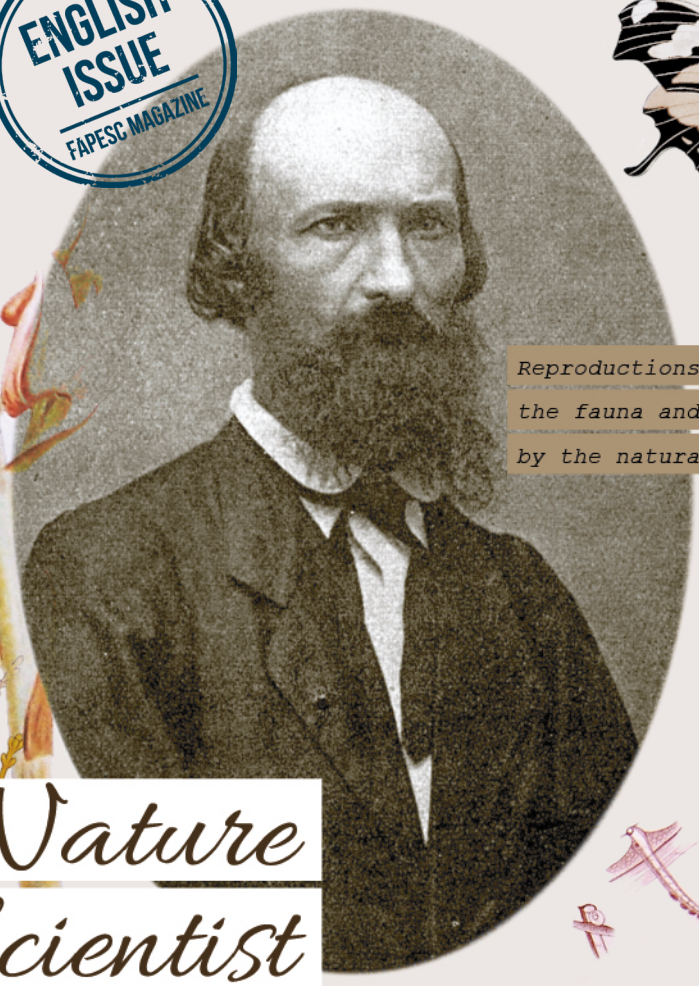
REVISTA FAPESC

Science, Technology, and Innovation in Santa Catarina

Issue 01 - Mar. 2022 - Year I

ENGLISH ISSUE
FAPESC MAGAZINE



Reproductions of illustrations of the fauna and flora of Santa Catarina by the naturalist Fritz Müller

Nature Scientist

200 years ago, was born **Fritz Müller**, the German naturalist who lived in Blumenau and Florianópolis, helped Charles Darwin to consolidate the theory of the evolution of species

fapesc | 25 ANOS

For **25 years**
encouraging Science,
Technology, and Innovation,
and connecting the actors
from this ecosystem

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SECRETARIA DE ESTADO DO DESENVOLVIMENTO ECONÔMICO SUSTENTÁVEL

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Information, dissemination and connection

Fábio Zabot Holthausen
President of Fapesc

The transparency on the application of public resources on Science, Technology, and Innovation (STI) was one of the encouraging factors for the creation of this magazine, but not only that.

That space of information and connection was idealized in the meantime, as the 25-year Fapesc journey to talk to Santa Catarina citizens, introducing programs, investments, projects, and actions realized in Santa Catarina STI's ecosystem. Well as the results and impacts of the researchers, managers, and entrepreneurs work from our State whom I enjoy thanking and congratulating.

In this way, Fapesc Magazine - Science, Technology and Innovation in Santa Catarina will be a qualified space of sharing, sensibilization, and approaching to disseminate and spotlighting searches, creations, industrial and intellectual property, inventions, methodologies, new businesses, startups and to tell the story of projects and enterprises created in Santa Catarina for people who makes this State has high rates of development and life quality: the entrepreneurs, researchers, managers, students, and innovators.

The performance of institutions and the people's attitude that make part of the Triple Helix allow a harmonic and collaborative action, producing intact and successful collaboration, and partnerships for Santa Catarina development, with a focus on creating opportunities, TI protagonism, investment attraction, and problems solutions facing our society.

We want to support the training of people, creating new businesses and products, projects and programs, establishing partnerships, and stimulating investments. We want to hold up institutions, talents, and protagonists who make knowledge and solutions that can inspire young people and motivate more people to join in the world of science, searches, technology, and innovation. We want to impact the quality of life and opportunities of those who live and choose to live in Santa Catarina.

Please help us to tell and disseminate these experiences and stories and co-create successful cases and opportunities. Accompany us for this purpose. After all, science and innovation are and always will be part of our day-by-day.

I thank the Fapesc team, and in their names, I thank the dedication and contributions of people and institutions that make science, management, and innovation and who made possible this project materialized, passing from a dream to become a tool of interaction, diffusion, integration, and transformation of reality.

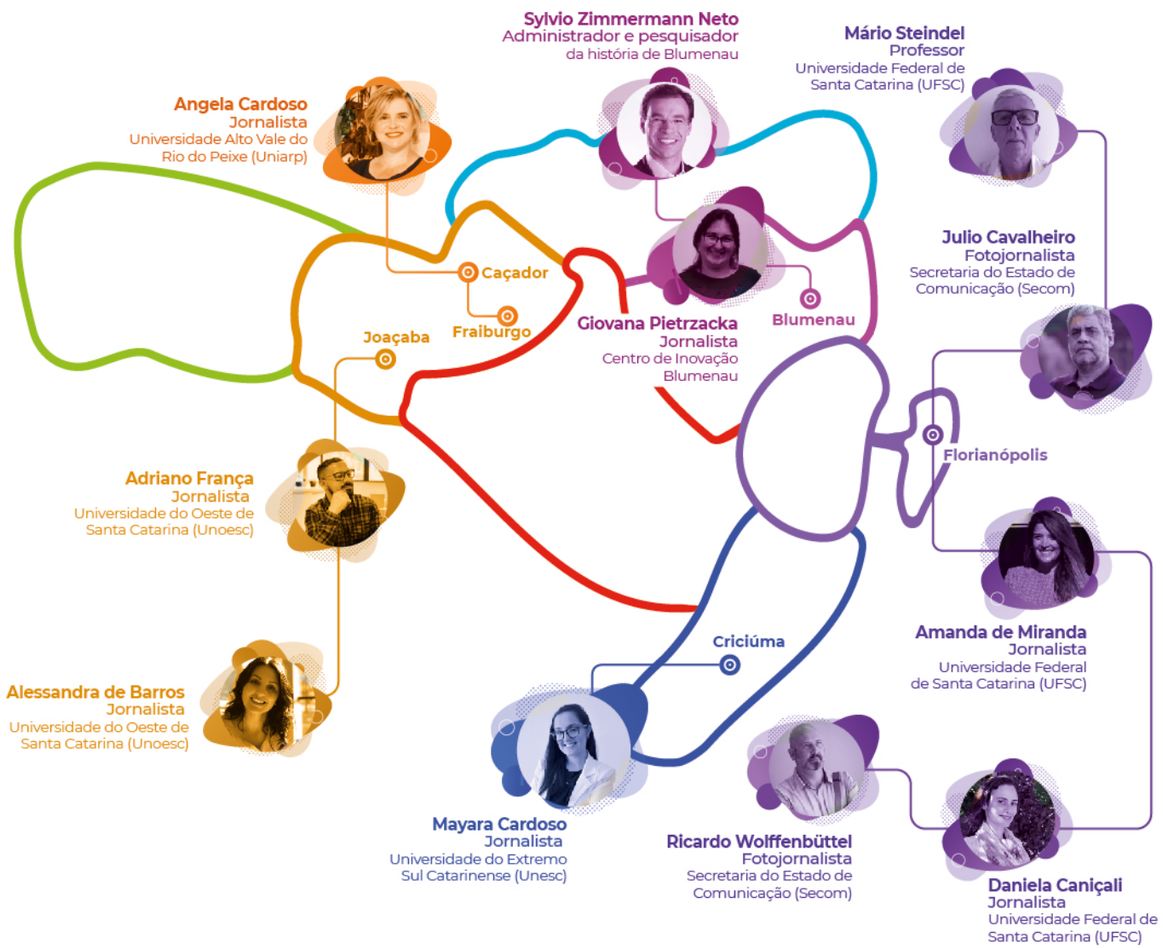
Make good use of this instrument and add value to their communities with new partnerships, businesses, projects, connections, and movement impacts.

Good reading!

People who collaborated in the first edition

Fapesc Magazine is a collaborative publication. The journalistic subject production is realized in partnership with ecosystem actors of science, technology and innovation from Santa Catarina. The goal is to publish the successful initiative of researchers, entrepreneurs and innovators from the State, as well as approaching society and scientific productions.

Participate you too!
Send your story suggestion to
revista@fapesc.sc.gov.br



Our Pitch

Produzir a edição número 1 de um produto jornalístico é sempre um desafio. Para uma instituição que comemora 25 anos de serviços prestados à ciência e inovação é uma oportunidade para experimentar novas formas de comunicar e divulgar as iniciativas catarinenses bem-sucedidas.

Em meio ao cenário epidemiológico em que vivemos, o trabalho da comunidade científica torna-se cada vez mais essencial. Por isso, o fortalecimento da ciência e tecnologia requer divulgação de resultados. Afinal, estar bem informado é indispensável para tomadas de decisões assertivas e o exercício da cidadania.

É com esta intenção que estreamos a **Revista Fapesc**: ser um elo entre a sociedade e a ciência, democratizando o acesso ao conhecimento.

Catarinense focus

Our goal is to spread the production of researchers and professionals from innovation in Santa Catarina.

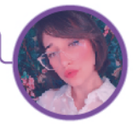
The cover's reportage in this edition makes a tribute for one of the most important scientists from Brazil. **Maurício Frighetto** reminds the path of the naturalist Fritz Muller, since the birth in Germany to research in Blumenau and Florianópolis. The work has infographics by **Sharlene Melanie** and diagramming by **Gabriela Garcia**, both designers who have assigned the magazine graphic project.



Didactic content

To simplify the actual subject, we created the section Fapesc Explains. They are illustrated materials by **Jenyffer Albuquerque** that introduce ordinary terminologies from the technology and innovation universe. in a synthetic way, we included the resource Glossary to explain terms that are used on the reportage.

Important subjects, like the interview produced by **Gisele Krama** about the women's challenges in science, earn space on section Interview. The magazine introduces the Fapesc indicators by manager **Flávia Feltrin Garcia**.



Interaction

Besides videos produced by **Caroline Westerkamp Costa**, the magazine offers 18 online subjects produced by studious people and professionals. They are seminaries, ebooks, podcasts and documentaries, like on reportage by **Milena Nandi** about a startup that is making a childish app, connecting literature and augmented reality. To access, point your smartphone camera to QR code and enjoy!


Collaborative network

This edition had about 11 partnerships. They are professional profiles that contribute with Santa Catarina development, articles that illustrate the higher education institution memory, besides the presentation of innovation spaces and scientific spread.in the end, nothing about this would be possible without the careful coordination and incentive from the Fapesc communication advisor, **Francieli Oliveira**.

I hope that the magazine can contemplate the expressive potential of the CTI ecosystem in Santa Catarina, one of the most competitives states in technology and innovation in Brazil. Knowing our website, surfers on social networks, send suggestions. Feel invited to joy our community.

Best regards,
Nanda Gobbi
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REVISTA FAPESC
Science, Technology, and Innovation in Santa Catarina

Nº 1

March 2022

SUMMARY

www.fapesc.sc.gov.br/revista-fapesc
On the Fapesc Magazine website, you can browse the printed issue, besides check out the exclusive content.

Point your cell phone's camera at the QR code and access it!

Do you know why the sky is blue?
The Nuclear Physics Professor of the UFSC, Débora Peres Menezes, explains how the set of colored lights from the Sunlight works.

Visit the Fritz Müller Museum of Ecology
Take a walk through time with art educator Tatiane Odorizzi in the house where one of Brazil's greatest scientists lived.

Santa Catarina Innovation Award

Professor Caspar Erich Stemmer

Ten categories

- Innovation Agent
- Innovative Researcher
- Innovative University Student
- Innovative Professor
- Innovative Young Student
- Innovative TSI
- Innovation in Product — Subcategories: Industrial Design, Digital, Equipment, Textile, Agriculture
- Innovation in Service and Process
- innovation of SocioEnvironmental Impact
- Innovative Government

R$420 thousand in prizes

Access: www.fapesc.sc.gov.br

fapesc 25 ANOS

Débora Peres Menezes

“It is the moment for women to be noticed in science

First elected woman **president of Sociedade Brasileira de Física**, a researcher from Universidade Federal de Santa Catarina speaks about the importance of feminine presence in prominent positions, the absence of young female students of the Exact department, and the sexism in the academic daily.

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Feminine Leadership
Since 2006, the Nuclear Physics professor from UFSC lead researchers in Santa Catarina, and, now, in Brazil

The Path

Occupation Area
Professor and researcher in the Nuclear Physics area at *Universidade Federal de Santa Catarina* (UFSC)

Education
Undergraduate and a Teaching degree in Physics from *Universidade de São Paulo* (USP). Master's degree in Physics at USP in 1986, and Doctoral degree in Physics at the University of Oxford (England), in 1989. Postdoctoral degree in the universities of Coimbra (Portugal) in 1988, Sydney (Australia) in 2005, and Alicante (Spain), in 2014.

Leadership Roles
- **Since July 2021**
  President of *Sociedade Brasileira de Física* (SBF)
- **2008 to 2012**
  Pro-rector of Research and Extension of UFSC
- **2006 a 2008**
  Coordinator of the Graduate Program in Physics of UFSC

Highlights
- **2021**
  Standing member of the *Academia Brasileira de Ciências* (ABC)
- **2017**
  Member of the Commission on Nuclear Physics of the International Union of Pure and Applied Physics
- **2012**
  Received a Medal and Francisco Dias Velho Merit Certificate from the Florianópolis City Council

Scientific Production
3.628 quotes
218 publish
183 articles
16 book chapters
Three books

UFSC Researcher
Débora Peres Menezes

The day of June 18th, 2021, is a marking point in the history of Sociedade Brasileira de (SBF), one of the most traditional of Brazil: for the first time, a woman was elected as president. Professor Débora Peres Menezes, Universidade Federal de Santa Catarina (UFSC) and standing member of the Academia Brasileira de Ciência, assumed institution leadership and represented a new moment of feminine participation in scientific institutions.

But this ascension did not happen without resistance. After all, of the 9 thousand SBF associated, only 27% are women. In the new slate elected in 2021, half of the directory is feminine, a considerable change for a research department dominated by men. To spotlight searches carried out by scientists and also to popularize science close to the lay public, Débora maintains the channel "Mulheres na Ciência" (Women in Science) on Youtube with volunteers. Recently she created a profile on TikTok to call attention to relevant subjects, such as vaccine development.

Physics is a very male area. Why does it not attract girls?

All children are born with an innate ability for science, which is curiosity. They want to know why and how some things work. What cuts out this curiosity is family and society.

Several gender stereotypes are mighty in our society. Start with toys. Toys for boys are for building, running, and playing, while the toys for girls are pots and dolls. In general, girls are taught one way and boys another.

And there is a genre stereotype linked to Math, which still is very strong. Tell a girl: 'Math is a boy thing, engineering is a boy thing, you can not be good at math'. And the girl is not good. It is what they expected from her. Why would she study math if it is hard and not for her? Of the 100 graduated people in Brazil, only four go to the exact area. Among these four, only one is a woman. We waste a lot of talent from people who could come from other areas related to science and biology because they think it is not for them.

As a researcher and a supervisor, do you help women to follow in Academic Careers and be highlighted in the Physics area?

I have never spoken about this subject of women. I had a successful career, and this genre subject was not part of my speech, but I received an invitation to work in the genre group of the Sociedade Brasileira de Física. Then, I started looking at numbers, and data, studying texts and began to talk.

From this moment, when I started talking to the department to write a text about it, I began to be wanted by girls. Until that moment, I had tutored only one girl. I had only guided men in my life. Since then, girls have been looking for me.

What does within the academic logic jam the ascension of women yet?

The scissors effect cuts out women from ascension. Then there are several things: there is something about women not being urged to compete because they play with dolls, not with games. When they face competition, a lot of them are frightened.

The maternity. Unfortunately, it is a burden for women. Now, in the pandemic, it did become much clearer. Some steps need to be overcome, but that moves women away from leadership careers.

You have to be dedicated, have to be available to face some things to be able to grow in your career. Many women are cut out, sometimes in a painful way.

> **"All children are born with an innate ability for science, which is curiosity. They want to know why and how some things work. What cuts out this curiosity is family and society.**
>
> Débora Peres Menezes

How was your career beginning? Why did you decide to study Physics?

I decided to do Physics because I liked Physics and Math a lot. But also Portuguese a lot. I always write too much. We write papers all the time, but it is much more specialized. I did not have clarity when I was a student.

And also that history that I had in my mind, that I had to be a school teacher. I thought I had to be a school teacher because it would be my social contribution. And I went. I was approved for a public examination and went to teach in São Paulo's suburb. I spent six months there, and I could not stand it.

You choose nuclear physics. What attracts you to this area?

It is very by chance. When I entered Physics, I had that history of being a teacher. At Universidade de São Paulo (USP), the first two years were basics, with teaching and a bachelor's degree. I have spoken that I wanted to do a teaching degree. I went for a bachelor's degree and began to do an undergraduate research project.

I had a classmate who, after that, was hired here at UFSC, who told me he was doing an undergraduate research project with a professor called Emerson. He is decent and works with theoretical nuclear physics. So, I went there looking for Emerson, and I loved him. It is what we have to do with a student: he gave me a short article and told me to come back next week to discuss what I had or did not understand. I came back, and he asked me if I could reproduce the math accounts and was so happy with that discovery moment.

I did a master's degree in this area and liked it. I applied this knowledge to the Doctoral degree at Oxford. In the meantime, I did a public examination to work with medical physics. I thought: will I spend 30 years doing the same thing? I realized that while I was learning, it was too much news, but after all, it would be a technician job and not a researcher job. I quit the job and left.

In England, I bumped into these women things. We found micro barriers, there are micro attacks that I did not have clarity on.

When I arrived at Oxford, I went to the room of my supervisor, chosen by me, and he said: "I heard that you are married." I confirmed it. So, he said: "Do you think you get this?". I answered that I would. He said, in the first year, the courses were too hard. He asked me to take the classes if I got it in one year, I could return.

