Centre ValBio

Annual Report 2018

Contents

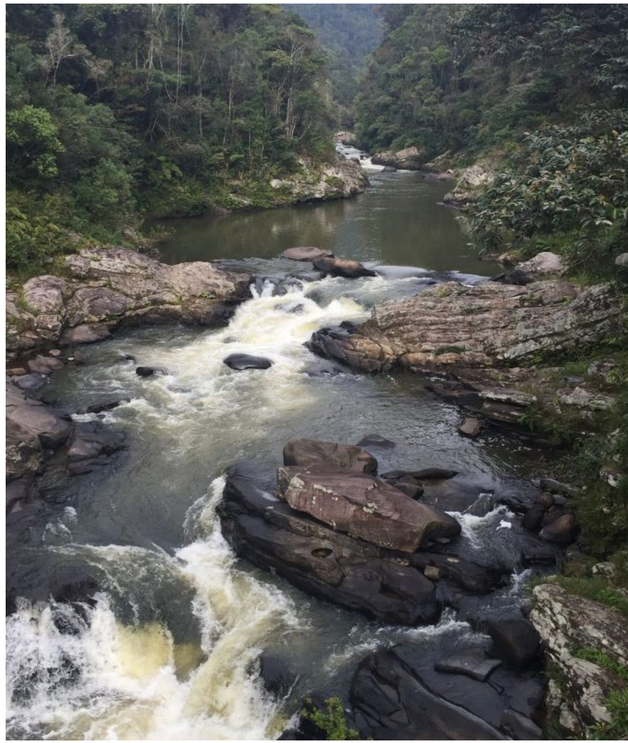
History of CVB

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 for thirty years. Not only did Dr. Wright discover that the primate still existed but 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. Patricia 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 developing ecologically sustainable economic development opportunities within local communities; and
- To provide the local villagers with the knowledge and tools to improve their quality of life through projects focused on health and well-being.



Letter from the Executive Director

Dear CVB friends and supporters,

2018 was a year of construction and building programs. We developed the new SOS Education Center, broke ground on construction of the SOS Biodiversity Research Center. Plans for the upper campus are underway.

Cyclone Ava started the year out dramatically. Floods took out bridges and destroyed rice paddies.

We are thrilled to announce that Ranomafana's critically endangered golden bamboo lemur population has tripled. New family groups have been discovered in multiple research sites within Ranomafana National Park. Many new discoveries were made in 2018, including a new species of mouse lemur, several new butterflies, eleven new species of microphages, nine new tardigrades, and a new species of leech. Steve Collins named a new species of butterfly after Centre ValBio.

In June, our technical advisor, Maya Moore, moved on to begin a doctorate degree at the University of Vermont. Michael Docherty, a finance advisor from UK, valiantly stepped in to join the CVB leadership team.

Jesse McKinney continues to improve technology at CVB. Simon LaPierre and Astrid Knoblauch joined him in accomplishing the expansion of medical drone program, DRoTS. We were awarded a USAID grant called ACCESS for medical drones.

This has been an adventure-filled year for our staff. Six exceptional employees obtained passports and journeyed outside Madagascar for training and presenting at international meetings. Funding for TEAM, our long-term ecological monitoring of biodiversity to detect climate change, has transitioned from Conservation International to CVB board member Steig Johnson, through the University of Calgary.

Tom Gillespie, CVB board member, and his team began a study to develop a non-invasive assay for immune function focused on mouse lemurs. This work complements Gillespie's ongoing efforts in Madagascar at the interface of global health and biodiversity conservation. Brett Scheffers continued his study of climate and frogs in different elevations of the canopy. Andrea Baden and her team continue their study of critically endangered black-and-white ruffed lemurs in Mangevo. Mark Krasnow and Caitlin Karanosky continue their genome-phenome mouse lemur project.

Marc Hoffman began collecting and preparing specimens for CVB's SOS Biodiversity Research Center beetle collection. Angus Hamilton developed a frog database and produced exceptional wildlife education videos for science communication. Gabriella Carjaval cataloged lemur vocalizations from the 13 species found in Ranomafana. Jessie Jordan, creative manager from the Palm Beach Zoo, joined us to improve our media communication outreach, and Luciana Paz interned with us for journalism.

CVB's year-round student Study Abroad programs are expanding and offer transformative opportunities for students. Our appeal to high school groups is growing, and we now host National Geographic Student Expeditions. BeLocal Group interns pioneered engineering projects, Stony Brook University ("SBU") medical students concentrated on studying tuberculosis, and SBU dental students saw thousands of patients in remote villages. For the first time a student group led by Deborah Ross from the School of the Visual Arts in NYC visited.

CVB launched several publishing projects in 2018. We're working with Chien Lee, a renowned wildlife photographer based in Malaysia, to publish a book called *Ranomafana: Visions of the Rainforest*. Jana Grabner, an Austrian artist, is also illustrating a book about the unique trees of Ranomafana.

Workshops were a big success this year. Environmental modelers gathered for training in January at the Ecological and Epidemiological Modeling in Madagascar workshop. In May, CVB and partners hosted *A Crucible for Planetary Health*, a research symposium to explore unique opportunities for scientific discovery in the ecozone around RNP. In addition, our partners held several workshops at CVB from biodiversity to health, education, and income-generating activities such as how to grow vanilla and wild pepper. Steve Collins and the African Butterfly Research Institute ("ABRI") invited lepidopterists for an international butterfly conference in April.

Gold mining continues to be a problem in the region, as it brings increased lawlessness and causes health problems. In July, bandits attacked the nearby village of Ambatolahy, where some of our employees live. Most of the houses were robbed, and we were deeply saddened by the death of our CVB research technician, Jean, who was shot and killed. Thanks to support from Primate Conservation, Inc. and the IUCN Primate Action Fund we are able to make Ambatolahy safer. We installed new surveillance systems and increased police protection. PIVOT joined the efforts, donating two motorcycles to the gendarmerie.

In October, there was a second bandit attack on the northeast side of the Ranomafana National Park. Unfortunately, a police commander lost his life. The bandits were found and brought to justice. This disruption is new to the region and we hope will disappear after the presidential election.

The year ended with two successful fundraising events in New York, thanks to Franck Raharinosy, board member Susan Cummings-Findel, and Eric Trepanier. Our ICTE Stony Brook headquarters team, Hodan Hassan, Jeanne O'Neill, and Tim Kobba, played key roles in our successes. I am very proud of our MICET team in Antananarivo, especially Benjamin Andriamihaja, our CVB team in Madagascar led by Pascal Rabeson, and all the things they accomplished this year. 2018 marked a year of challenges, growth, research, workshops, and Study Abroad expansion. We are hopeful that 2019 will be more peaceful as Centre ValBio continues to grow.

Sincerely,

Dr. Patricia C. Wright
Founder and Executive Director
Centre ValBio

Some 2018 Highlights

SBU Projects
External Visitors
CVB Activities

Jan. 12 - Dec. 21
Hunter College CUNY, research on *Varecia* reproduction and physiology

Jan. 29 - Feb. 2
Health Team: family planning training with Marie Stopes

Jan. 30 - Feb. 2
Health & Education Teams: workshop on sexual and reproductive health

Apr. 5
Finnish Association of Nature Conservancy (FANC) workshop on the monitoring of forest degradation and mapping

Apr. 5 - 25
3rd Afrotropical Lepidoptera Workshop

May 31 - June 20
Stony Brook University, BeLocal Da Vinci Bridge Project

May 25 - Jun. 27
Stony Brook University Study Abroad, biodiversity courses

Jun. 28 - 29
Lemur Portal workshop, GERP/FAPBM/WCS/REBIOMA

Jun. 27 - Jul. 11
Stony Brook University Dental Team undertakes community service visit

Aug. 9 - 24
NY School of Visual Arts, art education visit

Aug. 6 - 10
Catholic Relief Services hold 2nd Youth Summit

Jul. 25
Rano Wash / USAID project start-up

Aug. 16 - 31
CVB Propithecus Team attend 27th biennial meeting of the International Primatological Society (IPS), Kenya

Aug. 19 - 22
Health Team attend ITEM training given by USAID

Nov. 4 - 24
Education and DrOTS Teams attend workshop on capacity building for biodiversity and monitoring

Oct. 20 - Nov. 12
African Butterfly Research Institute visit to catalogue Madagascan butterflies

Nov. 11 - 16
Staff attend workshop on frogs organized by Antananarivo University

Feb. 19 - Mar. 1
Nov. 20 - Dec. 2
University of Helsinki, research on bats and socio-economy

Jan. 3 - 21
SBU Winter Intern Program, biodiversity and community focus

Jan. 13 - 20
Ecological and Epidemiological Modelling Mada (E2M2) workshop

Mar. 13
DrOTS Team attend Drone Day celebration in Tana

Mar. 16
First stone ceremony for the IUCN SOS Biodiversity Research Center

May 13
A Crucible for Planetary Health research symposium to explore unique opportunities for scientific discovery in the ecozone around Ranomafana National Park, with PIVOT, CVB, Stanford University, IRD, Harvard University, Calgary University, and UC Davis

Jun. 1 - 10
Lemur Capture with GERP

Jun. 25 - 29
Visit of S. Cummings-Findel (Sunshine Comes First) to monitor microloan project

Jul. 3 - 17
National Geographic expedition, community service focus

Jul. 23 - 28
University of Florida Study Abroad program on Madagascan biodiversity and conservation

Aug. 8 - Sept. 22
Staff attend Durrell Conservation Academy on field school on capacity building for biodiversity and monitoring, Mauritius

Sept. 17 - 21
Education Team attend training on vegetable farming at CEFFEL

Sept. 17 - 18
Stony Brook University Study Abroad, biodiversity courses

Nov. 14 - 18
GIS Team attend GIS day and training organized by SGGIS Madagascar

Oct. 19 - Nov. 1
Dr. Mark Krasnow and his team at Stanford visit to study mouse lemur genetics

Nov. 29 - Dec. 1
Research and Education Teams participatein the 25th anniversary of the University of Fianarantsoa

Biodiversity research and responsible environmental stewardship are issues which affect us all on a national and international level. Given this, CVB strives to contribute to Madagascar nationally while creating and strengthening international ties.

This year we have worked hard to deepen our relationship with Malagasy government. We joined the Ministry of Environment and Sustainable Development in supporting World Environment Day, and supported the Ramsar Convention by participating in the journée mondiale des zones humides, endeavouring to safeguard wetland biodiversity.

As we have done for the last 16 years, CVB continued to work closely with MNP. Our shared commitment to protecting Madagascar's natural heritage unites us.

Lastly, we are expanding our network of collaborators, welcoming our first researchers from Chubu University in Japan and Aberdeen University in Scotland, in addition to being selected as a finalist for the St Andrews Prize for the Environment.

Tsihy be lambanana ny ambanilantra.

- Dr. Benjamin Andriamihaja,
ICTE Country Director

Dear CVB friends and supporters,

2018 was marked by more accomplishments by our exceptional CVB staff under the leadership of Founder and the Executive Director Dr. Patricia Wright, and ICTE Country Director Dr. Benjamin Andriamihaja.

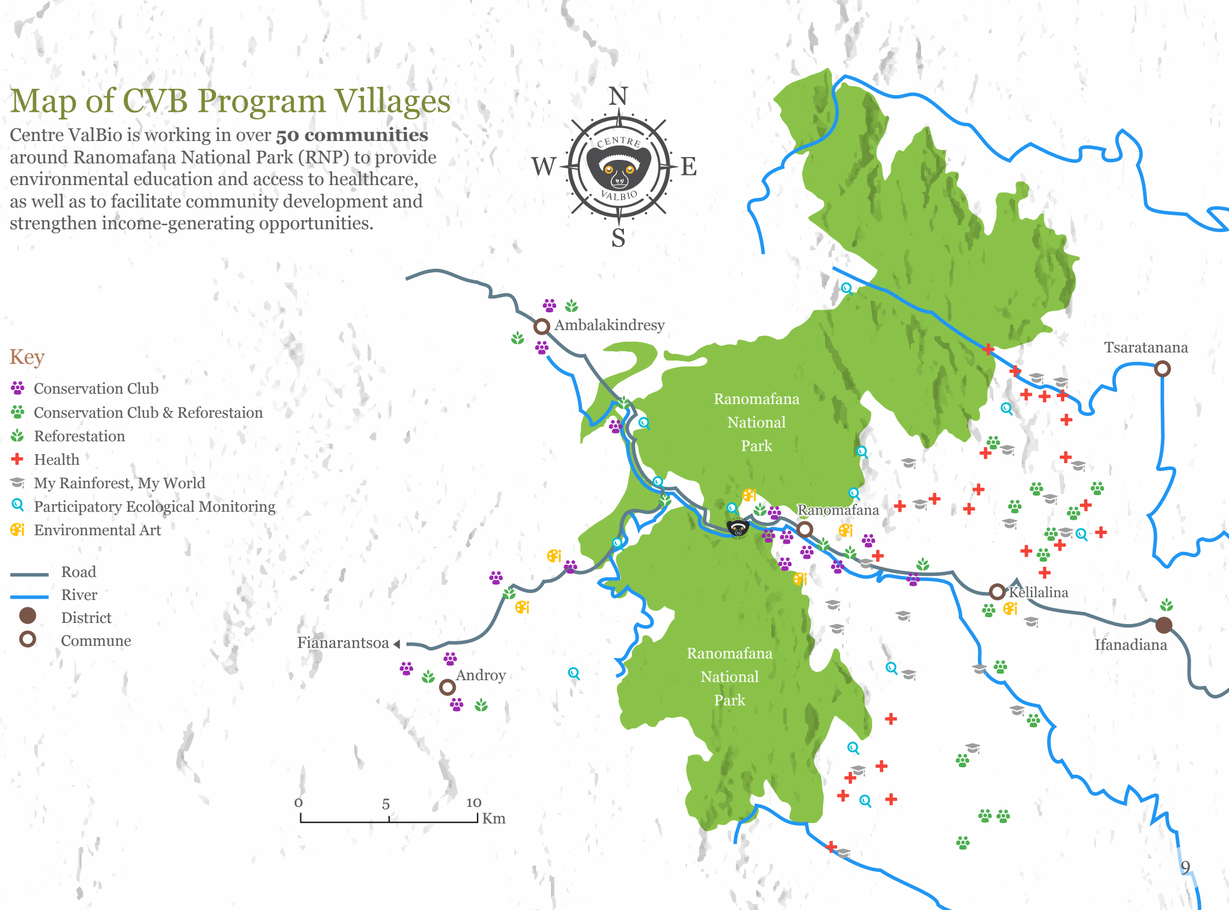
Our mission as leaders in research, conservation, and education is only possible through our dedicated and hardworking staff and collaborators. I am grateful for our close partnership with Madagascar National Parks on research and ecological monitoring, PIVOT for improving the livelihoods of the Ranomafana community, and CRS for working with CVB on many community-based projects. We are also proud members of Population Health and Environment. This past year, CVB partnered with Marie Stopes, Conservation International, and other NGOs.

