



Annual Report
2021

Centre ValBio

Madagascar

Contents

	Page
History of CVB	3
Statement of Purpose, Mission Statement, Goals	4
Letter from the Executive Director	6
Highlights of the Year	8
Map of CVB Interventions	12
CVB's New Herbarium	14
Ryan Butler	16
Dina Andrianoely and Laza Andrianandrianina	17
Long Service Awards	18
Emile Rajeriarison	28
Amanda Mancini	30
Dr Beatriz Otero Jiménez	31
In Remembrance	32
Tabula Madagascar	36
The Lemurs of Ranomafana National Park	40
Michel Rakotonirina	42
<i>Calophyllum</i> Update	44
Ashley Maggy	45
Ivohiboro Inauguration	46
Reforestation	50
Publications	54
The MicroceBus	57
Acknowledgements	58
Our Partners	64



Uroplatus sikorae

History of CVB

In 1986, primatologist Patricia Chapple Wright was given a seemingly impossible task: to travel to the rainforests of Madagascar and find the greater bamboo lemur, a species that hadn't been seen in the wild by scientists for thirty years. Not only did Dr Wright discover that the primate still existed, she proved that it lived alongside a completely new species, the golden bamboo lemur. What followed was a love affair with an animal and a country that continues to this day. Dr Wright is best known for her study of lemurs in Ranomafana National Park ('RNP'), which she helped establish in 1991.

Centre ValBio ('CVB') was created by Dr Wright in 2003 under the Institute for the Conservation of Tropical Environments' agreement with the Government of Madagascar. The richness of the critically endangered plants and animals, contrasted with the poverty of the people, inspired her to help both survive in harmony.

CVB's mission is:

- To promote world-class research and biodiversity training opportunities in one of the world's most biologically diverse and unique ecosystems;
- To promote environmental stewardship by providing conservation education and ecologically sustainable economic opportunities within local communities; and
- To provide the local people with knowledge and tools to improve their quality of life.

Statement of Purpose

Inspiring passion for biodiversity and conservation science in the tropics.

Mission Statement

CVB's mission is to be the standard-bearer for research stations in the tropics. By approaching the interrelated problems of climate action, poverty, and health with the interrelated solutions of quality education, economic growth, and scientific innovation, we hope to demonstrate that sustainable communities and reduced inequality are possible alongside a flourishing natural environment.

Goals

- To fully understand the complete ecosystem dynamics of a tropical rainforest, including mapping an entire ecosystem's genomics, and connect this with climate, environmental, and household health data to inform local practices, public policies, and global debates.
- To inspire innovative approaches to biodiversity research and conservation and provide training opportunities in one of the world's most biologically diverse and unique environments.
- To support environmental stewardship in conjunction with ecologically sustainable economic development for the local Malagasy communities.
- To be the coordination center of a network of field sites facilitating comparative research within Madagascar and also across the tropics to better understand regional and global biodiversity dynamics.
- To integrate ecological restoration, education, human health, agricultural improvement, natural resource conservation, and empowerment of local communities in a One Health framework.





Letter from the Executive Director

Stony Brook to concentrate on digitising the past thirty years of data. Spearheaded by Dr Beatriz Otero Jiménez, David Cyrille, and Dr Elinor Schoenfeld, the database continues to gain structure. With the help of CVB leadership from Dr Jean Claude Razafimahaimodison, Laza Andrianandrianina, and Dina Andrianoely, our biodiversity technicians entered reams of past data in a concerted effort to make this database of climate, botany, and biodiversity information complete.

Although many of our field research projects had to be postponed, long term initiatives such as my *Propithecus* monitoring, Dr Andrea Baden's ruffed lemur research, the T.E.A.M. ecological observation programme, and the CVB bamboo lemur project were continued. Due to funds from *Ecosia* (the search engine that plants trees), the USAID TSIRO project lead by Catholic Relief Services, and Seneca Park Zoo's blockchain tree tracking initiative, CVB's reforestation efforts have been greatly expanded. Additionally, by the end of 2021 our Education and Health Teams were back in the field, bringing vital services to remote communities. We are hoping that 2022 will bring back both study abroad students and researchers. The coals of research will be rekindled and fanned into even more successful new projects.

A special round of applause for our wonderful CVB staff, including the leadership of Michael, Benjamin, Pascal, Jean Claude, Dede, Prisca,

Lovaso, and Nicolas. During COVID-19 these senior staff were able to zoom into one of CVB's board meetings to be introduced to everyone. The board itself is transforming, with Rhett Butler and Jane Alexander stepping back and Dr Benjamin Andriamihaja, Dr Onja Razafindratsima, and Dr Jonah Ratsimbazafy joining.

Our young CVB staff have received several honours. Lovaso Razafindravony, Head of Education, had two abstracts and two papers accepted for publication during 2021. Laza Andrianandrianina, Assistant Research Coordinator, was been accepted into the postgraduate diploma in International Wildlife Conservation Practice at Oxford University, and he will be in the UK for much of 2022. Last but not least, Dina Andrianoely was selected to take the Durrell Endangered Species Management Graduate Certificate at the Durrell Conservation Academy in Jersey, Channel Islands, during the first months of 2022. We are very proud of their accomplishments.

I am pleased that the SOS Biodiversity Research Centre ('AinaBe') has become full of life. Meetings fill the conference room, research offices are occupied by staff, the laboratory is in use, and the collections room is filling up. Emile Rajeriarison, Paul Rakotonirina, and Dominique Razafindraibe are gathering plants and insects for these collections, which will be used as part of the first year of the Tabula

Madagascar 'Genome of an Ecosystem project', a collaboration between the CZ Biohub and CVB.

In November, Ashley Maggy visited CVB to assist with branding, communications, and social media. Also in November, Ryan Butler and Clara Tucker arrived to study insects and develop sampling protocols as part of the Tabula Madagascar project.

As part of this long-awaited November influx, Beatriz Otero Jiménez and I visited to spearhead the *Microcebus* Acoustics Project and encourage mouse lemurs to 'try on' acoustic microphone jackets to record mating calls. Fitting the jackets proved challenging due to the Houdini-like ability of the lemurs to escape all bonds, but the initiative was successful in recording mouse lemur vocalisations using ultrasound recorders borrowed from the University of North Carolina, Greensboro. We now have proof of concept for our proposal submission to NSF, entitled: 'Separating Species: documenting the "love calls" of two species of mouse lemurs in Ranomafana National Park'.

Dyan Machan, a journalist from the Smithsonian magazine, and Noel Rowe, her photographer, completed the complement of November guests when they arrived to visit the Lost Rainforest. Along with Benjamin and the CVB team, they attended the inauguration of the new Ivohiboro Protected Area headquarters, with the Smithsonian Institution documenting this milestone along with the biodiversity that the HQ will help to protect.

2021 was the third year of severe drought throughout western Madagascar. This drought impacted the vegetation and biodiversity of the Ivohiboro Protected Area; trees were wilted or had died, chameleon populations were diminished, and frogs were scarce. Luckily, our live traps captured many dwarf and mouse lemurs. In addition, three groups of ring-tailed lemurs were recorded and a large common tenrec was observed. We were pleased with the motivation and expertise of the ten newly-trained Protected Area rangers. We hired these local village residents after working with them during earlier expeditions to the Lost Rainforest. Now they have new uniforms and reliable salaries to ensure that we can protect and monitor this special forest for years to come.



Despite the challenges of 2021, we are ready to face 2022 with hopes of it being a CVB renaissance of health, research, and conservation.

Thank you to everyone for helping us to succeed.

With best wishes,

Dr Patricia C. Wright
Founder and Executive Director
Centre ValBio

Highlights of the Year

Meetings and Events Hosted by CVB
 Activities Attended by CVB Staff
 Community Events

January 15
 Official inauguration of the SOS IUCN Biodiversity Building ('AinaBe'); c. 150 pax

January 25–29
 CRS workshop; 'Virtual Journey of Hope'; CRS staff and donors; 40 pax

February 11
 FIMARA AGM and workshop; Pascal Rabeson, 35 FIMARA members and Ampanjaka; 37 pax

March 6
 Inauguration of the Ny Tanintsika borehole in Morafeno, paid for by the Bergen Highlands / Ramsey Rotary Club; c. 100 pax

March 12
 Jonah Ratsimbazafy, SBU PhD and student of Dr Wright, is honoured with a Malagasy postage stamp; Drs Wright and Andriamihaja and Michael Docherty attend

March 11
 Meeting with PROSPERER about FIMARA and the alembic, discussion on how to help local FIMARA production; Santatra, Rakoto Pierre, Botoratsy Raymond, Olivier, 3 Prosperer agents

March 24
 Inauguration of the Ny Tanintsika borehole in Mandivany, paid for by the Bergen Highlands / Ramsey Rotary Club; c. 100 pax

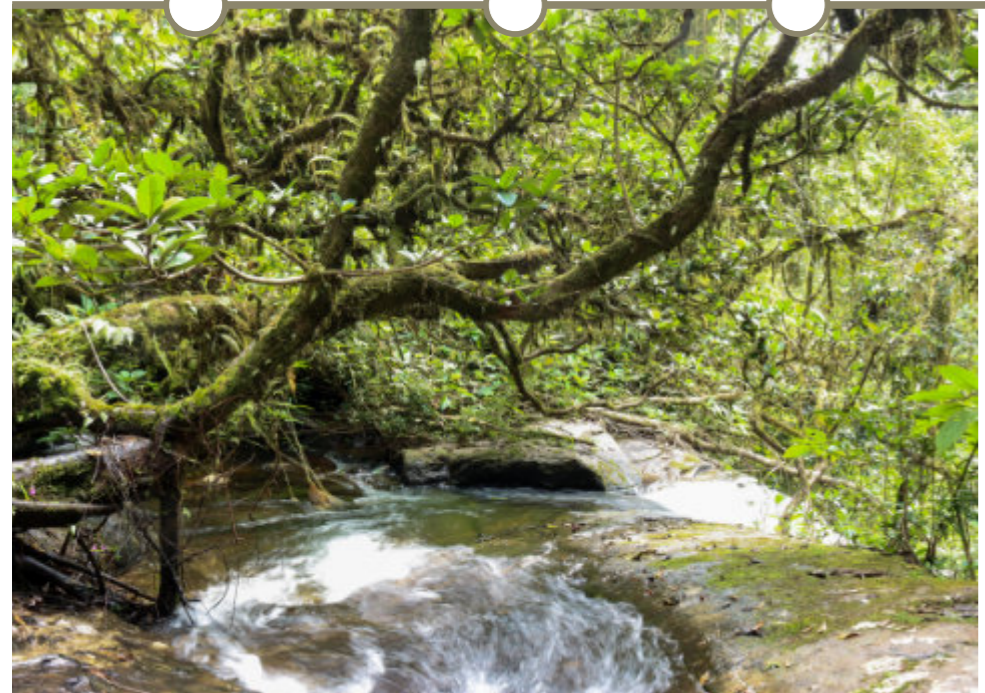
July 26
 Société Générale Madagascar head office courtesy visit to CVB; 3 pax

July 13–15
 CRS Youth Summit on developing future leaders in Madagascar; 78 pax

August 26
 Madagascar Soap Project workshop; Chris Coulter, Dr Caroline Rokoanilahina, Lovasoa Rakotondravony; 7 pax



Calumma nasutum



May 14
 Opening of COVID-19 PCR laboratory in conjunction with Pivot; Pivot & CVB staff, Governors of Vatovavy Fitovinany and Haute Matsiatra, Head of District Ifanadiana, Mayor of Ranomafana; 50 pax

May 24
 Meeting with the Assistant Mayor of Ranomafana regarding water supply in Ankevohevo and Mahatsarabe; Santatra, Botoratsy Raymond, Assistant Mayor, Responsible for Infrastructure in the Commune; 4 pax

June 2
 1st staff vaccination day at CVB, with 70% of staff getting their first COVID-19 vaccination

June 15–17
 CNARP (Centre National d'Application des Recherches Pharmaceutiques) scientific workshop on medicinal plants and traditional medicines; CVB staff and university representatives; 52 pax

July 20–23
 CRS CEFAR ('Centre d'Etablissement de Formation Agricole et Rurale') workshop; 40 pax

August 4
 Education Department workshop with the CISCO and ZAP of Ranomafana; CVB Education team, CISCO Ifanadiana, CISCO Haute Matsiatra, and ZAP Ranomafana; 18 pax

August 20
 CVB donates essential supplies to the Ranomafana gendarme following a fire

September 16–17
 USAID ACCESS accompanied by CRS visit to Ranomafana and CVB; 8 pax

October 20
 CVB's temporary lemur accommodation is expanded and renovated

November 8–11
 CRS workshop; 26 pax

Nov. 30–Dec. 15
 Mary Lee Gaylor visits CVB to assist with database and library

December 1
 United Nations Systems Meeting; CVB and PIVOT; 13 pax



2021 brought great changes to Madagascar, on a local and national level. V7V, the region we have called home since inception, was split into two, with CVB now being located in the 23rd region of Madagascar, Vatovavy. This re-organisation created a new governor, and was accompanied by governmental changes at all levels. We spent a great deal of time ensuring that all these new authorities were aware and supportive of CVB's activities.

Closer to home, we were able to celebrate the inauguration of our new Protected Area headquarters at Ivohiboro - see pp. 46-49. This is the culmination of many years of work to protect this important biodiversity hot spot, and will allow exciting new avenues of research

in the future. We already have researchers keen to work in this area.

We would like to thank the *Ministère de l'Environnement et du Développement Durable* for renewing our *Accord de Siège*. This document is our permission to operate in Madagascar, and it signifies the continuing trust that the Ministry has in the work that we are doing. We are proud that they agree we are making a positive contribution to the country.

Tsy misy mafy tsy laitry ny zoto.

- Dr Benjamin Andriamihaja
ICTE Country Director



2021 was a year of continued uncertainty. Despite implementing sanitary measures and getting over 85% of our staff vaccinated, CVB had to endure lockdowns.

Although few international researchers were able to continue their work, CVB still managed to accomplish a great deal in education, reforestation, and mobile health, to name but a few successes. In general, CVB staff were able to overcome most issues and deliver a normal programme of work. This is a testament to their resilience. By adopting unfamiliar technologies such as Zoom and Skype, staff were able to participate remotely in conferences and other important meetings. They were able to keep up to date on what is going on in conservation, reforestation, environmental education, and biodiversity research, while becoming adept at new technologies.