I talked to a classmate who was from Portugal: "I wanted to start some search. Will I spend two months waiting for the next term doing nothing? So, I went to talk with her supervisor. He received me saying: "You are married".

The fact that I was married, everybody knew it. There were three women, and one of them came here, married. It seems that I went there to have a child. He asked me: "How many children do you want?" I said I did not know and had never thought about it. Ele said: " Will you not have a child in England?" I answered: I do not know I came here to do my Doctoral degree, not to have a child!

I did my doctoral degree in record time. Even I saw a letter written about me another day where they said that I did the shortest doctoral degree in the institution's history.

I did it in two years and a half.

I encountered this sexism in how they look at women in areas with few women. Some women get too unsettled and give up. I bothered my supervisor, and I went to work with another one.

Do you know what nuclear physics is?
Scan the QRCode and learn
about it with professor Débora

Is it common in Physics?

Yes, it is. It is so common in the world. This kind of thing is so common whenever an area is too masculinized. There is a history of moral harassment, which is also so serious. Because this thing nullifies that women are not able to. And there is the thing about noticing that it is real. I realized that in Oxford.

Beyond episodes in Oxford, at another moment, did you experience discrimination episodes to be a woman?

When I was pro-rector of UFSC, I am not sure how much of it was actual, conscious discrimination, misogyny, or how much of a nuisance it was that it was me and not some man in the department. But there was a lot of resistance in the department.

What did they say? Were men giving this feedback?

Always. Several professors wrote in the Sindicato dos Professores das Universidades Federais de Santa Catarina newspaper (APUFSC), complaining, instead of talking to me, to make proposals. They said: "She wants to rule, to change everything." Then you see what completely sexist behavior is.

What was your reaction at that time?

I was commanding the Research Pro-rector. I could not get into fights against people. I tried to talk, but if they did not want to, what could I do?

I heard things like: "When you leave to be pro-rector, stay here, quiet in your room so they will forget you." You notice that is the thing because my presence bothers them. The fact that I make decisions and bother the department.

Today, if you would get invited again to be pro-rector, would you accept?

Nevermore. I think someone has to do the service, but it is not what I like to do. I worked 12 hours per day. I almost did not have time

Doctoral degree in record time
At Oxford, in England, the SBF president finished her dissertation in two years and a half

for my research. At that time, my son was a kid. Then I had a higher family demand than now. Then it was too much work and without recognition. Far from it, it seems I was doing nothing, was trying to harm someone. It was the review that I had done about my coworkers.

I wonder when I returned when the management was over, I bumped into a professor in the hallway, and he said this to me: " Now, you are going to return to work, huh." It is a mistaken view to have a job like that. I was overloaded. Everyday life was too heavy.

The SBF has bureaucracy as well, but it is a lightless bureaucracy. I do not feel this kind of displeasure with necessary things. But it was an experience. Everything is an experience.

Recently you were the first elected woman president of Sociedade Brasileira de Física. How do you rate this unprecedented act at the same time later?

I was the first elected one, but there have already been two other presidents. The other two were vice. What never happened is a woman has been a slate head. There was resistance.

I did not expect to do that either. It was something that happened that was not in my mind. We were there in a group and had to designate a slate. Who was president did not want to go on, who was vice did not assume. Of the group, I was the most senior person. And everybody started to say, "why not?"

I get every time saying that women did not have a prominent position. It was an argument determinant. But there was resistance from the council.

Which kind of resistance?

Some men said, "why do you not stay vice and your vice president become president?". It is a fully sexist argument. Why exchange it?

Do you think if it had a party with a man as a candidate for president, it would be more difficult?

I do not know. I think it was not the moment to have two slates. Science is always so attacked. It is relevant that societies are united. The enemy is not inside of it. I do not know if there would be a mood for another party.

> **"Then this chat among science, society, and scientists needs to improve. And for that to get better, scientists need to equalize their language to talk to lay people about science.**
>
> Débora Peres Menezes

It is the moment for women to be noticed. What is happening to me now is happening in other institutions. If you look at the Sociedade Brasileira pelo Progresso da Ciência (SBPC), it has nine counselors, of which seven are women who were elected now. One of them is from here, Miriam Grossi, a professor at the Centro de Filosofia e Ciências Humanas (CFH), UFSC. So, this is the time for women not to be afraid to expose themselves.

Being the first one, even though lately, it is better than never. But the message remains that other women can be that as well.

What are your struggles with this management?

The main one is communication. It is the most important thing. SBF is a society that does incredible things, but its partners do not know it. It is missing that we improve this communication.

SBF based itself on things that work for people my age, email, and website. But this mechanism you have to go through. You have to open the email, to enter the web page. And younger people get everything on their cell phones. If we want to reach the younger ones, we have to reach the networks they use.

Science has suffered attacks around the world, especially now in the pandemic. How do researchers evaluate this situation?

This thing is linked to a bit of knowledge envy. I do not know, not to have conditions to get it, then I will despise who has. It is one side.

Another is the lack of population scientific literacy in the world. There are two countries in the world where people are considered literate from a scientific view: Finland and South Korea.

In other countries, if you ask why the sky is blue?, an elementary thing, but people do not know how to say it even with a Doctoral degree. It is a lack of basic scientific literacy, a school deficiency. It is an issue.

With all this, there is a side that is missing to scientists: spread science. I do not think everyone has to do it because they have no time. Scientists do not have time to do everything, and a few have devoted themselves to scientific dissemination.

In addition, we are not trained for it. There is no training to do scientific dissemination. It is not part of a master's or even doctoral degree. Perhaps, that will change, and these people have realized that it is essential to communicate what science is to society.

Because if we do not do it, people will believe what is to science.

Then this chat among science, society, and scientists needs to improve. And for that to get better, scientists need to equalize their language to talk to lay people about science.

Then this chat among science, society, and scientists needs to improve. And for that to get better, scientists need to equalize their language to talk to lay people about science.

Has the scientific community learned or is it learning something from this anti-science movement?

People are coming to their senses and are noticing that scientific dissemination is essential. I will repeat: I do not think everyone has to do it because they have no time. We do better at what we like to do. I enjoy doing it. I had a museum, and now I have a channel on Youtube. I like it, but it is not easy. But I believe that everyone has to support those who do that. /

Were you curious?
Scan the QRCode and find out.

Women in Science
Access the channel and meet other researchers made by women.

Angel Investor

Divine push for startups

From the Broadway theaters, in the United States, to the corporate world, the expression angel investor contemplates the financial support, **knowledge, mentoring, and networking** for entrepreneurs with good ideas and the desire to grow.

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Illustration Jenyffer Albuquerque
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Those who had a startup already needed extra money to start over their business, to complement some action, or still advance in the market. At this moment, when they do not have their cash, the angel investor shows up.

The expression angel investor or business angel is not recent. It appeared in the 1920s in the Broadway theater in New York. At that time, some businessmen paid for the high costs of theatrical productions, supporting the execution and participating in the financial feedback. In this context, those people started to be known as angels.

With time, the concept was evaluated. Today it is more used to name those who invest in a beginner business, usually startups, that look for growth opportunities.

"In 2021, R$ 1,2 million were invested in startups from Santa Catarina"

Fábio Ferrari
President of Rede de Investidores Anjos (RIA)

Disclosure, Marvee

Blessed
Manoel V. Tomaz (left), Daniele Guarez, and Rodolfo L. Bloemer, from the startup Marvee, in Blumenau, have received R$300 thousand.

Innovation hub in Blumenau shelters SC Angels

Since the *Centro de Inovação Blumenau* (CIB) opened in 2020, several angel investors have arranged to provide resources in large quantities to startups from Santa Catarina. It was the connection with this important hub of innovation that boosted the chats that promoted new business. Thus, in March 2021, SC Angels was created, an association of angel investors that started with 50 people and today has almost 90 investors spread across the State.

"The CIB is where the connections happen, and there is no angel investment if there is no connection. Therefore, the CIB is a caldron where everybody meets ", says Rafael Silva, SC Angels president. Silva has been an entrepreneur since 2002 and an angel investor since 2011, with 37 businesses in action.

In Santa Catarina, according to the president of *Rede de Investidores Anjo* (RIA), Fábio Ferrari, about 60 associates compose the entity board, which was born in 2016, a partnership between *Associação Catarinense de Tecnologia* (Acate) and *Anjos do Brasil*. " In 2021, R$1,2 million was invested in startups from Santa Catarina. In 2020, a group invested around R$ 300 thousand", says Ferrari.

Movement grows in Brazil

Thereby in Santa Catarina, the angel investors are raising in Brazil. According to the *Anjos do Brasil* survey, a non-profit organization that promotes innovative entrepreneurship, in 2020, 6.956 investors were registered in this rank.

In the same year, according to the entity, R$ 856 million was invested in startups.

"In 2021, the first year of existence, the *SC Angels* made contributions to two startups totaling R$ 500 thousand in investments. In 2022, our goal is to invest, at least, in four new businesses in the South of Brazil", highlights Cacio Packer, *SC Angels* director and co-founder and startup investor for more than five years.

The choice of who to invest through virtual or face-to-face pitches is made monthly. Pitches have already been held in Blumenau, Jaraguá do Sul, Itajaí, and Florianópolis, all with qualified evaluators specialized in the world of startups.

Investment to boost innovative entrepreneurship from Santa Catarina

Keep an eye on this new opportunity, the Marvee startup, based in Centro de Inovação Blumenau, decided to accept the proposal introduced by two angel investors of R$ 300 thousand. Founded in February 2020, called M. Victor, the expert startup in financial BPO and a positive record did not need capital too soon.

"The angel investors were on our radar. We wanted to deliver more things first and then search for investors. At the beginning of the second semester in 2021, they came to us to believe in our team and project. Then, we got ahead", comments Manoel Victor Tomaz, the Marvee founding partner.

The entrepreneur says that part of this value was to be applied, mainly in the technology area, because one of the investors realized the necessity to enlarge and update the company in the sector.

"We had this goal for the 2021 end, but overcame the planned billing between 20 and 30%", completed Tomaz. With the investment, the goal is to triple the current customer base in the next two years, beyond raising the team, crossing 15 employees to 50 in the next 18 months.

This fast growth projection does not happen only for money applied by angel investors. These figures have the included role, with assistance known as smart-money, i.e., capital accompanied by knowledge.

Angel investors often do not have the time to be involved in the operation or donate themselves fully to the business. Therefore, in most cases, They start integrating the company consulting board and have access to movement to guide and advise once their know-how comes to auxiliary and point out essential steps.

"The angel delivers something intangible, i.e., their networking, becoming a startup mentor and counselor", evaluates Manoel Victor.

Who can benefit

Cacio Packer, the founder of SC Angels, explains that the association operates on three main axes: training people with a profile to invest, providing investment opportunities associated with more experience, and strengthening the participation of everyone in the investment process.

There are three associated types: supporter, investor, and entrepreneur. " In association, we have an investment thesis among them, it has two or more partners, business model B2B and scalable, to have an initial revenue and to pick up around R$ 1 million. But, in case our associate has interests in a particular business, they have total independence to invest", highlights SC Angels founder.

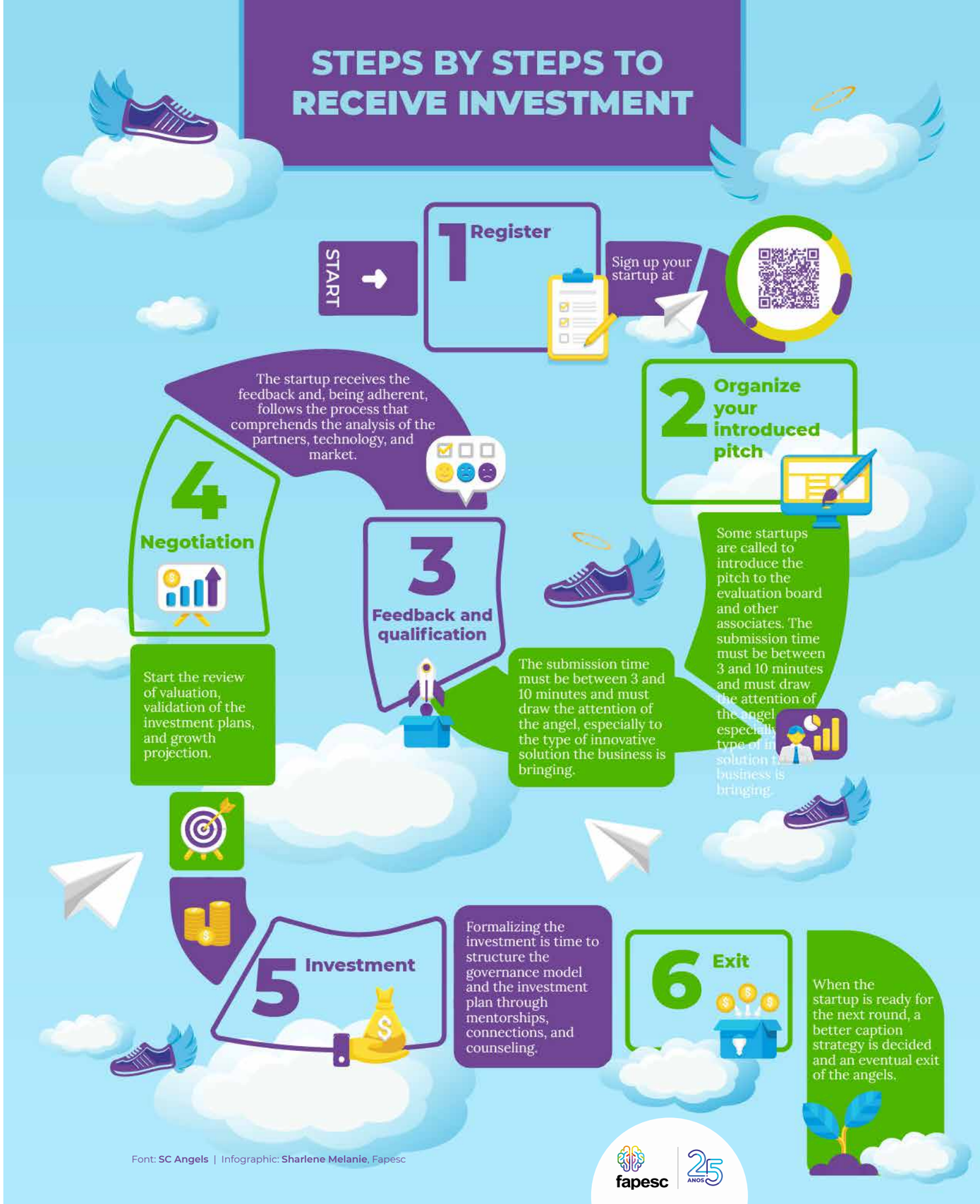
So it was the case of the startup specializing in BPO financial M. Victor to deliver independent angel investors capital, although associated with SC Angels.

2020

Brazil
6956 angel investors
invested R$856 million

Santa Catarina
60 angel investors
invested R$ 1.2 million

Font: *Anjos do Brasil* and *Rede de Investidores Anjo*



Who can be an angel investor

But, after all, who can be an angel investor? It is one of the main questions that appear in this subject. Having money is one of the basic requirements. An Angel investor is an individual, either a businessman or entrepreneur, who applied their investment, i. e., their patrimony.

Usually, the indicated percentual to start is between 5 and 10% from available value to investment. In amounts, something from R$ 20 thousand. But it is recommended not to compromise more than 10% of their property.

Furthermore, it needs to be prepared. "This is a high-risk investment, something that will give a return in six or ten years. If the business did not work, the damage might not affect your assets too much," explains Thiago Nicchellati, consultant of new business and innovation at Centro de Inovação Blumenau, over 12 years of teaching experience in undergraduate and graduate degree courses in the business management area.

> **"It needs to understand that it is a journey investment and not a financial one. And, yes, it is a very high risk. You must be prepared for anything", says the *SC Angels* president, Rafael Silva.**

Even recognizing the risk, Rafael does not give up on investing. "I always recommend it because I believe that is the Fountain of Youth: we grow up, lose it, earn it, learn it and renew. I invest because I believe in people remaking power", reports.

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And that is what Thiago, and many other entrepreneurs who have already received contributions from angel investors, believe. "Many times the company CEO wants to take smart for business, take the knowledge of investors, not only money", highlights him. /

On the other side
Thiago da Silva received angel investment, and now he invests in startups.

Personal collection

Scientist for life

A member of 100 thousand of the most influential scientists in the world, doctor, and researcher at *Universidade do Extremo Sul Catarinense*, **Felipe Dal Pizzol** acts on the front line in the fight against the pandemic, leading researchers with patients infected by the new coronavirus.

Mayara Cardoso
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The house of brothers Henrique and Rafael Ritter Dal Pizzol, 19 and 16 years, in Criciuma, South of Santa Catarina, is home to one of the most influential researchers in the world. The space the teenagers share with their parents is the refuge of doctor Felipe Dal Pizzol, one of the references in actions against Covid-19 in Santa Catarina.

At 46 years old, the father of Henrique and Rafael, married to the doctor and teacher Cristiane Ritter, is one of those responsible for the recovery of many survivors of the pandemic from Santa Catarina. But those who see Dal Pizzol exercising, listening to music on his headphones, and running around Congresso Square, Criciuma's downtown, do not imagine what is in his mind.

The shy and reserved way of the professor from Programa de Pós- Graduação em Ciência da Saúde at Universidade do Extremo Sul Catarinense (Unesc). Who shows papers at international events and acts on risky medical procedures does not say the broad influence of his scientific knowledge.

Photos Daniela Savi, Unesc

Among the most influential in the world
Felipe Dal Pizzol integrates the select ranking published by the scientific magazine PLOS Biology from the University of Stanford University (USA), which uses the quotes from the Scorpus database and updates the researchers in two rankings: impacts over the career in only one year, in his case 2019.

The Unesc professor is on the list published in 2020 by Stanford University (USA) of the researchers whose careers had more impact on science and has participated in 359 scientific studies published. Dal Pizzol had developed searches since 1996 when he was still an academic in the Medical course at Universidade Federal do Rio Grande do Sul (UFRGS) and joined scientific research projects. He completed the undergraduate course in 1988, and 20 years ago, he joined Unesc.

Recently, his dedication to science surrendered a new acknowledgment. In 2021, the professor was highlighted in another rank, this time among the most influential researchers in Latin America. In the study, accurate to the AD Scientific Index, a measurement system of scientist potential of the whole world, the doctor came in 102nd among Brazilian doctors and 138th among Latin-American doctors.