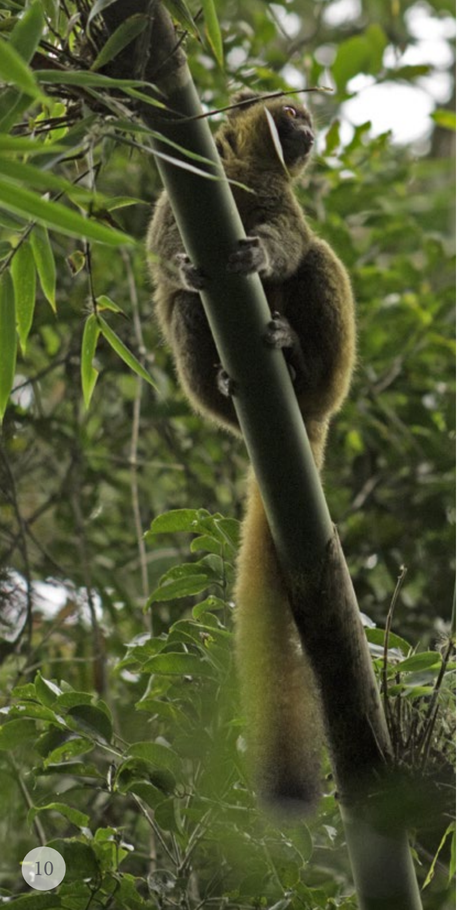
Thank you to Ny Tanintsika for the installation of wells, funded by the Rotary Club, in villages where drinking water is sorely needed. Internships and trainings continue to increase with University of Fianarantsoa in partnership with SBU Study Abroad. In June CVB collaborated with the Society for Conservation Biology by participating in their research fair at the University of Antananarivo. I am looking forward to seeing all that we can accomplish together in 2019!

- Pascal Rabeson, CVB Director

Map of CVB Program Villages

Centre ValBio is working in over **50 communities** around Ranomafana National Park (RNP) to provide environmental education and access to healthcare, as well as to facilitate community development and strengthen income-generating opportunities.





Research

CVB continues to be Madagascar's premier center for biodiversity, technology, and human health-related research. This year we published **50 papers** in scientific journals.

Long-Term Surveys

CVB continued its long term research on the demography, diet, and social behavior of three lemur species greater bamboo lemur (*Prolemur simus*), golden bamboo lemur (*Hapalemur aureus*) and Milne-Edwards' sifaka (*Propithecus edwardsii*).

The CVB Research Team continued taking data on growth, fruiting, and flowering patterns in rainforest trees. CVB is still monitoring the rare tree fungus that has killed 65% of the *Chrysophyllum paniculata* trees in the southern half of RNP for the past two years. This tree is an important food for six species of lemurs.

CVB also continued the daily monitoring of the greater bamboo lemur (*Prolemur simus*) and the golden bamboo lemur (*Hapalemur aureus*) within Talatakely in Ranomafana National Park. **31** individuals within four family groups of golden bamboo lemur as well as the **two** individuals (father and daughter) within the single observed group of greater bamboo lemurs in Talatakely have been followed during this year. Animal behavior and group movement are studied. We are hoping to begin the process of translocating a family group of greater bamboo lemurs into RNP this year to preserve the last genetic lineage of the original Talatekely population.

Propithecus edwardsi

Patricia Wright and CVB research team have been studying Milne-Edwards' sifaka for over 30 years. During 2018 four highly trained technicians followed **ten** groups of sifaka and take demography, diet and social behavior data in four study sites within Ranomafana National Park. This year four babies were born to the ten sifakas in the studied group and no mortality was observed.

During 2018 we observed that fewer trees produced fruit in comparison to years prior. Two of the Milne-Edwards' sifaka's favorite plant species did not produce any fruit in Voamalambotaholahy, and the percentage of fruiting trees was at an all time low of **43.66%**.

In Valohoaka new sifaka groups were seen sharing territories with the two groups that the CVB team follow.

Mouse Lemurs

Work continues on Dr. Mark Krasnow's influential long-term "Mouse Lemur Genome Project", which aims to unlock the potential of the mouse lemur as a model organism. By understanding the genetic underpinnings of behaviour and disease in the world's smallest primate, the team hopes to provide huge insights into how these conditions present in humans.

The group is also continuing to enhance the Malagasy science curriculum, using their "frugal science" $1 microscopes to encourage student exploration.

Digital Amphibian Database

Angus Hamilton (Melbourne, Australia), visited from September to November to begin building a digital database of the reptile and amphibian species of RNP – the most biologically diverse protected area for amphibian species in the world. Of the 160 species known in and around the area, upwards of 45 species of amphibian were found and photographed in Talatekely, Vohiparara, and Mangevo in collaboration with CVB's Malagasy frog expert Justin. The database was created with identification information included for as many species as could be identified in official records as being found in Ranomafana. This will enhance our ability to identify new species, and will be utilized and updated by future researchers interested in the Ranomafana region.

Tropical Ecology Assessment and Monitoring (TEAM)

Despite of the end of funding for TEAM project in 2017, CVB has continued to monitor the biodiversity in RNP using the standard TEAM methodology. 2018 was marked by end of season 8 (September 2017 – April 2018), but also the start of season 9 (October 2018 – April 2019). 12,422 images were obtained from 60 camera traps. TEAM identified 27 species of terrestrial vertebrates belonging to 23 genera, including the rare aye-aye (*Daubentonia madagascariensis*) and mysterious fanalouc (*Eupleres goudoti*).

A total of 6,754 vegetation stems, belonging to 230 species, were monitored within the six vegetation plots in the Ranomafana TEAM site during season 8. 63% of plot stems' DBH did not increase or decrease, while 37% increased slightly. In addition, analysis of the data has shown that there are 7.68% dead plants within the six plots inside the park. Lower DBH (10 – 20 cm) indicates a higher rate of dead trees due to human pressure.

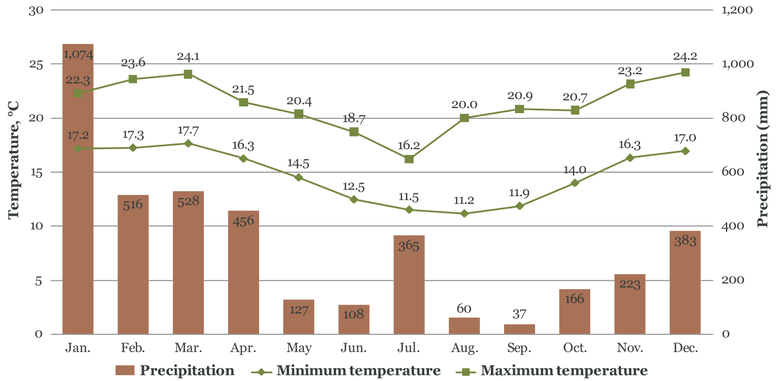
These trends will be monitored during TEAM season 9.

We are happy to announce that Dr. Steig Johnson, CVB board member, has found the funding for the continuation of the TEAM project.

Team Climate Data

In January, Cyclone Ava hit Ranomafana, and CVB's meteorological station received rainfall of **1,074 mm** for the month. The total amount of precipitation in 2018 was **4,043.6 mm** compared to **4,302.8 mm** in 2017. September had the lowest rainfall with **37 mm**. The monthly average temperature decreased by **0.1 °C** from 2017. The maximum temperature was recorded in December at **24.2 °C** and the lowest temperature was recorded in August at **11.2 °C**. March was the hottest month on average at **20.9 °C**.

2018 Climograph of Ranomafana



Conservation

Community Protected Areas

As part of the CVB expansion encouraged by the Madagascar Ministry of Environment and Sustainable Development, CVB and MICET are in the process of developing two new community protected areas (PAs), one in the eastern rainforests at Evato, Karianga, and the second in south central Madagascar. The Karianga Greater Bamboo Conservation Project is made possible with funding from Rainforest Trust and Taronga Zoo. Our goal is to employ locals to grow a wildlife corridor (COFAV) to connect remaining fragments.

Two expeditions to Karianga in the Southeastern part of Madagascar were carried out in 2018 to protect the largest known population of the critically endangered greater bamboo lemur.

During the first expedition CVB staff met with Karianga locals to train the community about biodiversity surveys and understand their needs, which will inform conservation management strategies, particularly in the face of climate change.

During the second expedition, we began training Intensive Rice Farming Systems (SRI), for **two different communes** with **44 participants**.

We visited the site for *Prolemur simus* conservation project in Imahasoa Village, and developed a reforestation program. As a result, **10 local communities** were funded to conduct biodiversity surveys. 45 locals with three different groups of tree nurseries received the training with SRI, and applied the sustainable technique to their fields.

More than **10 villages** at Ivato commune are ready to work with the tree nursery and donated land towards the reforestation program for March 2019.

The “Lost Rainforest” of Ivohibory is located in the Ivohibe district of Ihorombe Region, approximately 60 kilometers southeast of Ihosy. It has approximately 1,400 hectares of pristine primary forest surrounded by human-caused savannah. Benjamin Andriamihaja and Elia Rabenandrasana are overseeing the project from Antananarivo.

Starting in September 2016, Patricia Wright, Pascal Rabeson, the CVB Research Team and hosts of international researchers have carried out several biodiversity expeditions to inventory the unique fauna and flora found in this forest island, isolated for many years. New species of trees, frogs, and even lemurs make this forest a high priority.

Reforestation

CVB’s Reforestation Team carried on crucial activities to restore degraded landscapes surrounding Ranomafana National Park. In 2018, with the support of Seneca Park Zoo and Catholic Relief Services (CRS), our Reforestation Team working with local villagers planted over **9,479 seedlings** of **12 endemic fruiting tree species**, and **6,249 seedlings** were given away to villagers. All together 127,300 sq. meters were reforested. There are **14 active tree nurseries** in the villages and including the tree nursery at CVB. The team is making ten more plant-beds at the upper campus CVB nursery, which will increase the number by **5,000 more saplings per year.**

This year, reforestation piloted an experiment with a new technique, SITRIBOA; by scattering seeds instead of planting saplings. The goal is to increase seedling numbers in a more sustainable way, while reducing the costs of materials. The technique consists of sowing endemic seeds directly into soil at four different reforestation sites. This puts less stress on the plants and reduces our use of plastic. By the end of the year, a total of **450** out of 3,000 seeds germinated and are in good health at over 13 centimeters tall. More are expected to sprout into the new year. This technique has potential to reforest degraded areas, but soil quality and other factors need to be taken into consideration. Late in the year, we began experimenting with seedballs and will start to see results by early 2019. Through the expeditions and consistent interaction, the villagers are becoming more motivated to take part in reforestation. We teach the importance of trees in daily lives. These villages manage their own endemic tree nurseries in order to strengthen protection of their watersheds, upstream, the environment and to prevent erosion.

Approximately **15,000 seedlings** were planted this year. Those planting sessions were realized with the local villagers, Schools, MNP, Study Abroad, and other stakeholders. Groups of students from abroad had activities with the reforestation program such as Remote River Expedition, Florida University, National Geographic students, and Stony Brook Study Abroad programs.

Income Generating Activities Related to Reforestation

In partnership with Catholic Relief Services (CRS), our SPICES project is ever-expanding and improving. Two shade-grown cash crops, wild pepper and vanilla, are closely linked to CVB's reforestation initiatives in the Ranomafana and Kelilalina areas.

The reforestation team is helping villagers access new sources of income through the promotion of shade-grown cash crops. Madagascar is famous for its high quality vanilla. Although the highest quality is grown in the north and managed by large companies, we are working to develop a market in our region and train local farmers to improve the quality.

The quality of vanilla in the region is improving. **Two kilograms** of cured vanilla, and about **20 kilograms** green beans of vanilla were been sold this year. We plan to sell larger quantities to international fair trade companies in the future.

World demand for black and pink pepper is increasing exponentially. Pepper experts tested the wild pepper coming from RNP and scored it extremely high on flavor. Our local wild pepper (*tsiperifery*) is an endemic liana, so it needs a tree tutor to grow. Traditional harvesting techniques involve cutting down both the pepper vine and tutor together, which is obviously harmful for the tree as well as the wild pepper itself. To prevent this, the reforestation team has been working with villagers to domesticate the wild pepper in nurseries.

Wild pepper growing and harvesting is going well in the villages of Ambodivoangy and Ambodirafia, which now showcase wild pepper domestication farming around Ranomafana areas. **1,057 seedlings** of wild pepper have been planted in the villager's fields this year, and they are growing very well. A close follow up is ongoing to monitor the growth the seedlings.

For next year, we will continue to work with Conservation Club technicians on spices, vegetable gardens, and enhancing soil protection. This allows us to undertake conservation while strengthening the value chain for commodities such as vanilla and coffee.

Kelilalina vanilla

Community Outreach

Centre ValBio is working in over **50 communities** around Ranomafana National Park (RNP) to provide environmental education and access to healthcare, as well as to facilitate community development and strengthen income-generating opportunities.

Envoronmental Education

My Rainforest, My World

For the past three years CVB has brought conservation education to remote village schools surrounding RNP. Each lesson consists of classroom theory augmented with a mixture of games and hands-on activities.

During the 2017-2018 school year, we are proud to have doubled the program to include **20 schools** and **441 students.** Every MRMW class was able to visit RNP, where they had the chance to see many of the lemur species found in the park firsthand.

A main component of MRMW is the teacher training program. During the 2017-2018 school year, **four trainings** were organized. Before the start of the 2017-2018 school year, a two-week training was held with the 20 new intern teachers and 20 regular teachers, Madame Hanta Rasamimanana and her team from the *Ecole Normale Superieure* in Tana, as well as Mr. Dave Naish from Bristol Zoo. Oakland Zoo has also been an important partner in MRMW training workshops, as well as generously donating school supplies.