In addition, CVB still managed to celebrate World Lemur Day, World Environment Day, and various national reforestation events.

While the activities of CVB reduced slightly, with the help of Dr Wright, Dr Andriamihaja, Michael Docherty, and all of our hard-working staff, we still managed to accomplish most of what we would in a normal year.

All of our staff are excited about the future, with the arrival of researchers, study abroad groups, and others visitors helping return CVB to its usual busy self!

- Pascal Rabeson
CVB National Director

2021 was another year marked by huge COVID-19 challenges coupled with equally huge responses from staff, donors, and board members.

Continued generosity has kept the doors open and lights on. A huge debt of gratitude is owed to each and every donor. Their support has allowed CVB to thrive during a time when we faced a very real existential threat.

Following last year's inauguration, AinaBe started to host our insect specimen gathering activities, in support of both our nascent collections room and the groundbreaking Tabula Madagascar project - see pp. 36-37. When I first arrived at CVB, the construction site was

just being cleared, so this is an especially proud moment for me.

CVB never treads water, and during the year we welcomed the Ministry of Health for an inspection of the PCR laboratory, rehabilitated our temporary lemur accommodation ahead of a translocation, and celebrated the success of long-term friend Dr Jonah Ratsimbazafy who had postage stamps released in his honour.

My sincere thanks to the incredible group of staff, researchers, board members, and supporters who make this vital work possible.

- Michael Docherty
ICTE/CVB Chief Operating Officer



As a technologist, I must look toward the future and develop the technology this world needs to solve environmental issues like the pandemic, which drain hope from humanity and light from this world.

Many of the technology initiatives developed during the pandemic are now arriving in Madagascar to begin operation. These include: new fixed sensing and highly self-reliant drone systems that monitor the forest's health in real time; new data systems to enable CVB's push into big- and deep-data, allowing us to better unlock the secrets of the forest; and systems that show promise for introducing data connectivity throughout the entire forest. This is part of a ten-year effort to lay a foundation that

enables the extremely tech-centric solutions outlined in the CVB technology road map.

However, although technology can give conservation amazing new tools, it alone cannot solve this world's conservation issues. It takes dedicated people such as the staff of CVB, who through pandemic, cyclones, and everything else over the last few years have continued to advance anthro-ecological balance. Above all of the marvellous technology in the world, it is them of whom I am most proud.









- Jesse McKinney
ICTE/CVB Chief Technology Officer



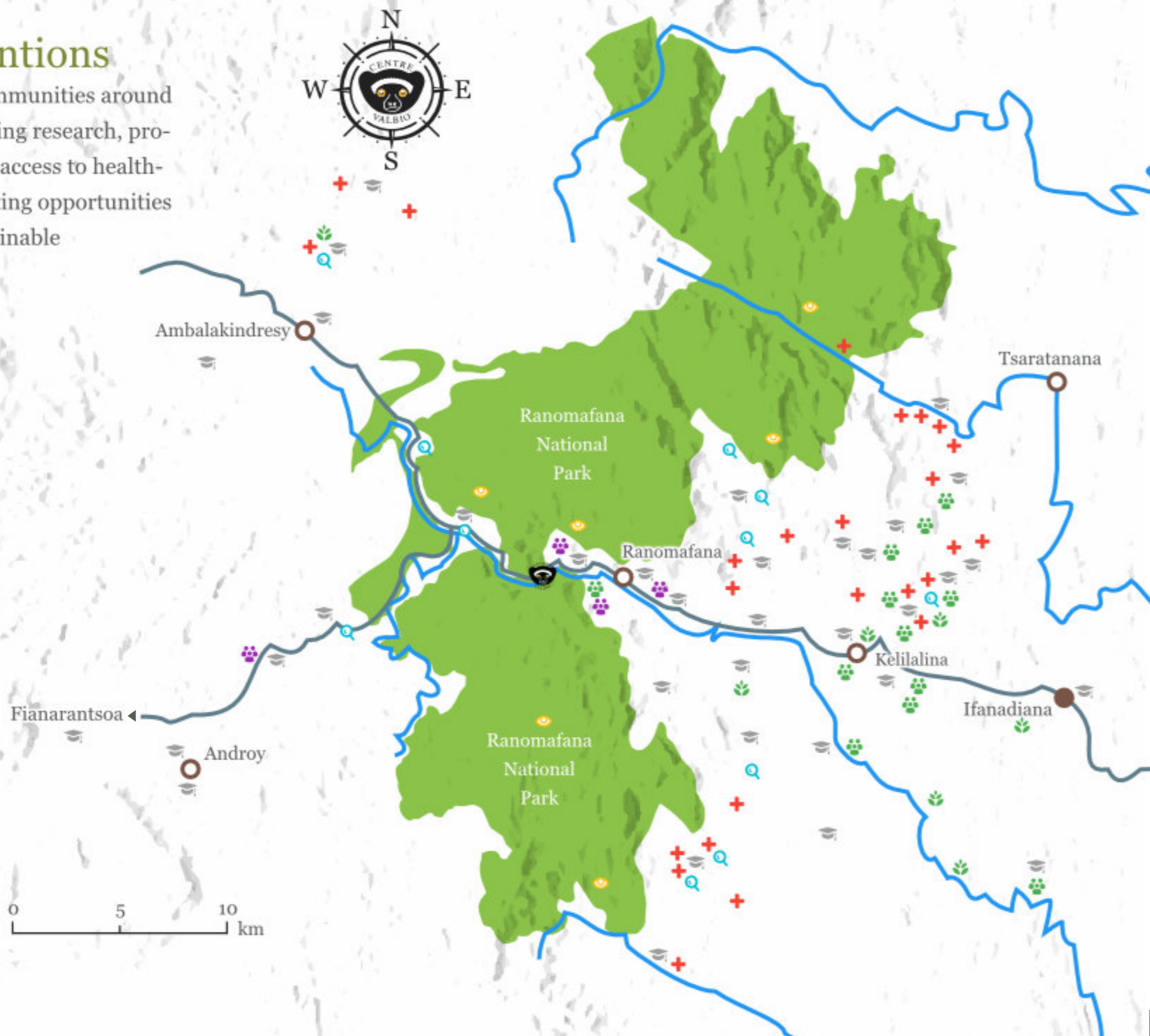
Map of CVB Interventions

Centre ValBio is active in over 75 communities around Ranomafana National Park, conducting research, providing environmental education and access to health-care, and supporting income-generating opportunities via reforestation that promotes sustainable agroforestry.

Key

-  Conservation Club
-  Conservation Club & Reforestation
-  Reforestation
-  Health
-  Education
-  Participatory Ecological Monitoring
-  TEAM
-  Boreholes / Wells

-  Road
-  River
-  District
-  Commune



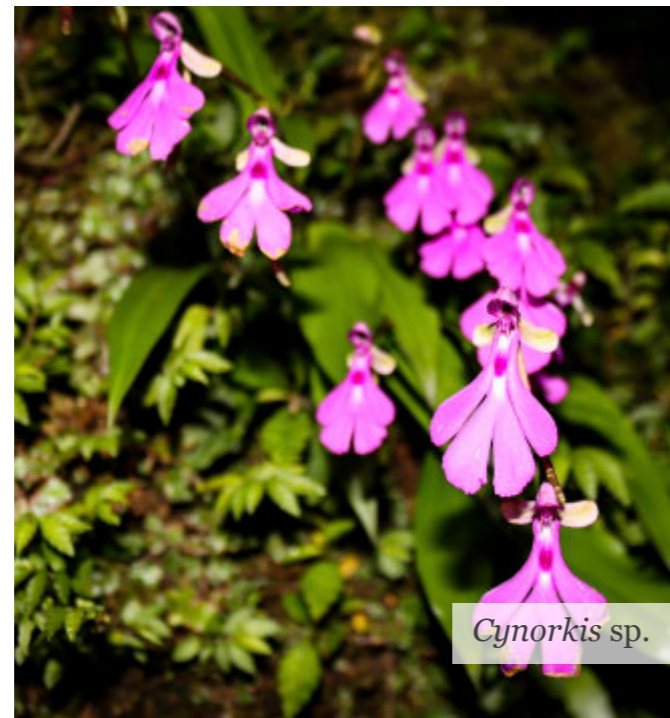
Uroplatus phantasticus



Kathy collects a fruit sample



Gravesia sp.



Cynorkis sp.

CVB's New Herbarium

An interview with Paul Rakotonirina (Responsible for CVB Herbarium) and Dominique Razafindraibe (Assistant Responsible for CVB Herbarium)

Q: Why has CVB started a herbarium?

A: Ranomafana National Park contains a huge number of endemic plant species, but there was no dedicated repository to preserve and document them. To address this issue, AinaBe was designed to contain a collections room where CVB could start to create a reference library of local species. Using training we had at Missouri Botanical Garden, we collect species samples and then process them in the AinaBe



Paul and Dominique in the collections room with preserved samples

laboratory. We identify the plants by order, family, and species, after which we dry and mount the samples for storage. The project began in January.

Q: How many species have you catalogued so far?

A: So far, we have identified approximately 400 species of trees and 1,000 species of plants that should be catalogued, but we have not yet taken samples from them all. One of the reasons why we have not yet taken samples from all target species is because sample collection depends on weather, and also the phenology of trees; we only collect samples from fruiting and flowering trees. This is firstly because they are easier to identify at that stage, and secondly because we must include samples of the fruits and flowers for our collection to be as comprehensive and as useful as possible. Having preserved fruits and flowers helps to distinguish trees with very similar leaves but distinctive features only present during the reproductive phase. So that we don't miss anything, samples are also collected from outside of the park on an opportunistic basis while on expeditions.

Q: Why is this important?

A: Having an identified and catalogued species sample readily available in a climate-controlled room aids any researcher who wants to identify any samples they find in the forest. It also helps local people to understand just how diverse the biodiversity is in their forest. Furthermore, many of the plants are used medicinally by natural doctors practising traditional

medicine. It is important to preserve this tradition, and having high-quality samples will let the older healers pass on their knowledge to the next generation. One interesting outcome is that we have discovered that the tree species *Ascarina coursii* is present in Ranomafana, which was an interesting find for the team!

Q: Can you tell us your past experience with plants that makes you suited for this work?

A: Before joining CVB, we [Paul and Dominique] both used to cut timber to make a living. Working at CVB has allowed us to provide for our families without sacrificing the forest to do so. We can save the forest while showing others the importance of not cutting down the trees. We were both born beside the forest and are both self-taught, with our childhoods spent in the forest. We became experts in identifying the plants surrounding us. We first learn to identify plants and trees by looking at the leaves, the flowers, and the fruit. Since working at CVB we have added to that by reading books, watching documentaries, and working with international researchers. In 2020 we received two incredible training sessions from Missouri Botanical Garden on botany and identification. Our favourite part about the job is being able to increase our skills and knowledge everyday through our work on the herbarium.

Interviewed by: Ashley Maggy
Translation by: Hasina Malalaharivony



MADAGASCAR
LAURACEAE
Cryptocarya sp.

Det. Dominique Razafindraibe 2021
Finnarantson : Haute Matsiatra Region
District : Lalangina, Commune : Androy, Fokontany :
Vohiparara, 2km sur RN25 vers Ranomafana.
Forêt humide de haute altitude.
21 244057S 047 39318E 1125m (38)

Arbre, 11m de hauteur, dbh : 7cm, fût : 3m. Fruit marron.
Abondance : 1 fied/0.1ha.
Photo 0

22 septembre 2021
Razafindraibe Dominique & Rakotonirina Paul (DORA)
CENTRE VALBIO BOTANICAL HERBARIUM



Ryan Butler

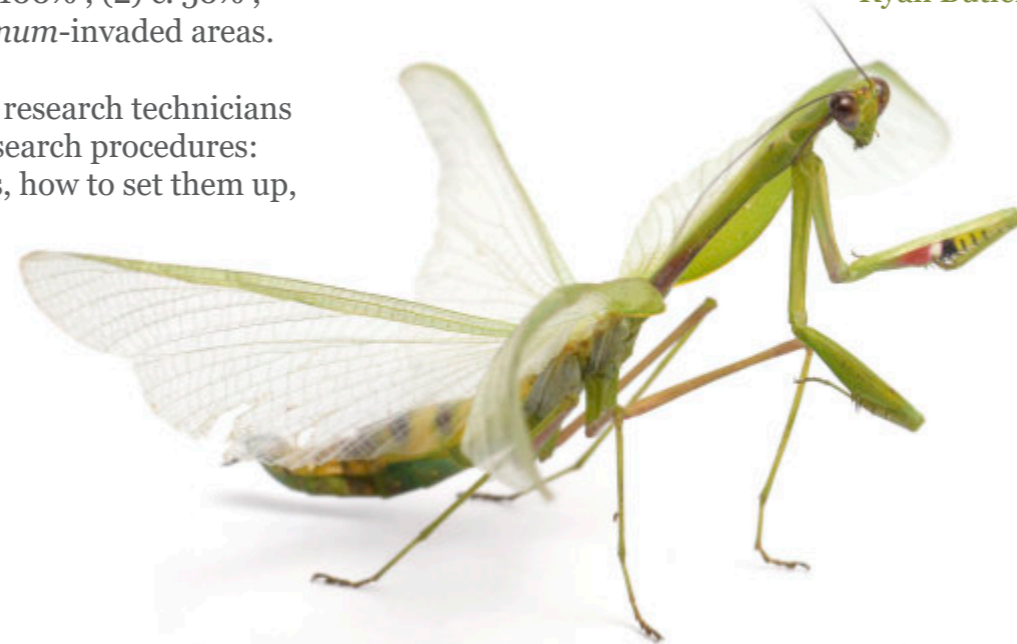
The strawberry guava (*Psidium cattleianum*) is a woody plant species of the Myrtaceae (myrtle) family native to Brazil. It is well known that *P. cattleianum* can disrupt the plant communities that it has invaded, excluding other plant species from growing due to toxic chemicals present in its leaves.

However, few studies have focused on the impact of *P. cattleianum* on insect communities. As insects are important pollinators and also form the base of the food web for many animal groups, it is important to understand whether *P. cattleianum* has had an impact on native insect communities, and if so whether it is positive or negative. The goal of my project is therefore to determine if there is a significant difference in the insect communities among three types of site: (1) c. 100% , (2) c. 50% , and (3) c. 0% *P. cattleianum*-invaded areas.