Acknowledgments like these put the researcher from Unesc in evidence in the science world. Dal Pizzol was also one of the six researchers from Santa Catarina chosen to compete nationally in the First Science, Technology and Innovation Confap Awards- Professor Francisco Romeu, winning third place in the category Highlighted Professor- Science of life- Professor Destaque- Ciência da Vida.

Daniela Savi, Unesc

Studies around the pandemic

However, many awards are not able to inflate the *gaúcho* (a person was born in *Rio Grande do Sul* state) ego with a Santa Catarina heart. For him, all the awards show the recognition that he is on the right track in his Medical and teaching careers. "There are award students in national and international events. It is so important. Thus, we realized how well they are trained. It is what the university wants: the students have each time much more featured", adds him. It was the first sign of the covid-19 pandemic in March of 2020, the doctor put his knowledge available, seeking solutions for the worldwide issue.

One month later, when the scenario pointed to more doubts than certainties, the researcher joined the group of ten professionals in the country involved in the formulation of The Guideline for the Covid-19 Diagnosis and Treatment, material for the Ministry of Health that gathers recommendations for professionals who work in the pandemic combat.

During the tiresome routine attendance at the intensive care unit, Dal Pizzol was contemplated by National Council for Scientific and Technology Development (CNPq) with the project Prospective, Multicenter Study of Predictive Factors of Hospital Mortality and Burden of Disease from Severe Acute Respiratory Syndrome- *Estudo Prospectivo e Multicêntrico dos Fatores Preditivos de Mortalidade Hospitalar e Carga de Doença da Síndrome Respiratória Aguda Grave*.

In the effective vaccine production against coronavirus, the Dal Pizzol searches did not leave out either. Group member of *Coalizão Covid Brasil*, acted with other professionals on medicine efficiency and security evaluation for patients with Sars- CoV-2 infections. The group formed by professionals from six hospitals of the Brazilian Network for Research in Intensive Care Therapy- *Rede Brasileira de Pesquisa em Terapia Intensiva* and the Ministry of Health, realized nine studies involving professionals from over 40 Brazilian hospitals, including Hospital São José, in Criciúma.

Scientific Research at the beginning of the career

Unesc collection

> "Be a researcher is to be an innovator and to be always ahead of the knowledge border.
>
> Felipe Dal Pizzol

Even as a freshman, in the first study phase, at the biochemical department from *Universidade Federal do Rio Grande do Sul* (UFRGS) in Porto Alegre, Dal Pizzol got a vacancy in the lab and joined the universe of Scientific Research. Until then, research was not a path that he imagined for his life.

"Luckily, I got the vacancy and never left this area aside. It has already been 20 years. Today, if I need to choose between being a doctor or a researcher, I choose to be a researcher", the researcher affirms proudly.

Currently, the lab where he acts at Unesc highlights the context of encephalopathy of Sepsis, with published high impact in the world. Being a part of the science world is a proud and challenging synonym for him.

"Be a researcher is to be an innovator and to be always ahead of the knowledge border", says he.

Medicine course creation from Unesc

It was the dedication to scientific research, especially around Sepsis, that encouraged the invite that would change the researcher's life. Two years after, between comings and goings to Criciuma, where he taught, and the State of Rio Grande do Sul, Dal Pizzol was invited to join the team that gave the first steps for medicine course creation from Unesc in 2000.

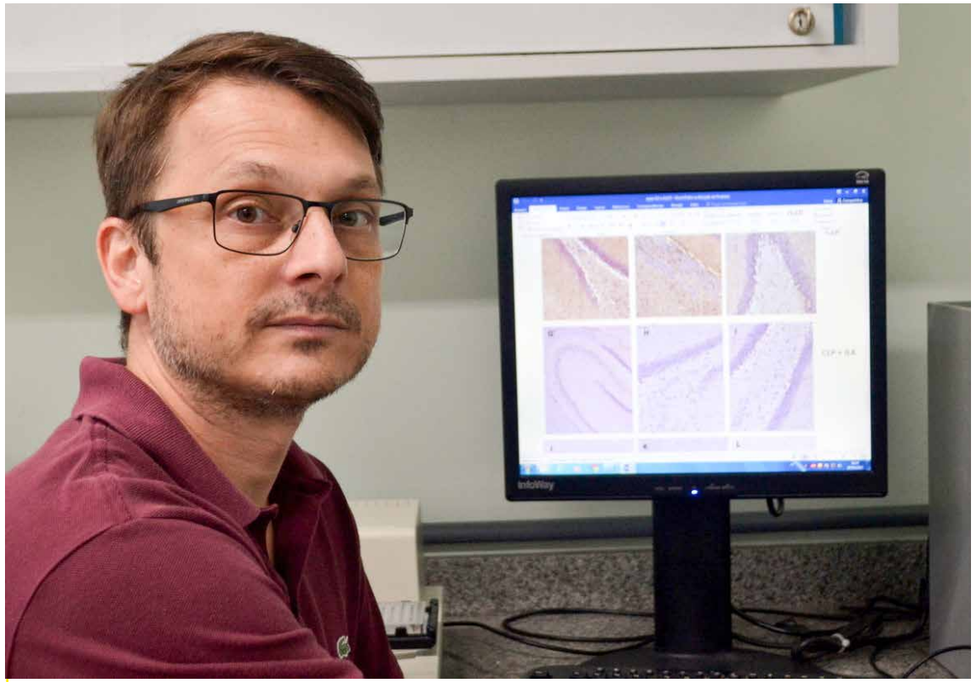
The young doctor, who collaborated with the course expansion, one of the most highly regarded in the institution, saw in the charcoal city potential to build his career.

The work realized over two decades, learning, teaching, and most caring, was able to offer him the feeling of belonging to the land that received him when he arrived by himself. "I already feel as a *catarinense* (a person who was born in Santa Catarina) and criciumense (A person who was born in Santa Catarina city of Criciúma)", guarantee.

The doctor participated in all of the university's growth. With Dal Pizzol's participation, the medicine course took shape and bore fruit, as well as the labs and the graduate degree programs. The decision to stay in Criciuma was a bet on the university's growth. "Unesc bets on our ideas because it has features that look forward to the future. I decided to stay because I saw that university was progressing, and I chose to be part of this", he adds.

Falling in love with Unesc, Dal Pizzol still emphasizes the institution's community character and the return of its actions on behalf of the community. "This system is interesting. We have a university with a character like United States models, with institutions in small places with a huge development power", compared.

"We work to solve problems that may impact people's lives"



Unesc collection

Unesc Medicine
The professor Dal Pizzol is part of the team responsible for the creation of the Medicine course from the *Universidade do Extremo Sul Catarinense* in 2000

Unesc collection

Applied Research
Expert in Intensive Care and Pulmonology Medicine, Felipe Dal Pizzol is one of the most important doctors responsible for the evaluation of the pandemic scenario in the State

The pandemic arrived, however unpredictable, putting to the test all the knowledge and action power of the worldwide scientific community. Expert in Intensive Care and Pulmonology Medicine, Felipe Dal Pizzol is one of the doctors responsible for the pandemic scenario evaluation in Santa Catarina.

For the doctor and professor, the research level from Santa Catarina shows the constant ascension and a very different scenario from years ago. "The research advanced. In my area, for example, there were few references. Today, the universities invest in search, and our production is important in the country", pointed out.

For him, the moment, though challenged, shows the natural way of the researcher in the confrontation challenges and the capacity to collaborate. "We never imagine that there would be a virus, but study, and we are ready for it: solve problems that may impact people's lives", highlights.

With the decrease in the number of cases and the loosening of the biosecurity rules, according to the researcher, the perspectives for the pandemic are of the coolant. For him, the data shows that Covid seasonality indicates an endemic, like the Influenza virus is endemic in winter.

This experience lets us be more prepared for the next, considering that every 20 or 30 years the world suffers something in this way. We learned to do fast and more applied research to combat the pandemic", pointed out. "Devastatingly, it was a way to expose to society the importance of knowledge creation and research work", concluded. /

Photo Report

Science, technology, and innovation from Santa Catarina are in focus

Photoshoot about the Covid-19

Photos Ricardo Wolffenbüttel
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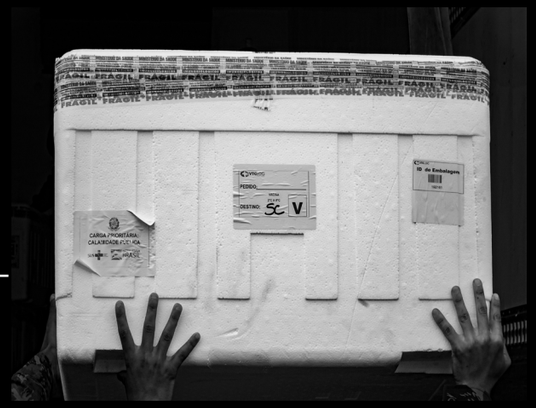
From the lockdown to the vaccine arrivals, the **visual chronic** about coronavirus pandemic in Santa Catarina in 2021

Empty City
March 2020
Nobody on the streets, squares and beaches

Lockdown in SC
March 17th, 2021
Closed trade and Collective passenger transport suspended

The world on hold
The passenger transport and the vaccine arrivals



The wait is over
January 18th, 2021
The first vaccine dose in Santa Catarina

On the front line
The tireless work of the professionals to save millions of lives from Santa Catarina

The hope message
Life first

Reinforcement
December 8th, 2021
The beginning of the application of the second dose

Access the documentary about the vaccine route in Santa Catarina

UNIARP
50 years of knowledge in the Santa Catarina middle-west

Rectorate in Caçador
The Universidade Alto Vale do Rio do Peixe counts for two campuses, one in Caçador and another in Fraiburgo

Photos: Angela Cardoso, Ascom Uniarp / Uniarp collection

Everything starts with 150 students and three undergraduate courses: Science, Pedagogy, and Languages. Now 50 years have passed, and the Uniarp celebrates its history aside from over five thousand students and **30 undergraduate and graduate programs** at Caçador and Fraiburgo cities.

Angela Cardoso
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Professor Mariluci Auerbach was only 11 years old when the first higher education institution settled in Caçador, in the middle-west, on July 31st, 1971.

Today, at age 61, the Master in Education may say that she has closely followed the growth of the Universidade Alto Vale do Rio do Peixe (Uniarp). Mariluci made part of the institution's 50-year trajectory and already occupied many positions: she was a professor, coordinator, and principal. Currently, she is responsible for pedagogical coordination.

"Uniarp suffered a huge remaking in the last years, with the enlargement of your spaces, new courses, and investments in learning, research, and extension," she says.

In 1981, the professor attended the Fundação Educacional do Alto Vale do Rio do Peixe (Fearpe), as it was known as the Uniarp predecessor at that time. She was in her second year of pedagogy when she received an invitation to teach Sociology at the magisterium. Since then, your professional career has always been linked to Uniarp.

From 3 to 30 courses

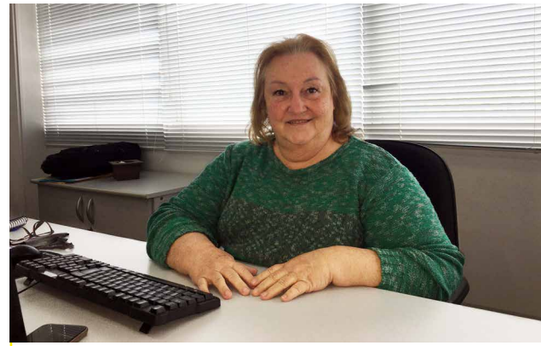
The first undergraduate courses offered in the second biggest city in Santa Catarina west were Science, Pedagogy, and Language. In the beginning, there were 150 vacancies; the majority of students were teachers from Caçador.

But it did not take long for the dwellers from nearby towns, like *Rio do Sul*, *Campos Novos*, *Curitibanos*, *Matos Costa*, *Arroio Trinta*, *Piratuba*, and *Videira*, to seek opportunities in the new college.

The inaugural lecture at the Pedagogy, Science, and Languages, with the then governor of the Santa Catarina State, engineer Colombo Machado Salles, happened on June 13th, 1972, at Cine Avenida. The event also counted the participation of Bishop Dom Orlando Dotti, the first institution director.

The college grew up, gained the status of a university in the 1990 's decade and the name *Universidade do Contestado* (*UnC*). After that, on December 15th, 2009, the Uniarp was instituted.

Currently, the university offers more than 30 courses, including bachelor, teaching, and associate degrees, split into areas: Social Applied Science, Exact and Earth Science, Health Science, and Human Science. /



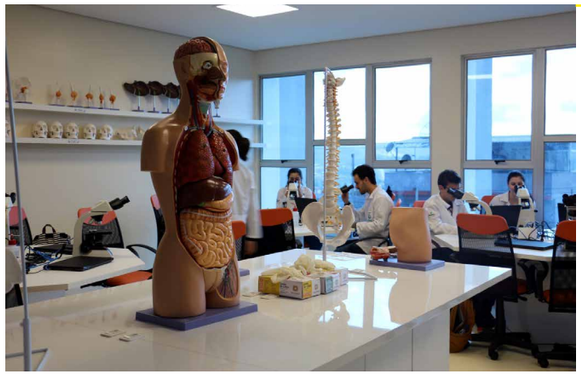
42 years of history
Mariluci Auerbach, from student to principal

New building in 1975
Fearp Founder, bishop Dom Orlando Dotti (right)

The inaugural lecture in 1972
Ex-governor Colombo Salles with the microphone

Regional Development, Culture, and Science

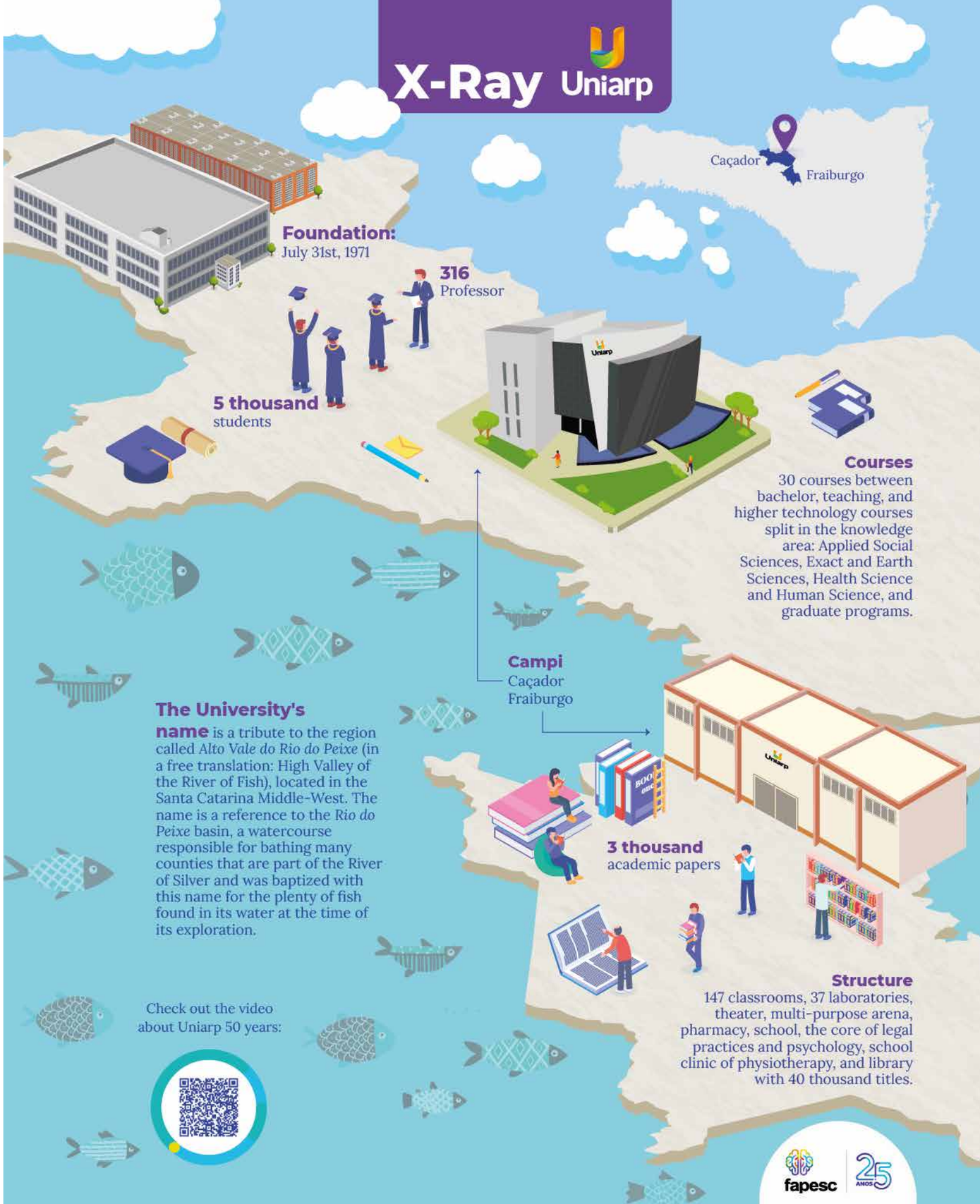
Laboratories
More than R$27 million were invested, in the last years, in new classrooms and laboratories destined for teaching and research practices



Community service
The School Pharmacy, the School Clinic of Physiotherapy, and the Core of Legal Practices and Psychology offer free services for the community. Check out the Fapesc Magazine website

"Uniarp arrived at 50 years old with financial, technological, and academic optimism and maturity. We go on elevating the levels of knowledge and investigating the university practices that value and incentivize social entrepreneurship and regional development. With investments in infrastructure in nearby towns, we are contributing with a quality of services in health and education. We believe that the university's role is to be a knowledge transformation agent on behalf of the quality of life of people.

Anderson Antônio Mattos Martins
Uniarp Rector



Personal collection

Researcher: Schirlei Russi Von Dentz
Dissertation: *School Inequalities and Higher Education: The Affirmative Actions at Universidade Federal de Santa Catarina*
Graduate Program in Education at *Universidade Federal de Santa Catarina (UFSC) Florianópolis*

Access the dissertation of the researcher

UFSC: before and after the Affirmatives actions program

A researcher compares data of students from Universidade Federal de Santa Catarina and highlights how the school diploma of parents influences the approval of young people in undergraduate courses, even after the **implantation of the quotas system** at the institution in 2018.

Amanda Souza de Miranda
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The hypothesis that the social origin and the identity question of genre and race, for example, influence access to Higher Education has been confirmed in the recurrent form and bare for Social Sciences, The Inheritors: French Students and Their Relation to Culture, by Pierre Bourdieu.