In order to evaluate the students' learning, at the end of each term students present what they have learned to their parents and classmates. Presentations may take the form of poems, songs, skits, or visual displays. This year MRMW initiated a school lunch program to provide a daily meal to all school children. Providing healthy noontime meals is a great way to keep children in school for more hours of the day, while improving their focus in the classroom and significantly decreasing absence rates. Parents were happy to participate, as it reduces financial pressure on families, by cooking, helping in the school garden and providing fuelwood, salt, and oil. Themes from the curriculum included "Grow your own Lunch". We produced 825 vegetables and planted 3,504 endemic trees through the MRMW program.

This year, we focused on repairing **eight** newly added schools. At the end of the school year, all of the MRMW classes came to CVB to present on topics that they had learned during the year.

I don't want to kill animals anymore! For example, rats cause problems in my village but the snakes eat rats. Also, because they help provide rain, you should not cut down trees without a good reason.

- Firmin, student from Anosy

Environmental Arts

In June, Ranomafana celebrated its annual Environmental Day with a parade, speeches, music, and art. Our artists and Education Team painted faces during the event and marched to represent CVB. The Environmental Arts Team worked closely with the community to produce murals and souvenir products to cater to the region's tourism boom.

Artists-in-Residence

Alain Rasolo, resident Malagasy artist, completed a scientifically accurate poster titled *Birds of Ranomafana*. He worked closely with Susan Cummings-Findel, founder of Sunshine Comes First, to develop and design marketing materials for local wood carver Fidi Fidelis. Rasolo continues to create beautifully intricate watercolors of new species, conceptual pieces, and other scientific illustrations for wildlife conservation and education. He also played a key role in designing CVB's annual report, three year MRMW report, and the CVB Health Team report. With National Geographic Student Expeditions, he also developed and helped to paint a Madagascar mural, featuring the country's iconic fauna and flora species, in a remote village classroom. With funding, his illustrations can be printed and used for future educational materials in classrooms around Ranomafana and throughout Madagascar.

Jessie Jordan, wildlife conservation artist, has been contributing creative services for a variety of projects at CVB since June. Her life-long mission is to inspire conservation through art and creativity. Her expertise in visual science communication and printing improved CVB's marketing materials 2018. She earned her bachelor's degree in fine arts at the Maryland Institute College of Art, and a graduate-level degree in science illustration at California State University, Monterey Bay. Since June, she has been creating logos, posters, illustrations, and videos while managing CVB's social media sites. Jessie and Rasolo worked together on the design and completion of two different educational murals. She also gave drawing and painting lessons to this year's MRMW school groups.

Deborah Ross, a wildlife artist and professor at The School of Visual Arts, NY, in conjunction with Rose Viggiano, Chair of the Art Education Department, recruited a group of artists and teachers to travel to Centre ValBio to learn about the center's conservation education and scientific work, and to assist in exploring the possibilities of art as a vehicle for conservation. Assisted by the generosity and knowledge of the local community they visited and ran workshops in several schools including Tanala Village School where we introduced traditional as well digital painting to the children. School of Visual Arts artists and teachers also partnered with Theo, one of the region's top tourist guides, and his conservation children's group in Ranomafana. After initial sessions to introduce watercolor, Theo selected 15 children to travel with the group to Anja Community Reserve. There the children were introduced to an entirely different ecosystem. After returning to Ranomafana, a painting session was organized to give the children an opportunity to express their experiences in nature. The paintings produced were a great success!

Jana Grabner is an illustrator and art teacher from Austria. She has been visiting Madagascar since 2011, working in the field of environmental education and arts with local conservation organizations such as the Madagascar Fauna and Flora Group, the Wildlife Conservation Society, and Centre ValBio. During her artistic residency at CVB, Jana began illustrating a book highlighting the importance of 30 endemic tree species found in Ranomafana National Park. This book introduces species that are of great importance for the wildlife, but are also traditionally used by the local population. Her intention is to provide a valuable resource for educational purposes and an introduction to the flora of the Ranomafana National Park for visitors. The book is expected to be finished and published by the end of 2019.

Conservation Clubs

This program, overseen by Caroline Rojosoanotahina and Anne Louisette Rasolomampionona Heritiana, promotes local stewardship of the environment. In addition to building tree nurseries and planting native trees, Club members work together to accomplish projects that connect reforestation with watershed protection and human health. Club members also identify income-generating activities that they are interested in pursuing, such as agriculture, animal husbandry, and artisan crafts, so that CVB can provide support and training.

Conservation Clubs are part of the CVB Education Team, and are activity-based, village-run, organizations focused on sustainable development and supported by our partner, Catholic Relief Services (CRS). This year, many of our expeditions included training on improving livelihoods in sustainable ways by enhancing biodiversity conservation. During the year the Clubs were visited by USAID agents and consultants three times for monitoring, visiting, and filming of field activities. We now have **34 Conservation Clubs** located around Ranomafana National Park, and plan to double that number in 2019. Each Club consists of 19 to 50 people, with a total membership of **1,360**. 172 of these members were trained in leadership by Conservation Club technicians. The success of the Clubs depends on strict adherence to performance criteria for reforestation, sustainable agriculture, hygiene, and sanitation. This past year brought a lot of cooperation between local members, supported by Catholic Relief Services, the United Nations, and USAID.

Conservation Club technicians embark on **six expeditions per year** to each village, with additional field visits to monitor or survey, if needed. All Clubs work on crop activities such as bean and peanut production. **90%** of Club members were trained this year in sustainable agriculture techniques to produce nutritional food as well as generate additional income. This was done alongside different partners like Bureau de Développement ECAR de Mananjary (BDEM), Catholic Relief Services, and the International Fund for Agricultural Development-led 'PROSPERER' project.

Club members often volunteer at their village's tree nursery, and are responsible for monitoring the trees planted in nearby reforestation areas. **14** of the Conservation Clubs have endemic tree nurseries, and since March, the Clubs have planted over **10,000 saplings**. Additionally, there are 20 fish farmers in the Clubs, spread over 15 villages. 34 villages also have chicken vaccination programs. Hygiene and sanitation education are practiced in each village, and Club members also organize cleaning sessions for their villages every week. Sanitation has improved to the point where the use of garbage pits in Conservation Club villages has now increased to 50%, and latrine use to 80%. Around 30% of the Clubs began using latrines in their villages this year.

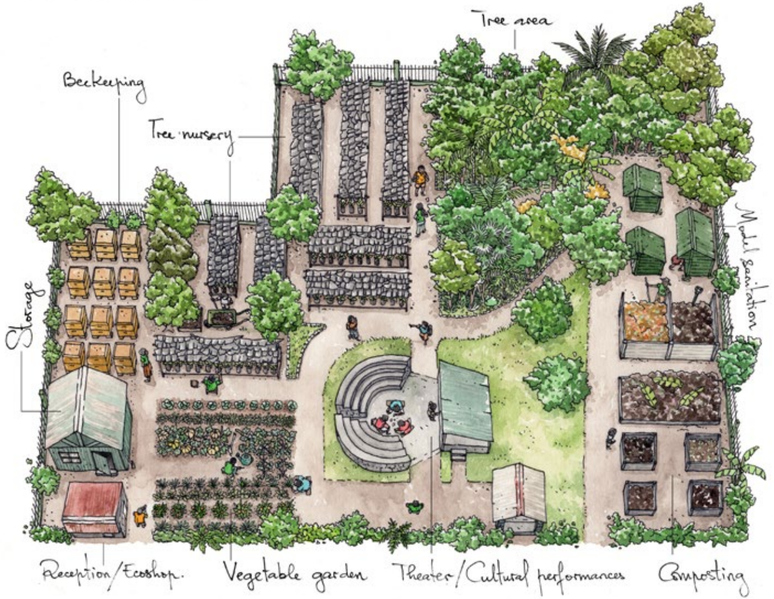
We are working with resident artists and interns to help create scientific animations and movies, as well as developing illustrations and other educational materials to illustrate complex concepts.

Drinking water availability is also a problem in villages with fewer trees - they have to travel further to find a fresh spring or other water source. Failing this, they have to resort to collecting unsanitary water from rivers, streams, or pools. Education about safe water for people will be our main focus for the next year. The Bergen Highlands/Ramsey Rotary Club have generously begun to help us install wells in local villages, providing safe drinking water.

Kianja Maitso

In June, Professor Mairead Dunne and Daniella Rabino from the Centre for International Education at the University of Sussex visited CVB on a Sussex Research Impact Funding grant to host training workshops with CVB outreach teams.

A few months later, Daniella and Chicago Children's Museum Exhibit Development Director, Katie Slivovsky, donated consulting hours to conceptually develop educational spaces in Ranomafana in collaboration with CVB, PLAY, and our local community partners.



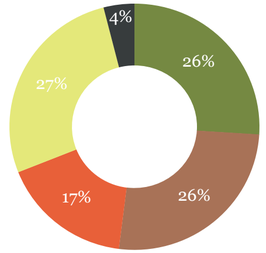
Community Healthcare

CVB Health Team

2018 was another successful year for the CVB Health Team, which provided a record number of consultations and medical services to **24** geographically isolated villages surrounding Ranomafana National Park.

In 2018 the Health Team conducted nine expeditions, spending close to 100 days in the field. The Health Team performed **2,626** consultations, an increase of **19%** compared to 2017. Acute and chronic respiratory illnesses were by far the most commonly diagnosed illnesses, accounting for almost half of the year's treatments.

Distribution of Treatment by Age



Additionally, **393** cases of malaria were treated, which remained the second most frequent illness treated by the Health Team for the third straight year. CVB hopes that their work treating malaria in conjunction with the large scale bed net distribution in 2018 will reduce the physical and economic burden felt by the local villagers as a result of malaria.

CVB is pleased to report that children under the age of 15 received **52%** of the year's treatments. Communicable disease, like respiratory illnesses, diarrheal disease, and malaria are extremely dangerous for children, especially those under the age of five. It is for this reason that improving access to medical care for children has and will always be a cornerstone of the Health Team's mission.

Raising sanitation and hygiene awareness though community-lead activities continued to be a central component of CVB's strategic plan during its 2018 expeditions. These activities, designed to leverage the existing skills and resources of the communities, have led to noticeable improvements in sanitary condition across the Health Team's four geographical zones.

With the help of the Health Team's trainings and activities, villagers took steps to reduce their exposure to indoor air pollution, a major contributor of respiratory illness, by building **30** outdoor kitchens. In a similar initiative, villagers constructed 38 pit latrines thereby reducing the unsanitary conditions that lead to diarrheal disease, the number one cause of premature death in Madagascar. Furthermore, each expedition in 2018 included a community wide cleanup effort where food waste, plastics, and other rubbish, all of which attract disease carrying pests, were disposed into communal trash pits. This cleanup initiative led to the construction of **42** trash pits in 2018.

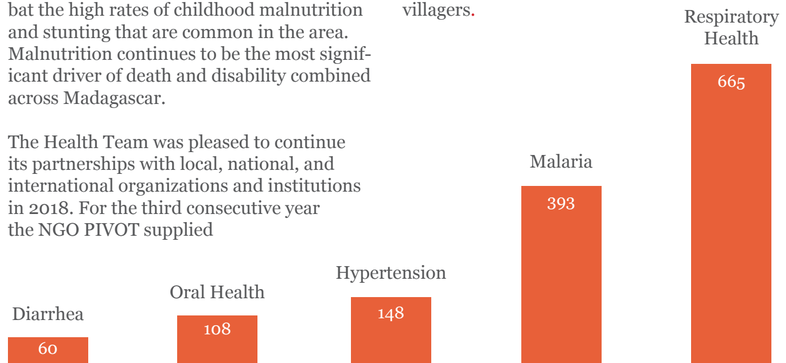
In 2018 the Health Team expanded its health awareness activities to include cooking demonstrations. While only in it's first year, this well-liked activity has trained over 150 women in 10 villages with the knowledge and culinary skills to prepare nutritious meals for their families. The Health Team hopes to continue this program in an effort to combat the high rates of childhood malnutrition and stunting that are common in the area. Malnutrition continues to be the most significant driver of death and disability combined across Madagascar.

The Health Team was pleased to continue its partnerships with local, national, and international organizations and institutions in 2018. For the third consecutive year the NGO PIVOT supplied the Health Team with 40 essential medicines that were used in the field. PIVOT also conducted three continuing education trainings which were attended by members of the Health Team: emergency delivery techniques, strategies for the prevention and treatment of communicable diseases, and malnutrition.

Furthermore, the Health Team collaborated with the SBU experiential learning internship program for the fourth year in a row. During their 2018 internships, six motivated undergraduate students conducted research alongside the Health Team, and investigated a wide range of public health topics.

The health team also assisted with the Stony Brook University School of Dental Medicine's annual mission that performed free tooth extractions for local villagers.

2018 Treatment Breakdown



DrOTS

CVB successfully launched the production healthcare delivery drone system DrOTS, which operated in **63** villages of the Androrangavola commune for much of the year. Although the TB Reach grant ended in December 2018, work continues on social impact and humanitarian drone use, as well as the underlying drone technologies utilized in DrOTS. In October, we were notified of being awarded a USAID grant to deploy a successor to the DrOTS drone system in ultra-remote coastal regions of Madagascar. As with DrOTS, this successor grant will focus on pioneering new socially beneficial technologies, while utilizing drones as a delivery system.

Work is under way to expand CVB's successful work with drones. We are exploring the possibilities offered by modular drones that can carry sensor packages such as high resolution cameras, long range radiar collar tracking and triangular units, or foliage-penetrating LIDAR units, which can construct 4D views of the forest from canopy to ground levels at variable time intervals.

Technology

The CVB Research Technology Department's mandate is to research and develop social impact and research enabling technologies. 2018 was a very productive year for CVB's Research Technology Department.

The CVB IT Department is tasked with ensuring reliable operations of CVB Technological Assets. Over the course of 2018, the CVB IT department made a number of improvements to support its core mandate. In 2018 we completed the modernization of network infrastructure in NamanaBe and LovaBe by installing new network racks on all levels of each building, new indoor access points and data drops, installing outdoor access points to provide reliable WIFI to all outdoor areas of the campus. We also finalized installation of a new 4Gbs backbone line between NamanaBe and LovaBe providing much enhanced, lower latency connection between the buildings.