Upon arrival at CVB, six research technicians and I went over basic research procedures: where to set up the traps, how to set them up,

how to record data, and how to pin captured insects. We decided to use a modified window trap to sample the insects, as recommended by Knuff et al. (2019). Such traps consist of a bottom portion for catching falling insects that then collide with the windows, and a top portion for insects that tend to crawl upwards when faced with an obstacle. Five traps each were set up in areas with c. 100%, c. 50%, and c. 0% *P. cattleianum* invasion. The three areas were compared using a non-metric multidimensional scaling ordination. The insect communities of the c. 100% invaded and c. 50% invaded areas were similar, whereas the c. 0% invaded areas displayed markedly different insect prevalences. This result is in accordance with similar studies that have found that sites devoid of invasive plants contain very different insect communities compared to invaded or only partially invaded sites.

- Ryan Butler



A mantis of the family *Nanomantidae*



Emile Rajeriarison (see p. 28)

Dina Andrianoely

Dina, our GIS responsible and leader of the *Propithecus* team, was selected to be part of the spring 2022 cohort for the Durrell Endangered Species Management (DESMAN) Graduate Certificate. This is an incredible honour, and Dina follows in the footsteps of Dr Wright and Dr Andriamihaja, both of whom have spent time at Durrell. Dina's studies include communication facilitation, species conservation, project management, and conservation leadership. Not only was Dina given a full scholarship, he was selected by Durrell for an 18-month career development plan. These skills and this new global network of colleagues will help Dina immensely. Well done, Dina!



Laza Andrianandrianina

We are delighted to announce that Laza, our Assistant Research Coordinator, will travel to Oxford in 2022 to complete the Postgraduate Diploma in International Wildlife Conservation Practice. This intensive course will greatly enhance his knowledge of field survey techniques, data analysis methods, and reporting techniques, and allow him to join a cohort of global alumni. He will also have the opportunity to attend the Museum of Zoology and the Student Conference on Conservation Sciences in Cambridge, and to meet Dina in Jersey! After completing this course, Laza will play a leadership role in conservation in Madagascar. Amazing work, Laza!





Long Service Awards

The beating heart of CVB is our skilled staff, and this year we honour 18 incredible individuals who have been with us for more than 20 years. The collective talent, expertise, and wisdom that they possess is nothing short of a national treasure. As the founder of Centre ValBio, I am immensely proud of their accomplishments. Without them, none of our success would have been possible.

I remember the early years when Zaka was the cabin cook, and today he is an expert mouse lemur technician. Dede was a chauffeur, then an expedition coordinator, and now is Head of Logistics! Telo Albert, one of our first lemur guides, is a respected village elder (Ampan-

jaka) and works on community research. Justin Solo splashed at night with the herpetologists, became a frog expert, and is now Head of Research Technicians. The *Propithecus* team—Ralisoa, George, and Remi— started studying sifakas with me when we followed the four groups in Talatakely. Pascal studied fish with Peter Reinthal, then ants with Gary Alpert, and now he is National Director. François was one of our only experts on insects and has developed into a treasured technician. Jean Guy started working with lemurs but now is a plant expert as well. Plants are difficult to distinguish, but experts like Paul, Dominique, and Armand have the ability and patience to perform detailed botanical work. Menja was a little girl when I first met her, and now she has become sought-after by many lemur research-

ers. Jean Lucien and Alfred were the original tree nursery assistants at Kianja Maitso, and now they are on our Reforestation Team. Finally, Némèse was USAID tree project technician and went on to be a founding member of the Education Department.

Together, these extraordinary people have amassed 446 years of invaluable conservation experience. Through good times and bad, they have endured to build a world-renowned tropical research station of which Madagascar can be justly proud. CVB honours these remarkable individuals: thank you with deep appreciation.

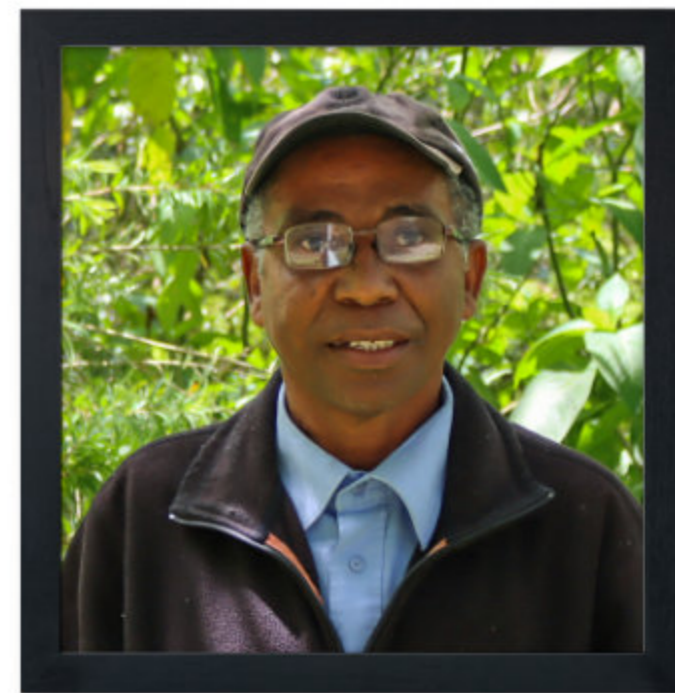
- Dr Patricia C. Wright



Justin Solo ▼

Joined: 1991

Justin Solo is CVB's Head of Research Technicians, a position he is very well suited to given his over 30 years of field experience! Like many CVB employees he lives in the village of Ambatolahy, just two kilometres down the road from campus. Over the years he has worked on projects related to primates, birds, frogs, and plant, giving him an incredible understanding of how the forest works. So much so that many people request to work with him time and time again. He now also devotes a lot of his time to sharing his knowledge with new technicians. Justin loves his job, and his message to everyone is that honesty is important in life.



Paul Rakotonirina ▲

Joined: 1991

Paul has been a CVB technician for well over thirty years, and his experience and talent have led to him becoming the Responsible for CVB Herbarium. He lives in a village near Ranomafana called Ambalamahasoia, so he is surrounded by the biodiversity that he studies. His speciality is botany and in particular plant identification, and he leads CVB's plant collection activities following training at Missouri Botanical Garden. Paul literally wrote the book at CVB on the scientific names of plants! Lemurs are another strength. Because of his diligence, he often works on long-term projects. He says that biodiversity requires love and patience.



Albert Telo ▲

Joined: 1990

Telo Albert is our longest-serving employee, having worked with Dr Wright before there was a single building on campus and even before the name 'Centre ValBio' was created! He hails from a village located near Ranomafana called Tanambao, which gives him incredible knowledge about local biodiversity. So, while the lemur species of RNP are his speciality, over his career he has been able to work on almost all genera found inside the park. Because of this deep knowledge, many of the projects he has been involved with have been long-term, lasting over one year. Telo Albert loves working in the forest, because his job allows him to increase his knowledge of local wildlife.

François Zakamanana ▼

Joined: 1991

Zaka remembers working with Dr Wright in the original research cabin as a cook! Things are very different now, working as a technician on CVB's modern campus. Zaka is one of the many members of staff who live in Ambatolahy, just two kilometres from CVB. He has worked hard to develop his specialities, and can now work on projects related to lemurs, botany, or ornithology. Recently, Zaka has been working on the important long-term mouse lemur projects at CVB. Zaka states that he enjoys working at CVB because of the knowledge and experience that he has gained.



Desiré Randrianarisata ▲

Joined: 1993

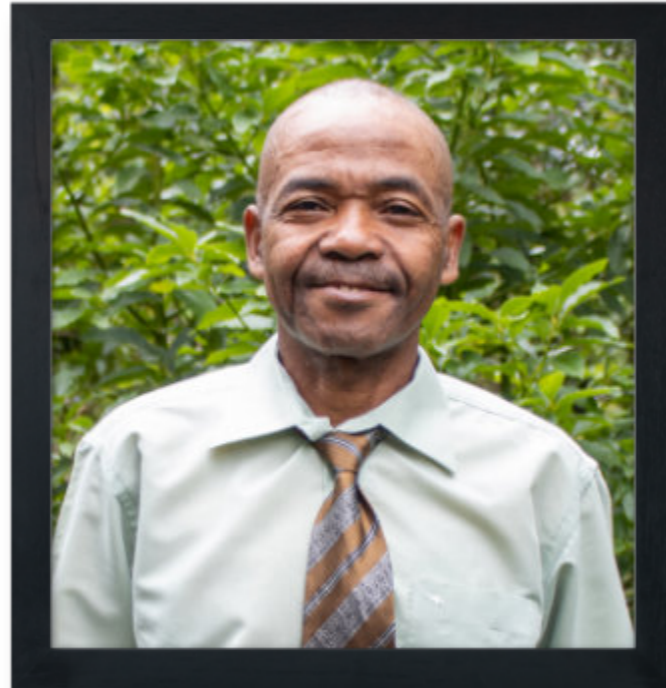
Dede has worked with Dr Wright since the early days of RNP, through the creation of CVB in 2003, to today, when he is Head of Logistics. He has a huge range of experience, from being a research assistant on a *Propithecus candidus* expedition in Marojejy National Park, to being the construction manager for the SOS IUCN Biodiversity Research Centre project. He also uses his videography training with UNICEF and RIT to make films about biodiversity and the environment. Nothing CVB does would be possible without Dede there to make sure everything runs smoothly!



Rémi Rakotovao ▼

Joined: 1994

CVB researchers know Rémi very well, and they are always asking if he can work on their projects because they value his passion and his dedication to his work. One of many staff from the village of Ambatolahy, Rémi is a technician in the Research Department. He has worked with Dr Wright for many years on the long-term *Propithecus* project, one of CVB's flagship initiatives, and he has also worked a great deal on *Lemur catta*. It is fair to say that he is a lemur expert! Rémi is always trying to learn more about the forest and all of its inhabitants, and takes part in every training available so that he is constantly increasing his biodiversity knowledge.



Laurent 'Ralisoa' Randrianasolo ▲

Joined: 1996

Ralisoa lives in a village near Ranomafana called Ambodikimba. Growing up surrounded by the local biodiversity, he became very familiar with it. His main speciality is primates, but he also works on a number of botanical projects. Since 2001 he has been a member of the *Propithecus* team, playing a key role in gathering an incredible historical data set. Because of his diligence and skill, many researchers ask for him by name every time that they visit. Ralisoa is proud that, no matter what difficulties he encounters, he always finishes his work, because he loves his job.



Calumma nasutum

Francois Ratalata ▼

Joined: 1997

François is another veteran who has been with CVB since it was little more than a campsite near the forest! He is one of the many staff who live in the village of Ambatolahy, just two kilometres from CVB and the park entrance. Surrounded by the forest since birth, François now works in the Reforestation Department as one of the individuals responsible for tree nurseries. Of course, over his long career, François has also worked on many lemur projects. He is well-trained in the topics of agriculture and environmental education, and is an expert in working with communities. François is happy to work in reforestation and proud to share his knowledge with others.



Jean Némèse Marie Randriarimanana ▲

Joined: 1998

Némèse, from Antsaha, lives close to the forest that he knows so well. He is responsible for the education activities in CVB's Reforestation Department. A specialist in endemic reforestation, Némèse has organised the construction of tree nurseries, participated in many reforestation events, and worked with numerous local schools and organisations to give valuable training on the forest; what it can provide, and how to care for it. He has also given and received training on the topics of agriculture and environmental education. Némèse is proud to say that he loves what he is doing.



Fossa fossana

Bernadette 'Menja' Rabaovola ▼

Joined: 1999

Menja is another member of staff who has worked with CVB since before the millennium! She lives in Ambodiamontana, close to the entrance of RNP. Though her main speciality is primates, in her many years at CVB she has worked on projects spanning much of the range of biodiversity in Ranomafana. Menja recalls that her first experience was with a project called 'Hormone Team'. In addition, Menja has participated in a number of projects related to insects, which is useful given our new collections room. She is very proud of the huge range of skills that she has learned.



Dominique Razafindraibe ▲

Joined: 2000

Dominique, from Ambalamahasoia village in Ranomafana, has been part of CVB's incredible team of technicians for well over 20 years. His primary speciality is botany, and he forms part of the core team of plant experts working at CVB on researcher projects as well as our own growing reference collection. Of course, Dominique has also become very familiar with lemurs as well! Over the years he has attended multiple training events to expand his knowledge. Dominique has an important message for everyone: 'we must protect the environment and reinforce this protection'.



Guibemantis liber

Armand Razafitsiafajato ▼

Joined: 2000

Armand joined CVB when the campsite was still just a cabin in the forest. He still sometimes walks past that very same cabin when working in the park! Armand lives in Ambod-ikimba village, near CVB's entrance. He is one of CVB's botany specialists, an important skill which means he has participated in many long-term plant research projects. Another area of expertise is phenology. Everyone knows Armand as a brave technician with a strong work ethic. He has spent most of his working life at CVB, and he enjoys what he does.



Faustin Jean Guy Razafindraibe ▼

Joined: 2001

A technician in the Research Department since he started working at CVB, Jean Guy is a specialist in primates and botany but he has the skills to work on any project if needed! He lives in Antanambao village. Because he is highly trusted, he usually works on projects for long periods of time. He has been particularly important to the *Varecia* phenology project, a vital CVB programme that forms a critical part of our long-term database ambitions. Jean Guy often attends training to develop his knowledge, because he always wants to learn new things and he enjoys what he does.



Georges René Randrianirina ▲

Joined: 2001

George, a research technician, has worked with the *Propithecus* team since 2001, which means that he has observed multiple generations of this lemur as they roam the forest. Few people will have such in-depth knowledge! George is an excellent botanist, but his main speciality is *Propithecus* and indeed all of the primates in Ranomafana. He has worked with many researchers over the years on diverse projects. They all know that George is very thorough and hardworking. According to George, even though the work may at times be difficult, it is worth it for the skills that he has learned.



Jean Lucien Talata ▲

Joined: 2001

Lucien, from Ambodikimba village near Ranomafana, lives surrounded by the trees that he works to protect. In addition to helping create and maintain the network of nurseries where we grow all of our saplings for our reforestation efforts, Lucien is a specialist propagation agent, meaning he is an expert in seed collection and sapling distribution. His years of experience in long-term reforestation projects allow him to work closely with communities to ensure they believe in the work that the reforestation team does, which is a vital part of how the team operates. A believer in lifelong learning, Lucien enjoys his work as he can constantly develop new skills.