But how does this present in numbers and involve people's lives? It is one of the questions answered by researcher Schirlei Russi Von Dentz in her Dissertation, School Inequalities, and Higher Education: The Affirmative Actions at Universidade Federal de Santa Catarina defended the Graduate Program in Education at Universidade Federal de Santa Catarina (UFSC).

In the study, the professor investigated 12670 new student registers at the university and did 48 interviews with teachers and students. Among other findings, it concluded that parents' school capital directly influences the children's approval in the university entrance examination.

The research used data referencing the years 2003 to 2007, before the affirmative politics existence at UFSC, and 2008 to 2018, the period the quotas system already existed.

Besides, having numbers about the access of whites, browns, and blacks from public and private schools confirm the importance of institutional actions for diversity raising, Schirlei went to the registers to understand what, in some way, already appeared in interviews: even though that configuration to access Higher Education has changed, there are necessary marks to be discussed for her.

"The affirmative actions project the idea that students less capitalized could enter in superior numbers at university, but it does not occur", explains professor Schirlei.

In Brazil

Instituted for the ex-president Dilma Rousseff, the Law 12.711, known as the quotas law in Higher Education, completes ten years in 2022. Through it, the federal education institutions linked to the Ministry of Education must preserve, every entrance exam in courses and shifts, at least 50% of their vacancies for students that had attended fully high school in public schools. Yet, for each income bracket, the institution must reserve vacancies for black, brown and indigenous people from the proportion of these groups in the state of origin.

The concept of capital is used by the sociologist Pierre Bordieu to define the power that can be cultural, social or even economic. In the research, the author approaches this concept of the educational degree and uses the school capital to refer to the educational degree power in an unequal society.

Parents' school formation x children's approval

The concept of school capital was an approach with which Bourdieu, the principal reference research theoretical, dominates cultural capital. In the study, Schirlei investigated the relationship between the school formation of parents and their access to the learning system with the approval of children in the University Entrance Examination in the UFSC in high, medium, and low concurrence courses.

"I hypothesized that, from the affirmative actions, there would be a rise in access to children of popular class parents. But with the data access, I identified another question", explains professor Schirlei.

The research does not work with the class concept of the economic point of view but with education access. Thus, it is treated as a popular class whose parents did not have access to the system or ended school education in middle school. Already the middle class refers to those who did or ended High School, and the high class to those who did or ended undergraduate and had access to graduation.

The dissertation goal, supervised by professor Ione Ribeiro Valle, was to evidence the political impact of affirmatives actions in the university space of UFSC, but in a comparative interpretation that takes into consideration a while ago, most homogeneous and elite universities, when there were no quotas, a long ten years of policies implementation of affirmative actions more complex and heterogeneous.

The researcher carried out a study articulating data from school diplomas of parents who had access to the University Entrance Examination in the most crowded, high-middle crowded, and the competition medium-low, and the least crowded.

From this crossing, the difficulties of access for children of popular class parents started to bear, especially in more crowded courses and even among those who access the university by quotas.

One of the most striking examples, in this case, is the Medicine course: of all new students with records studied in the four years of cut, 69,70% have parents with higher education, and only 7,3% are families whose parents have middle education.

"With these data, I also identified among courses of medium-high competition, the students at Technology Center- Centro Tecnológico (CTC) are the most elite concerning school capital from the country. Very few are in the popular classes," she explains.

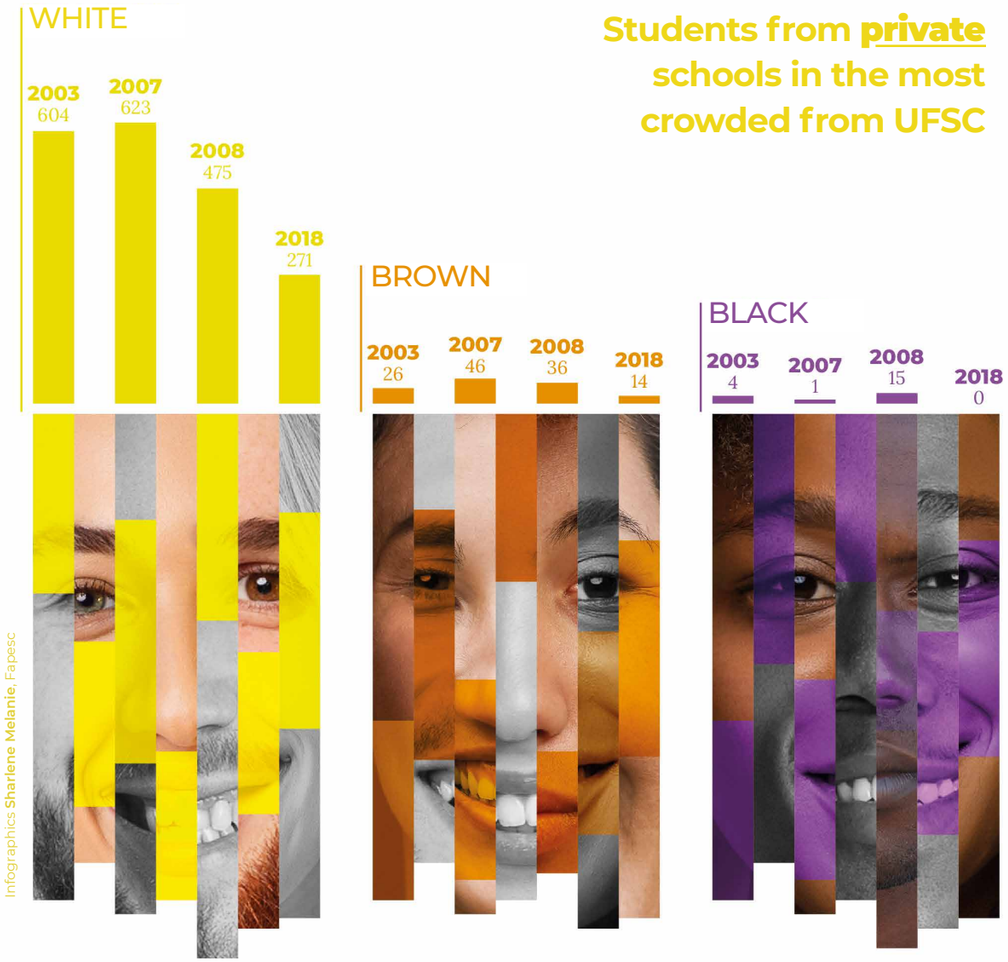
According to Schirlei, affirmative actions made quite a difference in the pattern of these courses. One example is the Mechanical Engineering course: in 2003 and 2007, before the existence of affirmative, there was no register of students with parents from popular classes. Already in 2008, there were three, and in 2018, eight.

Even so, the researcher's analysis is equivalent to that of the sociologist who accompanies her in the study. "Bourdieu said that the school tends to reproduce social inequalities. Affirmative actions project the idea that students less capitalized could enter a great number in the university, but this is not the case," she comments.

Even so, reaffirming the research, these politics are necessary to correct an unequal system.

Children of parents with Basic Education in the 10 most crowded courses from UFSC by race and color

Infographics **Sharlene Melanie**, Fapesc

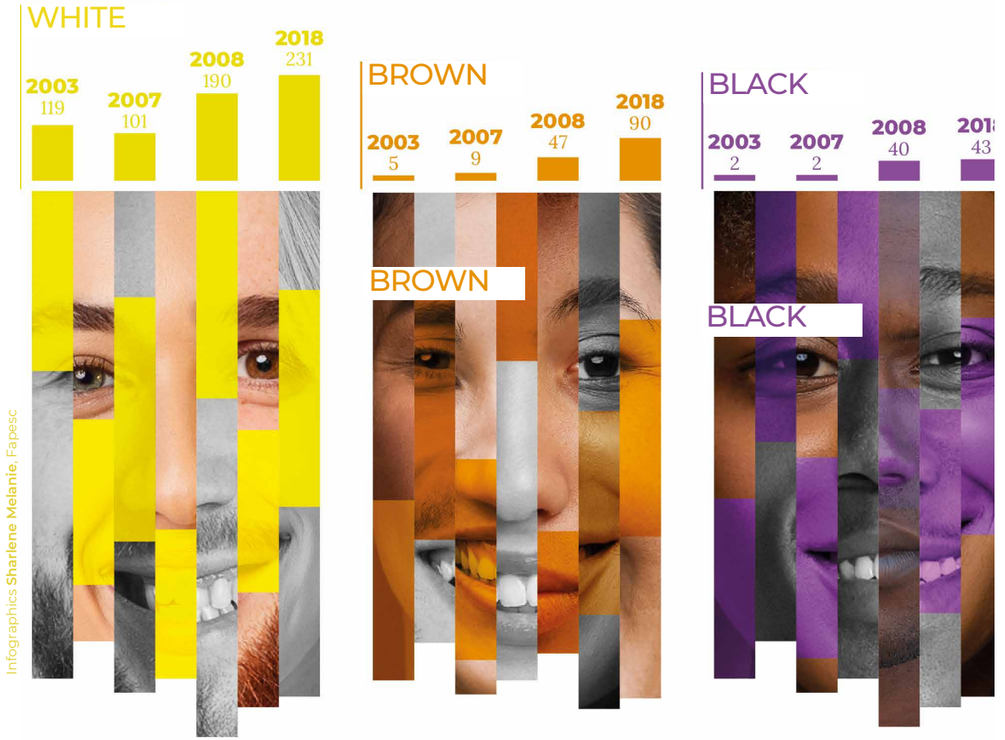


Technical education as preparatory

Another data that may indicate more chances of access to free Higher Education via the University Entrance Examination refers to students in federal educational institutions. "In the interviews, I heard a lot of reports from young people that studied at IFSC to guarantee better performances in tests, such as math and English," she says.

In the ten most popular courses, for example, to 879 student registers of public schools analyzed in four years of cutting, 130 were students from federal institutes of education. Despite this, when the race cut happens, the numbers register an inequality: from 364 students, 231 are whites, 90 are brown, and only 43 are blacks.

The preparation for the University Entrance Examination stood out, particularly in interviews done by researcher Schirlei: one of them, an indigenous student, said that he did half of an undergraduate course in a private university to feel prepared to join the public system.



Structural Issue

Schirlei focused your study on data from UFSC, whose quotas system has operated since 2008, but recognizes the problem is structural. For her, possible solutions to correct these distortions would be the expansion of vacancies or universal access and the strengthening of Basic Education, an engine of inequality.

"The basic education should be equal for all, but the lack of investments in education is whopping," she says. A possible weakness at this point in the network makes students come to University Entrance Examination with an unequal prepared level, which impacts the data of access and also the institution's diversity.

The researcher remembers that the interviews show other aspects, such as the low numbers of black professors and the difficulty of socialization between students from popular and high classes, considering that the leisure spaces demand a higher economic power. /

Fritz Müller
A rare record of the naturalist, at 69 years old, in Blumenau

The prince of nature observers

200 years ago, was born **Fritz Müller**, the german naturalist who lived in Blumenau and Florianópolis, helped Charles Darwin to consolidate the theory of evolution of species

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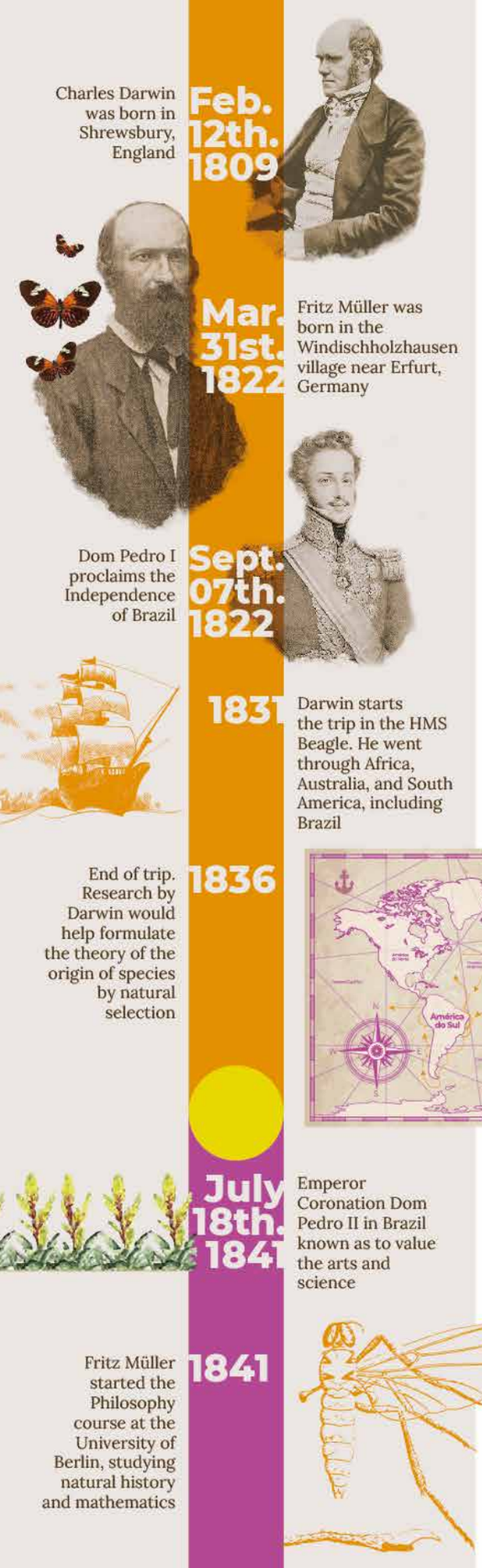
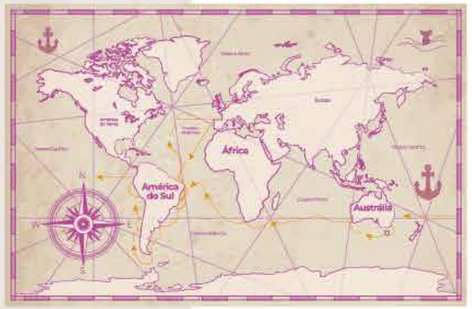
Videos Caroline Costa - caroline.costa@fapesc.sc.gov.br
Photos Gabriela Garcia - gabriela.garcia@fapesc.sc.gov.br
Edition Nanda Gobbi - nanda.gobbi@fapesc.sc.gov.br

Fritz Müller Museum of Ecology from Blumenau colletion



In the middle of the 19th century, Fritz Muller, a German rooted in Santa Catarina, used to explore the *Praia de Fora* in Desterro (current Florianópolis). Many times, with his little daughter, Rosa. He walked on the sand, rummaged through the rocks, went to the mangrove, and got in the sea. He watched and collected small sea animals, such as crabs and shrimps, and analyzed them in a simple microscope. His research in that open-air lab resulted in a book published in Germany, - and helped Charles Darwin consolidate the species evolution theory through natural selection.

On March 31st, 2022, it celebrates the 200 years of the birth of Fritz Muller. Knowing his history is an opportunity to understand the development of science and remember the path of a singular human being, named by Darwin as "the prince of observers." Muller was born in a German village some months before the independence of Brazil. He was a professor, researcher, naturalist, and atheist, at 30 years old when he immigrated to the Blumenau Colony, where he had been a settler for four years. In 1856, in *Desterro*, he became a teacher at the *Liceu Provincial*, similar to the Basic School.



In the Capital of the province of Santa Catarina, he received from a friend the book that would change your way of understanding nature: *On the Origin of Species*. Darwin postulated that living beings were fighting to survive and evolve- and the principal tool from that modification is **natural selection.**

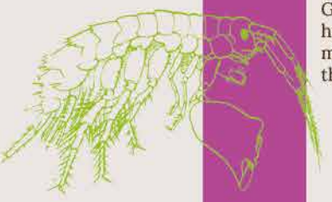
"Fritz Müller was enchanted with this idea and decided to submit to an experimental proof," says the doctor and biologist Luiz Roberto de Oliveira Fontes, one of the main responsible for the rescue of the naturalist work in the e-book *Fritz Müller 200 anos: legado que ultrapassa fronteiras*. He started researching crustaceans, such as crabs and shrimps, to prove the ideas of Darwin - or even to refute them. It was your research project.

The research realized at Praia de Fora, grounded by Beira-Mar Norte Avenue, was published in Germany, in 1864, in the book Für Darwin. After learning about the work, the English naturalist started to communicate by letters with Müller. Darwin still asked permission to publish the book in English, paying all the expenses. Until the death of the English researcher, both exchanged correspondence and scientific information.

Fritz Müller's research began to be introduced in *On the Origin of Species*, the fourth edition. According to the survey of professor Ildeu de Castro Moreira from *Universidade Federal do Rio de Janeiro* (UFRJ), Müller is the third scientist most cited in the sixth and the last edition of the book, with 19 mentions. It is the same number of **Alfred Russel Wallace's** citations, considering the co-author of the theory of evolution through natural selection.

Although, in amid of 19th century, the evolution of species idea had already been discussed for several scientists around the world, the innovative concept was the engine of this change: the natural selection; In 1859, the naturalist Charles Darwin resumed the idea in a book excerpt On The Origin of Species: if occurred useful variations to any organic being, the individuals with such characteristics surely have more chance of to be preserved in the struggle for survival; and from the strong principle of heredity, they will tend to produce descendents with the same characteristics. To be brief, I called this preservation principle of natural selection."

Many times ignored by the lay public and even in the Biology teaching, the British naturalist Alfred Russel Wallace reached similar conclusions as the Charles Darwin ones in an independent way. Even before the publication of the On The Origin of Species , the naturalists presented the ideas in a convention in London. Wallace is also considered the father of biogeography, science that studies the geographical distribution of living beings in space and time.



1842 Fritz Müller spent one year at the University of Greifswald, where he did the first marine research on the Baltic Sea

1844 Back in Berlin, Fritz received a doctoral degree in Philosophy with a thesis about leeches

1845 Fritz starts Medical School at the University of Greifswald

1849 He finished the Medicine course but did not receive the diploma. To be an atheist, he refused to take the oath that included a religious allusion

1852 He arrived in Brazil with his wife Karoline, his daughter Anna, his brother August and his sister-in-law. They lived in Blumenau Colony, Santa Catarina

1856 They moved to Desterro (current Florianópolis), where he became a teacher at Provincial Museum for 11 years

The Breath of Crabs

The evolution idea through natural selection suffered critics and objections and found challenges in some points. The VI Chapter in *On the Origin of Species* deals with *The Difficulties of the Theory*. One of them discussed how living beings far apart on the taxonomic scale had similar organs but they did not have the origin of a common ancestor - how, for example, the electrical organs of some fish.