Additionally, we installed one new projector system this year in the new dining area behind the main dining hall. This transformed the new dining room into a fully functional, segregated AV space that can seat up to 80 people. This year we also finished our qualification for TechSoup, which is a nonprofit assistance program which grants very steep discounts to software and hardware. As a result, we were able to save around $25k in Microsoft Office, and Windows modernization costs this year.

Plans are progressing to a content management system that is more easily updatable, to more quickly inform stakeholders of our successes. We also hope in the near future to be able to move to @centervalbio.org emails.

By enacting the above enhancements, all which are part of CVB's Cyber Infrastructure Plan, CVB can move forward with such campus wide improvements including accounts allowing employee and researchers to log in from any computer and have their own account and files safely with them at all times.

To facilitate the maintenance and development of research technologies, investment was undertaken to develop CVB's Design and Fabrication Lab, as well as CVB's Electronics Lab. The Design and Fabrication Lab, situated in the old LovaBe ambient Lab, features both a collaborative meeting space, modern workspace for CVB's technology staff, and ever-growing machine shop. It is open for researcher use, and researchers can also place orders for design and fabrication services.

Social Engineering

In addition to CVB's high-tech research lines, CVB co-founded a very low tech, grass roots engineering program called **BeLocal** in 2018. In partnership with SBU's School of Engineering, the BeLocal Group aims to crowd source low-tech, sustainable, solutions to daily life challenges in Madagascar through the partnership between BeLocal student and professional chapters located around the world. The 2018 group, which was comprised of SBU engineering students and faculty, investigated a way of making charcoal from waste rice stalks which can greatly reduce deforestation caused by planting eucalyptus, as well as a method of bridge construction utilizing interlocking, bamboo treated with locally sourced, sustainable materials to prevent rot.

With the assistance and collaboration of Mandrivany village, the team created a small bamboo girder bridge placed in the Kelilalina commune to test the use of bamboo as a structural and load-bearing material.

The agricultural waste charcoal project piloted recipes for material and workshops for instruction in villages. During BeLocal's community assessments in 2017, a major topic of discussion was of fuel use and production in villages. The conservation and health implications of improving fuel sources in households from the traditional charcoal or firewood are huge, inspiring the engineers working with BeLocal to find a more suitable method of creation. In June of 2018, the team held workshops and training sessions in charcoal creation.

BeLocal continues their activities in 2019 to build relationships with the University of Fianarantsoa and local villages to identify and define solutions to everyday challenges.

Logistics

While research and environmental stewardship are the purpose of CVB, none of those can happen without the dedicated and diligent Logistics Team looking after and maintaining our buildings, equipment, and vehicles.

While taking researchers (and their fecal samples!) to and from their sites, transporting staff to the airport for international conferences, and helping Study Abroad students experience the rich cultural offerings of Madagascar.

Head of Logistics Dede Randrianarisata, along with volunteer Jim Ehle Meyer, assisted with the construction of our new SOS Biodiversity Research Center, helping troubleshoot problems as we brought the construction plans to life. Jim also designed and built floor jacks and an engine winch to help with our vehicle maintenance.

During the year we hired a full-time mechanic, Mamy, to help care for our vehicles and keep them safe and secure. Our five vehicles were under heavy use for projects at CVB. Away from vehicles, we renewed our storage rooms, increasing their capacity.

Research Station Use

In 2018, Centre ValBio hosted **282** individuals from **31** different countries conducting research in Ranomafana National Park and its surrounding communities, using our laboratory, participating in training, workshop, or Study Abroad programs, or taking a tour of our facilities and attending a lecture. Numbers of individuals increased this year and countries of origin nearly doubled!

Researchers

119 individual researchers stayed at CVB in 2018. The average length of stay was **10.5** days. The majority of researchers were American (**44%**) and Malagasy (**28%**). This year, CVB welcomed visitors from **31** different countries from all **six** inhabited continents!

Scientific Tourists and Tour Groups

1,336 Malagasy students and **488** scientific tourists toured the CVB campus in 2018.

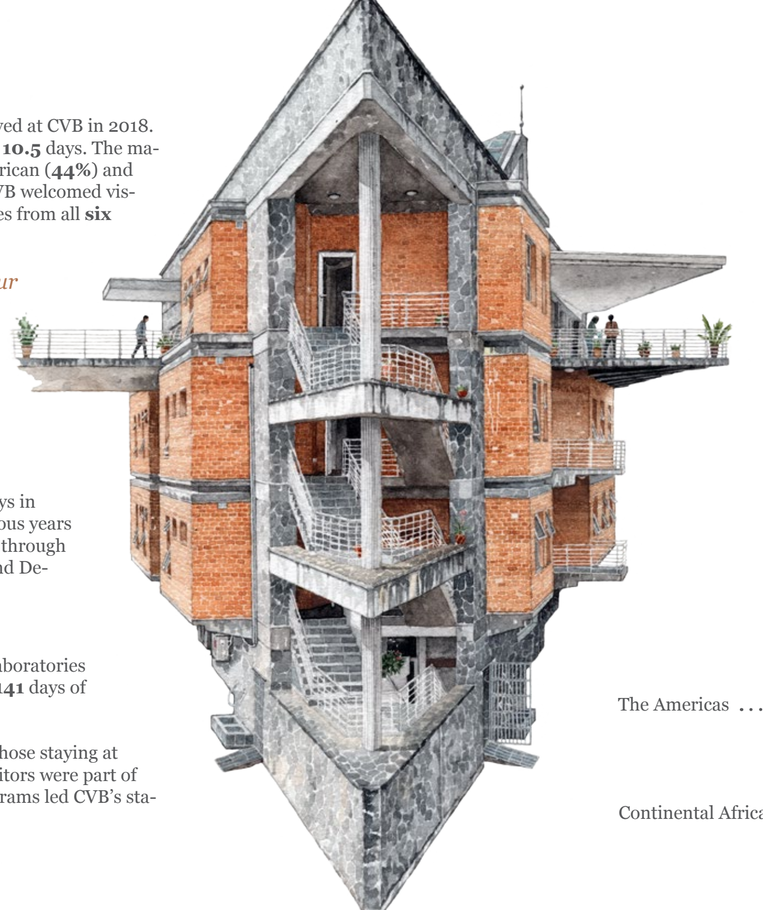
Station Days

The total number of station days in 2018 was **5,313**. As with previous years our busiest months were April through to September with February and December being quieter

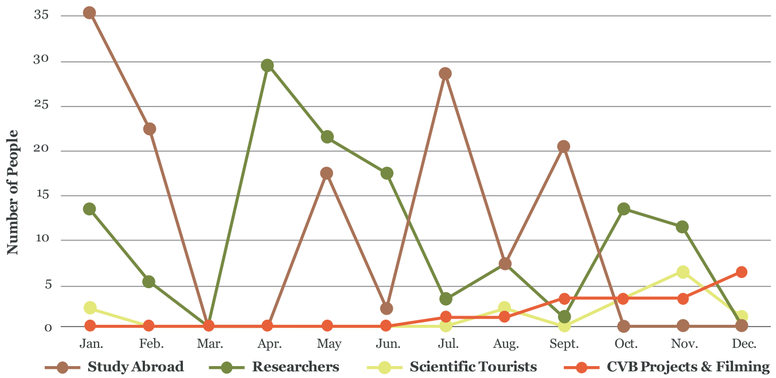
Laboratory Use

16 researchers used the CVB laboratories in 2018, for a total number of **141** days of lab use.

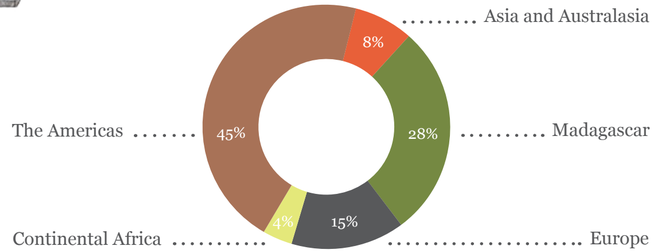
Researchers made up **31%** of those staying at CVB in 2018, while **69%** of visitors were part of courses or works training programs led CVB's station usage.



Visitors



Visitors By Origin



Year in Numbers & Countries of Origin of CVB Guests

282
Total scientific visitors

5,313
Station days

31
Countries from which CVB received visitors

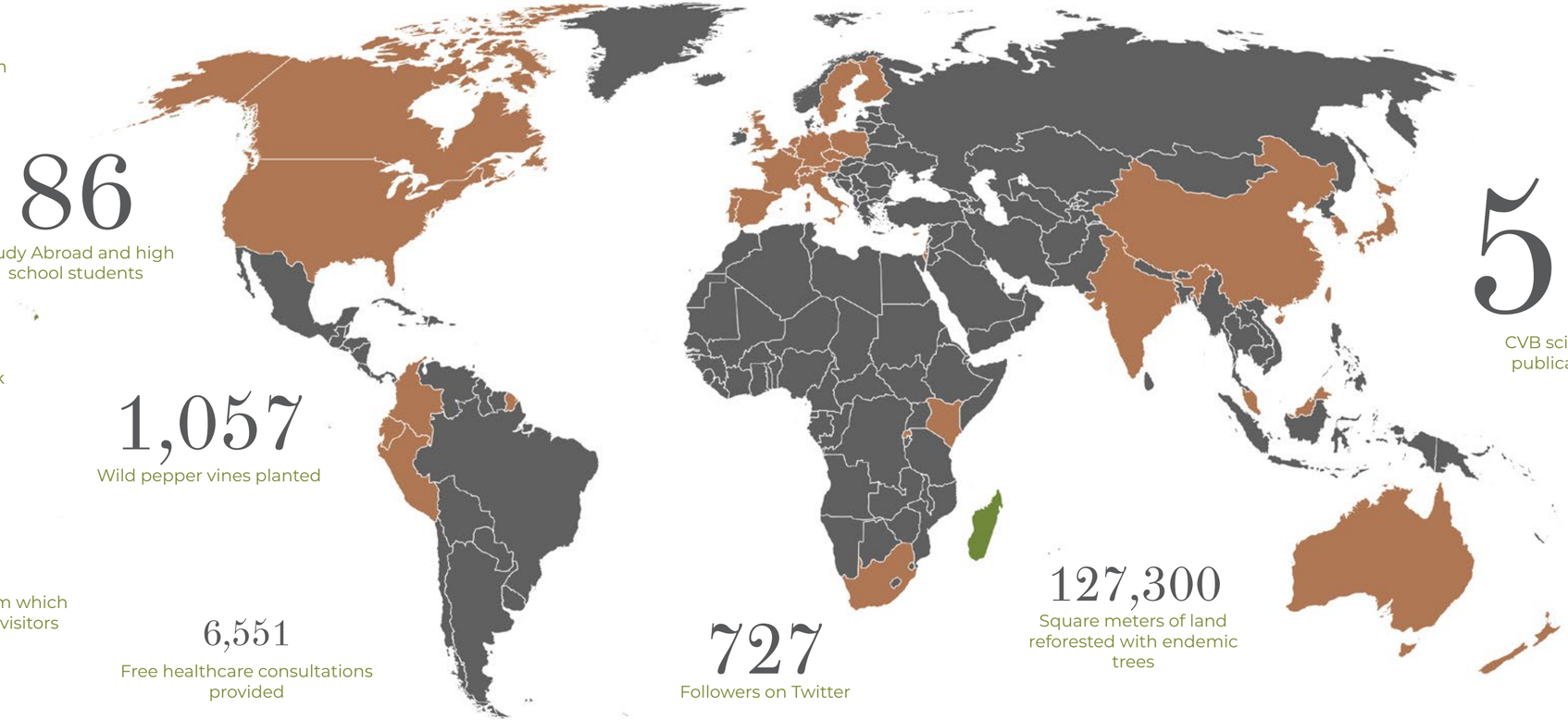
839
Followers on Instagram

10,488
Followers on Facebook

86
Study Abroad and high school students

1,057
Wild pepper vines planted

6,551
Free healthcare consultations provided



727
Followers on Twitter

127,300
Square meters of land reforested with endemic trees

456
Items sold in the Eco-shop

50
CVB scientific publications

13,604
Days spent in the field

303
Expeditions facilitated by CVB

Researchers

Andrea BADEN (Hunter College, CUNY) and her team: Eliette NOROMALALA, R. Felix ANDRIANANTENAINA (University of Antananarivo), Nina BEEBY (Hunter College of CUNY), Ilari FALCK (University of Helsinki), Rita SMITH (Loyola University, Chicago), Liselotte VAN DEN HOUT (Auckland University of Technology), Giulia ROSSI (University of Bologna), and Nichole ARBONA (Kansas State University). Fidisoa RASAMBAINARIVO (Veterinarian), Nicolette McMANUS (Northwestern University, USA), and Mathieu RALAIVAO (University of Antananarivo), continued to work in Mangevo studying the reproductive physiology and infant care strategies of *Varecia variegata* and the impact of habitat degradation on gastroinstestinal microbiota.

Jesse BARBER, Juliette RUBIN (Boise State University) and Akito KAWAHARA (University of Florida) studied the evolution and diversity of the production of ultrasound by moth predator avoidance method against bats.

Gabrielle BUENO (University of Rochester, New York) investigated the effects of different habitats on infant development in *Lemur catta* in the Ivohibory recently discovered forest.

Mar CABEZA, Marketta VUOLA, Aina BRIAS GUINART (Helsinki University), Eric Marcel TEMBA, Santatra ANDRIAMITANDRINA, Rindra RANDRIANDIMBIMAHAZO, Malalatiana RASOAZANANY, and Nasandratra RAOELINJANAKOLONA (University of Antananarivo) continued the training and research program of RESPECT (Reserve Planning in the Tropics) consisting of bird inventory, forest structure, and field experimentation using fake caterpillars for the evaluation of predation pressure on insects.

Gabriella CARVAJAL (Stony Brook University) recorded lemur vocalizations within Ranomafana National Park to serve as acoustic references for threatened lemur species.

Santiago CASSALETT (City University of New York) and Megan MAH (University of Calgary) examined the implication of lemur nutritional niches on species coexistence and conservation.