Jean Joseph Alfred Raharison ▼

Joined: 2001

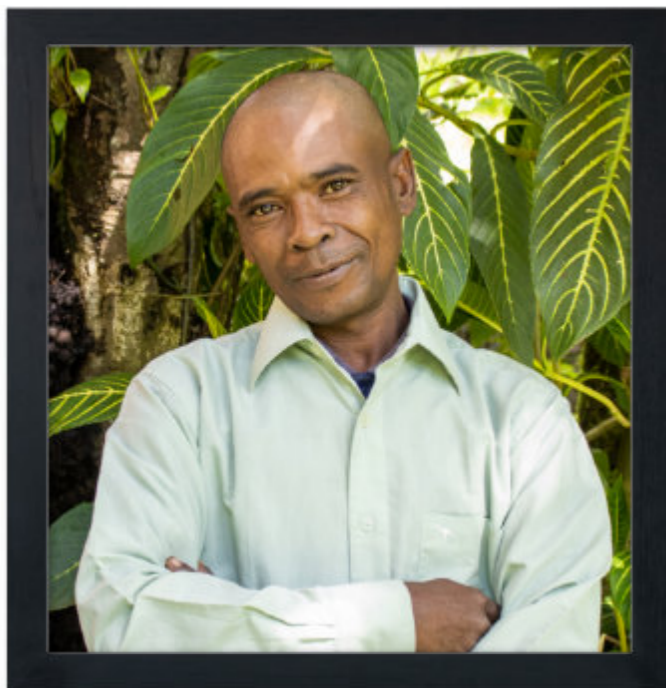
From Tanambao village, Alfred is another veteran with over twenty years' experience. He is responsible for CVB's tree nurseries, which are scattered all over the region and which drive our reforestation programme. Like many technicians, Alfred is multi-talented, and also has experience on lemur behavioural projects. In the course of his career, he has attended many reforestation training events, allowing him to be an excellent teacher and trainer when working in villages. Whether growing samplings or explaining the ecosystem services of forests, Alfred is a reforestation ambassador.



Georges Razafindrakoto ▲

Joined: 2003

George, from Ambodikimba, is a firm favourite of many researchers. It is not uncommon to hear them negotiating (or arguing...) with each other about whether George is available! His main areas of speciality are primates and botany, but in his long career he has also been involved with projects that focused on birds and bats. Even from a single picture, at a bad angle, George can usually identify a species in Malagasy, French, and Latin! Unsurprisingly given his popularity, George often works on projects for years. He also attends every training that he can in order to develop his skills.



Pascal Nalimanana Rabeson ▼

Joined: 2003

A specialist in ecology, conservation, and administration, Pascal is currently National Director. Research management is not Pascal's only skill, as he studied in the USA (ecology), and Russia (ichthyology and fish farming), meaning he speaks four languages. Several major organisations have worked with him, including the California Academy of Sciences and SCGIS Madagascar Chapter, of which Pascal is president. Environmental work is not the only area where Pascal has been active, with his ICBG work being focused on drug discovery and community economic development.



Prolemur simus



Emile Rajeriarison

Emile has worked with Dr Wright for over 35 years, acting as her first field guide during the discovery of the golden bamboo lemur in 1986. Currently, Emile leads the insect collecting activities for the Tabula Madagascar project and CVB's collections room.

Q: What was it like when you first started working with Dr Wright?

A: Dr Wright came to Ranomafana in 1986. When she arrived, she asked to meet people that know the forest very well. They sent someone to look for me! I did not speak English at that time, only a little French. I took the team into the forest and explained what I knew

about the forest. I showed them lemurs, birds, plants, and insects. Based on this, Dr Wright asked me to help them during their field expeditions. We quickly found the Sifaka, and then she asked me about the bamboo lemur. I told her there was a small one half the size of a cat. Looking for this, we discovered the golden bamboo lemur together.

A few years later, Dr Wright had the dream of protecting the forest. Every single day more trees were cut down, causing me great pain. I agreed that we should protect the forest, but asked how people could then earn a living? Dr Wright told me not to worry, since the incredible biodiversity would generate many alternative careers, such as hotel work, or work as



A forest insect trap

guides and research technicians. She was right!

Q: Can you tell us about the insect collection project that is currently ongoing?

A: This primarily relates to the Tabula Madagascar project (see p. 36), which is currently documenting and analysing insect diversity around Ranomafana. A secondary goal is to create an insect database. Why this focus on insects? Well, they play so many roles! Some of them are pollinators, some are parasites, and some are decomposers which break down organic matter. Bees also produce honey, which give them an economic aspect. Additionally, insects are a source of protein for humans and other animals.

We collect the insects from various locations then bring them back to the laboratory for drying and pinning. I am training the students who assist us with capturing on how identify the various species we find. We carefully label and store the insects in special boxes and put them into the reference library in AinaBe. So far, we have collected 2,376 specimens!

Q: What are your hopes for the future of the forest?

A: I hope that the government helps us to stop gold mining in the forest. I also hope that Ranomafana National Park grows and expands; the forest recovers quickly when deforestation stops! We need a healthy forest for the next generation.

Interviewed by: Ashley Maggy



Part of CVB's Lepidoptera collections



Amanda Mancini

Amanda Mancini, a doctoral candidate at the City University of New York and long-term CVB researcher, returned in November to pilot her NSF- and Explorer’s Club-funded research involving the use of drones in Ranomafana National Park. This continues CVB’s efforts to pioneer the use of drones in Madagascar for the purposes of both biodiversity research and protecting human health.

The goal of Amanda’s research is to better understand the relationship between forest structure (for example, canopy height and connectivity) and both recolonisation potential and movement behaviours in the critically endangered black-and-white ruffed lemur (*Vare-*



cia variegata). Amanda focused her pilot research on two locations: Talatakely, where intensive logging occurred in the late 1980s, and the pristine forest at Mangevo. Ruffed lemurs only recently recolonised the forest in Talatakely, and Amanda is using drone imagery of these forests along with GPS collar data from ruffed lemurs to better understand what characteristics of the forest at Talatakely have enabled this recolonisation event.

Ruffed lemurs rely on large trees with broad canopies for food and shelter, however these were the exact trees targeted by logging operations. By using drones to gather a fuller picture of differences between the contrasting forests at Talatakely and Mangevo, Amanda will be using these forests and what characteristics are

most important to them. Ultimately, results from this study could inform how and when the much-needed recolonisation by *Varecia* of regenerating or reforested areas may occur.

Thanks to the support of CVB research staff and prior drone expertise at the station, Amanda and her team were able to successfully collect aerial imagery across both study sites despite several unanticipated technical challenges. In a short five-week field season, Amanda was able to collect over 4,500 images across 120 hectares of forest. Work is now underway to process these data in order to generate structural maps for each site that can be used in combination with GPS collar data from ruffed lemurs that will be collected in 2022.

Dr Beatriz Otero Jiménez

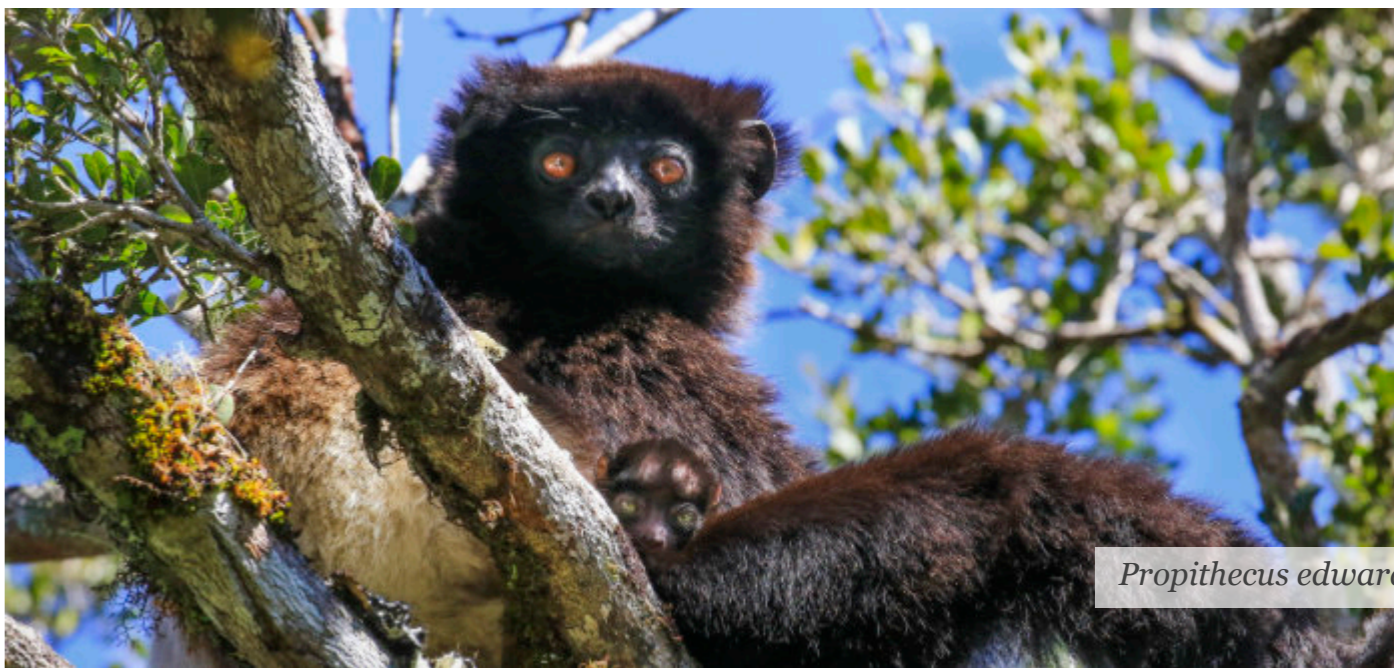
Understanding the responses of wildlife to habitat loss and degradation is crucial to the development of successful conservation strategies. Madagascar has suffered extensive forest loss in the last 50 years, especially in the humid forest where RNP is located. Dr Otero Jiménez’s research seeks to answer the following question: how do animal species respond to landscape changes in Madagascar’s humid forests? She uses various different types of data (behavioural, acoustic, genetic, and spatial) in her efforts to answer this question.

Milne-Edwards’s sifaka: This sifaka (*Propithecus edwardsi*) is the largest species of lemur in RNP and is categorised as endangered by the IUCN. Dr Otero Jiménez and collaborators are using long-term sifaka behavioural data along with climate and botanical data to better understand the current status of the population and to model its response to potential landscape changes such as reforestation or deforestation. This information will allow better management strategies to be developed to ensure the conservation of *Propithecus edwardsi* and their habitat.

Ivohiboro: This year the Ivohiboro-Analamary forest in south-central Madagascar was recognised as a Protected Area (see pp. 46–49). This isolated humid forest is surrounded by savannah yet harbours surprising biodiversity. Dr Otero Jiménez and collaborators Dr Patricia Wright, Ryan Rothman, and Serenity Montaña are studying the plant and animal community

of this forest. Their results confirm that this forest harbours species known to be dry or humid forest specialists. Their continued work will examine the role of Ivohiboro as a refuge for biodiversity in the region.

Mouse lemur acoustics: Using ultrasonic recorders, Dr Otero Jiménez and her collaborators study the vocalisations of the brown mouse lemurs (*Microcebus rufus*) in RNP. In recent years, the team led by Dr Mark Krasnow (chair of the CVB board) found two genetically distinct groups of brown mouse lemurs that do not interbreed. Dr Otero Jiménez’s work focuses on understanding the role of vocalisations on the ability of these two groups to self-distinguish, and the results will shed light on the importance of acoustic signals in species differentiation.



Propithecus edwardsi



Professor Tom Lovejoy

August 22nd, 1941–December 25th, 2021

Tom Lovejoy was a renowned scientist and a passionate advocate for reversing climate change, preserving tropical biodiversity, and understanding human fragmentation of the Amazon rainforest. Tom had been a CVB board member since 2009 and Eleanor King from George Mason University, his last student, is currently working on quantifying Madagascar rainforest tree growth within and without Ranomafana National Park. Tom believed tropical research stations were fountains of conservation and cited CVB as a shining example. Dr Wright worked with him at National Geographic's Conservation Trust where they discussed how Madagascar's extraordinary wildlife and nature could be preserved into the future. Tom was equally comfortable working in muddy boots in the rainforest, in sneakers in the university classroom, and in dress shoes in the chambers of the US Congress. His energy writing lectures, laws, and declarations helped immensely to make concrete conservation action happen. He founded the 'debt-for-nature swaps', was Chief Biodiversity Advisor to the World Bank, and was a past chair of the Scientific Technical Advisory Panel for the Global Environment Facility. Science and networking were his tools and biodiversity and the Amazon rainforest his first loves.

We will miss you, Tom; your passion, your knowledge, and your support.



Professor Richard Leakey

December 19th, 1944–January 2nd, 2022

Richard Leakey was a renowned wildlife conservationist, palaeontologist, Stony Brook professor, and a close advisor to CVB. Although he never visited Madagascar himself, his daughter, Samira, was a CVB intern in the early 1990s. Richard was a larger-than-life conservationist believing in bold moves and honest assessments. He had an uncanny wisdom: When Dr Wright and Dr James Hansford discovered cut marks on the 10,000-year-old Aepyornis bones from Christmas River, Dr Wright consulted Richard and with his half century of experience, he eyed the huge bones, took them into his hands and nodded affirmatively. Despite his iconoclasm with respect to academia, no-one who saw what he had achieved at the Turkana Basin Institute in Kenya could doubt what he accomplished for science through a lifetime of commitment to his country, to discovering our human origins, to saving wildlife, and to discovery. Richard was a visionary who could impart passion for his grand projects, while always displaying the true grit required to go against the mainstream when accomplishing action for the greater good.

We will miss you, Richard; your quick wit, your expert advice, and your love of good food.