Darwin showed that by observing closer, these organs, although similar, had fundamental differences in their structure. In other words, they evolve independently. "To test the conclusions reached in this work, Fritz Müller very carefully followed the similar line of argument," writes the sixth edition of *On the Origin of Species*.

Fritz Müller focused on land crabs to analyze this point. Most of these animals are aquatics, but some of them, such as the ghost crab, can live on land. For that, they developed some adaptations to breathe outside the water. "Some species carry some water when leaving the sea for brief periods while others live almost exclusively in the terrestrial environment," explains Alberto Lindner, professor at *Universidade Federal de Santa Catarina* (UFSC). He is an expert in marine biodiversity and a connoisseur of the work of Müller.

If the argumentation line of Darwin has been correct, these structures would have to be different in land crabs in different genres and families. Müller observed and confirmed the hypothesis. How Darwin writes: "In other words, the structures acquired over this process, despite serving the same purpose, will be necessary to be different. According to the theory that defends the actions of independent creation, these cases presented here are unintelligible. This argumentation line seems to have had huge weight for Fritz Müller, who now accepted the theory I defend in this work".

The taxonomic scale, initially proposed by the Swede botanics Carlos Lineu, classifies the living beings in the following taxons, ranging from largest to smallest: kingdom, phylum, class, order, family, genus, and species. In the example cited by Darwin, despite being fish, they were the genus too much different: Gymnotus (knife-fish) and Torpedo (electric ray).

Darwin refers to the creationism or fixist, idea why every species, including the human beings, were created as they are and do not change. Despite being related to religious thought, many scientists had already defended this principle.

It is an example of the research in the book: *Facts and Arguments for Darwin*. And that was cited by the English naturalist. But the work goes further. The book presents, according to Fontes, one of the translators for Portuguese, a set of original observations about crustaceans, including morphology, physiology, ecology, ontogeny, and embryology, only with the support of a simple microscope.

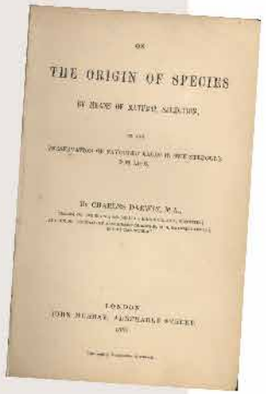
"The book *Für Darwin* seems to have been decisive in the consolidation of the evolutive theory in the academic middle because it was produced by a scientist already known and respected, for some years, in this middle, for the quality and importance of your scientific production, about some groups of marine organisms, mainly the brachiopods and the rhizocephala. Even so, currently, the interpretative board of evolutive discussion changed, and it is undeniable that Fritz Müller's book is the first to verify the evolutive theory and its mechanism of natural selection, with solid observation sets and experiments", writes Fontes in the e-book *Fritz Müller 200 anos: legado que ultrapassa fronteiras*.

The nature and academic education

Fritz Müller had a solid educational background in Germany that started with frequent contact with nature. "Already in the tenderest youth, my interest was awakened by the alive nature through my father, a dedicated researcher of the rich plant world. My first memories are walking through the forest and fields with my father and mother," he writes in a little autobiography. He also did an internship in the pharmacy of his grandfather Johann Trommsdorff, the father of German scientific pharmacy, where he met Hermann Blumenau.

He became a doctor in Philosophy at a time when that discipline gathered most of the knowledge. He focused, specifically, on Natural History and Math. His thesis was about the leeches surrounding Berlin. He also cursed Medicine School but did not receive the diploma. For being an atheist, he refused to pronounce the oath that continues the excerpt: "So help me God and the holy gospel."

1858 Charles Darwin and Alfred Russel Wallace introduce the ideas about evolution through natural selection in the Linnean Society of London



1859 Charles Darwin published the book *On the Origin of Species* by means of natural selection in England

1861 Fritz Müller received a copy of the book and was delighted. He decided to research crustaceans to prove or refute the theory

1862 The only son of Fritz Müller died in the first hours of life

1864 The research of Fritz Müller resulted in the book *Für Darwin*, written in Desterro and published in Germany

1865 Charles Darwin asked Fritz Müller, with whom he regularly exchanged letters, permission to translate it into English and publish it in London

Without expecting the "reactionary trend" or a "change in the religious intolerance" that occurred in Germany, he decided to emigrate to Brazil. He explained it in his autobiography: "I decided to emigrate to Brazil. Firstly for its rich fauna and flora, secondly because he believed that here the german habit would keep easily among the Yankees, and thirdly, mainly, because the founder of the Blumenau colony [Hermann Blumenau] was known to me, and also a long-time friend,"

Along with his wife, Caroline Töllner, and his daughter Anna - the first daughter had died - e with the brother August Müller and his wife, Friederike Hoffmann, departures to the Blumenau Colony, where they arrived in 1852. Fritz Müller lived as a settler but went on doing some searches. "For four years, I lived with an ax and a hoe in the forest, I was good. Being by yourself has its charm; you need to search in the woods and build your own house, your hen house, and pigsties, to clear the land for a plantation, braid the basket, have to slaughter your pigs, etc." related in his autobiography.

In 1856, the president of the province, João José Coutinho, invited him to be a teacher in Florianópolis - some teachers at a Jesuit school died of yellow fever. First of all, he got reticent but later accepted the proposal. In his autobiography, she reported that the 'animal-rich treasures' and the 'old desire to explore the marine fauna' motivated him. He had worked previously with this ecosystem on the Baltic Sea in the North of Germany.

The Fritz Müller passage by Florianópolis used to be less remembered than in Blumenau. The Praia de Fora, the place that the searchers that resulted in the book *Facts and Arguments for Darwin*, even exists today - it was grounded by Beira-Mar Norte Avenue. In spite of your most famous image being related to a simple man that walks through the woods barefoot, UFSC professor Alberto Lindner says that the naturalist was the pioneer of marine biology, ecology, and evolutionary biology in Brazil. Beyond the searches about crustaceans, cited by Darwin, he studied other sea animals such as jellyfish, polychaetes, and corals. Professor Lindner features some tributes by Müller in his discoveries. He describes, for example, a genre of octocorals as the Carijoa (a tribute to indigenous the lived on Santa Catarina Island when the Europeans arrived) and the species called Olindias sambaquiensis (a jellyfish that bears the name of the Sambaqui neighborhood).

Still, in *Desterro*, Müller would start researching **botany,** influenced by Darwin. "In the first letters, it is possible to notice interests of Darwin in botany, notably by climbing plants and orchids, sending Müller his work with these groups. In reply to Darwin, Fritz Müller provides new information about plants from Santa Catarina island that Darwin sent for publishing in Europe, such as climbing plants and bromeliads," Lindner wrote in the ***e-book Fritz Müller 200 anos: legado que ultrapassa fronteiras.***

In a letter to Darwin, translated by Cezar Zillig in the book *Dear Mr. Darwin*, Müller also related the beauty of the Santa Catarina island and called attention to the deforestation on hills. "The landscape on our island is pretty beautiful; even the travelers that know Pacific Ocean island, Java, etc. told me our island is one the most beautiful points they have ever seen. "Unfortunately, the vegetation now loses much of its former grandeur; the old-growth forests are almost gone, and many of our hills are now covered almost exclusively with the low and insignificant shrubs of Dodonaea."

Botany is a branch of biology that studies the plants and seaweed life. Embrace aspects of growth, reproduction, development, metabolism,diseases and evolution of the vegetal organisms. Fritz Müller produced 107 works in the area, being 102 scientific articles and five bibliography critics.

Natural History
Scan the QRCode and access the ebook with lectures of scientists and admirers of Fritz Müller

The forests and butterflies

Unhappy with the direction of the Liceum, Fritz Müller asked to quit his job as a teacher and decided to return to Blumenau after 11 years. And while he lived in the Vale do Itajaí

(the coast region next to the Florianópolis capital) became a traveling naturalist at the National Museum. Müller started exploring the Santa Catarina woods to expand the scientific sets of the museum and collaborated with his scientific magazine. The paths were made of boats and horses, but often barefoot, as he liked to walk. Thus, he could observe the details. "Fritz Müller would rather the ecologic microcosm. He liked to see the details: insects, other arthropods, leaves, flowers," described the biologist and environmentalist Lauro Eduardo Bacca on **Webinar 5: the legacy of Fritz Müller according to the environmentalist perspective.**

In the e-book, Bacca wrote that Fritz Müller is an "excellent ecologist." "Fritz Müller stands out much more as a pioneer and brilliant ecologist than an 'environmentalist', in the ascribed sense to this term by the environmentalist José Lutzenberger (1926- 2002) to the activist in the environment and ecological causes. The initial concern of our naturalist was arduous, along with the enchantment with everything he saw, however pleasurable work of starting life from nothing, obtaining from the forest and his own effort everything he needed to build a house and implement his farm and pasture." During these wanderings, perhaps in the garden at his house, Müller observed the relationship between birds and butterflies. From this analysis came up the most important scientific works in his career.

Perhaps today, at least in the courseware and videos teaching biology on YouTube, Fritz Müller is more known for the term Müllerian mimicry. Even far away physically from other researchers, he was well-informed about scientific questions. It was already known as Batesian mimicry, proposed by English naturalist Henry Walter Bates. According to the theory, through natural selection, some species, more helpless, got similar to others to deceive predators.

For more information, access it

The research of Bates was about butterflies that researched them in the Amazon Forest, and some were unpalatable for birds. When being eaten, the predators spit them, so the birds have learned that they taste bad and do not return to try eating them. Other species of butterflies looked like those in their shape and coloration. They enjoyed learning about birds and got similar protection. Perhaps the best-known example today is of the false coral, which deceives its predators by resembling the venomous species.

Müller focused on the genres of butterflies with coloration much similar in appearance but distant in kinship. He observed that both groups came out winning. How did he know they were unpalatable? "He saw these butterflies with the pecked wings, sometimes without a leg, and noticed that the birds, or even amphibians and other animals refuse them. The predator felt the bitterness, that is not only inside them, but also in the glands, and spit it," explains Fontes.

But the naturalist went further. Through a mathematical formulation - probably the first in the area of what would later be called ecology - he demonstrated that the smaller population of butterflies benefited even more. "They are families of distinct butterflies that evolved in a shape and colorful pattern due to the natural selection explained mathematically by Fritz Müller. It was a theoretical work, a great insight," says Lindner. According to the professor, researchers published in important magazines, such as Nature, continue to analyze the theory of Müller.

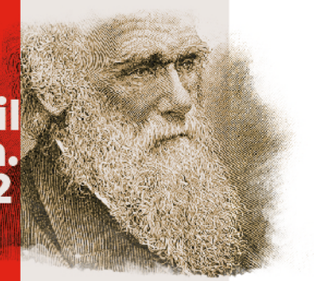
Müllerian mimicry
Butterflies from Fritz Müller Ecology Museum and the phenomenon of natural selection

1878/1879

In two articles, he describes a phenomenon of butterflies mimicry that starts to be known as "Müllerian Mimicry" based on the evolution theory

1879

His daughter Rosa died in Berlin- she committed suicide



April 19th. 1882

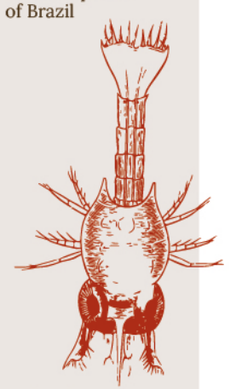
Charles Darwin died at 73 years old

Nov. 18th. 1889

Proclamation of the Republic of Brazil

1891

The last years that Fritz Müller worked as a traveling naturalist. He quit because the naturalist had to live in Rio de Janeiro



1893

Beginning of the Federalist Revolution. Fritz Müller was arrested for treason after helping wounded Federalists in the fighting. In the same year, his wife Karoline died

Recognition

Professor Alberto Lindner is from Blumenau and, in his childhood, heard from his parents the history of an illustrious relative. He is the great-grandson of August and Friederike, brother and sister-in-law of Fritz. While Linder was studying Biology at *Universidade de São Paulo* (USP) learned about the Mülleriano mimicry but did not know that it referred to the naturalist. When he read the book *Dear Mr. Darwin: Letters on the Evolution of Life and Human Nature*, released in 1997 by the doctor and writer Cezar Zilling, he comprehended the dimension of that character. "Reading that book, I understood that Fritz Müller was essential for science. You read a letter, see what Darwin requested, see that he treats him like an equal".

The book of Cezar Zilling was important not only for Lindner but for many researchers that started to use it as a source of research. At the 1988 Biennial Book Fair in São Paulo, Luiz Roberto de Oliveira Fontes saw the publication cover. Did not call him out on the authorship of those two great researchers, but the termite, his research theme - and one more study subject of Müller. "Attract me the termite, but in the book I soon met Fritz, missing for the world in 1897, at 75 years old," wrote an article. So he decided to search and share information about that one called an "illustrious unknowing."

Fritz Müller, who released 264 scientific works about several themes, was recognized in life. Beyond the intense exchange of letters and information with countless researchers outside the world received the title of Doctor Honoris Causa from two universities in Germany and was invited to teach in that country but refused. Years later, he did not accept to live in Rio de Janeiro. Along with changes in the direction of the National Museum, every traveling naturalist should live in the capital - and Müller quit his job. After landing in Santa Catarina, he nevermore left the State.

Fritz Müller Ecology Museum
Access the video and know the ecologic museum in Blumenau, which shelters personal stuff and books with poetry written by the scientist

In Santa Catarina, beyond carrying out the great part of his scientific production, Müller had lived the challenges of his time: suffered floods, a torrent of water, and typhoons; helped the community rebuild after the 1880 floods; joined in public debates through the newspaper; he was superintendent of Blumenau, a position equivalent to the mayor, by 27 days; and he got arrested for treason during the Federalist Revolution - after a confront between federalists and republican, he, as a doctor, rescued hurt people.

He had nine daughters and taught them swimming, even worried about the floods, and he dedicated himself to their education. The only boy died soon after birth in Desterro, which left Fritz Müller quite desolate. He thought the son could follow his steps in science since, at the time, women had little space in the public sphere. Among his daughters, Rosa, who did the collecting with him at the Praia de Fora in Desterro, was his companion. Beyond the vocation for nature watching, was, like her father, a great designer, a necessary ability for a naturalist.

Fritz had planned to write a book something like a diary of a naturalist in Brazil, as other naturalists had done in that period. He expected it to be written by Rosa, with his support. Even so, she went to Germany to study, try to be a teacher, and suicide - there is not much information about why.

Müller got desolated, and the book was never released. As he explained in a letter. "Afterwards, mainly as the Darwin and insistence of my brother, I thought to write to you and spread the loose leaves over your grave, and they could tangle a perfumed crown. Sometimes I put myself to carry out some plan, but I could not: after some minutes, my thoughts were on her; who should write such a book, and I got brooding about the mystery of her sudden death that for me continues as incomprehensible today as the first day."

Tributes are programmed to mark his bicentenary as a special session in the Federal Senate. Some have already been

One of the greatest Brazilian scientists of the century XIX

Fritz Müller, known as the German-Brazilian naturalist Johann Friedrich Theodor Müller, was one of the greatest Brazilian scientists of the century XIX. Recognized, even by Emperor D. Pedro II, his contributions projected Santa Catarina and Brazil in a worldwide scenario.

The recognition of his work can be measured not only by the journals where these articles were published but by the quantity and quality of his correspondents around the world and by the honors he received from the international scientific community, mainly from Germany, on the occasion of his 70th birthday.

Despite his geographic isolation from the great worldwide culture and scientific centers, Müller kept plenty of correspondence with the greatest scientific exponents of the natural science world.

Therefore, in 1879, the calling for Fritz Müller's 70-year celebration in Santa Catarina had the participation of many scientists of the diverse specialties of Natural Sciences, as the Darwinian circles as the opposites of the theory, what for the jubilee is all more honorable.

Even so, the Botany Magazine of Tokyo celebrated him with a commemorative note, being Fritz Müller had never corresponded with Japanese botanists. The German Magazine *Die Natur* organized the stunning photographic album confection, with leather and wood cover, containing records alluding to the science with representations of the animal and plant kingdoms from the tropics. Corners decorated with silver plaques, there were photographs of the notable naturalists and admirers worldwide, whose researcher Fritz Müller did not meet in person.

This delicate gesture seems to be a unique fact that there is news regarding tributes and recognition that a scientist has already received. On the first page, writing with artistic lettering consists of the following message:

happening. One of the great initiatives is the group called "*Desterro Fritz Müller/ Charles Darwin 200 anos*", since 2019 to organize debates, circles of conversation, webinars, and e-books with expert participation. In 2020, in partnership with the Department of the Education State - Secretaria de Estado da Educação (SED), it did webinars focused on teachers from Public Schools of the State to debate the naturalist work and legacy to make him a better-known character.

At these meetings, the professor at UFSC, Alberto Lindner, suggested another way to honor him: preserve both ecosystems that he observed and studied: the sea and the Atlantic Rainforest. /

Fritz Müller Ecology Museum
Access the video to meet the set of the museum where lived the scientist in Blumenau

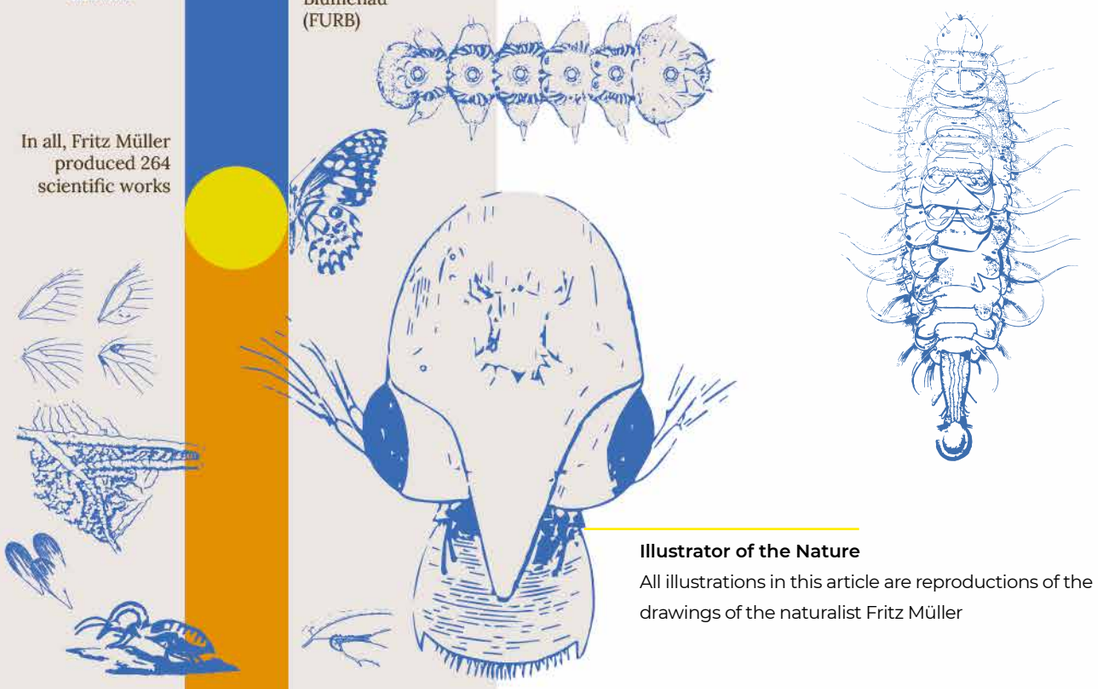
Aug. 23rd. 1895
End the Federalist Revolution in Brazil

May. 21st. 1987
Fritz passed away in Blumenau, babbling the names of his last love: bromeliads. He had nine daughters and only one son.

