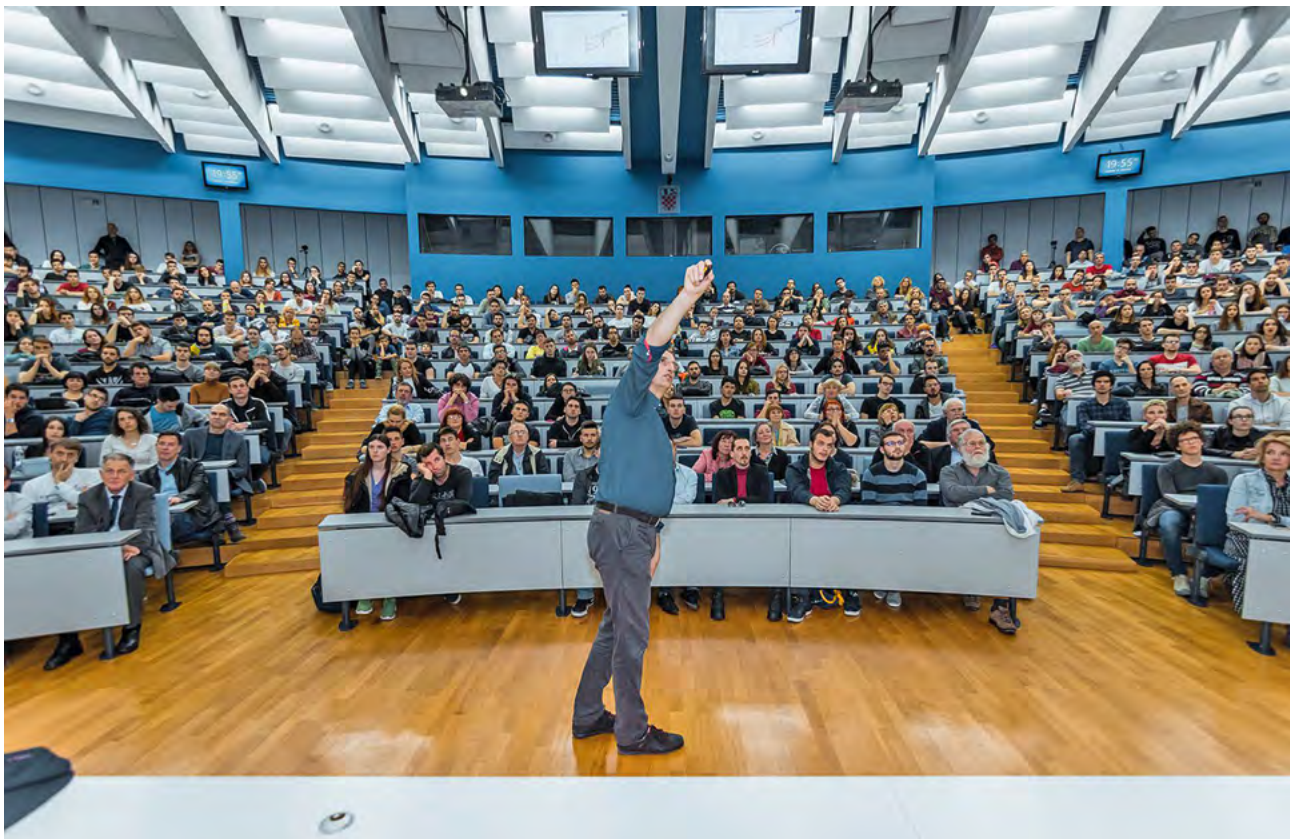


Photo: Josip Svalina / Archive Ivica Puljak

Part 1

Knowledge-based approach in the populist political arena

The political scene of Croatia is becoming more and more superficial and populist. Physicist Ivica Puljak and his political colleagues from the party “Pametno” (“Smart”) believe in long-term strategies created in collaboration with experts, rather than through trading particular interests with different parties. But their stubborn refusal of the opportunistic coalitions and their un-populist rhetoric doesn’t seem, for now, an especially successful approach to politics.