Aparna CHANDRASHEKAR (Hunter College, CUNY) and Michael A. VELONJARA (University of Antananarivo) assessed the parasite prevalence of malaria within *Varecia variegata* in Ranomafana National Park.

Steve COLLINS, Colin CONGDON, Josiane GOOSSENS, and Ian BAMPTON from the African Butterfly Research Institute collected lepidoptera specimens in Ranomafana and the surrounding area to investigate the role of development and phenotypic plasticity in speciation, as well as the ecological functions and evolutionary patterns of sexual characteristics.

Christopher COULTER (Boston University, School of Public Health) trained four villages around Ranomafana National Park (Ambodiaviavy, Sahavondronina, Torotosy, and Bevoahazo) on grassroots soap making. This project aims at introducing a sustainable, cost effective process of soap production and use that will improve access to a key tool for basic hygiene as well as generating income for local people.

Mariah DONOHUE (U. of Kentucky) and Eva Stela NOMENJANAHARY (U. of Antananarivo) used a multi-species framework to assess the ecological and evolutionary factors driving gut microbiome dynamics of the endangered lemurs of Ranomafana and Isalo National Parks.

Zo Ella Samuel FENOSOA (University of Antananarivo) studied the dissemination of the parasitic plant *Bakerella* sp. by frugivores and the effects of its infection on the community of plants in humid forests in eastern Madagascar.

Andrea Baden

A growing body of research is beginning to show that interactions between primate hosts and their microbial communities are complex, and that each derives fitness benefits from the other. Hosts, in particular, rely on microorganisms for processes ranging from digestion to immunity. However, despite the critical importance of host-microbe interactions for a complete understanding of host evolution and ecology, the factors responsible for the development and maintenance of the host gut microbiome are still poorly understood. Research by Dr. Andrea Baden (Hunter College, CUNY) and her colleagues Drs. Timothy Webster (University of Utah) and Randy Junge (Columbus Zoo) have been conducting research at the Mangevo field site to unravel the myriad factors shaping the gut microbiome using a combination of detailed genetic, ecological, and behavioral data collected from two communities of black-and-white ruffed lemurs (*Varecia variegata*). Specifically, their research has the overarching aim of characterizing the ontogeny of the microbiome and differentiating key heritable and extrinsic factors responsible for microbiome development in the species.

In order to answer these overarching questions, Dr. Baden and colleagues conduct annual capture seasons during which time they conduct biomedical health assessments, collect biological samples, and radio-collar animals to locate and identify individuals. These field seasons also provide Malagasy and foreign veterinary, master's and PhD students with opportunities for hands-on training in how to plan, execute, and facilitate field research. Capture seasons are followed by year-round monitoring; Dr. Baden has worked with a large team of CVB technicians, local Mangevo villagers, and field assistants since 2005 to monitor the daily behaviors (social interactions, reproductive behaviors, diet, and movement) of ruffed lemurs. Research at the Mangevo field site over the last year (2017-2018) has resulted in several published and in review abstracts and journal articles, including papers describing the nesting behavior, ectoparasite load, and feeding ecology of black-and-white ruffed lemurs. In fact, in collaboration with CVB researcher Sarah Zohdy, Dr. Baden's research has led to the discovery of a new mite species specific to this large-bodied, frugivorous lemur. Research at this site is ongoing and is currently supported by the Leakey Foundation, National Science Foundation, and the City University of New York. Regular updates on this research are available at: **www.HunterPMEL.org**.

Brett Scheffers

The wet rainforests of Madagascar, and those found within RNP, are an iconic, critically endangered hotspot in amphibian and reptile diversity. These forest are diverse due to a cool and wet climate, which makes these forests perfect for supporting an amazing array of frogs and chameleons in all shapes and sizes. Also, these rainforests are quite complex in their vegetation and structure and animal communities stratify within this vegetation from ground to canopy, similar to a layered cake, with each layer containing a unique set of species.

As a result, animals fill the three-dimensional vegetation space of rainforests in what is called vertical stratification. It is thought that this layering of animals from ground to canopy allows for more species to be packed into a single space.

Our knowledge of towering forest canopies remains elusive, primarily because of the difficulty in accessing canopy environments. Dr. Brett Scheffers and his lab group at the University of Florida has spent the past five years studying frogs and chameleons to better understand the habitats they use and to contrast two competing life strategies, living on the ground versus living within trees. Where species live in the rainforest is strongly linked to species' physiology, morphology, and behavior. These traits not only influence their distributions on the landscape, but also their resilience to climate change.

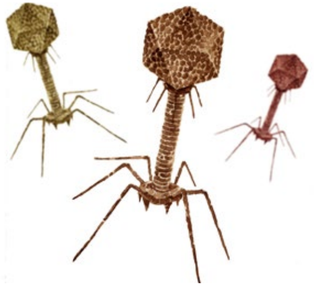
The Scheffers team conducts ground to canopy surveys to quantify vertical stratification of frogs and chameleons across wet and dry seasons and wet to dry habitats and they explore whether physiological adaptations (e.g., desiccation tolerance) arise from living in hot, dry canopy environments (because the canopy is more exposed to the sun).

Importantly, their research explores how habitat loss and climate change impacts the animals living within rainforests of Madagascar. Climate change might change the way species can use each layer of the forests and might even 'flatten' the vertical distributions of tropical forest communities by reducing canopy moisture and triggering downward shifts in their distributions. This is a dangerous scenario for rainforest animals because it can elevate competitive and predatory interactions by causing too many animals to cram into a single space on the ground.

Dr. Scheffers and his group of researchers collects data to test the underpinnings of this theory, which he hopes will shed light on the possible impacts of climate change and habitat loss on species living in biologically rich and complex forest environments.

Thomas GILLESPIE and Emily STRAHAN (Emory University) investigated the relationship between enteric infection, human disturbance, and immunity in non-human primates using a new assay in collaboration with Bosinger Research Group (Yerkes National Primate Center), Wright Research Group (Stony Brook University, and CVB), Krasnow Research Group (Stanford University), and Andriamahery and Hajanirina Razafindrakoto (University of Antananarivo).

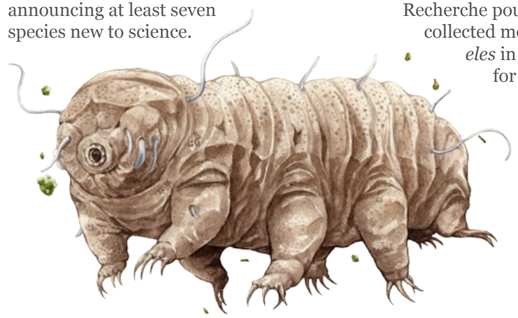
Graham HATFULL and Deborah JACOBS-SERA (University of Pittsburgh, Department of Biological Sciences), continued their studies of the molecular genetics of mycobacteria and their mycobacteriophages. Phages new to science were discovered, and genomic investigations promise to give insights into viral diversity and evolution.



Marc HOFFMANN (Technische Universität Braunschweig), Aristide ANDRIANARIMISA, Mahandry ANDRIANARIMISA, and Andolalao RAKOTOARISON (University of Antananarivo) examined the genetic identification of entomology diversity within RNP, focused on prey and parasite herpetofauna.

Roxanne KARIMI (Stony Brook University) Luis FERNANDEZ, Claudia Maribel KVEGA RUIZ (Wake Forest University) and Kenneth DAVIS (UNEP) conducted rapid environmental assessments of mercury release, fate, and transport as part of Madagascar's National Action Plan to reduce mercury usage.

Andrzej KEPEL and Marta KEPEL (Polish Society for Nature Conservation), presented their 2017 research at 14th International Symposium on Tardigrades in 2018, announcing at least seven species new to science.



Katherine KLING (Stony Brook University) conducted diurnal primate surveys in the corridor and forest fragments of Andrambovato and Analavero, Tolongoina.

Mark KRASNOW (Stanford University) and his team, Jozeph PENDLETON, Caitlin KARANEWSKY, Andriamahery RAZAFINDRAKOTO, Hajanirina Noeline RAVELONJANAHARY, Megan ALBERTELLI, and Guy ALBERTELLI, continued working on their long-term research on "*Microcebus rufus*: a novel model organism for medicine research". They also pursued their teaching program at Kelilalina high school with the École Normale Supérieure-University of Antananarivo.

Gregory LANZARO (University of California-Davis) and Diego AYALA (Institut de Recherche pour le Dévelopement, France) collected mosquitoes of the genus *Anopheles* in the surrounding area of RNP for further genetic studies.

Munetoshi MARUYAMA, Shotaro KAKIZOE, Toshiharu MITA (Kyushu University, Japan), and Anjatiana ANDRIANAJA (University of Antananarivo) collected insect specimens in Ranomafana National Park and its surrounding area to complete their study of the taxonomy, morphology, and evolution of myrmecophilous and termitophilous insects, wasps, and dung beetles in Madagascar.

Amy MOLOTOKS (University of Aberdeen) looked at the local perspectives of conflict risk between food security and biodiversity. She conducted interviews in villages around Ranomafana National Park to investigate the local perspective on the conflict risk between biodiversity conservation and food security.

Omer NEVO (German Primate Center, Göttingen) and Hary RAZAFIMANDIMBY (University of Antananarivo) continued their project on chemical ecology of seed dispersal by lemurs.

Timothy RAXWORTHY (Hampshire College) had conducted surveys on vanilla bean farming in Madagascar, looking at an economic and social parts of policy and development. Several village communities and associations, including those of the rural communes of Ranomafana, Kelilalina, and Ifanadiana, were visited and in-site field investigations were made.

Onja RAZAFINDRATSIMBA (College of Charleston), Camille DESISTO (Harvard University) and Veronarindra RAMANANJATO (University of Antananarivo) looked at the mechanism and consequence of the spread of *Psidium cattleianum* in the rain forest of Madagascar.

Amanda ROWE (Stony Brook University) evaluated the methods of DNA barcoding in nutritional ecology analyses and studied the variations in energy availability and energy consumption of mouse and dwarf lemurs in habitats of various structures and conservation statuses.

Amanda ROWE, Anna BOCKHAUS, Zachary RIDGWAY (Stony Brook University), Luke MARTIN (Australia National University) and Eva Stela NOMENJANAHARY (University of Antananarivo) went to Zombitse National Park with the CVB team for a preliminary census and a community dynamic study of *Microcebus murinus*, *Cheirogaleus medius, Mirza coquereli,* and *Phaner pallescens*.

Brett SCHEFFERS, Gilles BERNARD (University of Florida), Gianluca CERULLO (University of Sheffield), Lalatiana RANDRIAMIHARISOA (Madagascar National Parks) and Tsitohaina ANDRIAMBOLOLONA (University of Antananarivo) conducted ground to canopy surveys to quantify vertical stratification of frogs across wet and dry seasons and wet to dry habitats. They combine field studies and laboratory experimentation to assess the impacts of the climate change to amphibians' ecology. 72 trees, ranging from 17 to about 40 meters high, were surveyed in the morning and at night within two forest sites Vatoharanana and Valohoaka. Three laboratory experiments: thermoregulation, vertical enclosures, and dehydration and maize were also conducted.

Jadelys TONOS, Ella MATSUDA, Benjamin JOHNSON (Rice University) and Zo Ella Samuel FENOSOA (University of Antananarivo) looked at the effect of frugivore movement patterns on seed dispersal, plant community structure, and biodiversity maintenance in eastern Madagascar.

Gal ZANIR, Lior AHARONE (Augmanity Nano LTD) and Tsinjo ANDRIATIAVINA (University of Antananarivo) collected lemur's fecal samples within Ranomafana National Park to complete their studies on wild animal microbiome database.

Sarah ZOHDY (Auburn University) and her team, Nina FINLEY, Janet ROBERTS, and Breanna SIPLEY, continued their research on mouse lemur lice, and its effect on viral spread in human populations.

Tom Gillespie

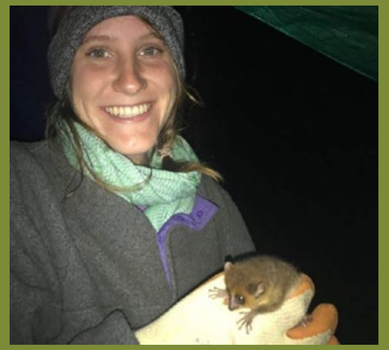
Tom's team believe in a 'One Health' approach: protecting human and wildlife health, while ensuring the sustainability of the ecosystems within which they live. This places the team at the intersection between lemur research and human health initiatives.

This approach is especially useful when researching diarrheal disease, the third leading cause of mortality in Madagascar. Despite the significant impacts of diarrheal disease, the risk factors that best predict disease outcome have not been comprehensively studied. Tom's research combines traditional survey-based epidemiological methods with cutting-edge molecular and computational tools. Survey data is used to determine how patient socio-economic status and behavior affect risk of disease, while shotgun metagenomic sequencing detects the full range of pathogen diversity, and a novel machine learning method ranks the predictive ability of generated outcomes. This interdisciplinary approach, in partnership with their health partners (Ministry of Health and PIVOT), will better channel health resources toward children at greatest risk.

Thus far, Tom's team have completed household surveys and collected diagnostic specimens. They completed DNA extractions and diagnostic analyses and have interfaced these lab results with their survey data to examine the relationship between a child's pathogen community structure, socio-economic status, behavior, ecological exposures, and diarrhea.

They have examined zoonotic enterobacteria (like *Salmonella*, *Shigella*, and *Vibrio*) in six lemur species. Prevalence differed strikingly when comparing lemurs from pristine and disturbed forest. Pathogen incidence rates nearly doubled when looking at only lemurs from disturbed areas (60%) versus all individuals (33%). As such, there was a negative association between lemurs in pristine habitat and these pathogens. They also compared patterns of infection with *Entamoeba histolytica*, causative agent of amoebic dysentery in humans, in seven species of lemurs. This protozoan was found in three species of lemurs with prevalence ranging from 5.4% in *Microcebus rufus*, to 7.7% in *Eulemur rufifrons*. All *E. histolytica*-positive lemurs were from the sites with the highest level of daily human foot traffic, and distance to human settlements had a significant effect on *E. histolytica* presence. These results strongly suggest that lemurs are becoming infected with human pathogens, but do these pathogens harm lemurs? Tom's team are working on a non-invasive assay to find out!