*Professor Edward
O. Wilson*

June 10th, 1929–December 26th, 2021

Ed Wilson was not only an ant expert and a professor for over 45 years, but also a two-time Pulitzer Prize winner, sociobiologist, co-founder of the theory of island biogeography, environmental activist, and a renowned conservationist. The breadth, passion, and importance of his thought earned him a unique place in the field of biodiversity. Although he never managed to come to Madagascar, he understood and was ardent about studying and valuing its unique ecosystem. When Dr Meg Lowman asked where to construct the next canopy walkway, Ed immediately replied 'Ranomafana National Park, Madagascar. No question'. He was a mentor to Dr Gary Alpert and Pascal Rabeson, both of whom studied the ants of Madagascar, and Dr Sarah Kariko, who studied the spiders of Ranomafana. On his 90th birthday party at Walden Pond, Ed met with CVB insect expert Marc Hoffmann, Dr Kariko, Noel Rowe, and Dr Wright to discuss the status of conservation in Madagascar. A mesmerising writer and incredibly comprehensive thinker, Ed had a gigantic impact on our understanding of biodiversity and why we must value it now and in the future.

We will miss you, Ed; your insight, your universality, and your compassion.



Camponotus maculatus



Tabula Madagascar: *Genome of an Ecosystem*

CVB is partnering with the Chan Zuckerberg Initiative's CZ Biohub in the groundbreaking Tabula Madagascar project. We aim to create a genomic record of all of the organisms in the mouse lemur ecosystem using samples collected from Ranomafana National Park.

After receiving our samples, collaborators at the Vertebrate Genome Laboratory at Rockefeller University will record and annotate all DNA in each species to create high-quality reference genomes for the entire ecosystem. Additionally, our collaborators at CZ Biohub will categorise the cell types and map them to the

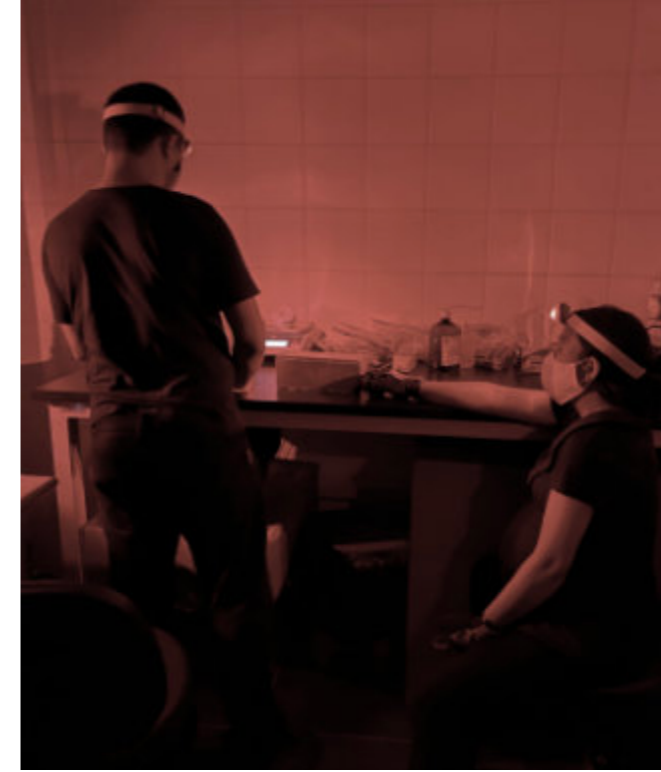
locations on the body of each species to create cell atlases for everything in the ecosystem. This will be one of the most thorough genetic documentations of an ecosystem ever created. Tabula Madagascar's vision is to provide an example of how 'ecosystemics' can be used to study and protect biodiversity.

In pursuit of this incredible goal, I have been working with laboratory managers Haja Ravelonjanahary and Andriamahery Razafindrakoto to run the pilot project at CVB in November. Mr Emile Rajeriarison's dedicated team of field technicians (see p. 28) collected the arthropod species identified as mouse lemur prey in PhD candidate Amanda Rowe's previous research at CVB in 2019. We successfully extracted high-quality DNA from several



species, and thanks to help from Dr Beatriz Jiménez, the samples were then exported to Rockefeller for sequencing in December. This was an important milestone!

Based on the success of the pilot, Tabula Madagascar will continue in 2022, with the goal of collecting, flash-freezing, and exporting arthropod and plant species from across the mouse lemur ecosystem. To further this ambitious goal, the CVB laboratory has successfully installed a liquid nitrogen generator, expanding collaborative opportunities and the range of our research. Frozen samples will be shipped to the collaborating Vertebrate Genome Laboratory at Rockefeller and the CZ Biohub where the genome and cell atlas will be carefully constructed for each species.



In addition to collecting the incredible number of samples required for creating a genomic record, Emile and his team of field technicians are working to create a physical record of biodiversity. They have been systematically collecting, identifying, photographing, and preserving specimens of insects and plants in CVB's herbarium and insect collection. This is a monumental task, but the scientific value cannot be overstated. These anatomical reference libraries, combined with the genomic and cell atlas libraries created by Tabula Madagascar, will open up avenues of biological research heretofore unavailable.

- Clara Tucker





The Lemurs of Ranomafana National Park - An Interactive Guide

Centre ValBio is always searching for new and innovative techniques to promote environmental education and awareness. The limitations and difficulties engendered by the COVID-19 pandemic have made this search for new teaching tools all the more important. Spurred on by this, our efforts this year focused on a digital learning platform for lemur education that utilises art, graphic design, and interactive media to make conservation education modern, accessible, and above all fun. If people can't go to the lemurs, perhaps the lemurs can (electronically) go to the people!

We were partnered in this project by the incredibly talented Daniel Roper-Jones. They say in Madagascar that if you drink the water, you will return, and Daniel is proof of this; in 2008 he was a study abroad student at CVB! He now uses his passion for nature to create environmental education and public awareness projects that promote the conservation of endangered species. As part of this mission, he is the founder and director of Fauna in Focus, a non-profit that designs learning facilities, educational materials, nature films, and interactive digital tools, all designed to 'improve knowledge of and attitudes towards wildlife, inspire support for conservation and build a new generation of nature lovers and conservation leaders around the world'.

It takes a village to raise a child, and this project relied upon the hard work and talent of many people. Dr Wright and CVB's technicians provided detailed information on each species of lemur, including diet, range, reproduction, and much more. Photographers including Noel Rowe provided the high-quality images and videos to be used in the guide, and researchers provided recordings of vocalisations. Lovasoa and the Education Department helped immensely with organisation, testing, and training. Dan then combined all of this into a detailed and exciting guide that can easily be accessed by children and adults alike.

The guide is called 'Lemurs of Ranomafana National Park', and it works on most PCs. It has full touchscreen functionality, and as you can see from these pictures, we are experimenting with making fun kiosks that can be placed at CVB and also at the entrance to Ranomafana National Park. Eventually, these kiosks may be deployed at zoos or universities around the globe.

Not only will this project let people all over the world see and hear the lemurs of Ranomafana, it crucially also gives local people the same opportunity. Many people living around the park are not able to visit for one reason or another, so this guide is a vital resource that lets them experience the wildlife of the local forest.

- Lovasoa Razafindravony





Michel Rakotonirina

December 12th, 1978–November 7th, 2021

Michel worked as part of our kitchen staff since July 1st, 2017. He was always responsible, cheerful and a good representative of CVB. He died suddenly on November 7th at the age of 43. He was grandson-in-law of Telo Albert and is survived by his wife and seven children.





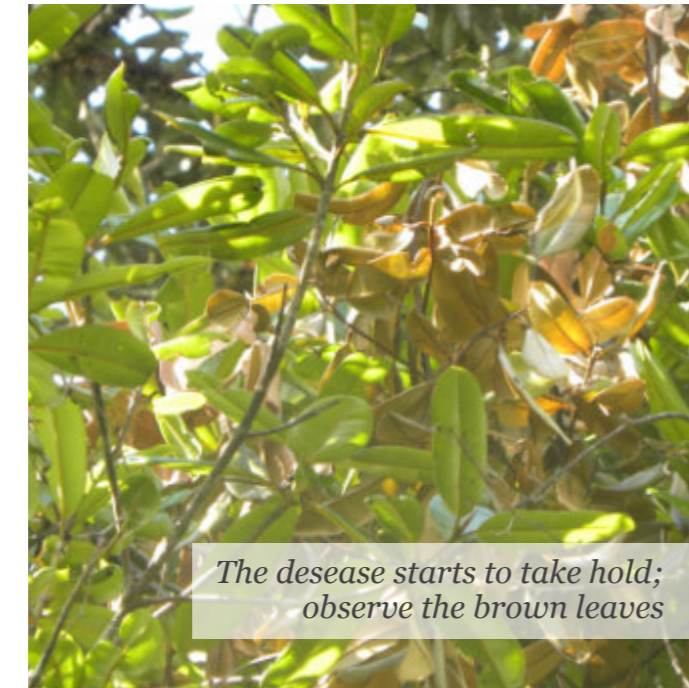
An example of the devastation

C. paniculatum on existing trails within the forest, and 2) identify trees in dedicated one-hectare botanical plots.

By comparing results from 2017 and 2021 at four different sites (Talatakely, Mangevo, Bevoahazo, and Valohoaka) we have evidence that the disease is receding, with only six new infected trees between the four sites in 2021.

Monitoring will continue until the cause of the disease and its vectors are understood. The CVB botany team of Paul Rakotonirina, Dominique Razafindraibe, Ralaisoamamonjy Randrianandrasana, and four new technicians are passionate about saving this endemic tree!

- Paul Rakotonirina



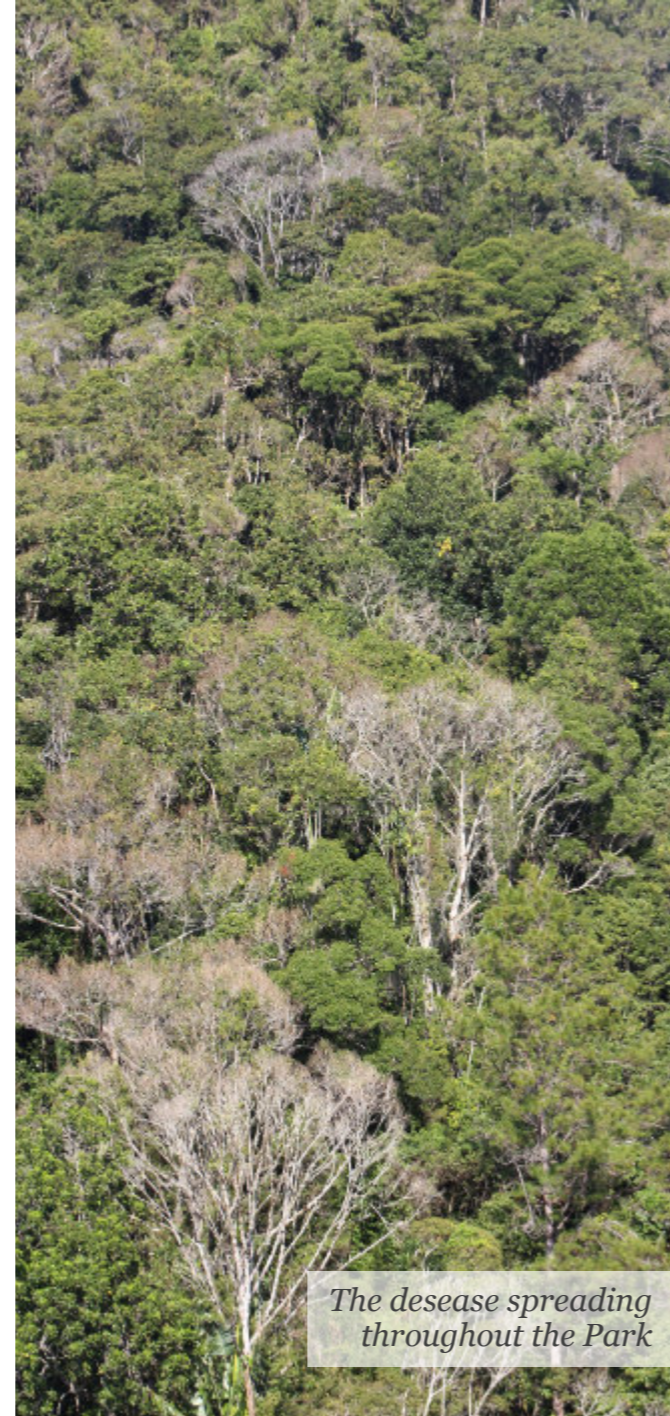
The disease starts to take hold; observe the brown leaves

Calophyllum Update

This is the sixth year that *Calophyllum paniculatum* trees in Ranomafana have been afflicted with a deadly invasive disease, likely caused by an undetermined bark beetle.

There are three species of *Calophyllum* in the park: *C. paniculatum*, *C. milvum*, and *C. drouhardii*. However, only *C. paniculatum* has been affected by the disease.

Since 2017, CVB has diligently monitored this outbreak at a number of sites within RNP. Our objective is to follow the annual progress of the disease and to assess the impact on future generations (trees of c. 5 cm DBH). Two different methods are used: 1) Opportunistically identify



The disease spreading throughout the Park

Ashley Maggy

I am Ashley Maggy, ICTE's Communications Officer. Over the last nine months I have been able to call Madagascar my second home, with my first home being the Adirondacks in up-state New York.

My goal is to make sure that the important work being done by CVB reaches as many people as possible. By sharing facts, stories, and timely updates I am able to communicate CVB's huge range of conservation interventions to a global audience.

By accompanying the scientists, researchers, students, and technicians at CVB into the field, I am able to capture their stories in words, images, and video. This allows me to share the importance of conservation on social media, making sure that we communicate effectively to young and old, scientist and non-scientist alike.

Some of my favourite projects have been: going on expeditions to remote villages with the Education Team to document water quality; an expedition with the Reforestation Team documenting deforestation, tavy, and reforestation; and joining the *Propithecus* Team during darting procedures for health check-ups. All of this has allowed me to photograph many incredible endangered species, which I have developed into a project to create a database of photographs that can be used for research and social media purposes. It's been amazing to combine science with creativity and communication!



Propithecus edwardsi



Prolemur simus



Mantella baroni



The team arrives!



Natural regeneration in action

to restore endangered ecosystems while emphasising community involvement. Dr Chris Duke led their team as they created firebreaks to stop the periodic blazes that threatened the forest. The communities were engaged economically to dig these firebreaks and plant trees inside them.