“There are two kinds of optimists in this world,” says Croatian physicist Ivica Puljak as he launches into his public lecture about the future of space and

humankind. “The ones who hope they will get the present, waiting for Santa Claus to arrive; and those who want to build a little house on the tree and invite their friends to help them.” It is an effective ice-breaker and you can hear the audience giggling. They can sense this will be an unusually relaxed lecture about complicated physics phenomena. It is obvious that Puljak knows how to captivate attention, and why wouldn’t he – in the last year alone, he has done more than 160 lectures at public events, high-schools, faculties, and even kindergartens. There are not many Croatian scientists that are so passionately active in popularizing their science, especially not ones with such a high profile scientific career – Puljak, among other things, led one of the main international groups responsible for finding the Higgs-Boson. Today he is a professor at

the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture (FESB) in Split, a guest scientist at CERN and a guest professor at Ecole Polytechnique in Paris.

Puljak, among other things, led one of the main international groups responsible for finding the Higgs-Boson.



He uses the “optimist allegory” a lot, not only as an efficient lecture introduction, but also as a good metaphor for his own beliefs – the same ones which led him to enter politics after 20 years of a successful scientific career. It was this very entertaining physics lectures that had of late boosted his popularity among the Croatian public and even stirred up some bad feelings – a couple of months ago a local politician publicly accused Puljak of “lecturing to the kids that there is no God”. This accusation, absurd as it sounds, paints a perfect picture of the current chaotic, polarized and increasingly conservative public discourse in Croatia, which also strongly shapes the country’s political scene. It is a scene which for years now efficiently turns most intellectuals and scientists away from politics, as it becomes more and more superficial and populist in its nature.

It started with a school

Maybe the complicated Croatian political world wouldn’t have been Puljak’s destiny either, if it wasn’t for a very pragmatic reason – the absence of a school in that part of the city of Split where Puljak’s family lives.

“Ten years ago my wife Marijana and I realised that the long-promised school would never be built if we, as citizens, didn’t do something about it. So we united with some of our neighbours and organized a local citizen initiative,” recalls Puljak. They began on the most basic local level and won the elections for the little so-called “kotar” council with not much more than a hundred votes. Marijana Puljak became a president of the council and started, amongst other things, to tirelessly lobby for the school. Five years later the school still hasn’t been built, but the group has realised that some things indeed can be changed by acting within the system. In 2013, they decided to participate in elections for the city council and the mayoral office. It took them only three months of political campaigning to get 10 percent of the votes and subsequently, four seats in the council. From there on, their ambitions grew and they decided to transform an existing citizen’s initiative into a real political party.



Ivica Puljak, with his wife and partner in politics Marijana, above the City of Split.

However, at this point things also became complicated. Puljak and his political colleagues – mostly the highly educated citizens with on-going careers in other areas – insisted from the beginning on sticking to their principles, with transparency regarding party goals being high on the list. They adopted an almost scientific approach and made a highly structured program which positioned them on the left-liberal spectrum, with emphasis on strengthening science and modernising education, reducing state administration and taxes for the private business sector, as well as insisting on social welfare measures such as free education and public health. They named their party “Pametno” (“Smart”) which raised more than a few eyebrows at the time.

The price of political “stubbornness”

When the first coalition propositions started to arrive – for example from the leading left party SDP at the Split city council – they weren’t really keen on making many compromises and decided that they would rather take a slower approach than sacrifice parts of their program. In the beginning, the price of this “stubbornness” seemed quite high, particularly during the 2015 parliamentary elections – they turned down an offer to join a large coalition of independent local initiatives known as MOST, proclaimed a “fresh new political power”, which later went on to become one of the biggest election winners, crucial in forming the new government.

“If our negotiations with MOST had ended successfully back in 2014, we might have never become an inde-

pendent party. But we realized soon enough that they were much more interested in gaining the votes, than in the program itself,” says Puljak. His party won barely a few percents and remained far away from the parliament. It turns out that the newly formed government, cobbled together with awkward compromises and robust negotiations around seats, didn’t last long. The next parliamentary elections happened in 2016. Pametno still stayed below the electoral threshold, but this time they came reasonably close to winning their first parliamentary seat. A year later consistency and patience paid off somewhat when they won 7 out of a total of 35 seats in the Split city council.

Not everybody sees this painful approach, where progression is measured every few years by at most a few percent, as a particularly promising in the context of the passing time. Over the last 27 years, the Croatian political scene has been constantly dominated by the two large parties – right-wing HDZ and left-wing SDP. Currently the most successful third option, known by the name Živi zid is, in a way, the exact opposite of Pametno’s agenda, relying much more on a loud presence in the public, than on the feasibility of the political program. Nevertheless, Puljak remains optimistic that a steady, non-populistic approach will eventually get them far enough.