The interplay between wildlife diseases and host immunity remains difficult to characterize due to a lack of tools to remotely assess immunologic status in wildlife populations. Tom's team are developing a noninvasive assay to study the interplay of enteric infection and immune function in *Microcebus rufus*. Their study has the potential to elucidate eco-immunological mechanisms underlying the relationship between anthropogenic disturbance and wildlife disease dynamics.



Amanda Rowe

Amanda is Patricia Wright's second year PhD student based out of Stony Brook University, New York, USA. In 2018, Rowe and her team of foreign researchers, CVB technicians, and local guides completed several pilot studies for Amanda's PhD work focusing on the community ecology of small bodied, nocturnal lemurs in the family Cheirogaleidae. During these study periods, Amanda collaborated with Mariah Donohue, Eva Stela Nomenjanahary, Anna Bockhaus, Luke Martin, and Zachary Ridgway. Together, these researchers and their teams collected about 800 fecal samples from 12 lemur species spanning five research sites. Research was focused in rainforest and dry forest sites of Ranomafana National Park, Zombitse-Vohibasia National Park, and Isalo National Park. These dry forest pilot seasons represented some of the only research to be completed in these areas to date.

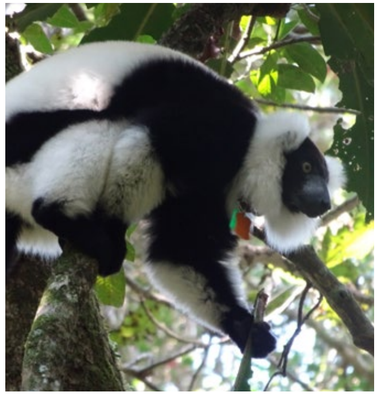
During these pilot studies, Amanda and her collaborators conducted diurnal and nocturnal follows, during which time behavioral data and fecal samples were collected. Nocturnal follows in Zombitse-Vohibasia National Park focused on *Phaner pallescensfor* fecal sample collection. In addition to follows, live captures were conducted of *Microcebus rufus*, *Microcebus murinus*, *Cheirogaleus medius*, and *Mirza coquereli* using live trapping techniques. Upon capture of these animals, Amanda's team collected fecal samples and morphometric data. Lastly, Amanda and her collaborators conducted nocturnal transect surveys in Zombitse-Vohibasia National Park to estimate population sizes of all nocturnal lemur species in the park.

One focus of Amanda's research is the comparison of targeted insect consumption by sympatric lemurs along a gradient of disturbance in both rainforest and dry forest climates. To meet this goal, over the next six months she will complete DNA sequencing of prey fragments found in collected fecal samples and compare insects found in lemur diets to forest resource availability.
To estimate forest resource availability, Amanda's team collected about 15,000 insects during the pilot studies using a combination of pitfall traps and night-lighting methods. These specimens will be used to gain a detailed understanding of the insects that lemurs are targeting for consumption along with completion of biodiversity assessments for each site. Secondarily, these insects will be sent to experts throughout the world for identification and possible diagnosis of new species. Collected specimens will be curated and kept in CVB's SOS Biodiversity Research Center.

Noromalala Elliette, I study the black-and-white ruffed lemur (*Varecia variegata*), one of the primate species under the gravest threat of extinction. While anthropogenic disturbance and habitat loss are the most notable threats that they face, health issues also endanger these lemur populations as well. My research aims to investigate one such health issue; intestinal parasites, and the different factors which might influence their diversity and intensity. This is done by examining the connections (or lack thereof) between parasites and the gut microbiome, the set of genes in the major histocompatibility complex, diet, and social dynamics.

Our methodology involves collecting of fecal samples and recording behavioural and feeding data. Initial analysis suggests that there are at least two parasites, and a number of nematodes, that infect Varecia. One species may be unique to this species, and in collaboration with my advisor Dr Andrea Baden and the infectious disease lab at Auburn University, genetic testing is planned.

My hope is that my research will be a tool for conservation and help to protect this critically-endangered species, while providing a model for future studies examining primate health.



"Conservation efforts are urgent, and research is an important tool to help focus these efforts on the most productive strategies. By understanding biodiversity presures, we can protect these critically endangered species. Thank you to CVB for their conservation programs and support of researchers."

- Noro, PhD student from Antananarivo

Katherine Kling

Katherine, a doctoral candidate at Stony Brook University, will track the movement and behavior of lemurs living outside of RNP to address the following questions:
When, where, and how often do lemurs enter human-influenced environments, like growing fields? What activities do they engage in there? What types of human landscapes do they prefer?

Even human-dominated ecosystems can potentially serve as valuable habitats for Malagasy wildlife if these endangered species can survive in these human-altered habitats. The extent to which lemurs use and move through human-dominated environments is not well known.

Katherine and her team are based 25 kilometers southeast of CVB, working within an intensely-farmed agricultural landscape interspersed with forest fragments in the village of Ambalavero as well as in the neighboring Ambositra-Vondrozo Corridor (COFAV).

Ambalavero's network of 19 forest fragments are spread across a landscape predominantly consisting of rice, cassava, peanuts and other legumes, ginger, sugar cane, and banana fields. Villagers in Ambalavero also habitually walk through fragments and selectively log. Local lemur populations are therefore living with a high degree of human influence.

Katherine's team has done two preliminary studies, most recently in October of 2018. They've determined the presence of at least two diurnal lemur species within these forest fragments and another three within the adjacent forest corridor. Critically, they found several groups of red-bellied lemur (*Eulemur rubriventer*), the project's target species. These lemurs have been found in both disturbed and undisturbed forest but are commonly absent in forest fragments.

Along the railway tracks bordering the COFAV, local people have reported seeing lemurs moving outside of the forest, suggesting that these populations may be able to adapt to anthropogenic challenges. In 2019, Katherine's team will use automated GPS tracking and behavioral observation to understand how lemurs use the overall landscape. As anthropogenic impacts limit how and where animals move, this research is vital for informing conservation policy.

New Butterfly Species

The African Butterfly Research Institute ("ABRI"), headed by Steve Collins, is currently focusing on Madagascan butterflies. There is a paucity of literature and information on this well known group of insects despite years of work.

The current aim is to produce a smartphone app illustrating all 330+ species of Madagascar's butterflies, of which slightly over 70% are endemic. The app will be in English, French, and Malagasy to make information available to the general public, guides, and scientists alike as literature is largely unavailable or too expensive for a wider audience.

There is certainly one species new to science, and more probably three. The most extraordinary coincidence is that at least two of these new species of butterfly were observed breeding on the big leafed bamboo that was so important to the work done 40 years ago by Dr. Patricia Wright and her colleagues on bamboo lemurs.

One of these butterfly species was last observed in the interior of Madagascar 170 years ago, and has not been recognized since.

Another butterfly, never seen in the wild, was reared from eggs and caterpillars in CVB's laboratory. Another butterfly species that evolved to cohabit with arboreal ants in the forest was found in November, and had not been seen for over a century.

ABRI recorded 168 species, or 51% of all Madagascan butterflies, in just two months of 2018. This makes Ranamafana the richest area for butterfly biodiversity in all of Madagascar. Such a small area being so biologically rich in butterflies would suggest that this is likely to be the case for other insect groups.

Cataloging Biodiversity

Marc Hoffman, an undergraduate student from Technische Universität Braunschweig, has been interested in arthropods, especially beetles, his whole life. Due to the great support of Professor Miguel Vences and Dr. Andolalao Rakotoarison (Technische Universität Braunschweig) as well as Dr. Patricia Wright, he spent three "mind-blowing" months (October to January), at CVB.

Within only two months of active collecting, he was able to find almost a thousand species of beetles for CVB's SOS Biodiversity Research Center collections! Mounted specimens have been sorted systematically (by families, subfamilies, and tribes) in wooden insect drawers. Depending on size, the specimens have been preserved either pinned on a stainless insect pin or glued on a carton board and dried using silica gel. They have been given a label containing information on the place, date and circumstances of finding as well as a sequence number, relating to a line in a digital catalogue that can be updated by any researcher adding specimens to Centre ValBio's new collection in future projects. Since identification literature on most insect groups of Madagascar is either non-existing or hard to obtain, identification to species level was only possible in certain rather popular groups.

At this point, it is impossible to estimate the number of Arthropod species that RNP boasts, and thus it is important to host specialists of all sorts that can help to add to CVB's SOS Biodiversity Research Center collection. There are hundreds of groups of Malagasy insects that desperately require experts to collect, revise, and study.

"The most amazing thing about roaming the tropical rainforest for the first time is that here, opposed to the well-researched and documented nature of Europe, you see creatures that you never saw a photo of, read about, or even imagined before!"

- Marc Hoffman, Technische Universität Braunschweig

Workshops & Events

CRS Youth Summit

For one week in August, **six** young conservation clubs attended the second annual youth summit organized by Catholic Relief Services. The training enhanced their general life skills, and also as Conservation Club members. They were able to meet and interact young leaders from Toliara, Morombe, Toamasina, Antananarivo, and Mananjary. Experiences were shared by young professional leaders from Youth First, YMCA, and Observatoire de la Jeunesse. Topics included gender, agriculture, livelihood, youth volunteering, and youth entrepreneurship. Presentations on successful leadership were given by CRS, Orange Madagascar, Adventist Development Relief Services, Centre ValBio, the Malagasy government, and UNICEF. Six individuals earned training certificates. For youth Summit 2017-2018, Additionally, 12 young Conservation Club members obtained certificates of youth volunteering, leadership, and championing change for community.

A Crucible for Planetary Health

This was a research symposium to explore unique opportunities for scientific discovery in the ecozone around RNP. Participants included world class scientists and experts who work on model systems at all scales—systems of organisms, of health care, of environments, of technologies, of big data—and are all applying their expertise in focus to this unique region.

Lepidoptery Conference and Research

A butterfly conference organized by the Lepidopterists Society of Africa was held at the CVB in April 2018. The ABRI contingent decided to focus on Ranomafana even after the other party moved to other locations.

International Primatology Society

In August, lemur research technicians Dina Andrianandoely, Remi Rakotovao, Georges Rene Rakotonirina, and Laurent Ralisoa joined RNP Director Josiane Rakotonirina, and graduate student Noromalala Eliette, in obtaining passports and participating in the 17th Annual International Primatology Society Congress in Nairobi, Kenya. They presented research, and also did exchange visits to Nakuro National Park, Kakamenga Park, Naivasha, and Nairobi Zoo to learn more about conservation.

Seed Dispersal Workshop

Onja Razafindratsima, CVB researcher, organized a Seed Dispersal Workshop in Antsirabe.

PMD PRO Training

Project management training, hosted by PIVOT at Centre ValBio in December 2018.

Academic Training & Capacity Building

Stony Brook at CVB

SBU Undergraduates
This year we successfully completed three SBU Study Abroad programs, with a total of **33 students** participating in the Winter, Summer and Fall programs, our second, ninth and 25th programs respectively!
In January, students participated in the second Winter internship program under the guidance of Tharcisse Ukizintambara and teaching assistants Jessica Zuniga and Franck Rabenahy. Students dedicated themselves to three-week internships on a range of topics.

SBU's five-week Summer program took place between late May and early July. During this session, students were exposed to a range of experiences including the Malagasy language, health, environmental education, ecosystem diversity, and scientific research. The program included lectures, field exercises, and a cross-country trip. Students also designed independent research projects, covering a large spectrum of issues. Project results of these were presented at CVB in Ranomafana and at the American Embassy in Antananarivo.

From September to November, 19 students (17 from the United States and two from Madagascar) participated in the Fall 2018 program. The U.S. students came from a wide range of colleges and universities. The program focused on biodiversity, education, Malagasy culture and language, ecosystem diversity, and human impact.

SBU Medical Students
During June, four medical students worked on testing an app for diagnosis of soil-transmitted helminthiasis, understanding the village perspectives of parasite infections, learning via network analysis how TB is socially transmitted, and learning how household air pollution impacts TB screening and diagnosis.

SBU Dental Students
For the 14th year in a row, Dr. Larry Wynn, along with Dr. Hamil Willoughby, led a group of dental students from Stony Brook University. From June to July, these dental students treated a total of 665 patients at free dental clinics in Ranomafana and Kelilalina for a variety of tooth problems in both young and old patients.

As dental coverage in not currently provided by the state, this mission is vital to the health of the local community.

Other Study Abroads

Every year, groups of students come from around the world come to study at CVB. In 2018, **131 students** from high school and university participated in Study Abroad programs.

University of Florida
CVB was proud to welcome back the University of Florida for a third year in a row for their course on biodiversity and conservation in a developing country. Students worked on a variety of projects including reforestation, health, and lemur research, and they also immersed themselves in traditional local culture.

California University of Pennsylvania
CVB was delighted to host a number of students from California University of Pennsylvania's Madagascar Field School program, led by Dr. Summer Arrigo-Nelson. As well as experiencing local artists and traditional basket weaving, these students worked with various CVB teams including Health and Reforestation. They were also able to experience lectures on biodiversity, speak to active researchers, and participate in night hikes and bird watching to appreciate the full range of local biodiversity. They gained hands-on experience in the latest research techniques used by professional field biologists, natural resource managers, and conservationists.

National Geographic Student Expeditions
For the second year in a row, National Geographic Student Expeditions came to Madagascar. Alicia Lamb, from Clarkson University, and Eamon Callison, from Harvard University, led this year's expedition. They brought 15 students from the United States, Ecuador, Columbia, and China for nearly three weeks of community service work with CVB's Reforestation and Education Teams.

The students learned about agriculture and soil erosion mitigation work in the Ananitehana village, and helped our artist residents paint educational murals in the Androy commune classrooms. The murals were interpretive maps of Madagascar in the primary school and a world map in the secondary school featuring some iconic wildlife from different regions. With limited access to educational materials, these maps will offer a permanent method of teaching and inspiring over 400 children in this commune each year.

Highschool Programs
CVB was also lucky enough to host Putney Student Travel for the first time, and a program from Culture Connect. These students had the opportunity to be immersed in Malagasy culture and gain exposure to high-level science.

"Camping in the rainforest was a fun learning experience, as we learned about the topography of Ranomafana National Park and snippets of the Malagasy language and culture. We were able to fully immerse ourselves in the wildlife, which provided us with a deeper understanding of the ecosystem. We learned a lot about the long-term goals of these research projects and how fieldwork plays a vital part in the overall future conservation of these animals." — *Libby & Emily*

Volunteers and Interns

Luciana Paz (University of Tampa) completed a journalism internship by following the Education and Health Teams to collect visual and written content for videos and blog posts.