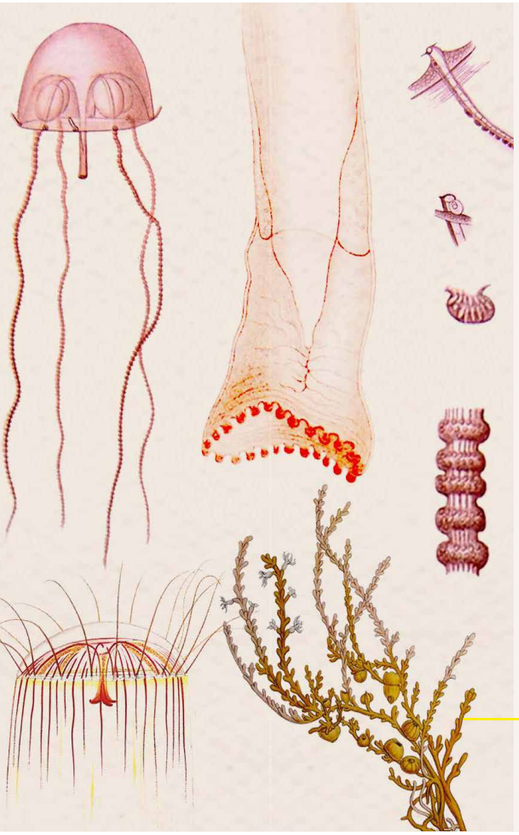
2009
He received the title of Doctor Honoris Causa at Universidade Federal de Santa Catarina (UFSC)

2014
Received the title of Doctor Honoris Causa at Universidade Regional de Blumenau (FURB)

In all, Fritz Müller produced 264 scientific works



Illustrator of the Nature
All illustrations in this article are reproductions of the drawings of the naturalist Fritz Müller



“Much honored Sir
In the following pages, you will find the portraits of a good number of friends and coworkers, which feel united to you by the love of nature and a deep interest in phenomena of organic life in your reciprocal relations. United us the desire to manifest to you, the insightful master of biological research, the most cordial congratulations on the passage of your 70th birthday. Certainly, each one of us owes you for the multiple incentives, and not a few owe you gratitude for the valuable and uninterested support in your work! Wishes that the conscience of to have enriched science during a long and blessed life, and for you had conquered the glad recognition of all those of similar aspirations, gild your sunset of life!”.

(Quote translated into Portuguese by the historian Sueli Petry, from the Blumenau’s historical archive).

Santa Catarina Fauna and Flora
Drawings of the naturalist Fritz Müller from the set of the Ecology Museum in Blumenau

It was in Desterro city where the great naturalist Fritz Müller had recognized the book On the Origin of Species written by Darwin, who would become a dear friend and collaborator. The lecture on this work impressed him deeply with the genius hypothesis placed there.

Provided with modest scientific equipment, like a simple microscope, Müller realized his more important scientific work, the book Für Darwin, released in Germany in 1864, the work that would project him in a worldwide scenario.

The book brought necessary contributions to support the newly released theory of evolution through natural selection by Charles Darwin, who made warm discussions in the social and scientific environment of great hubs of world culture, such as London, New York, and Paris, but also here in Santa Catarina, with Fritz Müller, that published articles, in newspapers at that time explaining in accessible language the controversial theory.

As far as is known, Müller was the first in Brazil to discuss the new theory, showing to be in the vanguard of his time. /

Mário Steindel

Scientific coordinator of the *Grupo Desterro Fritz Müller/ Charles Darwin*- 200 years, member of the Fapesc Senior Council, and retired full professor of the Department of Microbiology, Immunology, and Parasitology of UFSC.

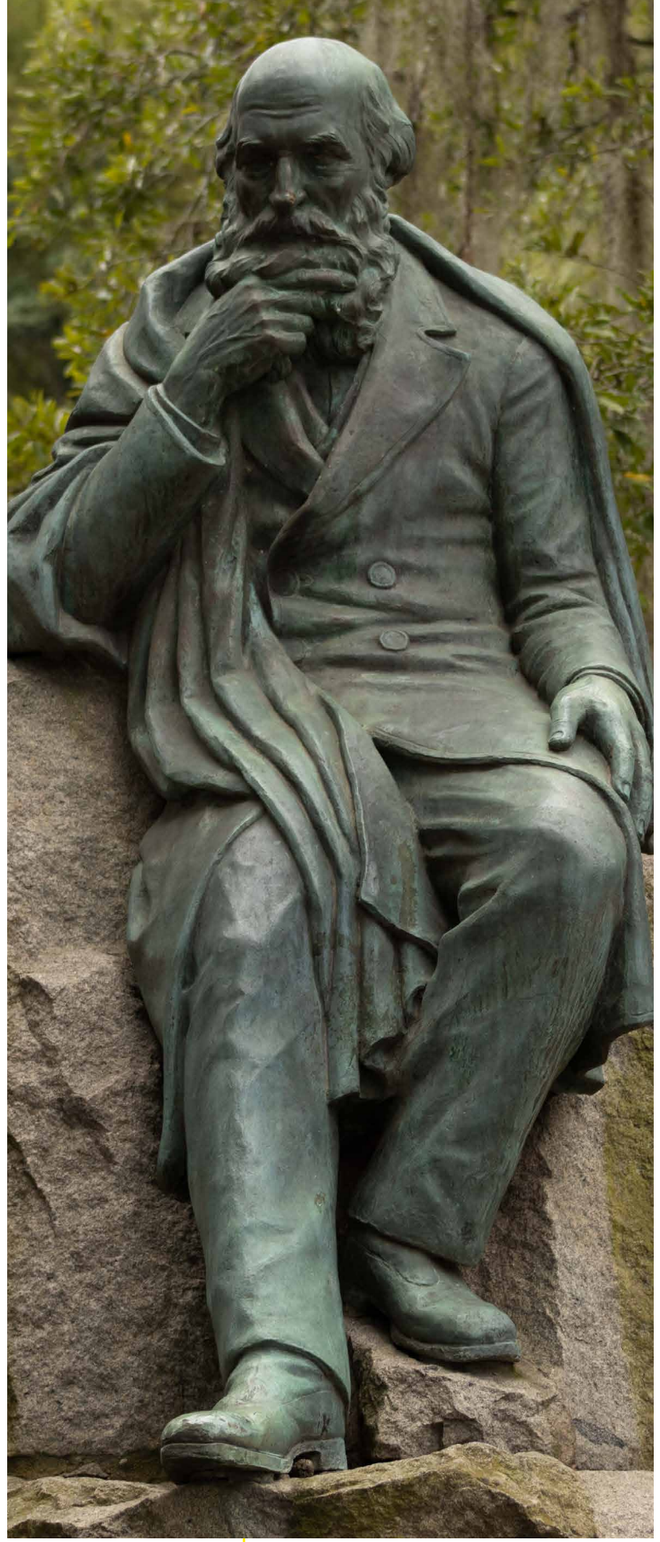


Photo: Gabriela Garcia, Fapesc

Tribute to Fritz Müller
Statue in Blumenau

Opinion - Sylvio Zimmermann Neto

A man in search of the truth

Humanity is pursued by the constant uncertainty about where we come from. Which reasons and where our ancestors were from, responsible for creating this Brazilian cultural complex mosaic, is an occult question until today. We do not fully explain which were all the factual circumstances that brought European immigrants, among others, to this side of the Atlantic Ocean, above the Equator Line. Many people lived in regions that passed through political insecurities, religious conflicts, social convulsions, and inclement weather, but some came for solid convictions. They were interested in nature beyond the ideological principles that brought who would become the best Brazilian scientist in the 19th century for Santa Catarina.

In March 1852, in Erfurt in Prussia, sir Hermann Trommsdorff wrote a letter to a friend and ex-employee. He announced a relevant event for the family: Fritz and August, older sons of his brother-in-law Müller, from Mülhberg, have resolved to emigrate to Brazil, destined to Dr. Blumenau colony, the addressee of the letter.

The uncle manifested a feeling of satisfaction and comfort while writing about an option of the nephews to Dr. Blumenau’s colony because of the friendship that united them. Highlights the solid academic degree of the young emigrants of the family but did not let evidence concern the politics and religious convictions that followed them. He still claimed the nephews thought that in Europe, they could not be happy!

Since high school, Fritz Müller had already started his slant for pharmacology and his interest in botany, beyond the ability to math thoughts.

After a happy childhood, at 13 years old, he changed to Erfurt, where he was kindly welcomed by his maternal grandfather, Trommsdorff, a chemical and pharmacy owner and famous scholar at his time. The reason is that he knew the future colonizer H. Blumenau, an enthusiastic botanist who later would work for the uncle in the chemical industry of Trommsdorff.

It is believed, at this time, there was in the young student a boost for search and emigration. Whose contributed to performance in science the enthusiasm for foreign languages. The future naturalist showed much ability in several languages, such as French, Italian, Swedish, and Arabic, among others.

Müller studied Math and natural history and obtained the title of doctoral in philosophy at 22 years. Coming back to Erfurt, in his uncle's house, Fritz taught in the high school and as a private teacher. But, in the middle of the year, he quit teaching and went to Greifswald to study in medical school. Figuring out the possibility of boarding ships to please his wish to know distant countries. A friend from that time in Greifswald, Dr. Oehlschläger, described his lifestyle:

"Rarely had I come to know a human such as modest and unpretentious, but at the same time with such high spirit. Many times, when at night he returned exhausted from a botanical-zoological excursion in the region and visited me, by chance I had to guess, more than heard from his mouth, that during walking of many hours wanted to delude with a piece of dry bread in the pocket for lunch". He relates, "he never complained about this life that is sometimes devoid, scarcity life".

The medical student joined the discussion about politics and religion, and he, the pastor's son, decided to break up with his baptism. His loyalty to his convictions made him reject the oath for his graduation from Medical School. It was a fact determinant for emigration. Between 1849 and 1852, Fritz Müller taught in Grimmen city, in Western Pomeranian. Over there, the information about Brazil's South and Chile's South drew his attention.

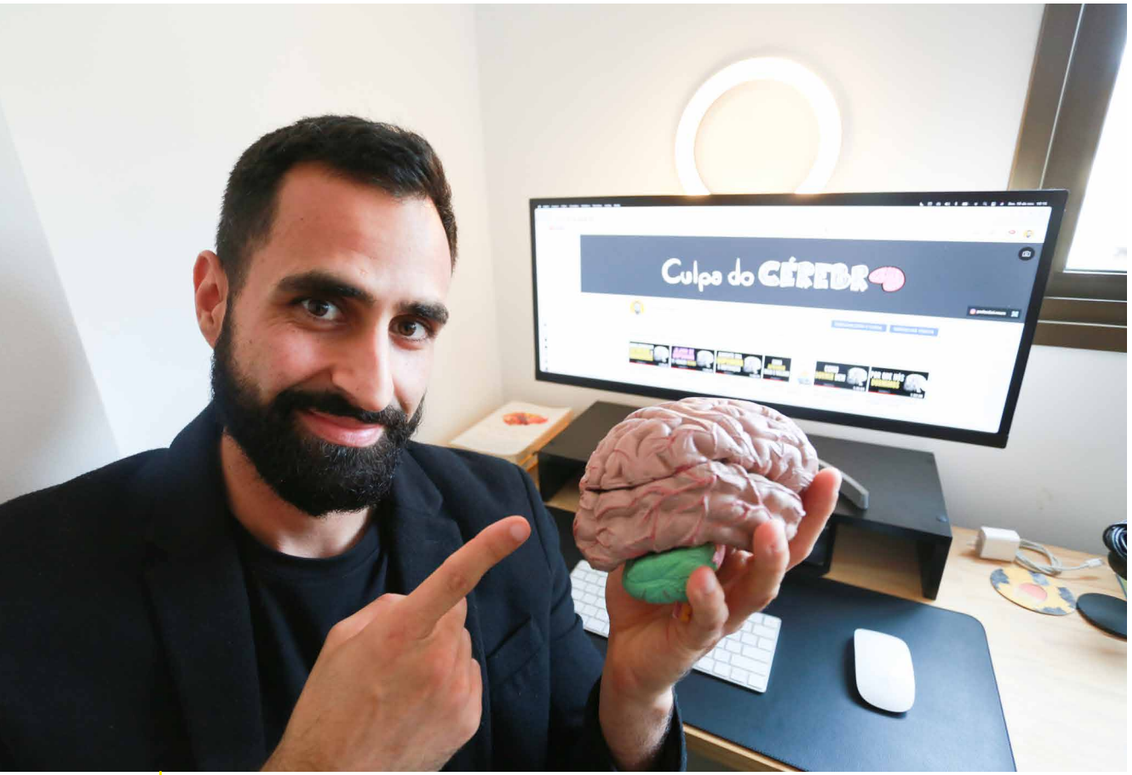
In May 1952, Müller traveled with his wife, a child, and his brother, who had already married. On board the Florentin Ship on a sad trip from Hamburg to São Francisco do Sul. A Measles outbreak and inadequate feeding victimized 12 children on the ship. The trip from São Francisco to the final destination was not easy.

Müller Brothers are among the first owners in the colony lands in the recently created colony of Dr. Blumenau. The family lived years of resignations in the palm trunk cottage and raw earth floor. On the plate, dry meat, powder, and black beans. After a hard bed and hard work on the farm to survive and facing several privations, there was a sincere feeling of pleasure with the new country and lifestyle.

Destiny went on to dictate changes in the life of German-Brazilians. Classes in Desterro, fireflies, ants, and pit vipers. Sea beasts, papaya trees, and date palms. Math, natural science, physics, and chemistry. The conviction about what has to be done, the mangrove and the crustaceans. Lovely dad, a teacher, and a farmhand. A man who leaves us a huge scientific legacy and helps to figure out our nature - Fritz Müller, the man whose entire life longed for freedom and truth. /

Sylvio Zimmermann Neto

Secretary of the Economic Development, Innovation, and Entrepreneurship of Blumenau.



Scientific dissemination
With a didactic language, Andrei Mayer spreads scientific research online

Is it brain fault?

The professor from *Universidade Federal de Santa Catarina* (UFSC) since 2018, Andrei Mayer, set up a recording studio at home in Florianópolis where he disseminates **neuroscience on social media**.

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Photos Julio Cavalheiro
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What happens in the mind when we think? How does the brain do calculus? Why did we sleep? Since childhood, professor Andrei Mayer had asked about the mysteries related to the human brain working. He loved to follow the channel schedule Animal Planet, which influenced your decision to choose the Biology course when it arrived at the moment to do the University Entrance Examination.

Today, at 34 years old, Andrei looks to find these answers, not only to satisfy his curiosity but also to share with as many people as possible. Professor in the Physiological Science Department of the Biological Science Center from UFSC. Andrei teaches undergraduate and graduate programs, supervises students in scientific research, and Master's and Doctoral degrees. But in everything that makes today, what is more, his motivation is scientific dissemination.

With about 60 thousand followers on Instagram and 90 thousand subscribed to his channel on YouTube in February, the professor is a neuroscience popularizer in Brazil.

Studio at home
Since he joined UFSC, Andrei has dedicated himself to popularizing science; everything began with recording his classes and the online availability of the subjects

NeuroTalks

At the end of 2020, his work of scientific dissemination started to earn more projection, acquiring more constancy as well. “After one year of learning, groping, I have started to go further, to try more YouTube resources, live, I proved different ways of videos and learned about light, camera and framework.”

When he felt more confident, the teacher launched, on his **Youtube channel,** the NEUROTalks, an interview program in which neuroscientists are invited to talk about their specialties.

With around 1h30min of time, the NEUROTalks videos soon became a hit contradicting the social media logic, where usually the immediacy reigns of videos that are shorter each time. The titles provoke the curiosity of people: “Exercising helps the memory and prevents Alzheimer’s and Can music make you smarter? What is the secret of creativity? Why 12 weeks for an abortion? How can meditation help with stress? What can we do to make new neurons and age with a good memory? Why are we so anxious about the pandemic?”.

After NEUROTalks, Andrei decided to prove a new way of dissemination and started producing a **podcast called Fault of the Brain** - Culpa do Cérebro, available on Spotify. Keeping the pattern of long subjects - around 75 minutes -this time, he shows a specific theme without guests. On July 29th, 2021, he released the first episode: “Three simple strategies to improve your concentration, mood, and learning”. On Youtube, where the content is disseminated, the video registered 17 thousand views in December.

One of his concerns is to combat the misinformation: “There is a lot of content arriving on people all the time by Instagram, WhatsApp, Youtube, television, and newspapers. Many people are speaking without having the understanding or knowledge to speak. If we, researchers, do not position ourselves, it will only have these people speaking. I began to position myself more. And the fact that I am a University professor gives me credibility. We have to put ourselves as a reference for the population”.

As in his classes and his social media, he encourages his students and followers to combat the misinformation: “ I am tired of correcting so much misinformation. But we can transform people into activists against misinformation.”