Scientists in denial

“Modern society should be developed through long-term strategies and policies created in collaboration with experts, rather than through practices that see those with the reins of political power trade particular interests with different parties. Such acting is extremely unprofessional, but that’s how things are too often done in Croatia. And we want to change that”, says Puljak. In this situation, it is precisely the experts, scientists in particular, he emphasizes, who have the responsibility to act and try to change society for the better.

“We as scientists usually think that expertise takes priority, while politics is of less importance. I often hear my colleagues say: we will give our expert advice and let politicians implement it.

But that is not likely to happen, especially not in a developing society like Croatia. It is childish to be an expert expecting things to change and at the same time choosing to stay away from politics,” reasons Puljak. One of his greatest disappointments, he concludes, is specifically the opportunistic passivity in Croatian academic circles.

The science community in Croatia is, indeed, mostly silent. In this country, which has one of the smallest state budgets for the research and innovation in the EU – barely 0.85 percent of GDP – scientists are the last ones who will complain loudly. Almost every scandal in academic circles, even the plagiarism accusation leveled at the then-serving minister of science and education himself, passed without much public outrage from the science community, provoking usually only lonely protests from individual crusaders. The combination of silence and resistance to changing the academic system, where excellence is often not the main criteria for career advancement, is recognised by many as an important reason why Croatian science is still less competitive on the world scene.

“Croatian scientists rarely react to injustice because of fear and opportunism. The usual attitude is that there is no need for ‘making a fuss’ and it is better to look after your work and career,” says Tanja Rudež, award-winning Croatian science journalist at Jutarnji newspaper. The fear is real, explains Rudež, recalling the case of four Croatian philosophers who reported ex-Minister of science and education Pavo Barišić for plagiarism to the science ethical committee in parliament, and later suffered, they said, harassment at work, including a repeal of the study program on which they were engaged. Rudež agrees that stronger public involvement should be a sort of obligation for scientists, especially in the era of pseudo-science movements, but she still has some mixed experience with scientists turning politicians. She was publicly called out for her opinions and writing by one ex-minister of science, Dragan Primorac, and unsuccessfully sued by another, Pavo Barišić. Nevertheless, she sees Puljak’s political ambitions as promising ones.

“I like the motivation and ideas behind his political engagement. I also think their chances grew because of the current crisis in leading left-wing opposition party”, says Rudež.

Puljak’s political goals are also supported by his closest science colleagues. “The engagement of scientists in politics is always welcome because scientists make conclusions based on careful fact analysis. Besides, they bring a specific political content to the public discourse, without much populist rhetoric,” says Nikola Godinović, physicist at FESB. He supports the idea of a more functional, socially engaged society which invests in science and education and thinks Puljak can successfully link both worlds – science and politics. As for Puljak, he admits that his intensified political activity makes it increasingly difficult to maintain a high intensity of scientific work. But scientists, says Puljak, are used to work overtime. Back in the period of the “hunt” for the Higgs-Boson, it was usual for him to work 30 hours without rest. It also helps, he says, to have a wife as a partner in politics and a harmonious family in general. Ivica’s and Marijana’s oldest daughter and son are already students, while their youngest daughter is at the end of elementary school, all with excellent grades.



Ivica Puljak doing a public lecture about „the future of space and humankind“ at the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture (FESB) in Split.
(Photo: Josip Svalina / Archive Ivica Puljak)

Preparing for the EU elections

The one thing that will certainly suffer from more ambitious political activity, predicts Puljak with some regrets, are his science lectures for the wider audience. “I was surprised to see how much people are interested in science and knowledge. I hope I will get to

share these ideas through politics, which is an even better way to do so,” says Puljak.

The pace of his political activity is likely to escalate quickly in the next few months. In May, Pametno is planning to run for the EU parliament elections, and then the party will likely participate in the next Croatian presidential elections at the end of the year. Their biggest goal is the 2020 Croatian parliamentary elections. In the meantime, they continue to be an unusual presence on the Croatian political scene. At the beginning of September, Pametno suddenly announced they will not enter the already planned and promising coalition with GLAS and IDS, two parties on the left spectrum. The cited reasons were “different views” regarding the current financial crisis of two of the biggest Croatian shipyards, “Uljanik” and “3. maj”, and a potentially controversial involvement of one of the IDS members. Again, the party’s move produced some mixed reactions in Croatian media.