Olly Dove (Imperial College London): After her master's degree fieldwork in Andavadoaka Toliara, Olly came to CVB to join our Research Team and conducted a biodiversity survey in the Amboasary fragmented forest.

During July and August, CVB had the pleasure of hosting three high school interns from the U.S.A. Libby Scaperotta, Emily Welch, and Alex Rogers. They helped the Reforestation Team and followed the Propithecus Team to investigate the bacteria and viruses in sifaka guts via fecal samples. They also aided the Botanical Team in the collection of data on imperiled *Calophyllum* trees. Then they shadowed red-bellied lemurs along with Mariah Donahue (University of Kentucky) and Amanda Rowe (SBU). While following Mariah's team, they had the opportunity to gather fecal samples and behavioural data from red-bellied lemurs. Later, they collected insects from pitfall traps and set mouse lemur traps with Amanda.

Training in Mauritius

Laza Claude Ralazampirenena, TEAM leader, was selected to go to Mauritius for Durrell Institute in Conservation and Environment workshops in biodiversity training.

FIMARA

CVB worked closely with the FIMARA members (Ampanjaka healers) throughout the year to plan, train, and collaborate on improving medicinal plant production in the Ranomafana region. **1,800** lemongrass bunches were planted this year, with lemongrass oil extraction anticipated in 2019.

All FIMARA members were trained in how to grow lemongrass on their own land to increase crops and therefore income, with the grower in charge of finding customers. Renovations of the storage space for medicinal plants took place in April & May. **Two** rooms were built, one to store raw plants until dried and the other to keep the plants before extracting oil. Nearly **300** m² of lemongrass was planted in 3 months. September was a productive month of collecting and drying medicinal plants, including voasary gasy, to sell in the green pharmacy. The oils were packaged for sale, and labels, business cards, and brochures were produced. CVB staff traveled to Antananarivo to negotiate with Homeopharma, who agreed to collaborate as an authorized distributor. We started selling essential oils at the CVB Eco-shop as well.

Sunshine Comes First

Susan Cummings-Findel visited again and worked closely with Alain Rasolo to illustrate and design marketing material for Fidi Fidelis, the legendary Kelilalina wood carver. Susan also monitored her entrepreneur projects.

Famiova

Famiova's scarves are one of CVB's most popular souvenir items at the Eco-shop. This past year, CVB helped renovate the shop roof and paint the walls. In July, we did a silkworm farming workshop in Ambositra. In December, we started the construction of a room for silkworm farming.

Madaworks

In December, **five** girls were selected for the 2018 scholarship awards: Ramana (Ambalakindresy), Rasoanambinina Mamitina Isabelle Ysabelle (Kelilalina), Rasoanirina Lucia (Kelilalina), Rasoanambinina Marie Bernadette (Ranomafana), and Hanta Tahinasoa Marie Christine (Ranomafana).

Spreading the Word

Centre ValBio, with Dr. Patricia Wright at its helm, continues to draw international attention and acclaim for its dedication to conservation, community, and innovation.

CVB Media Coverage

- Science Advances published elephant bird discovery in *Early Holocene human presence in Madagascar evidenced by exploitation of avian megafauna*, reshaping the history of humans in Madagascar
- CBS filmed a segment on lemurs and climate change in November. *The Last of the Lemurs* aired in January 2019 on World News
- The BBC stayed at CVB in November to film a segment on the hunting behavior of pelican spiders which will air in 2019
- RNP was featured on the Conversationist site as part of their article, *Madagascar: fear and violence making rainforest conservation more challenging than ever*

Dr. Wright - Awards and Speaking Engagements

- President's Distinguished Alumni Medal, City University of New York
- Named *Natural World Hero*, by Natural World Safaris

- Invited speaker, *The Lost Rainforest of Crystal Mountain, Madagascar*, South Fork Natural History Museum & Nature Center, NY
- Invited participant, workshop: *Developing Off-Grid Instrumentation for Biological Field Stations: What Does the World Need?* Stanford University, CA
- Invited speaker, Human Biology and Global Health Institute, Stanford University, CA
- Scientific expert, *The Burning Season*, a film directed by Claire McCarthy, starring Naomi Watts
- Invited speaker, The Explorers Club, NY
- Invited speaker, Environmental Science Speaker Series, Indiana University, IN
- Invited speaker, Conservation Leadership Lecture Series at Palm Beach Zoo & Conservation Society, FL
- Finalist, St Andrews Prize for the Environment, Scotland

Social Media Outreach

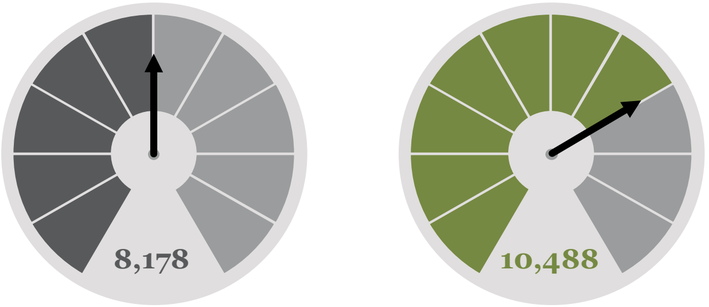
Social media can serve as a tool to heighten awareness for good causes. Over the past year it has enabled CVB to forge new relationships, reconnect with long-term followers, and share progress on current projects in wildlife conservation, biodiversity research, health, and education.

In July, Jessie Jordan took over the management of CVB's social media platforms (Facebook, Instagram, and Twitter). Subsequently, CVB's Facebook page reached over 10,000 followers and our Instagram followers doubled. Department updates, "bio facts", group visits, ongoing projects, and other events held by Centre ValBio were all shared with CVB's ever-growing online audience in 2018.

Facebook statistics illustrate that regular post updates resulted in increased awareness amongst thousands more people in the United States, Madagascar, and around the world. This is an excellent opportunity to spread CVB's message to a global audience.

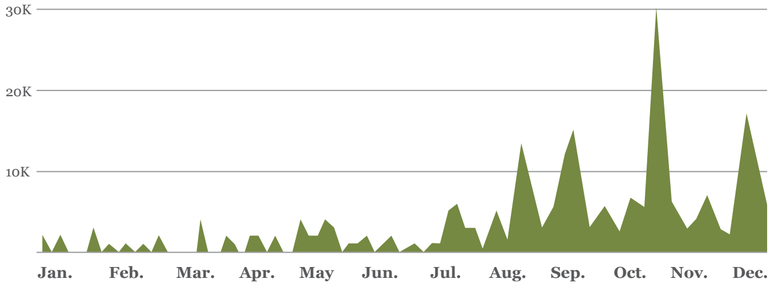
In 2019, we hope to include more calls to action through innovative and user-friendly donation campaigns. Our goal is to increase followers and audience engagement.

Facebook Followers 2018



1st January — 31st December

Centre ValBio Facebook Post Engagement 2018



SOS Biodiversity Research Center - Opening 2019

Looking Ahead

Next year will be a dynamic year, as we finalize and implement a five year plan to safeguard CVB's future.

Living Library

Despite being one of Madagascar's most visited national parks, Ranomafana hasn't yet been showcased by any dedicated books. To remedy this, Dr. Wright and wildlife photographer Chien Lee have combined their efforts to produce the first ever photographic book on Ranomafana National Park. The aim of this publication, which is scheduled for release at the end of 2019, is to showcase the park's amazing biodiversity through photography, highlighting its importance for the conservation of endemic species as well as the park's value as a center for biological research and sustainable ecotourism.

Biologist turned wildlife photographer, Chien Lee has been based on the island of Borneo for the past 23 years where he has worked on a multitude of nature books and field guides, and now spends several months every year in Madagascar. Regarding his work on this project, he remarks that "Ranomafana is like a dream-come-true for the nature photographer - it has everything from charismatic lemurs to colorful frogs and amazing forest scenery." With this in mind, his primary objective is to capture images that reveal the hidden side of Ranomafana's rainforest: aspects of the park's incredible biodiversity that often remain unseen by the more casual visitor.

Sustainable Funding

CVB hopes to be a model of innovation and an inspiration for future generations.
In August 2018, Katie Slivovsky from the Chicago Children's Museum and Daniella Rabino (PhD candidate, University of Sussex) conducted three weeks of workshops with CVB's Education and Environmental Art Teams to develop three complimentary educational spaces in Ranomafana.

These spaces include CVB's new SOS Education Center, Ranomafana's Nature Center, and Kianja Maitso. While CVB's SOS Education Center primarily focuses on performances and lectures, the Nature Center offers a space for children to playfully explore the natural world. The building is nearly complete, but still needs funding to finish construction and purchase the educational supplies that will transform it into a dynamic and exciting space for learning.

Historically, Kianja Mainsto, in collabortion with local authorities and MNP, has served as an outdoor model village in the town center of Ranomafana where adults and children can actively explore examples of healthy, sustainable living. Sadly, much of the park was destroyed during recent cyclones, so funding and repairs are needed to restore the park.

Thank you to Katie and Daniella for bringing CVB's staff together and orchestrating a well thought out plan for these three spaces.

Publications

Aivelo, T, Norberg, A. Parasite–microbiota interactions potentially affect intestinal communities in wild mammals. J Anim Ecol. % 2018; 87: 438– 447. DOI:10.1111/1365-2656.12708

Aivelo, T., Harris, K.M., Cadle, J.E., & Wright, P. (2018). Exploring non-invasive sampling of parasites by metabarcoding gastrointestinal nematodes in Madagascar frog species. Basic & applied herpetology, Volume 32, Pages 29-40, DOI:10.11160/bah.92

Aivelo, Tuomas & Medlar, Alan & Löytynoja, Ari & Laakkonen, Juha & Jernvall, Jukka. (2018). Metabarcoding Gastrointestinal Nematodes in Sympatric Endemic and Non-endemic Species in Ranomafana National Park, Madagascar. International Journal of Primatology. DOI:10.1007/s10764-017-0010-x

Altizer, Sonia, Daniel J. Becker, Jonathan H. Epstein, Kristian M. Forbes, Thomas R. Gillespie, Richard J. Hall, Dana M. Hawley, Sonia M. Hernandez, Lynn B. Martin, Raina K. Plowright, Dara A. Satterfield, and Daniel G. Streicker. Food for contagion: synthesis and future directions for studying host–parasite responses to resource shifts in anthropogenic environments. 373. Philosophical Transactions of the Royal Society B: Biological Sciences DOI:10.1098/rstb.2017.0102

Amato, K.R., Sanders, J.G., Song, S.J., Nute, M., Metcalf, J.L., Thompson, L.R., Morton, J.T., Amir, A., McKenzie, V.J., Humphrey, G.M., Gogul, G., Gaffney, J., Baden, A.L., Britton, G.A., Cuozzo, F.P., Fiore, A.D., Dominy, N.J., Goldberg, T.L., Gómez, A.F., Kowalewski, M.M., Lewis, R.J., Link, A., Sauther, M.L., Tecot, S.R., White, B.A., Nelson, K.E., Stumpf, R., Knight, R., & Leigh, S.R. (2018). Evolutionary trends in host physiology outweigh dietary niche in structuring primate gut microbiomes. The ISME Journal, 1-12. DOI:10.1038/s41396-018-0175-0

Asangba A, Donohue ME, Lamb A, Wright PC, Leigh SR, Stumpf RM. Variations in the microbiome storage method are not large enough to obscure variations due to factors such as community, species, body site, and captivity. American Journal of Primatology

Baden AL, Mancini AN, Federman SF, Holmes SM, Johnson SE, Kamilar JM, Louis EE Jr, Bradley BJ. Anthropogenic pressures explain population genetic structure in a Critically Endangered moist forest specialist, *Varecia variegata*. Nature Scientific Reports.

Baden AL. 2019. A description of nesting behaviors, including factors impacting nest site selection, in black-and-white ruffed lemurs (*Varecia variegata*). Ecology and evolution, ISSN: 2045-7758, Vol: 9, Issue: 3, Page: 1010-1028, DOI:10.1002/ece3.4735

Beaudrot, Lydia, Miguel Acevedo, Jean-Philippe Lessard, Douglas Sheil, Eileen Larney, Patricia Wright, Jorge Ahumada, Distributional shifts in a biodiversity hotspot, Biological Conservation, Volume 228, 2018, Pages 252-258, ISSN 0006-3207, DOI:10.1016/j.biocon.2018.10.016

Beeby N, Baden AL. Feeding ecology of black-and-white ruffed lemurs in Ranomafana National Park, southeastern Madagascar. American Journal of Primatology, DOI:10.1159/000156842

Beidokhti, M.N., E.S. Lobbens, P. Rasoavaivo, D. Staerk, A.K. Jäger, Investigation of medicinal plants from Madagascar against DPP-IV linked to type 2 diabetes, South African Journal of Botany, Volume 115, 2018, Pages 113-119, ISSN 0254-6299, DOI:10.1016/j.sajb.2018.01.018

Bellati A, Scherz MD, Megson S, Hyde Roberts S, Andreone F, Rosa GM, Noël J, Randrianirina JE, Fasola M, Glaw F, Crottini A (2018), Resurrection and re-description of *Plethodontohyla laevis* (Boettger, 1913) and transfer of *Rhombophryne alluaudi* (Mocquard, 1901) to the genus *Plethodontohyla* (Amphibia, Microhylidae, Cophylinae). Zoosystematics and Evolution 94(1): 109-135. DOI:10.3897/zse.94.14698

Dunham, A. E., Razafindratsima, O. H., Rakotonirina, P. and Wright, P. C. (2018), Fruiting phenology is linked to rainfall variability in a tropical rain forest. Biotropica, 50: 396-404. DOI:10.1111/btp.12564

Erhart, E.M., Tecot, S.R., & Grassi, C. (2018). Interannual Variation in Diet, Dietary Diversity, and Dietary Overlap in Three Sympatric Strepsirrhine Species in Southeastern Madagascar. International Journal of Primatology, 39, 289-311, DOI:10.1007/s10764-018-0040-z

Faust C, McCallum HI, Bloomfield L, Gottdenker, Gillespie TR, Torney CJ, Dobson AP, Plowright R. 2018. Pathogen spillover during land conversion. Ecology Letters. 21:471-483.