CVB led the extensive schedule of training. Workshops were given in biodiversity surveying and monitoring techniques, including lemur transects, lemur trapping, camera trapping, conservation drones, bird & bat mist netting, insect malaise traps, GIS mapping, and stream ecology protocols. Collaborations with Missouri Botanical Garden inspired botanical plots and associated collections and identifications. Twelve local people were trained to



The new headquarters building

Ivohiboro Inauguration

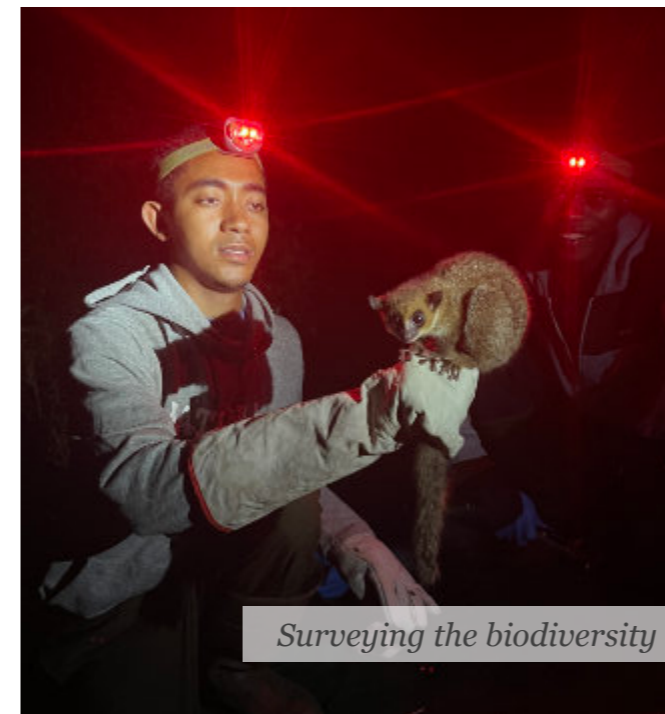
It was a hot and dusty day in December when the team arrived at Ivohiboro Protected Area ('PA') to celebrate the inauguration of the new PA headquarters. Dyan Machan is a journalist from Smithsonian Magazine. Noel Rowe—renowned primate photographer and a member of the CVB board—is creating a visual record of the entire expedition. Dr Benjamin Andriamihaja is the managing director of MICET and my colleague of thirty years. Pascal Rabeson is CVB's national director and an insect specialist. Rina Ramandimbiarison, representing the Rainforest Trust, knows more than anyone how much hard work it has taken to create the PA and construct the headquarters. Tsiory, the representative from the Min-

istry of Environment, is here to ensure that the achievement of this important milestone can be communicated to the Minister.

I reflected back to five years ago, when we first saw this amazing rainforest hidden away amongst a vast expanse of burned wasteland and parched soil. An oasis of nearly two thousand hectares containing species almost certainly never described before. From 2016–19 we brought international teams from the USA, Poland, and Canada to work alongside Malagasy specialists and describe the secluded biodiversity. The species found included mosses, lichens, ebony trees, land snails, mouse lemurs, and dwarf lemurs, and the team also noted that the documented geographic range of certain bats should be increased.

Given CVB's particular interest, the teams studied the infant behaviour and seed dispersal habits of the ring-tailed lemurs. Seeing so much incredible diversity under threat, we partnered with MICET and the Rainforest Trust to undertake the arduous bureaucratic process required to establish this forgotten Eden as a PA. Dozens of delicate meetings with local communities and regional authorities were navigated. The area was mapped and a Conservation Action Plan developed. With Rainforest Trust providing the funding and MICET leading the implementation, the creation of the Ivohiboro PA was finally accomplished.

Our other vital partner in this endeavour was The Phoenix Conservancy, an NGO that seeks



Surveying the biodiversity



A ceremony with the Ampanjaka (village elders)

monitor and evaluate the wildlife and habitat. Through the Rainforest Trust they were hired as the first cohort of park rangers, with permanent salaries to provide them with long-term security.

As we waited for the inauguration ceremony to begin, I shook each of the new park rangers' hands, reminded of the first time we met five years ago at one of the initial community meetings. I praised the new headquarters that we were celebrating and they beamed. Then the Ampanjaka (elders) from the surrounding villages arrived and we greeted them warmly, as we hadn't seen each other since COVID-19 struck. We all took our places in the shade and out of the blazing sun to begin the kabary (speeches).

Later, we climbed the mountain with the biodiversity team to monitor the newly-protected rainforest. We camped next to the canopy and gazed at a windswept tree alone on the crystal-studded ascent to the mountain top. Dyan, ever the journalist, was eager to ask questions. When I asked my own question, Dyan confided that she hadn't been camping since she was a child. What an unforgettable way to be reintroduced to it! The usual high winds rippled the tents as the sun went down and the team prepared for the research.

We caught mouse lemurs and dwarf lemurs that night, and watched chameleons and a snake in the morning. The *Lemur catta* called, but were too far away for us to see. The rainforest was the driest that I had ever seen it.

There has been a major drought in the southwest of Madagascar, and this forest had clearly felt the impact.

My biggest thrill was when I saw the endemic saplings. Hundreds of them. The Phoenix Conservancy community firebreaks created over the last three years had done their job admirably, with no fires penetrating the peripheral zone. Released from these annual conflagrations, the rainforest had begun its struggle towards a natural recovery. These young trees, scattered throughout the grassland, had probably sprouted from seeds dispersed by lemurs, birds, and bats; the natural method of seed dispersion for this biome. Each sapling was green, vibrant, and tall enough to reach my chest. The forest was expanding by itself. A lot

had happened in the five years since we discovered this relict forest. There were tears in my eyes when I explained to Dyan that this was indeed a successful conservation project. The communities, the region, and the endemic wildlife have all played a part in that success.

The Smithsonian Magazine published the article by Dyan (with photographs by Noel Rowe) in July/August 2022 under the title *Into the Forbidden Forest: Famed American biologist Patricia Wright explores an astonishing breadth of biodiversity in the wilderness of Madagascar*.

- Dr Patricia C. Wright



Phelsuma quadriocellata



Reforestation

Introduction

2021 was another tough year due to the ongoing COVID-19 crisis, including for CVB's Reforestation Department. Our activities had to be paused many times, and this disruption made it difficult to efficiently achieve everything that we wanted. However, despite this, our incredible team still managed to accomplish a huge amount of vital work in 19 villages. This work was divided into four main projects: 1) SPICES, 2) Ecosia, 3) RANO WASH, and 4) CVB's Regular Activities.

Together, these projects represent a massive increase in the activities of the Department compared to 24 months ago, and we are aiming for CVB to be a reforestation powerhouse in Africa.



1 - SPICES (in collaboration with CRS)

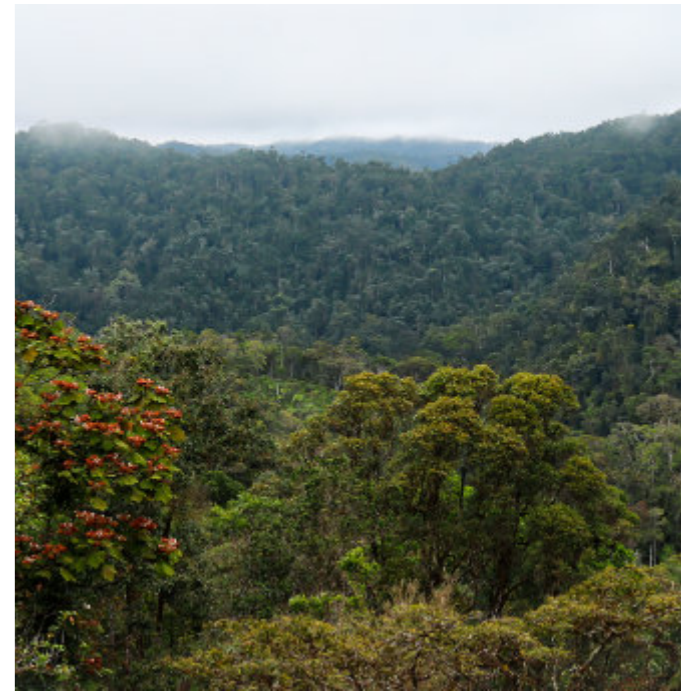
In the face of COVID-19, the SPICES project continued its crucial work in the Vatovavy region. Once again, we focused on promoting of the use of native tree species for reforestation, in conjunction with agroforestry training and support. It is important that we reinforce the use of endemic species, since the government does not emphasise this when promoting reforestation. This year we also started discussions regarding renewable/sustainable energy.

Taken together, the SPICES nurseries now produce over 20,000 saplings each year, of which roughly 6,000 are native tree species. To produce this quantity of trees, the Reforestation Team collect and distribute seeds of native tree species to the tree nurseries; 57.5 kg in



total this year. In addition, to encourage local participation the team train the communities who tend the nurseries to conduct their own local seed collections in adjacent forests. The most common species gathered is *Bridelia tulasneana*, and just one kilogram of seeds from this tree can grow over 5,000 saplings! By the end of the year, 22,562 endemic trees were planted or in stock, plus over 80,000 saplings of other endemic plants.

Overall (combining valuable crop spices, fruit trees, and endemic plants & trees), the SPICES project planted 163,900 saplings this year, with a further 890,000 available in stock. Incredible progress is being made to develop independent and self-sufficient spice farmers no longer reliant on slash-and-burn agriculture.



2 - Ecosia

We were delighted to continue our partnership with Ecosia this year, as they help us to reforest the east coast of Madagascar. Ecosia (<http://www.ecosia.org/>) is an internet search engine that donates 80% of its profits to a global network of reforestation partners, with a focus on southern hemisphere countries.

This year we completed the hard work of installing nurseries in our new partner villages, after which we conducted a huge number of seed collection sessions. This resulted in our nurseries being able to produce 300,024 saplings, and by the end of December a total of 295,033 new trees were in the ground. The remaining saplings will be planted in three more villages in January and February of 2022.

This year's planting was entirely focussed on reforestation, but we are in the process of designing an exciting new continuation of the project where spices and other valuable species are planted alongside endemic trees. This is part of Ecosia's global project to make their reforestation efforts more sustainable, and brings their work closer to CVB and CRS' SPICES programme.

3 - RANO WASH

We are excited to announce a partnership between CVB and RANO WASH ('Rural Access to New Opportunities in WATER, Sanitation, and Hygiene') using the PHE ('Population, Health, and Environment') approach. This endeavour is centred on Kianjanomby village, where RANO WASH built drinking water in-

frastructure and want to accompany this with environmental education activities spear-headed by CVB. So far, we have:

- Led school reforestation activities (from nursery to planting)
- Created vegetable gardens at the public school
- Provided training on water source protection
- Ran school lessons about environment protection

As part of this, two nurseries were installed in Kianjanomby: a tree nursery of 5,000 saplings near the local water source, and a tree nursery of 940 saplings at the local school to teach the students about reforestation. We hope to have more news about this timely project soon!



4 - CVB's Regular Activities

This year, CVB's long-running upper campus tree nursery produced a grand total of 10,432 saplings, of which 4,642 have already been planted. The remaining 5,790 will be used for various local reforestation campaigns in 2022.

We are delighted to announce that 1,800 of these saplings were planted by CVB's staff, meaning that each and every member of staff has planted the government's suggested 10 trees per citizen. Other planting sessions were conducted by the NGO Vozama, the Women's Association of Ranomafana (on International Women's Day), the Scout Association of Ranomafana, and the District of Ifanadiana. CVB is proud to have been able to donate saplings to these local organisations

The Reforestation Team also conducted several seed collection expeditions to keep our tree nurseries fully productive, with a total of 1,999 kilograms of seeds being collected.

Exchange visit: As a component of the partnership between Vozama and CVB, we conducted an exchange visit with them and the CVB Reforestation and Education Departments. We introduced VOZAMA to our reforestation project methodology, as well emphasising the important environmental education activities that should accompany such projects if they are to be truly sustainable. Around 40 people from Vozama's intervention sites in the Haute Matsiatra region participated in this exchange, and we look forward to future collaborations.

Exchange visit: The Ministry of Environment regional office from Atsimo-Atsinanana, accompanied by the MNP team from Manombo Special Reserve, undertook an exchange visit to CVB. Together we visited the tree nursery at Sahavondronina, after which we conducted an interesting brainstorming session where we exchanged perspectives on reforestation issues in Madagascar. We hope that this will lead to a formal collaboration between all parties, as we share many goals regarding the preservation of Madagascar's unique environment.

Such exchange visits are an important and growing part of CVB's reforestation outreach activities.