Puljak lecturing high-school kids about physics in a more relaxed way. In the last year alone, he has done more than 160 lectures at public events, high-schools, faculties and even kindergartens.
(Photo: Eva Magdić / Archive Ivica Puljak)

“In the Croatian political landscape which is characterised by right and left collectivism, Pametno differs from the others precisely because it rejects collectivism. They have unusually high standards in refusing opportunistic coalitions,” says Jurica Pavičić, Split-based Croatian writer and political journalist.

“Although I’m personally not liberal, I’m glad that the Pametno party exists, because they are the only political party in Croatia which is ideologically consistently liberal and represents those values that are unpopular with the leftists – for example in the economy,

and with the rightists – when they advocate against religious education in the schools,” says Pavičić. If Croatia is by any chance to become a more mature society, says Pavičić, Pametno could become something like the Spanish Ciudadanos – a small, elite liberal party that plays an important role in the political equation.

The next year will certainly tell if this anti-populist, knowledge-based approach will stand any chance in Croatian politics. If we are to judge by the first Puljak’s political goal ever – the school which eventually got built – perhaps the answer will be “yes”.

The current anatomy of the Croatian political scene

During the last 27 years, which mark the period of Croatian Independence, the Croatian political scene has been dominated by two major political parties – the conservative, center-right Croatian Democratic Union (HDZ) which has formed a total of seven governments so far, and the center-left Social Democratic Party of Croatia (SDP) which has been in power twice. The current government is a result of the coalition between HDZ and Croatian People’s Party-Liberal Democrats. The government has support from another five small parties, a couple of independent parliament members and the representatives of national minorities, which proves barely enough for a weak majority in the parliament. There are altogether 20 parties in the current 9th parliament assembly. According to the last polls, HDZ is still the most popular party, followed by a somewhat weakened SDP. The third place is occupied by Živi zid (populist, anti-establishment, Eurosceptic party), while MOST (center to center-right party) is the fourth.

“Today it seems that Croatia is heading toward a prolonged period of conservative governments, because the largest opposition party, SDP, is in deep crisis,” says Jasmin Klarić, a political journalist at Telegram news portal. However, that means the political field for other centrist and center-left parties are wide open, he says, and it seems that parties like Pametno have a great opportunity to reach out to the disappointed voters, unhappy with the current government and main opposition parties.



Photo: Archive Ivica Puljak

Part 2

Challenging transition from scientist to politician

If he gets elected to the European parliament in May, Croatian physicist Ivica Puljak will switch fully from a 20-year successful scientific career to politics for an indefinite period of time. One of the main challenges of this often painful transition is the question, how can you communicate your mainly hard, long-term science-based solutions to a society where voters predominantly vote out of opportunistic motives or for purely nationalist ideas?

„We think we have a fair chance for winning at least one seat in the European parliament“, says Ivica Puljak optimistically, contemplating upcoming

European elections in May 2019. Two months ago, he and his colleagues from political party Pametno aborted negotiations to join a small left coalition and decided – in a way that has become something of a trademark – to go it alone in the elections. Puljak will be the leading party member on the election list. If his optimistic predictions turn out to be right, it is highly likely that the Croatian physicist will become the new European MP.

For him, that also means he will move completely from a 20-year successful scientific career to politics for an indefinite period of time.

“If people have elected you as their representative, it is not morally right to have a job on the side. The only thing I would keep is the popularization part – all the scientific lectures for the public

which are, in my opinion, useful for the community,” says Puljak. For him and his political colleagues, May’s elections are important not only because of their political agenda to strengthen Croatia’s place among united Europe, but also as sort of a test for the 2019 presidential and 2020 parliamentary elections. If he gets to the European parliament, Puljak plans to focus on his area of expertise, advocating for bigger EU investment in science and encouraging better use of EU funds in Croatia. Pametno’s campaign for the EU elections, which they plan to base on the concept of a stronger united Europe, will start soon after the new year.

“Stubborn” voting patterns

But the road to the European parliament will be rocky. At the last European elections Croatians chose 11 representatives by a preferential voting system. Voter turnout was low and most of the seats were split between the two largest coalitions, left and right. The one remaining seat went to an autonomous political party ORAH which got 9,42 percent of the votes. In the last November polls, Pametno was still below 3 percent of support.