Youtube
Check out the weekly program of interviews with neuroscientists and videos of the scientific dissemination about the brain, mind and behavior, and get how the brain works

Podcast on Spotify
Access to know more about the scientific dissemination and everyday themes. The program presents contents in a simple and easy way for everyday application

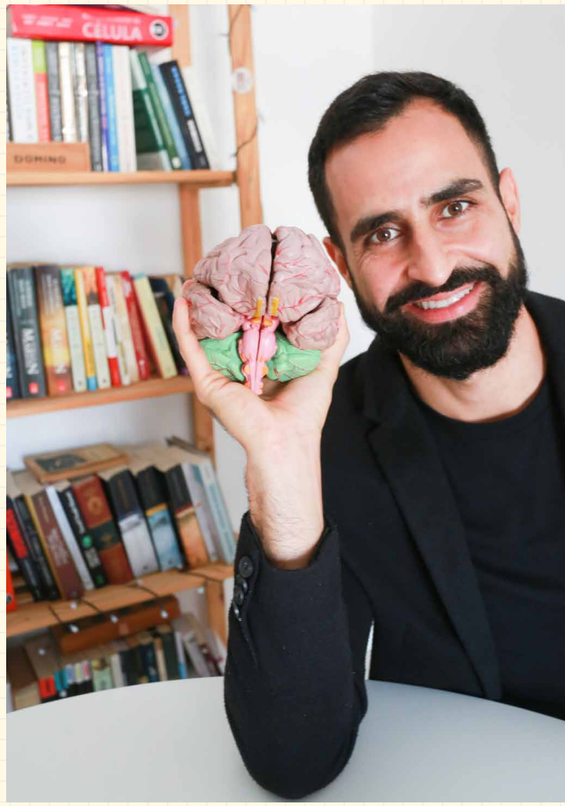
T he potential of the scientific dissemination

Despite all efforts that the work of scientific dissemination demands, Andrei claims to feel fulfilled: “Generally, I always liked to communicate so much and like to talk, to explain, to see what a person learns, as well as I like to learn, to listen, like this exchange a lot”.

For professor Andrei Mayer, translating scientific research of the most diverse areas to a didactic and colloquial language is necessary to keep the population well informed: “Scientific dissemination is a way to teach and to equip people with knowledge. Scientific knowledge, by its nature, is much more applicable once reached by experimentation. It makes a difference to an informed population with scientific knowledge, knowing where that knowledge is from, who produced it, and what is the potential.”

Andrei defends that there should be more incentives, inside the academy, for this type of activity:

“If we evaluate what we do at the university, I think we need more resources for scientific dissemination. We need to create the habit of disclosing what we are routinely doing. It can be fascinating because we really can change people’s lives. We need to understand that this will change the perception of science and the importance of the university for people.



Three years of dedication to the popularization of science

At 18 years old, Andrei started his academic degree at Universidade Federal de Juiz de Fora (UFJF), his hometown. In the first semesters of his undergraduate, he realized that it was not in this place that he found the answers to questions that motivated him to continue studying.

Advised by a professor, he requested a transfer to the Universidade Federal do Rio de Janeiro (UFRJ), where he joined the Biological Science course - Medical Modality. "I always liked to study the brain and behavior. I felt fascinated by all of this. When I discovered that there is a field of study in other universities, I decided to go there", he relates.

Andrei attended the undergraduate, master, and doctoral degrees at UFRJ. In 2018, two years after finishing the doctoral degree, he realized the dream he had since been a teenager: be approved in a public tender for a professor at Universidade Federal de Santa Catarina (UFSC). "All my trajectory was moved by this huge will to follow the academic career as a neuroscientist."

> **"I always guess that I should offer something else. My role as a professor is much more than talking about what there is in the textbook.**
>
> Andrei Mayer

Everything began at UFSC in 2018

Since joining UFSC, Andrei has dedicated himself to popularizing science. He began recording his classes and made them available online, so those were accessible to anyone interested in the subject. Created the channel Youtube It is brain fault - A Culpa é do Cérebro, released a podcast program with the same name and a page on Instagram, where his posts are very didactic, with light and relaxing language.

The professor related to starting producing material to spread on social media demanded so much personal effort but was willing to dedicate himself to the activity for considering the popularization of science very important.

To choose the themes that can interest his public, Andrei often consulted the websites of magazines like Nature, Neuroscience News Magazine, PNAS, Cell Press, Science, and Sleep Journal, among other recognized international publications. He also searches on Google, using keywords in English that generally direct to these foreign websites of scientific journalism. His first criterion in the selection was to be consistent and confirmed by respected researchers in the area. Some articles are from the bibliographies references of the book that Andrei considers good, like the case of Why We Sleep: Unlocking the Power of Sleep and Dreams by the neuroscientist Matthew Walker.

The researcher prioritizes the searches whose results have the potential to generate a better engagement: "There are several works that are very nice, but I know that will not interest the lay people. If I can not relate that with the person day-to-day or I do not find applicability, do not talk about work." He also does not limit himself to spreading the scientific findings more recently: "Sometimes I bring classics. Older research is not necessarily outdated".

One of the benefits of doing scientific dissemination, according to **Andrei**, is an opportunity to enlarge his study horizon to learn about subjects that are not linked directly to his research projects: "These readings go far beyond my research line and have a very positive impact on my classes and the research that I develop." He reports that since he was a student, he already thought that the professor should not limit himself to the courseware: "I always guess that I should offer something else. My role as a professor is much more than talking about what there is in the textbook." /

Instagram
Follow the news on social medias of the Professor Andrei

From Minas Gerais to Santa Catarina
Professor Andrei Mayer started his university studies at *Universidade Federal de Juiz de Fora*, his hometown, and finished his undergraduate degree in Biological Science course - Medical Modality at *Universidade Federal do Rio de Janeiro*

Santa Catarina technology in the Antarctic

Dualbase, from Palhoça, transmits environment data via satellite for a project at *Universidade Federal de Viçosa* and installed the **first meteorological station** 100% national at the frozen continent.

Maurício Frighetto
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During February 2020 and November 2021, the temperature registered at Comandante Ferraz Antarctic Station in the Antarctic varied between -19,58 °C and 10,77 °C. The information, which is public and can be accessed by the internet, is transmitted by satellite in a meteorological station from Dualbase (Santa Catarina company). According to the company, it is the first measurement equipment of atmospheric data with 100% Brazilian technology installed on the Frozen Continent.

The opportunity for Santa Catarina people to arrive at the South Pole started in 2019. The researchers from Núcleo de Pesquisa Terrantar at Universidade Federal de Viçosa (UFV), that study the Antarctic ground for more than 18 years, analyzing the reply of the terrestrial ecosystem to the climate changes and looking for a company to fo the transmission by satellite such as the ground temperature and moisture. And found the Dualbase, which replied to the challenge of the researchers.

The Terrantar is part of Instituto Nacional de Ciência e Tecnologia da Criosfera, which gathers Brazilian researchers that do studies at Programa Antártico Brasileiro (Proantar). A lot of research has been done at Comandante Ferraz Antarctic Station, a Brazilian base at King George Island. Today, the place shelters a modern building, which opened in 2020 after the old one was consumed by fire in 2012.

The Terrantar researchers keep nearly 40 points with sensors in the region. Before the installation of the technology with satellite transmission, data were collected annually when trips to the continent took place.

“We were the only company that accepted the challenge to propose a solution for a problem that the university had,” counts Felipe Alfredo Jahn, CEO - Dualbase president.

Some stations are in areas of hard access. “It is possible to arrive at some equipment every two or even three years. Sometimes the equipment loses because water gets in the system, and the battery discharges. Sometimes, it takes three years to know that information was lost,” describes Gustavo Becker Ventura, CTO - Dualbase Technical Director. “With the transmission, the researchers know if the equipment is working and the numerical value of the measure”.

The company took the opportunity to take its equipment, a meteorological station that measures temperature, relative humidity, solar radiation, and atmospheric pressure. The data are open and can be accessed via the internet.

Ventura also earned a diploma. Signed by the Navy Captain Paulo Max Villas da Silva, the document says that he traveled 60 nautical miles on board the *Navio de Apoio Oceanográfico Ary Rongel* between February 7th and March 10th, 2020 completing two days of sea and 27 days of camp. He was there to install the equipment. “It is an amazing life experience. What we see, the beauties over there, it is something that verges on the fantastic. We work with weather monitoring

Access in real time the atmospheric data in the Antarctic

Dualbase colletion

Land Ecosystem
Since 2020, the Santa Catarina company transmits data, such as temperature and soil moisture, to researchers from Minas Gerais university that searches for the influences of climatic changes

“We were the only company that accepted the challenge to propose a solution for a problem that the university had.”

Felipe Alfredo Jahn
CEO - President of Dualbase

here in South America. I have already traveled to places with all types of weather and experiences, but the one over there is different," he comments.

The business people are proud of the work. "It was an interesting challenge. Few companies can place equipment in an extreme place," reports Jahn. "Our equipment is developed to work at minus 40 to 70 degrees. But it is tested in the laboratory. We did not have the opportunity to put ourselves in a real condition for such a long time. The team has a feeling of pride. It is the first station 100% made by Brazilians to work in the Antarctic."

Environmental Decoder

Founded in 2009 and incubated at Celta Pedra Branca in Palhoça, the company received incentives from Primeira Empresa Inovadora (Prime) in 2010 and Tecnova in 2014. Both programs are promoted by Financial Agency for Studies and Projects - Financiadora de Estudos e Projetos (FINEP), linked to the Ministry of Science, Technology, and Innovations (MCTI), and by Fapesc.

"It is a company that left incubation and currently has relationships with several countries. Last year, we raised over R$ 2 million in taxes. It is a company that the government invested in, and it worked. Now our equipment is working in the Antarctic", evaluates Felipe Alfredo Jahn. And besides being in the Frozen Continent, the Dualbase has participated in other essential projects in the country.

The dam disruption in Mariana, Minas Gerais, in November 2015 provoked 19 deaths and great environmental contamination over Rio Doce. Since then, Fundação Renova, responsible for the repair of damage caused, has implemented a series of monitoring of the drainage basin.

Dualbase has participated in this project since 2017 after winning the bid. The company has 25 points with real-time water monitoring from Rio Doce. " It is quali-quantitative monitoring. We observe the quantity of water and the quality and transmit, in the meantime, to over 130 environmental bodies," explains Jahn. "For example, if the turbidity rises to a determined level, do not collect water for human uses and irrigation and not fishing."

Everything is done automatically, without the necessity of a professional having gone to the collection points. However, a team remains on standby to do the preventive maintenance, clean up the equipment and calibrate it - and it serves to correct when there are faults.

Centro de Lançamento de Alcântara (CLA), located in Maranhão, is strategic to be near the Equator line, and to its geographical characteristics - it is an essential point for the launch of rockets and satellites. In 2016 Dualbase was selected by bidding and executed the instrumentation installation in an anemometric tower, an innovative project with the measurement profile to wind with ten anemometric and cloud height measurements, among other meteorological quantities.

These projects make Dualbase take a stand as an environment decoder: it turns into data information such as the rain quantity, temperature, atmospheric pressure, and air humidity. /

It is an instrument that measures the velocity of wind. anemometer tower is a tower that, usually, has more than one anemometer.

Extremely cold
The distributed equipment was in the frozen region, produced to support temperatures less than 40 degrees

Weather Station
The device, produced with 100% Brazilian technology, makes atmospheric data measures in the Antarctic

Fapesc completes 25 years of support to the STI Ecosystem

Raised in 1997 to support science and technology, the foundation incorporated the **innovation** in its name and DNA

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Indicators Flávia Feltrin Garcia
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Photo: Luis Gustavo Debiase

ParqTec Alfa
Since its foundation, the Fapesc headquarters is located in the buildings that shelters dozens of technology business, at João Paulo neighborhood in Florianópolis

A building in Florianópolis that originated as a company incubator. A development grant to science and technology that turns into a foundation to support science and technology – and which later incorporates the innovation in its name and DNA. It is a synthesis of the history of the Research and Innovation Support Foundation of Santa Catarina State (Fapesc), which completes 25 years on January 9th, 2022.

"In the last years, we started to give more emphasis on innovation, not forgetting the research, the training people, and a lot of important themes," explains the Fapesc president, Fábio Zabot Holthausen. "We brought innovation as a transversal action to all the programs and processes, i. e. we reinforce that innovation is essential for science, research, and business. Innovation, besides the process, is also important as a result that will impact the society as action and impact of the research. It was a driver that we established. And, with this, structured some specific innovation programs with special attention to actions connected to the Innovation Centers of Santa Catarina".

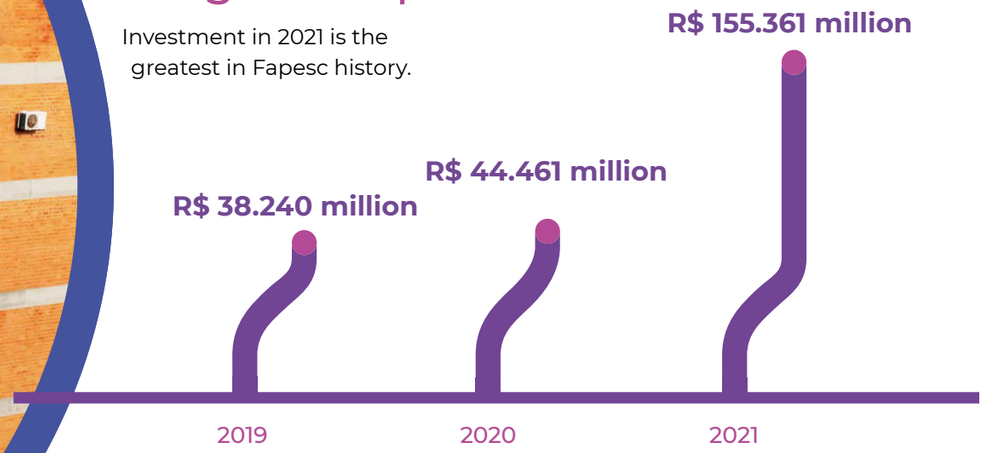
Photo: Francieli Oliveira

Innovation Centers from Santa Catarina are spaces created to promote innovative entrepreneurship, helping to create and expand innovative business. They have services as pre-incubation of companies, incubation, business acceleration, coworking, maker spaces, spaces for events and training, spaces for P&D, Marketplace, One Stop Shop, connection with financial institutions and investors.

Did you find it interesting? Scan the QRCode and connect yourself with the ecosystem of innovative entrepreneurship, as startups, technology companies, researchers, mentors and investors.

Budget Jump

Investment in 2021 is the greatest in Fapesc history.



The year 2021 was special for Fapesc, with investments of more than R$ 155 million- it represented three times more than in the year before that. The value is referent to the calls launched that will execute in the next few years. The resources are designated to several actors from the ecosystem of the Science, Technology, and Innovation (STI) from Santa Catarina, as researchers, entrepreneurs, innovators, and business people, since those that are starting their journey, even those who are references in their areas.

To arrive at this historic moment, the Fapesc went through a long way. Its bud is the Fundo Rotativo de Fomento à Pesquisa Científica e Tecnológica do Estado de Santa Catarina (Funcitec), created in 1990, right after the approval of the Santa Catarina Constitution and huge mobilization in the State on behalf of STI. At the time, it also constituted the Tecnópolis, planning space to receive technological companies in Florianópolis, current ParqTec Alfa.

During this period, it has done partnership with Fundação Certi, linked to Universidade Federal de Santa Catarina (UFSC), originated the Celta, an incubator with a space of 10.500 square meters, that started with 27 incubated companies, the Fapesc headquarters in this building. It is from this period the creation of Rede Catarinense de Ciência e Tecnologia (RCT) that would take the internet to the STI ecosystem of the State.

In 1997, it happened one more step in this journey. The grant was extinct and gave rise to the Science and Technology Foundation, which keeps the initials Funcitec. According to the first president, Neri dos Santos, at this moment, the foundation became a public entity with a juridic personality of private right, with its assets and income and technical-scientific autonomy, management, and finances.

> **"One of the important actions at the beginning of this history was the installation of the *Rede Catarinense de Ciência e Tecnologia* that took the internet to all Santa Catarina universities.**
>
> **Neri dos Santos**
> First President
> of Fapesc

"One of the important actions at the beginning of this history was the installation of the Rede Catarinense de Ciência e Tecnologia that took the internet to all Santa Catarina universities. We were the State of Brazil to implement a network of this nature," remembers Santos. Fapesc manages the network so far, which reaches schools, laboratories, incubators, hospitals, museums, and houses of culture. "The RCT was the base to the ecosystem development of innovator entrepreneurship in our State," cmpletes.

Diomário Queiroz, professor of UFSC and ex-rector of the institution, was the foundation president when it consolidated the name Fapesc in 2005. "Evolved the concept for a supportive foundation. Before being a grant, the resources existed, but there was no structure and a mode of operation that could effectively help to promote the scientific and technological development of the State. So it started to be a foundation, with the idea of making programs that support all State, promoting its development and approaching the producers from academic bodies."

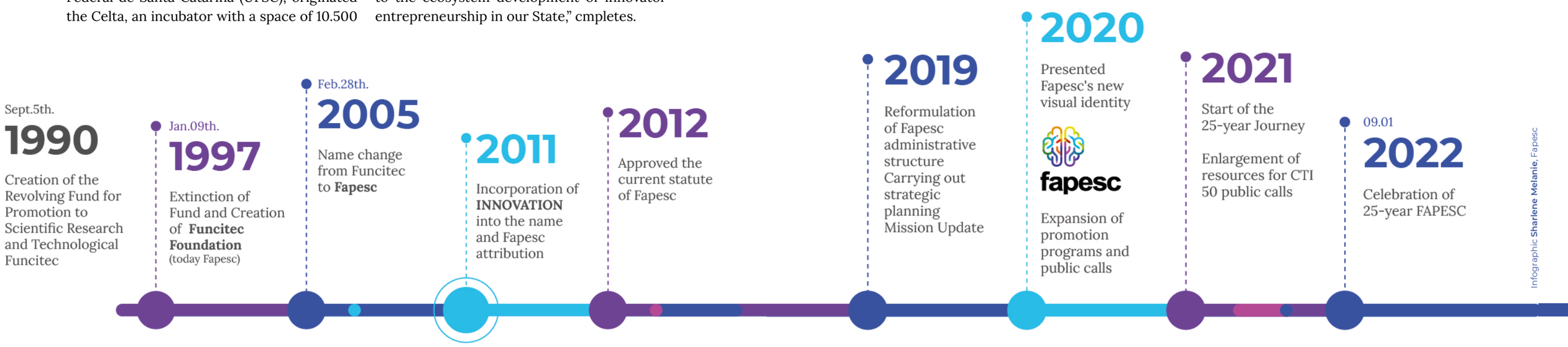
Queiroz emphasizes an important moment in his management. "The fact more memorable in my management in the Foundation was the approval of the Lei Catarinense de Inovação." The norm, from 2008, defines Fapesc as " a promotion agency that executes the state policy of science, technology, and innovation." One year later was elaborated the Política Catarinense de Ciência, Tecnologia e Inovação.