14,816
fruit trees planted



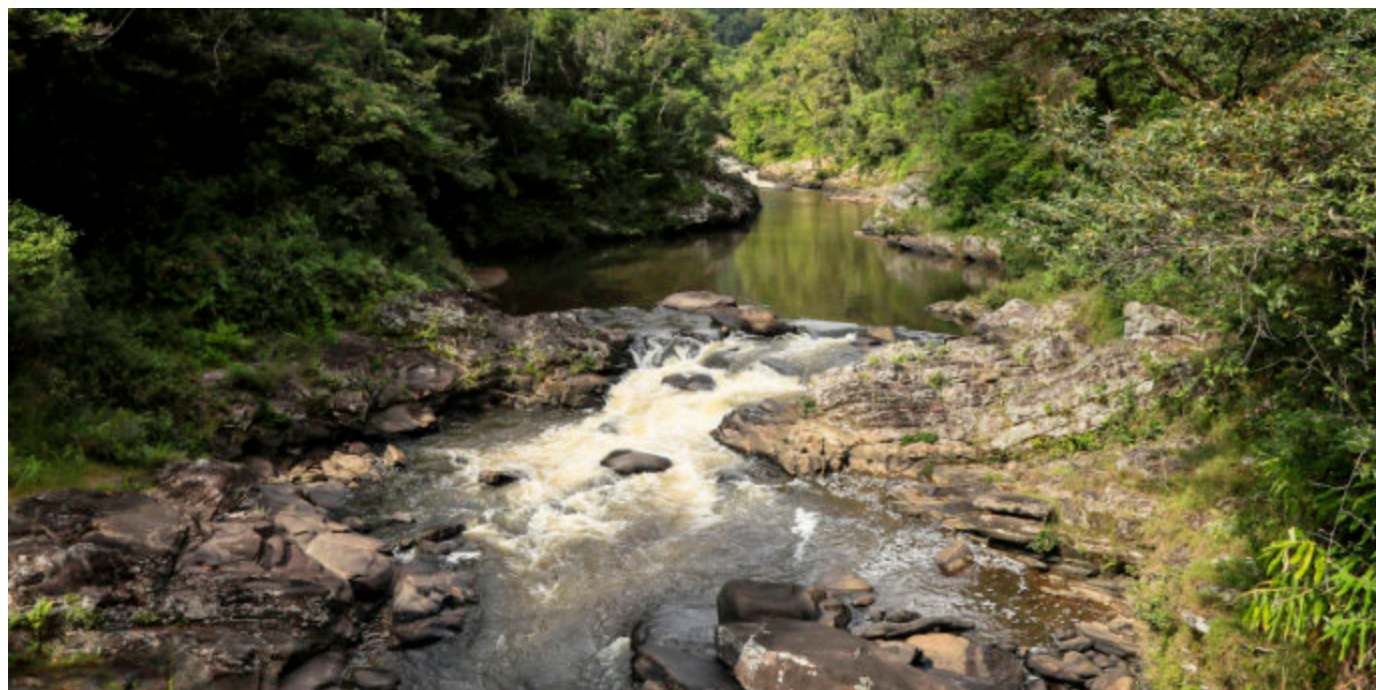
322,225
endemic saplings planted



1,999 kg
of seeds collected



126,553
valuable crop seedlings planted



Boophis elenae



Publications

Amato, K.R., Chaves, Ó.M., Mallott, E.K., et al., 2021, Fermented food consumption in wild nonhuman primates and its ecological drivers. *Am J Phys Anthropol.* 2021; 1–18. DOI:10.1002/ajpa.24257

Beeby, N., Baden, A.L., 2021, Seasonal variability in the diet and feeding ecology of black-and-white ruffed lemurs (*Varecia variegata*) in Ranomafana National Park, southeastern Madagascar. *Am J Phys Anthropol.* 2021; 174: 763– 775. DOI:10.1002/ajpa.24230

Bornbusch, S., Lydia K. Greene, Sylvia Rahobilalaina, Samantha Calkins, Ryan S. Rothman, Tara A. Clarke, Marni LaFleur, Christine M. Drea, 2021, Gut microbiota of ring-tailed lemurs (*Lemur catta*) vary across natural and captive populations and correlate with environmental microbiota, bioRxiv 2021.06.27.450077. DOI:10.1101/2021.06.27.450077

Brias-Guinart, A., Pyhälä, A., Cabeza, M., 2020, Linking biodiversity conservation and education: perspectives from education programmes in Madagascar. *Madagascar Conservation & Development* 15, 1: 35–39. DOI:10.4314/mcd.v15i1.4

Finney, M., McKenzie, B.A., Rabaovola, B., et al., 2021, Widespread zoophagy and detection of *Plasmodium* spp. in Anopheles mosquitoes in southeastern Madagascar. *Malar J* 20, 25 (2021). DOI:10.1186/s12936-020-03539-4

Guevara, E.E., Greene, L.K., Blanco, M.B., Farmer, C., Ranaivonasy, J., Ratsirarson, J., Mahefarisoa, K.L., Rajaonarivelo, T., Rakotondrainibe, H.H., Junge, R.E., Williams, C.V., Rabeloson, E., Rasoanaivo, H.A., Rahalinarivo, V., Andrianandrianina, L.H., Clayton, J.B., Rothman, R.S., Lawler, R.R., Bradley, B.J. and Yoder, A.D. (2021) Molecular Adaptation to Folivory and the Conservation Implications for Madagascar's Lemurs. *Front. Ecol. Evol.* 9:736741. DOI:10.3389/fevo.2021.736741

Itoigawa, A., Fierro, F., Chaney, Morgan E., Lauterbur, M. Elise, Hayakawa, Takashi, Tosi, Anthony J., Niv, Masha Y., and Imai Hiroo, 2021, Lowered sensitivity of bitter taste receptors to β -glucosides in bamboo lemurs: an instance of parallel and adaptive functional decline in TAS2R16?, *Proc. R. Soc. B.* 2882021034620210346M. DOI:10.1098/rspb.2021.0346

Johnson, S.E., Tecot, S.R., Ralainasolo, F.B., Ratsimbazafy, J.H., Overdorff, D.J., Donati, G., *Eulemur*, true lemurs. (2021). In Goodman, S. M., and Benstead, J. (eds.), *The Natural History of Madagascar*, 2nd edition, University of Chicago Press, Chicago

Klinges, David & Scheffers, Brett. (2021). Microgeography, Not Just Latitude, Drives Climate Overlap on Mountains from Tropical to Polar Ecosystems. *The American Naturalist.* 197. 000-000. DOI:10.1086/711873

Martin, L.D., Rowe, A.K., Nomenjanahary, E.S., Wright, P.C., Deppe, A.M., 2021, Popula-

This year, Centre ValBio reached an incredible milestone - our 1,000th publication!

We are honoured to have helped contribute to the world's knowledge of this beautiful island.

tion estimates of Hubbard's sportive lemur (*Lepilemur hubbardorum*) at Zombitse-Vohibasia National Park, Madagascar. *Folia primatologica.* DOI:10.1159/000512559

Melin, A. D., Joseph D. Orkin, Mareike C. Janiak, Hasinala Ramangason, Julie E. Horvath, Christian Roos, Clément J. Rabarivola, Alphonse Zaramody, Nicole Andriaholinirina, Steig E. Johnson, Erich D. Jarvis, et al., Jeffrey P. Higham (2021). Variation in predicted COVID-19 risk among lemurs and lorises. *American Journal of Primatology*, e23255. DOI:10.1002/ajp.23255

Pelley, J., Preventing pandemics by protecting tropical forests, 2021, *Front Ecol Environ* 2021; 1might9(3): 144–148. DOI:10.1002/fee.2327



Buteo brachypterus



Spinomantis aglavei

Rakotonanahary R. J. L., Andriambolamanana H., Razafinjato B., Raza-Fanomezanjanahary E. M., Ramanandratsiory V., Ralaivavikoa F., Tsirinomen'ny Aina A., Rahajatiana L., Rakotonirina L., Haruna J., Cordier L. F., Murray M. B., Cowley G., Jordan D., Krasnow M. A., Wright P. C., Gillespie T. R., Docherty M., Loyd T., Evans M. V., Drake J. M., Ngonghala C. N., Rich M. L., Popper S. J., Miller A. C., Ihantamalala F. A., Randrianambinina A., Ramiandrisoa B., Rakotozafy E., Rasolofomanana A., Rakotozafy G., Andriamahatana Vololoniaina M.C., Andriamihaja B., Garchi-

torena A., Rakotonirina J., Mayfield A., Finnegan K. E. and Bonds M.H., 2021, Integrating Health Systems and Science to Respond to COVID-19 in a Model District of Rural Madagascar. *Front. Public Health* 9:654299. DOI:10.3389/fpubh.2021.654299

Rowe, A. K., Donohue, M. E., Clare, E. L., Drinkwater, R., Koenig, A., Ridgway, Z. M., Martin, L. D., Nomenjanahary, E. S., Zakanana, F., Randriamanandaza, L. J., Rakotonirina, T. E., & Wright, P. C. (2021). Exploratory analysis reveals arthropod consumption in 10 lemur species using DNA metabarcoding. *American Journal of Primatology*, e23256. DOI:10.1002/ajp.23256

Tonos, J., Razafindratsima, O.H., Fenosoa, Z.S.E. and Dunham, A.E. (2021), Individual-based networks reveal the highly skewed interactions of a frugivore mutualist with individual plants in a diverse community. *Oikos*. DOI:10.1111/oik.08539

Other Publications
<https://www.lemurconservationnetwork.org/exploring-the-impact-of-the-covid-19-pandemic-how-resilient-were-conservation-organisations-in-madagascar/>
<https://localnewsmatters.org/2021/03/29/el-cerrito-perfumer-donates-portion-of-sales-to-protect-endangered-lemurs/>

The MicroceBus

The journey to work just got a lot more fun!

Thanks to the incredibly generous Dorothy Lichtenstein, CVB has a brand-new Toyota Coaster to help us transport staff, researchers, and guests to and from the station and also on research and cross-country expeditions. The MicroceBus can carry 23 people (plus a driver), letting us move large numbers of people around in less time and using less petrol. Luckily, the bus can carry a lot more than a real *Microcebus*! Air conditioning and modern suspension also mean that Madagascar's... *challenging*... roads are much less of a problem. Dede Randrianarisata, Head of Logistics, is confident that this vehicle will help CVB's conservation efforts for years to come.





Terpsiphone mutata

Donor Acknowledgments

Conservation is experiencing immense pressure globally due to COVID-19 and its numerous consequences. With no researchers or students able to visit CVB, we faced an existential crisis. It is due to the incredible and enduring generosity of the below donors that we have survived and thrived, and we owe each and every one of you an immense debt of gratitude.

.....

\$50,000–\$200,000

Dr James R. Herrnstein
and Dr Robin M. Herrnstein
The Herrnstein Family Foundation
Pamela Hurst-Della Pietra, DO,
and Stephen A. Della Pietra, PhD
International Union
for Conservation of Nature
Laurie Landeau Foundation LLC
Laurie J. Landeau, VMD,
and Robert J. Maze, PhD
Dorothy Lichtenstein
The Imperfect Family Foundation
Stephen Quake
SUNY Impact Foundation Inc.

\$5,000–\$49,999

Bergen Highlands / Ramsey
Rotary Club
Dr Mark Krasnow
and Dr Patti Yanklowitz-Krasnow
Noel Rowe

\$1,000–\$4,999

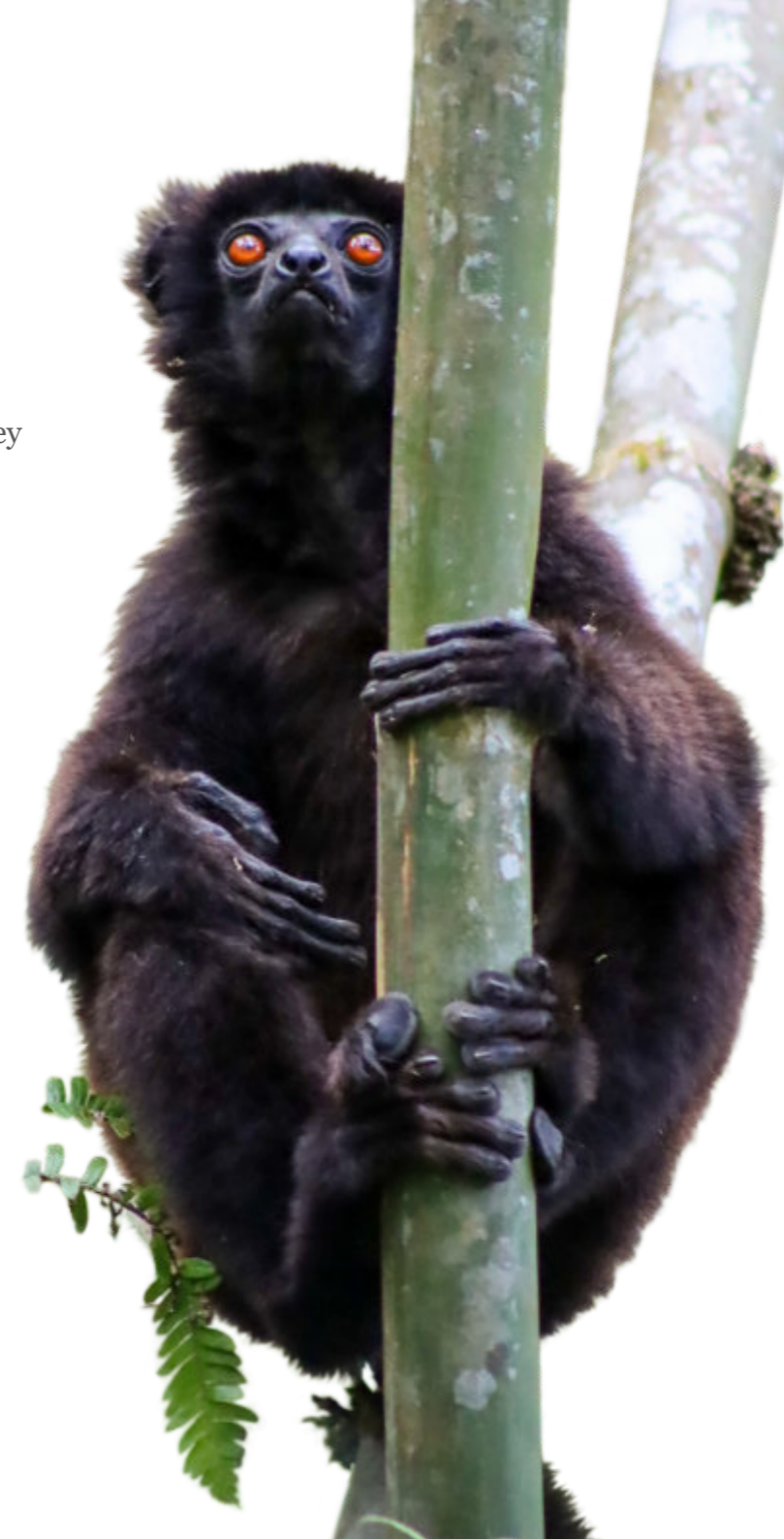
Aronson Foundation
Matthew Bonds and Molly Norton
Dr Jacqueline Grennon Brooks
James Brumm
Community Foundation Boulder County
The Gini Coefficient Fund
Conservation Society of California
Drew Fellman
Alexander C. Harris and Annemarie Drummey
Dr Steig E. Johnson and Vanessa Kato
Dr Jeffrey Levinton and Joan M. Miyazaki
Seneca Park Zoo
Nancy Sherlin and Grover Sherlin
Laurie A. Stern
(Velvet and Sweet Pea's Purrfumery)
Susan Wheeler
Diane Woodhouse
Dr Patricia C. Wright and Noel B. Rowe

\$500–\$999

Front Room Gallery
Jan Bille-Hansen
Barbara Hendry
Tara Loyd and James Loyd
Amy Nonnenmacher
and Andreas Nonnenmacher
Edward W. Testa, Jr, and Jennifer A. Testa
Dr Eric Trepanier and Y. Angela Trepanier