Members of the party Pametno during the visit to European Parliament, organized by ALDE, Alliance of Liberals and Democrats for Europe – European political association to which they are part of. (Photo: Archive Ivica Puljak)

Generally speaking, in the last five years, active Croatian voters seem to be favouring right wing, populist options, while consistently low voter turnout probably testifies to a prevailing sense of general political disappointment among citizens. According to Vuk Vuković, Croatia-based PHD candidate at the University of Oxford, who among other things studies voting behaviour, there are some consistent patterns of voting in Croatia which are quite resistant to any non-populistic political campaign. Vuković and colleagues analysed different economic and demographic databases and the results of five post-war elections in Croatia. They concluded that Croatian voters like to award increased spending before elections, especially for big construction projects. Vuković call this phenomenon “budget populism”.



„Our results show that in the places where corruption was more present, leading politicians got better chances to be re-elected”, says researcher Vuk Vuković. (Photo: Archive Vuk Vuković)

“Corruption plays a big role in this issue. We found that in places where corruption was more evident, leading politicians had a better chance of being re-elected,” says Vuković. The “calculation” is fairly simple: they usually need just 20 percent of all registered voters for a victory and they know they will get it from people who are depending on them through different kinds of corruption and personal interest. The other important aspect is so-called emotional voting. In the case of Croatia, war memories from the nineties still play a significant role. In areas more affected by the consequences of war, says Vuković, results show that the leading right wing, nationalist party HDZ is the inevitable winner.

“Lately there is also an issue of worryingly increased economic emigration. Tens of thousands of citizens left Croatia in the last couple of years, and they are probably voters who could be more favourable to political options like Pametno,” concludes Vuković.

So if you are a scientist motivated to enter politics, trying to promote scientifically supported strategies, how can you communicate your mainly hard-science-based, long-term solutions to a society where voters are predominantly driven by these factors?

Door to door approach

Puljak admits this will be a tough battle to win.

“We are witnessing today the weakening of science’s influence on society. One of the reasons is the rise of the

social networks, which allow faster spreading of different opinions in public. Seemingly easy populist solutions often look more attractive, which makes it more difficult to implement unpopular ideas based on science,” says Puljak. In these circumstances, he knows that he needs to communicate ideas, especially those which include science, in a simpler way.

“As a scientist who is entering the politic arena, you need to learn not to be scientifically precise all the time. You need to learn how to tell more in as few words as possible and you need to get used to the fact that your arguments sometimes won’t even be considered,” says Puljak. You will be judged and unreasonable attacked in a way that is unthinkable in the science community. And you will probably never get fully used to this behaviour. Which is all right, concludes Puljak – that means you held on to your common sense.

The hardest part is to spread the ideas to the public. Small parties like Pametno have a limited budget and, as Puljak claims, limited access to the media. So he often tries what is scientifically proven to be the best way of communicating the message to the voters – a door to door strategy.



Ivica Puljak in conversation with citizens in Split: „Politicians shouldn’t feel uncomfortable to go out and talk with the people”, says Puljak. (Photo: Archive Ivica Puljak)

“Nobody likes this approach, especially not intellectuals. The intellectuals usually like to comment on things from the comfort of their living rooms. But politicians shouldn’t feel uncomfortable to go out and talk with the people,” says Puljak. He has knocked on hundreds of doors in his hometown Split in the last few years. Ideally, he would try to talk with people about the goals of his party. Some of them invited him to coffee. Some immediately said they were

not interested. But he never had any unpleasant encounter. And he always enjoyed the experience.

A bigger challenge from a scientist's point of view, says he, could be talking to politicians.

"In Croatia it is very hard to have an argumentative conversation with the politicians. Most of them will put you in a certain box and refuse to talk to you at all. On the Croatian political scene you cannot have a reasonable conversation about, for example, genetic modification issues, because the majority of politicians are not familiar with the most basic biology or medical concepts," says Puljak.

Resistance within science community

Indeed, science is not a topic much discussed either in the Croatian parliament or in public. And when it is, scientists are often the last to be asked for their opinion. Back in 2016, for example, the national educational reform – the first one after almost two decades – which had been meticulously written up over more than two years by more than 200 teachers and university professors – in the end "fell down" under pressure from conservative circles. Their main concern was those parts of the reform that related to improving and implementing sexual and civic education.

Improving the science and high education laws and regulations in Croatia also proved to be notoriously hard, mainly because the main resistance to any serious changes has almost always come from academic circles. In 2013, an attempt made by the then-serving National Council for Science to tighten infamously low advancement criteria for academic positions in Croatia ended in the Constitutional court, in a case submitted by dozens of faculties and other institutions. The court then abolished these new regulations, stating, among other things, that the new criteria were endangering the "freedom of the scientific work".