The law also bestowed to Fapesc the organization of an innovation award to recognize people, institutions, and companies that highlight the promotion of knowledge, innovation practices, process generation, innovator goods, and services. In this task arise the Prêmio Inovação Catarinense Professor Caspar Erich Stemmer. Its name honors one of the most important names in the history of the STI ecosystem from Santa Catarina.

The complementary law n° 534 of 2011 defined the name of the institution: the Research and Innovation Support Foundation of Santa Catarina State, incorporating the


Fapesc collection

Innovation pioneers
Engineer Caspar Erich Stemmer (left) and the Fapesc ex-president Ségio luiz Gargioni in 1975, during a travel to Germany , when they worked together at the Ministry of Education



Infographic **Sharlene Melanie**, Fapesc

innovation on the name and consolidating among the promoting programs by Fapesc. “We had several promising projects in the innovation area, mainly the Innovation Synapse (Sinapse da Inovação), ‘’ remembers Sergio Luiz Gargioni, Fapesc president at that time. “And we said: it is not only science and technology, where is the innovation? Who cares about innovation? The State has nobody. A simple project was sent for assembly and approval.”

Gargioni, a professor of UFSC that had gone through important functions in the State and Brasília, was president of Fapesc between 2011 and 2018 and also coordinated the Conselho Nacional das Fundações Estaduais de Amparo à Pesquisa (Confap) between 2013 and 2017 - the council articulates the state foundations. According to him, his point mark in Confap was to arrange international grants, bringing resources for the state foundations. “Fapesc importance for Santa Catarina is vital. All points where today talks about science, technology, and innovation in the State have the hand of Fapesc, the thought of Fapesc, the joining of Fapesc with somewhat financing.”

Presidents timeline

1997
Neri dos Santos
27.01.1997
22.09.1997

Francisco Afonso E. Vieira
29.09.1997
31.12.1998

1999
Honorato Antônio Tomelin
01.01.1999
05.04.2002

2002
Paulo de Tarso M. Luna
03.05.2002
31.12.2002

2003
Antônio Diomário de Queiroz
31.01.2003
15.03.2005

2005
Rogério Silva Portanova
28.03.2005
29.03.2006

2007
Vladimir Álvaro Piacentini
03.01.2007
16.04.2007

Antônio Diomário de Queiroz
16.04.2007
01.01.2011

2011
Sérgio Luiz Gargioni
03.01.2011
31.12.2014

2015
Sérgio Luiz Gargioni
01.01.2015
12.09.2018

2018
Gilberto Luiz Agnolin
12.09.2018
01.01.2019

2019
Fábio Zabot Holthausen
03.01.2019
atual

Infographic **Sharlene Melanie**, Fapesc

fapesc 25 ANOS

Main programs

Innovation

- Born: ideas pre-incubators
- NITs: Technological Innovation Centers
- University entrepreneurship
- Innovation Synapse
- Spark
- Incentive to incubators
- Developer training
- Santa Catarina Innovation Award
- Innovation Center Operation
- Fapesc Connection: supports events
- Santa Catarina Innovation in Tourism
- Startup SC Speeds up
- Entra21: developer training Ativação ao Ecossistema de CTI- Activation to STI Ecosystem
- #Fapesc@Gov+Pesquisa&Inovação program: for public bodies from State Government

Scholarships and Events

- Support events
- Scholarships cycles
- Scholarship for emerging and consolidating graduate program
- Support for consolidating the STI Ecosystem from Innovation Centers
- Innovation Agriculture
- Mapping of the Santa Catarina STI Ecosystem Development Process
- IInnovative Talent
- Support for the People Catarina Program
- Fapesc Award for Journalism in Science, Technology and Innovation

Science and Research

- Universal Research: support for research projects in all areas
- Applied researches in different institutions
- Biodiversity Appreciation Award
- Support for Santa Catarina Corn Monitor Program
- STI Infrastructure Support for Young Researchers
- Academic Structuring of Laboratory Infrastructure Support
- Mineral coal appreciation
- Viniculture and Viticulture appreciation
- Research with national and international agencies

2021 - 50 calls launched

Innovation

Total: **11 calls for applications**

Investment **R$ 27.807 million**

Scholarships and Events

Total: **20 calls for applications**

Investment **R$ 104.424 million**

Science and Research

Total: **19 calls for applications**

Investment **R$ 23.130 million**

In 2020, the visual identity was changed to bring innovation in the way the foundation presents itself, valuing knowledge and the people. Since the last anniversary, in 2021, had begun the "25-year Fapesc Journey" (*Jornada dos 25 anos da Fapesc*), with a series of actions and celebrations to mark this history as the achievement of the Fapesc Award (*Prêmio Fapesc de Jornalismo em CTI-Ciência, Tecnologia e Inovação*), that it is in the second edition. Another important action is the achievement of the *Circuito Inova SC*, making in partnership with the *Associação Catarinense de Fundações Educacionais* (Acafe) and with the *Plataforma On*.

Several other initiatives will be carried out in 2022 to highlight the research results and impacts, and projects for society in Santa Catarina. According to the president of Fapesc, these actions will provide more transparency on how public investments are changing institutions and helping the economic and social development of Santa Catarina.

For Holthausen, it is a challenge to remember the Fapesc history due to its lifetime and its mission: "Promote the Santa Catarina ecosystem of Science, Technology, and Innovation through the promotion and integration of their agents, aiming the advance of all areas of knowledge, the regional balance, the sustainable economic development and the improvement of quality of life." Even for that was launched the Program #Fapesc@25anos Conectando+Catarinenses (25-year Fapesc connecting Santa Catarina people).

The 25 projects were selected to count not only the foundation history but also all development of the STI ecosystem from the State. "It is a mapping of the STI ecosystem that will culminate in 25 books. It is a gift for Santa Catarina," affirms the Foundation president. "We want to tell the history of the State from the STI ecosystem with this. Let a legacy for the State and for those who visit us. The idea is to show a little bit about why Santa Catarina is what it is. And for that, we can notice this journey of time that culminated in a competitive, innovative, and entrepreneurial State." /

Photo: Francieli Oliveira

Fapesc Team
Part of the team of the Research and Innovation Support Foundation of the Santa Catarina

Startup changes childish stories in entrepreneurship lessons

From the real world to fantasy, the character Queen Leona encourages children in the **self-knowledge and development process**

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Infographic Sharlene Melanie
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The childhood experiences and memories in the family farm in Caxambu do Sul, Santa Catarina west, helped the psychologists and sisters Cássia and Marina Cavalli to make the amazing Reino Bambini, the scenario of childish books with lessons about entrepreneurship. Thus was born the startup that tells stories and demonstrates that innovation is not just related to technology.

The *Reino Bambini* is also the startup name responsible for books of Queen Leona, the character half girl, half lion, raised to encourage the self-development of kids. During her journey in different places on Earth and Space, the character with superpower learns to recognize her abilities and respect her personality and history.

> **"Entrepreneurship is an attitude of curiosity and interest for the surroundings. It evolves observation of society and what people need."**
>
> Odilon Luiz Poli
> Professor

"As psychologists, we can help with kids' preparation in their professional and personal choices and contribute to knowledge themselves", tells Cássia.

The idea of the sisters to resignify the occupation and redirect the work as psychologists started in 2015 after they found out that kids, more easily than adults, give new situations and feelings. Since 2018, *Reino Bambini* has already launched the books: *A Jornada de Leona*; *Rainha Leona - A Origem*; e *Rainha Leona - Uma Viagem Estelar*; além de *Rainha Leona - O mistério da Floresta Azul*, a trilingual book, written in Portuguese, English, and Spanish, with interactive accessories, where the readers can become characters.

To create and develop a startup that counts stories, Cássia and Marina had the guidance and support of the *Incubadora Tecnológica Inctech*, located at *Pollen Parque Científico e Tecnológico* in Chapecó. "The mentality that we had for business was from the times of our parents. In the incubator, we learned that the company needs to have scale and flow", comments Cássia.

The *Reino Bambini* works with outsourced partnerships, hired on demand. In this way, it makes partnerships with studios of illustration and animation, publishers of books, and communication and consultancy advisory in the Law area. The startup is framed at Rouanet Law, the federal law of incentive to the culture that allows the project development.

Ideas and self-knowledge

Being conscious of the strength and what needs to be improved is one of the most necessary actions for the entrepreneur. According to the educator and doctor in Education, Odilon Luiz Poli, self-knowledge is valuable to those who want to be entrepreneurs. In the analysis of the professor of the Graduate Program in Education at *Universidade Comunitária da Região de Chapecó* (*Unochapecó*), people can be more creative when they are comfortable with what they do. "The self-knowledge helps to understand what fills our life, and the sooner people are brought to be honest with themselves, the more prepared they will be to make choices, undertake and live."

For the professor, in childhood, human beings are more open to the new and allow themselves more, as well as make mistakes to try again. In this scenario, the schools are strong allies of entrepreneur education. "The Child Education and Elementary School needs to rescue the scientific and general curiosity of kids. Thus, students can understand that an idea needs step-by-step until it becomes a reality."

Poli points out three main factors for those who want to undertake: curiosity, creativity, and method. "Entrepreneurship is an attitude of curiosity and interest for the surroundings. It evolves observation of society and what people need. It takes discipline and organization to execute. It is not enough just to have an idea. You have to make it happen".

Photos: Disclosure, Paula Navarro Fotografias

Memories from childhood
The family farm in Caxambu do Sul, in the Santa Catarina West, was the inspiration for the psychologists and sisters Cássia (left) and Marina Cavalli

Reino Bambini
The authors have already published four child books in all

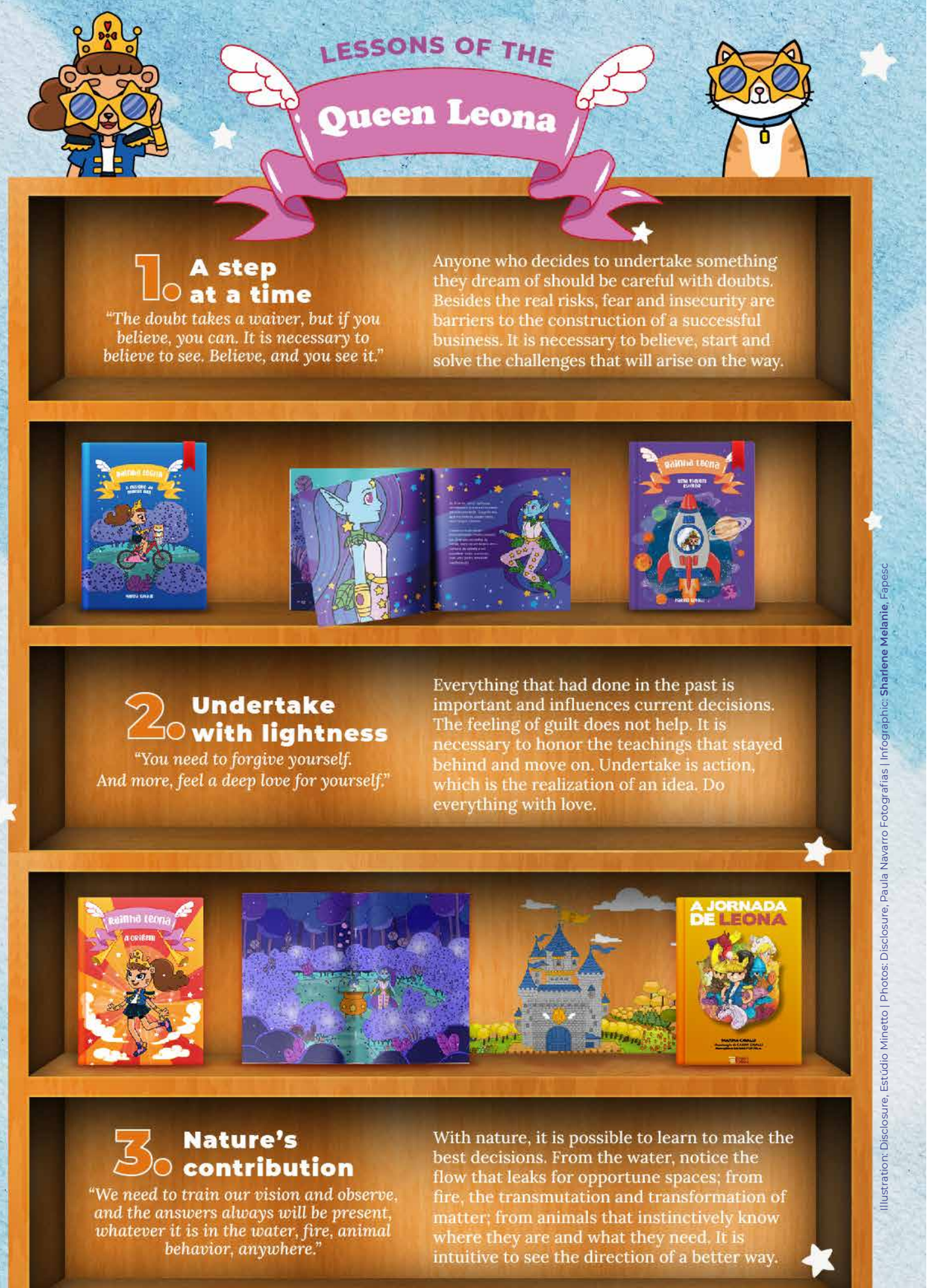

Illustration: Disclosure, Estúdio Minetto | Photos: Disclosure, Paula Navarro Fotografias | Infographic: Shaflene Melanie, Fapesc

Self-knowledge
The startup Reino Bambini books encouraged little readers to seek their life purpose

App
Scan the QRCode and have fun with the character Queen Leona

Game and augmented reality

Marina and Cássia wanted to deliver to kids something that helps to change their life, but when the method was created, to be applied in schools in 2015, the idea was not through literature. The psychologists took videos and proposed practice activities. The videos need to have the plot to be recorded, so the idea to write a book came up. Thus, raising the first book and Marina made an old dream come true.

The first jobs have already been the base for interactive material of Queen Leona made by a startup, as accessories in the paper that follow the books. But there are new products in progress, such as a cartoon, a game with augmented reality, and an app.

The country girls were the character Leona's inspiration, bringing a message about entrepreneurship and alluding to feminine empowerment. Leona was born on another planet and raised on Earth by foster parents, encouraging her to understand and accept her gifts and go further, looking for her purpose. Leona brings with her feminine strength and her grandiosity.

Women Entrepreneurship

For the sister from the Reino Bambini, the start to undertake is the knowledge about themselves. "Successful entrepreneurship depends on the purpose, and it is linked to who you are. I need to discover myself to deliver me to real actions. All that Leona does is from that: intern way and external actions. I discover my potentiality, purpose, nature, and I act, execute and walk on the world", affirms Cássia.

For the future, the startup located in Chapecó plans to do free digital deliveries, produce movies of the character Queen Leona, series, licensed products, everything without losing the essence of Reino Bambini: tell stories and encourage readers to get to know each other from an early to pursue their life purpose. /

Unoesc opens the archaeological center in Joaçaba

The collection of 11 thousand pieces is composed of arrowheads, grain macerators, and ceramics, and it reflects the **lifestyle of the indigenous group** that inhabited the Santa Catarina Middle-West region thousands of years ago

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A part of the Santa Catarina Middle-West history surfaced with the excavations realized surrounding the Canoas River. The result of the work is exhibited at the Archaeological Center from Universidade do Oeste de Santa Catarina (Unoesc) in Joaçaba. The space beyond doing a culture rescue offered a new opportunity for research and study about the lifestyle of the ancestors from the region.

The collection is composed of items like arrowheads and ceramics that tell the history of indigenous groups that inhabited the Santa Catarina cities of Abdon Batista, Anita Garibaldi, Cerro Negro, Campo Belo do Sul, Vargem, and São José do Cerrito years ago.

The pieces at the new Archaeological Center show a little about the lifestyle of indigenous groups that lived in Santa Catarina before the arrival of Europeans. They were hunters- collectors that had been in the State 12 thousand years ago and the potters-horticulturists groups that lived 2 thousand years ago.

"The hunter-collectors were nomads and lived in small groups in forests and fields. The potters-horticulturists, already composed of groups with more than 30 members, installed houses close to water, such as the creek. These groups built underground structures for food preservation and to shelter in lower temperatures. They were semi-sedentary, practiced agriculture, and, because of the ceramic tool use, they prepared more elaborate meals, such as boiled and soup", explains the archaeologist from Unesc Archaeological Center, Marina da Fonseca Lopes.

Pieces rescue the lifestyle of indigenous groups

Marina points out that objects such as plates, cups, and indigenous ceramics are fragmented. According to the archaeologist, the artifacts bring characteristics of the context in which the groups were inserted, explaining the lifestyle of the people who used them.

"The amount of arrowheads rescued in the search calls attention. We have a total of 77, and some cases, only one archaeological site collected more than 30 arrowheads, a quantity very significant if compared with other archaeological sites in Santa Catarina, once that type of material is rarely evidenced".

Open to the community, the Unoesc Archaeological Center is a tool for articulating teaching, research, and extension, with environmental and heritage actions. Besides the pedagogical activities, with thematics as culture, memory, and environment.

"The amount ofarrowheads calls attention. A quantity very significant if compared with other archaeological sites in Santa Catarina."

Marina da Fonseca Lopes
Unoesc Archaeologist

Unoesc colletion

Indigenous ceramic
The collection reinforces scientific exchange

The coordinator of the Unoesc Archaeological Museum, professor Tiago Diersmann, highlights the scientific importance of the Archaeological Center in Joaçaba. "With the creation of the scientific collection, the information makes part of a database and can support the visiting researchers, reinforcing technical exchange between institutions. The new collection portrays part of the history of human society and contributes to the cultural and scientific development of the region.

The collection of the Archaeological Center was born from studies and excavations realized during the construction of the Garibaldi hydroelectric power station at Canoas River. The study is guaranteed by the Brazilian environmental law, which determined the realization of the archaeological search in huge infrastructure works, aiming to preserve trace elements from the pre-colonial era. /

Trace elements from the pre-colonial era

The Unoesc Archaeological Center has a search laboratory, a multimedia classroom, and a collection with 11 thousand archaeological pieces. The space is open to public visits with a pre-schedule. Check out some pieces that are in the set.

Hatchets

Scraper, it used to work with fur and prepared wood

Ceramic fragment with a painted surface

Core, auxiliary part in the tool confection

Pestle hand to grind grain and foods, like corn

Arrowhead

Unoesc colletion

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