\$100–\$499

Michael A. Bell
Darlene Benson
Anne Binnie and Alec Binnie
Julia Bradford
Louis Bubala and Jill Strawder-Bubala
Dr Dylan Chapple



\$100–\$499 (Continued)

Hugh E. Chapple II
Stephanie Cornell Hass
Dr Elena Cunningham
and William Cunningham
Michael Docherty
Frank Dumond
Dr Anne D. Ehrlich and R. A. Wodehouse
Christina M. Fink
Douglas J. Futuyama, PhD
Pierce B. Gardner, MD,
and Sylvia B. Gardner
Liath Gleeson
Mary Lee Gaylor
Thomas Gillespie
Kenny Haar and Marcia Haar
Jane Hurley
Melissa Jackson
Dr Sarah C. Jourdain and Eric D. Jourdain
Dr Thomas E. Lovejoy
Nathan L. Montague
and Heather A. Montague
Dr Deborah Overdorff
Esther Piaskowski Cohen
Karen Pihl and John Pihl
Dr Michael Rich
Helen Rowe-Drake
Darrel Samuels
Elisabeth Schoenthal
Mary R. Truhlar, DDS,
Richard S. Truhlar, DDS,
and John Walker

Propithecus edwardsi



Varecia variegata editorum

Under \$100

Dr Jonathan Aronson
and Dr Joan Abrahamson
Kathryn F. Alessi
Jodi Battershell
The Benevity Community Impact Fund
Justin J. Bopp, PhD
Morgan Chaney and Caylee Heiremans
Jeanne Compitello
Dr Kristina Douglass and Scott Douglass
Peter Connolly and Anika Fischer
Mary Lee Gaylor
Jennifer L. Gilday
Thomas R. Gillespie, PhD
Robert Giordano
Hodan Hassan
Dr David Inouye

Lawrence Kalvar
Kiran A. Lorick, MD
Marsh & McLennan Companies
Suldan Mohamed
Dr Mark Ogden
Pfizer Foundation
Sharon T. Pochron, PhD,
and William T. Tucker
Marketa V. Riggs

Ryan S. Rothman
Kathryn Scheriff
Roseanna Stasik
Ashley E. Sullivan
Ryan Trexler

Philip Valentine
Julie Vandenberg
Dr Julie Wieczkowski

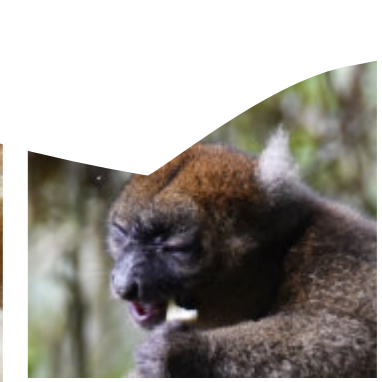
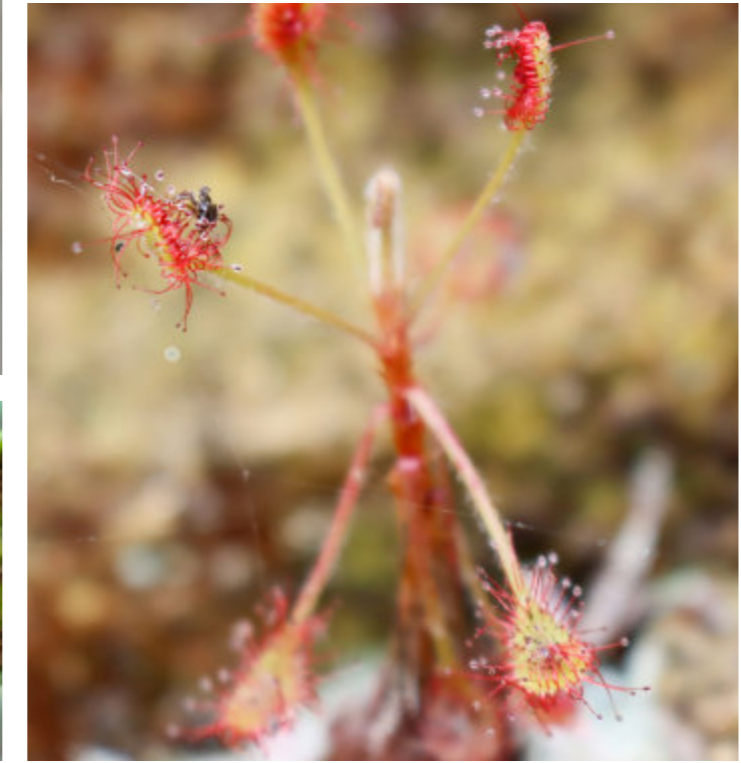
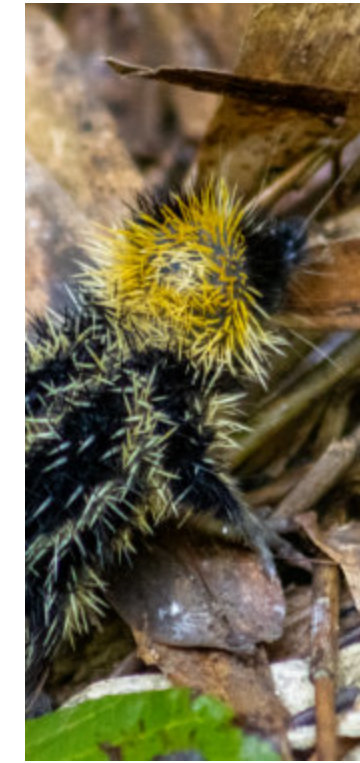
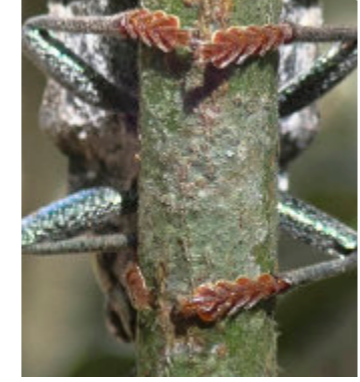
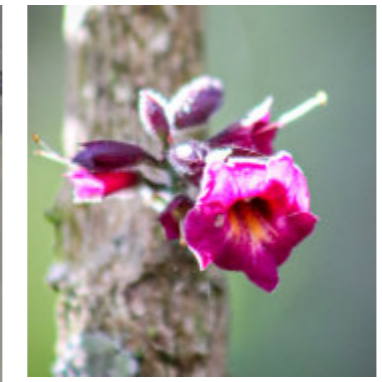
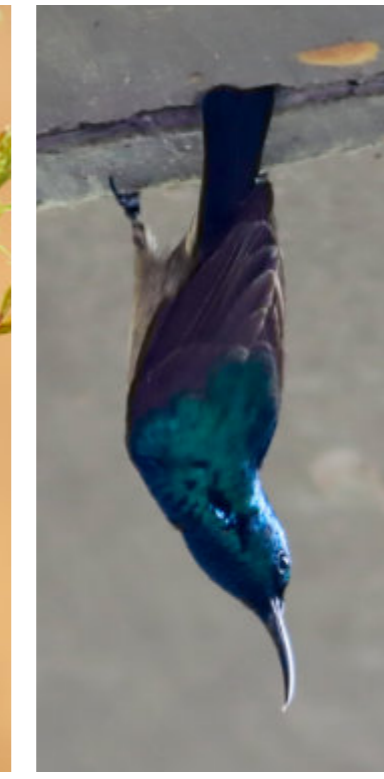
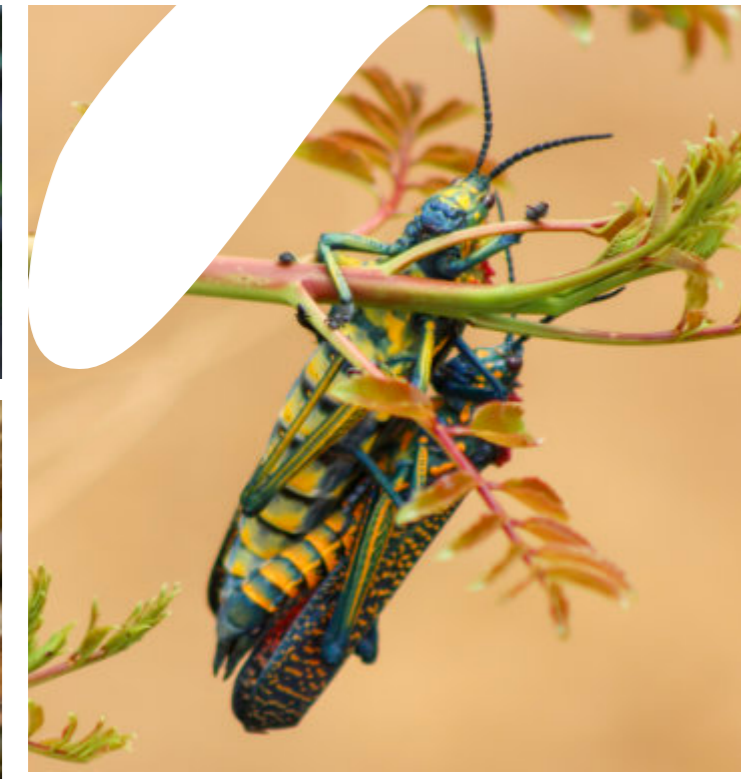
Acknowledgments

- Ministère des Affaires Étrangères
- Ministère de l'Environnement et du Développement Durable
- Ministère de l'Intérieur et de la Décentralisation
- Ministère de la Population, de la Protection Sociale et de la Promotion de la Femme
- Ministère de la Santé Publique
- Ministère du Travail, de l'Emploi, de la Fonction Publique et des Lois Sociales
- Dr Germain Rakotozafy, Directeur Régional de la Santé Publique, Vatovavy-Fitovinany
- Dr Randrianambinina Andriamihaja, Médecin Inspecteur, District Ifanadiana
- Chefs CSB II, Ranomafana, Kelilalina, and Tsaratanana
- All Centre ValBio staff (Administration, Education, Finance, Health, Logistics, Reforestation, Research, and Technology)
- PIVOT
- MSI Reproductive Choices
- Bergen Highlands/Ramsey Rotary Club
- All of our long-term researchers and their graduate students
- All the Kings of the villages and Presidents of the Fokontany
- The Mayors of the Communes of Ranomafana, Kelilalina, and Tsaratanana
- All the community health workers
- The CVB board

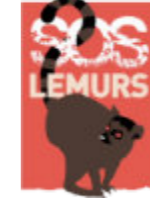


Calumma oshaughnessyi

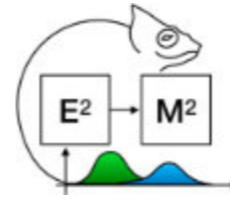
To you all, we are truly thankful.



Our Partners



INDIANAPOLIS ZOO



Eulemur rufifrons

Leadership

Advisory Board

Dr Joan Abrahamson
Dr Benjamin Andriamihaja
Jane Alexander
Dr John Allman
Dr Jonathan Aronson
James E. Brumm
Rhett Butler
Dr Thomas Gillespie
Dr James Herrnstein
Dr Robin Herrnstein

Dr Steig Johnson
Dr Mark Krasnow
Dr Thomas E. Lovejoy
Dr Stuart Pimm
Wai Poc
Dr Jonah Ratsimbazafy
Dr Onja Razafindratsima
Noel Rowe
Dr Barbara Wold

CVB Senior Management

Dr Patricia C. Wright, *Founder & CVB Executive Director*
Michael A. Docherty, *ICTE/CVB Chief Operating Officer*
Dr Benjamin Andriamihaja, *ICTE Country Director*
Pascal Rabeson, *CVB National Director*
Jesse McKinney, *ICTE/CVB Chief Technology Officer*
Prisca Andriambinintsoa, *CVB Head of Administration*
Dr Ando Rakotoniaina, *CVB Head of Health*
Desire Randrianarisata, *CVB Head of Logistics*
Nicolas Rasolonjatovo, *CVB Head of Reforestation*
Dr Jean Claude Razafimahaimodison, *CVB Head of Research*
Lovaso Razafindravony, *CVB Head of Education*

Stony Brook University Staff

Dr Pierce Gardner, *Medical Assistant, ICTE*
Jennifer Gilday, *Staff Assistant, ICTE*
Ashley Maggy, *Communications Officer, ICTE*
Nathan Montague, *Finance Coordinator, ICTE*
Dr Beatriz Otero Jiménez, *Postdoctoral Associate, ICTE*



Lepilemur microdon

Photo Contributors

Eric Heisey pp. 1, 36, 51, 55, 56, 58
Frank Rabe pp. 2, 68
Gregory Tam p. 4
Ashley Maggy pp. 7, 8, 9, 11, 13, 14, 19,
20, 22, 23, 25, 26, 28, 30, 36, 38, 39,
40, 45, 50, 51, 52, 59, 60, 62, 63, 65, 67
Noel Rowe pp. 10, 11, 18, 25, 27, 31, 33,
34, 38, 39, 43, 46, 47, 48, 49, 52, 62, 66
Jessie Jordan p. 10
Alain Rasolo pp. 15, 21, 23, 25, 41, 57
Emile Rajeriarison pp. 16, 29, 36
Ryan Butler p. 16
Dina Andrianoely p. 17
Patrick Richard pp. 21, 22, 24, 61
Claude J. Ralazampirenena pp. 24, 44
Dave Klings p. 31

Wilsoncenter.org p. 32
Dr Patricia C. Wright p. 37
Désiré Randrianarisata pp. 37, 42
Daniel Roper-Jones p. 41
Paul Rakotonirina p. 44
Nicolas Rasolonjatovo pp. 50, 51

Illustrations by

Alain Rasolo pp. 4, 12, 54, 57

Chief Editors

Dr Patricia C. Wright
Michael A. Docherty

Graphic Designer

Alain Rasolo (studio oloNala)

Research - Community - Conservation



Centre ValBio

- Madagascar -

BP 33

Ranomafana, Ifanadiana 312

(+261) 34 13 581 71 / (+261) 34 38 864 12

- USA -

Stony Brook University

SBS Building, 2nd Floor, Room N-203

Stony Brook, NY 11794-4310

(+001) (631) 632 3273

www.CentreValBio.org



Follow us on:



A wasp of the family Sphecidae