So scientists who eventually got the political power and tried to introduce ambitious change, have often found themselves stuck between political

negotiations and strong opposition from the part of the science community opposed to any changes at all. It could be really frustrating, says Saša Zelenika, professor in the Faculty of Engineering in Rijeka and former state secretary in the Ministry of science and education.

„There is no fair play in politic“

"I was surprised to see that the influence of informal lobbying groups could be even bigger than the dispute between political parties. For any serious changes to our science and educational system, we obviously firstly need a more mature society," concludes Zelenika. Mathematician Hrvoje Kraljević, professor of the Faculty of Science in Zagreb and former Minister of science and education (2000. – 2002.) shares similar experiences from his political episode.

"There is no real ethics and fair play in politics. And it's almost impossible to see the whole group of people working together for the common good, instead of pursuing particular interests. But you can find a similar situation within the scientific community too," says Kraljević, referring to the fact that some of the most controversial moves and opinions in the Croatian science in the last few years have come from institutions like the University of Zagreb or Croatian Academy of sciences and art (HAZU). The University of Zagreb, for example, to the astonishment of many Croatian scientists, recently gave an honorary doctorate to the controversial politician from Bosnia and Hercegovina, Dragan Čović; and HAZU last year opposed Croatian ratification of the European convention on preventing and combating violence against women.

Development of critical thinking

Ivica Puljak admits that he is painfully aware of all these problems, but stays optimistic that the situation can be improved with a stubborn long-term approach. Changes and improvements based on scientific evidence often appear complicated to the public and the politicians. And that is precisely why

more scientists – he emphasises again – have to be more active in politics and more active and braver in communicating ideas.

"If there are only few of us, it is hard to explain to other politicians what are scientific results and why should we implement them in strategies. And, if it's hard to convince politicians, then it is also hard to convince the public," says Puljak. On the other hand, his experience with the public lectures shows that people actually like science and that they intuitively know that science is good for them and for society. So with that in mind, Puljak thinks that development of critical thinking through the educational system – something that is according to some latest research lacking in Croatian schools – must be one of the crucial goals of every modern society. For that reason, improving the development of education and science strategy will be the one of the main targets in Pametno's future campaigns for the next two election years.



The popularization of science in the form of public lectures is also a way to encourage critical thinking, says Puljak. (Photo: Archive Ivica Puljak)



Photo: Archive Ivica Puljak

Part 3

There are no magic tricks in politics

With the European elections around the corner, Ivica Puljak and his party tried to gain more visibility the hard way. In the meantime, the Croatian science community was starting to wake up, after another controversial proposition at the University of Zagreb.

It is still somewhat cold, an early spring afternoon in Zagreb, the capital of Croatia. More than 2000 people have gathered in front of the Croatian National Theatre building, one of the city's landmarks, in a peaceful protest. You can easily guess that the crowd is made up mainly of scientists just by looking at the overly complicated, cynical protest banners. Oh, and they are singing *Gaudeamus Igitur*.

In fact, this is one of the largest academic protests in Croatia in the last ten years. The primary motif is an official proposition by the Zagreb Academy of Music to the University of Zagreb to award an honorary doctorate to current city mayor Milan Bandić. The idea, which the university officially took under consideration, didn't sit well with the Croatian science community. It was the last in a long line of controversial moves directly involving the university administration. This time, many scientists decided to publicly express their discontent not only by signing the petition, but also by coming out onto the streets. The rationale that mayor Bandić had helped the academy and the university financially and logistically was precisely the point which upset protesters the most – they argued this was public money which

was supposed to be assigned to the science sector.

As with many times before, Ivica Puljak was one of the first prominent scientists who condemned the proposition in public. Accordingly, he got an invitation to speak at the protest organized by PhD candidate Stjepan Perko from the faculty of political sciences.

The Boiling Point

On that cloudy Tuesday Puljak finished his usual six hours of lectures at the University of Split, hopped in the car, drove for two and a half hours to Zagreb and arrived just in time to hold his speech. He didn't spare his words; he criticized past decisions of

university rector Damir Boras and the senate, recalling the case last year when the University of Zagreb awarded an honorary doctorate to the controversial politician Dragan Čović.

"I'm ashamed of these people and their decisions but on the other hand, I'm proud of all of you who came here this evening. This is the first time I can remember that so many of us gathered together to fight for our ideals and for a better university", concluded Puljak at the end of his speech, supported by loud cheering from the crowd.



Ivica Puljak giving a speech at the scientists protest against awarding an honorary doctorate to the mayor of Zagreb.

(Photo: Archive Ivica Puljak)

He is a good speaker, his skill forged in hundreds of public lectures and more than a few political debates of late. He doesn't need to consult his notes while delivering his lines. Right here, you can witness the full transition from the scientist to the politician. But although the elections for the European Parliament are right behind the corner, the speech at the protest carries a deeper significance for Puljak than just another political activity.

The University of Zagreb – the largest Croatian University – has in the last few years become one of the public battlefields involving Croatian science, intense enough to spark a public revolt in the predominately silent academic community. Lawsuits against journalists and even students supporting the

idea of sharing part of the program between Faculty of Humanities and Social Sciences and Catholic Faculty of Theology or minimizing the status of Croatian Studies (one of the more successful institutions at the University) are some of the moves by the rector and the senate that provoked many negative reactions. One could argue that all these events finally resulted in somewhat more political engagement within the Croatian science community. The idea of awarding the current mayor with an honorary doctorate just for, as some of the protesters emphasize, doing his regular job was obviously the boiling point. This time, many other scientists, besides the "usual suspects" like Ivan Đikić or Ivica Puljak, were willing to openly criticize the intention.



Puljak and Damir Bakić at the scientists protest against awarding an honorary doctorate to the mayor of Zagreb.

(Photo: Archive Ivica Puljak)

Inspiring Action

"In the context of the usual reservations typical of the Croatian science scene, we can say that this was a great response," comments mathematician Damir Bakić, another Croatian scientist who decided to enter politics. Bakić is a former member of the university senate, which he left last year after strongly disagreeing with some of the decisions voted on. He was also the only opponent to Damir Boras on last year's elections for the rector's job, when Boras was elected for the second time. Bakić continued to be politically engaged, joining the new political platform "Možemo" ("We can"). As opposed to Puljak, he wants to stay away from any election list or function. He thinks that he can contribute as much through the development of strategic plans and proposed measures. Either way, both men believe that things can

change only through stronger social and political action.

"Of course the job of university professor is infinitely nicer than being a politician," says Bakić. In people's minds, he explains, politics in Croatia for the last three decades is strongly associated with corruption and clientelism. There is a strong public discourse that things cannot be changed.

"But only we, ourselves, can overturn this negative atmosphere and citizen's distrust in political structures. Precisely the people who were not involved in politics before and who have their integrity preserved can prove there could be better ways," says Bakić.

For both men, the case of the University of Zagreb – the place where they studied and, in Bakić's case, work – is a more personal issue. They are participating in that protest primarily as concerned scientists, not politicians. But trying to change the current situation at the university could be seen as a good starting point for any scientist to get more involved in shaping public opinion and policies. Being clearly and openly vocal about important issues is certainly an efficient way to inspire others with their example.

„It's important to express your opinions loudly," agrees Puljak. He is nevertheless a little sceptical and believes there are still too few scientists who are willing to do that. The protest was a success, but that's not enough, he says. For example, only five or six of thirty existing faculties officially opposed the proposition.

„There's a lot of opportunism in the academic community. The whole system is built largely on favours. It is something that can't be changed overnight," he says.

The Street Campaign

Two weeks later, at the beginning of April, Puljak was back in Zagreb. Presenting their candidates, his party "Pametno" officially started their campaign for the European elections which will be held in Croatia on 26th May. Weeks before that, "Pametno" considered some possible partners among some new political parties, but

ended up only in partnership with a small local initiative. Which means that Puljak was officially the leader of the list. If the party wins enough votes for at least one seat in the European Parliament, he will definitely become an MEP. At the presentation in Zagreb he repeated that they see Croatia as part of a stronger, more united Europe. The media focused on his words about the need for a more intelligent use of EU funds in Croatia. At the end of that first campaign day, Puljak was satisfied and optimistic.



Puljak and his colleagues from party Pametno during the official start of the campaign on the streets of Zagreb. (Photo: Archive Ivica Puljak)

There is no magic trick for a successful campaign, he repeatedly responds to my question about how his party could gain more votes in the rather crowded Croatian political scene. Only hard work to slowly gain more visibility pays off eventually, concludes Puljak.

“Pametno” is already quite present on social media, which is a modern campaign skill that has not exactly been mastered by every Croatian political initiative. So in the next few weeks, they focused on “face to face” communication with citizens. Their first stop was logical: their base town, Split.

At this time of the year, the famous promenade by the sea in the second largest Croatian city is still mainly occupied by local citizens. A month or two later and the long esplanade, filled with bars and restaurants, will be swarming with tourists. But in April, if you are local, the popular “Riva” is still the best place to be on the weekends. Literally hundreds of people flock to the sunny promenade for one of the favourite Croatian rituals – drinking coffee and chatting. If you want some

close encounters with fellow citizens, this is the right spot.

As the campaign was still in its early days, Puljak and his colleagues opted for a short walk. Puljak has become a highly recognisable figure in his hometown, not only because of his scientific and political work. He tends to end up in the media for quite unusual reasons. Last year he intervened in a street fight, separating the two men involved. A couple of weeks ago, he saved a little girl whose hand got caught in the escalator at a mall. He reacted quickly and grabbed the girl before the high point of the steps, probably literally saving her life. During the hour-long walk, around twenty people approached Puljak and his colleagues with questions. Interestingly, many of them asked what will happen with Puljak’s science career if he get elected to the EU parliament.



Ivica Puljak in conversation with the citizens at Split’s ‘riva’ (promenade) during the campaign for the European elections. (Photo: Archive Ivica Puljak)

“I will freeze my science career and do the job which I’m elected for,” Puljak repeats over and over again. Some citizens want to know how he feels about an expansion of the EU. Some ask what he thinks about some particular EU laws. But most of them were interested in his opinions about some quite local subjects. For many voters in Croatia, EU elections are still less important than the ones at the national level. Puljak takes his time to answer every inquiry. For him, there are no “wrong” or unpleasant questions. He has never experienced any awkward situations, and this Saturday walk was no exception.

The Long Fight

As elections approach, his daily schedule intensifies. But Puljak still tried to juggle it with all of his usual activities. Some day a couple of weeks before the elections he went to Daruvar, a town in the central part of Croatia, and held two lectures for the kindergarten kids, followed by two lectures in elementary school and two more in high school. Then he had an interview for a TV station, after which he went to listen to two more lectures at the science festival. Days like this are for him more the norm, then an exception. In the week after his campaign started, he traveled for four days to his second working place – CERN. This time he was guiding a large group of Croatian and Bosnian physics teachers as part of the educational program which he started with fellow Croatian CERN scientists. The recipe is simple – teachers get a chance to visit CERN, listen to some lectures and then use this experience back in their own schools. This is a type of activity that Puljak is not prepared to sacrifice at this point of his political career.

“I’ve always had a large working capacity. I can still handle everything”, says Puljak with confidence. Back then he even still managed to squeeze in three to four hours of basketball weekly, but in the weeks before elections this became more and more challenging.



Guiding the physics teachers from Croatia and BiH to CERN on their visit. (Photo: Archive Ivica Puljak)

After Easter (and in the time this article was written), the party intensified the campaign and started visiting all of the largest Croatian cities. Their current rating in the public polls at that point was still below 3 percent, which was hardly be enough for that one desired place out of twelve reserved for Croatian representatives in the next

EU parliament. The fact that the left political spectrum in Croatia, to which his liberal party "Pametno" gravitates, is now more than ever divided into different small parties didn't help either. But Puljak was still confident that they can make it.

"If we succeed at being more present in the media – which is a hard goal for small parties like ours – I'm confident we can have a good result," says Puljak. If that doesn't turn out to be the case, he would certainly not give up. "In my opinion, it is worth fighting to build a stable and strong political option which will have enough political strength to change things. It's a long and hard process which takes time and patience. And we are prepared for that," says Puljak.

EPILOGUE

The elections for the European Parliament didn't end up well for Pametno party. Their small coalition with the party Unija Kvarnera got 1.4 percent of the votes, way below 5.19 percent needed this time for winning one seat.

Puljak was disappointed, but he admitted that by the end of the campaign he expected this result. The strong coalition with several new parties that shared the same basic values and pro-EU sentiment like Pametno would have made a difference, he acknowledges. Many of the political commentators made the same conclusion – there was a promising number of new left and liberal smaller political initiatives with serious programs which could have played a significant role in elections if only they got united. That never happened, and they mostly shared the same destiny at elections. As in the majority of EU, two major central left and right parties didn't dominate and gained around 20 percent of the votes each. Far-right and populist parties, on the other hand, got more votes than expected.

"We can only hope that this was an important lesson for the future, as the parliamentary elections are approaching in about one and a half years from now", said Puljak commenting the election results.