Fernández-Llamazares, Á. and Cabeza, M. (2018), Rediscovering the Potential of Indigenous Storytelling for Conservation Practice. Conservation Letters, 11: e12398. DOI:10.1111/conl.12398

Garchitorena A, Miller AC, Cordier LF, et al, Early changes in intervention coverage and mortality rates following the implementation of an integrated health system intervention in Madagascar, BMJ Global

Health, 2018;3:e000762, DOI:10.1136/bmjgh-2018-000762.

Gardner, C., & Jasper, L. (2018). Miscellaneous behavioural observations of Malagasy birds. Madagascar Conservation & Development, 13(1), 70-74. DOI:10.4314/mcd.v13i1.8

Giordano RC, Rist CL, Parsons MB, Ramananjato R, Wright PC, Bliska JB, Bonds M, Gillespie TR. 2018. Behavioral and socio-economic risk factors of pathogenic enterobacteria infection and antibiotic resistance in Ranomafana commune, Madagascar. Emerging Infectious Diseases.

Hansford, J., P. C. Wright, A. Rasoamiaramanana, V. R. Pérez, L. R. Godfrey, D. Errickson, T. Thompson, S. T. Turvey, Early Holocene human presence in Madagascar evidenced by exploitation of avian megafauna. Sci. Adv. 4, eaat6925 (2018), DOI:10.1126/sciadv.aat6925

Herrera, James P, Cortni Borgerson, Lydia Tongasoa, Pascal Andriamahazoarivosoa, B. J. Rodolph Rasolofoniaina, Eli R. Rakotondrafarasata, J. L. Rado Ravoavy Randrianasolo, Steig E. Johnson, Patricia C. Wright, Christopher D. Golden. Estimating the population size of lemurs based on their mutualistic food trees. J Biogeogr. 2018;45:2546–2563. DOI:10.1111/jbi.13409

Hutter, Carl R., Shea M. Lambert, Zo F. Andriampenomanana, Frank Glaw, Miguel Vences, Molecular phylogeny and diversification of Malagasy bright-eyed tree frogs (Mantellidae: Boophis), Molecular Phylogenetics and Evolution, Volume 127, 2018, Pages 568-578, ISSN 1055-7903, DOI:10.1016/j.ympev.2018.05.027

Hutter, Carl Richard, Zo F. Andriampenomanana, Jary H. Razafindraibe, Dr. Andolalao Rakotoarison & Mark D. Scherz (2018) New dietary data from Compsophis and Alluaudina species (Squamata: Lamprophiidae: Pseudoxyrhophiinae), and implications for their dietary complexity and evolution, Journal of Natural History, 52:39-40, 2497-2510, DOI:10.1080/00222933.2018.1543732

Jacobs, Rachel & C. Frankel, David & J. Rice, Riley & J. Kiefer, Vera & Bradley, Brenda. (2018). Parentage complexity in socially monogamous lemurs (*Eulemur rubriventer*): Integrating genetic and observational data. American Journal of Primatology. 80. e22738. DOI:10.1002/ajp.22738

Kalúz, Stanislav & Starý, Josef. (2018). Two new species of the family Cunaxidae (Acari: Prostigmata) from Madagascar. Zootaxa. 4378. 549. DOI:10.11646/zootaxa.4378.4.6.

Kling K. and Wright P. 2018. “Conservation, Primates.” The International Encyclopedia of Biological Anthropology, Wenda Trevathan (ed). John Wiley and Sons, Inc.

Landman, Willem, Olivier Verneau, Louis Du Preez, First record of viviparity in polystomatid flatworms (Monogenea: Polystomatidae) with the description of two new species of Madapolystoma from the Madagascan anuran hosts Blommersia domerguei and Mantella expectata, International Journal for Parasitology: Parasites and Wildlife, Volume 7, Issue 3, 2018, Pages 343-354, ISSN 2213-2244, DOI:10.1016/j.ijppaw.2018.09.004

Liu, S-P, Wipfler, B, Beutel, RG. The unique locomotor apparatus of whirligig beetles of the tribe Orectochilini (*Gyrinidae, Coleoptera*). J Zool Syst Evol Res. 2018; 56: 196–208. DOI:10.1111/jzs.12195

McCuskee, Sarah, Andres Garchitorena, Ann C. Miller, Lara Hall, Mohammed Ali Ouenzar, Victor R. Rabeza, Ranto H. Ramananjato, Hery-Tiana Rahaniraka Razanadrakato, Marius Randriamanambintsoa, Michele Barry & Matthew H. Bonds (2018) Child malnutrition in Ifanadiana district, Madagascar: associated factors and timing of growth faltering ahead of a health system strengthening intervention, Global Health Action, 11:1, 1452357, DOI:10.1080/16549716.2018.1452357

Mengual X, Ståhls G, Laska P, Mazanek L, Rojo S., Molecular phylogenetics of the predatory lineage of flower flies *Eupeodes-Scaeva* (Diptera: Syrphidae), with the description of the Neotropical genus *Austroscaeva gen.* nov.. J Zool Syst Evol Res. 2018;56:148–169. DOI:10.1111/jzs.12212

Nevo O, Valenta K, Razafimandimby D, Melin AD, Ayasse M, Chapman CA. 2018 Frugivores and the evolution of fruit colour. Biol. Lett. 14: 20180377. DOI:10.1098/rsbl.2018.0377

Nevo, O., D. Razafimandimby, J. A. J. Jeffrey, S. Schulz, M. Ayasse, Fruit scent as an evolved signal to primate seed dispersal. Sci. Adv. 4, eaat4871 (2018). DOI:10.1126/sciadv.aat4871

Nouvet, Elysée, Astrid M Knoblauch, Ian Passe, Andry Andriamiadanarivo, Manualdo Ravelona, Faniry Ainanomena Ramtariharisoa, Kimmerling Razafimdriana, Patricia C Wright, Jesse McKinney, Peter M Small, Niaina Rakotosamimanana, Simon Grandjean Lapierre, Perceptions of drones, digital adherence monitoring technologies and educational videos for tuberculosis control in remote Madagascar: a mixed-method study protocol BMJ Open 2019;9:e028073. DOI:10.1136/bmjopen-2018-028073

Prötzel, David, Miguel Vences, Oliver Hawlitschek, Mark D Scherz, Fanomezana M Ratsoavina, Frank Glaw, Endangered beauties: micro-CT cranial osteology, molecular genetics and external morphology reveal three new species of chameleons in the *Calumma boettgeri* complex (Squamata: Chamaeleonidae), Zoological Journal of the Linnean Society, Volume 184, Issue 2, October 2018, Pages 471–498, DOI:10.1093/zoolinnean/zlx112

Ragazzo, L.J.; Zohdy, S.; Velonabison, M.; Herrera, J.; Wright, P.C.; Gillespie, T.R., *Entamoeba histolytica* infection in wild lemurs associated with proximity to humans, Veterinary Parasitology 249: 98-101, 2017, Https://eurekamag.com/research/061/964/061964424.php

Ramamonjisoa N, Natuhara Y. Contrasting effects of functionally distinct tadpole species on nutrient cycling and litter breakdown in a tropical rainforest stream. Freshwater Biol. 2018;63:202–213. DOI:10.1111/fwb.13053

Raulo A, Ruokolainen L, Lane A, Amato K, Knight R, Leigh S, Stumpf R, White B, Nelson KE, Baden AL, Tecot SR, Social behaviour and gut microbiota in red-bellied lemurs (*Eulemur rubriventer*): In search of the role of immunity in the evolution of sociality. J Anim Ecol. 2018;87:388–399. DOI:10.1111/1365-2656.12781

Razafindratsima, Onja & Gentles, Anecia & Drager, Andrea & Razafimahaimodison, Jean-Claude & Ralazampirenena, Claude & Dunham, Amy. (2018). Consequences of Lemur Loss for Above-Ground Carbon Stocks in a Malagasy Rainforest. International Journal of Primatology. DOI:10.1007/s10764-018-0042-x.

Safidindray, Daniel Sendranirina, Anne Wadouachi, Amélie Raharisololalao, and Léa Herilala Rasoanaivo, A new iridolactone from *Bremeria erectiloba* Wernham (Rubiaceae), International Journal of Chemical Studies 2018; 6(5): 78-80

Scheffers, Brett & Williams, Stephen. (2018). Tropical mountain passes are out of reach - but not for arboreal species. Frontiers in Ecology and the Environment. 16. DOI:10.1002/fee.1764

Schnell IB, Bohmann K, Schultze SE, et al. Debugging diversity – a pan-continental exploration of the potential of terrestrial blood-feeding leeches as a vertebrate monitoring tool. Mol Ecol Resour. 2018;18:1282–1298. DOI:10.1111/1755-0998.12912

Tecot SR, Baden AL. 2018. Profiling caregivers: hormonal variation underlying allomaternal care in wild red-bellied lemurs. Physiology and Behavior 193: 135–148. DOI:10.1016/j.physbeh.2017.12.007

Travis DA, Shaffer CA, Robertson C, Kennedy S, Gillespie TR, Concertino M, Alpern JD, Stauffer W. 2018. Biodiversity and Health. In: Beyond One Health: From Recognition to Results. John A. Herrmann and Yvette Johnson-Walker (eds). Wiley, Hoboken.

Umanets, Alaxander, Iris de Winter, Freek IJdema, Javier Ramiro-Garcia, Pim van Hooft, Ignas M A Heitkönig, Herbert H T Prins, Hauke Smidt, Occupancy strongly influences faecal microbial composition of wild lemurs, FEMS Microbiology Ecology, Volume 94, Issue 3, March 2018, fiy017, DOI:10.1093/femsec/fiy017

Vagell, Raymond & J. Vagell, Vance & Baden, Andrea. (2015). SMARTA: Subject-Mediated Automatic Remote Testing Apparatus For Color Vision Discrimination Tasks. DOI:10.3758/s13428-018-1113-9

Valenta, Kim & Kalbitzer, Urs & Razafimandimby, Diary & Omeja, Patrick & Ayasse, Manfred & Chapman, Colin & Nevo, Omer. (2018). The evolution of fruit colour: phylogeny, abiotic factors and the role of mutualists. Scientific Reports. 8. DOI:10.1038/s41598-018-32604-x

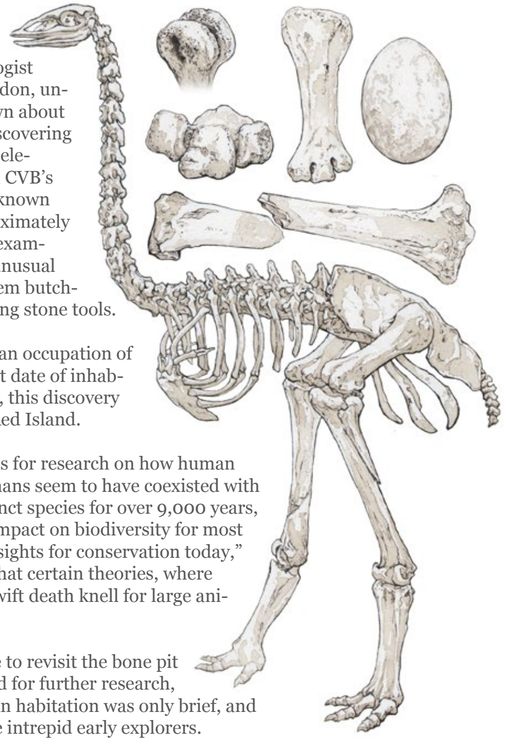
Veron, Géraldine, Délia Dupré, Mia-Lana Lührs, Peter M. Kappeler, Luke Dollar, Julie Pomerantz, Steven M. Goodman, Genetic polymorphism and structure of wild and zoo populations of the fosa (Eupleridae, Carnivora), the largest living carnivoran of Madagascar, Mammalian Biology, Volume 92, 2018,Pages 68-77, ISSN 1616-5047, DOI:10.1016/j.mambio.2018.04.007

Winter, Iris de, Sebastiaan van der Hoek, Jeroen Schütt, Ignas M.A. Heitkönig, Pim van Hooft, Gerrit Gort, Herbert H.T. Prins, Frank Sterck, Anthropogenic disturbance effects remain visible in forest structure, but not in lemur abundances, Biological Conservation, Volume 225, 2018, Pages 106-116, ISSN 0006-3207, DOI:10.1016/j.biocon.2018.03.021

Wood HM, Scharff N (2018) A review of the Madagascan pelican spiders of the genera *Eriauchenius* O. Pickard-Cambridge, 1881 and *Madagascarchaea* gen. n. (Araneae, Archaeidae). ZooKeys 727: 1–96. DOI:10.3897/zookeys.727.20222

Zablocki Thomas, P. B., Karanewsky, C. J., Pendleton, J. L., Aujard, F. , Pouydebat, E. and Herrel, A. (2018), Drivers of in vivo bite performance in wild brown mouse lemurs and a comparison with the grey mouse lemur. J Zool, 305: 180-187. DOI:10.1111/jzo.12550

Elephant Bird Publication



Two years ago, Dr. Wright and Dr. James Hansford, a palaeontologist from the Zoological Society of London, unintentionally rewrote what is known about the history of Madagascar after discovering unusual markings on the bones of elephant bird sub-fossils displayed in CVB's reception area. These bones were known through carbon dating to be approximately 10,500 years old, and after closer examination it was confirmed that the unusual markings were actually post-mortem butchery cutmarks made by humans using stone tools.

As previous estimates for the human occupation of Madagascar had placed the earliest date of inhabitation at perhaps 4,000 years ago, this discovery radically alters the history of the Red Island.

The discovery also has implications for research on how human contact impacts megafauna. "Humans seem to have coexisted with elephant birds and other now-extinct species for over 9,000 years, apparently with limited negative impact on biodiversity for most of this period, which offers new insights for conservation today," says Dr. Hansford. This suggests that certain theories, where human interaction was always a swift death knell for large animals, may need to be revisited.

Dr. Hansford and Dr. Wright hope to revisit the bone pit where the remains were discovered for further research, including determining if the human habitation was only brief, and discovering the tools used by these intrepid early explorers.

Fundraising Events

SPiN

On October 21st, SPIN New York hosted "Tonga Soa!", an event to raise awareness and funds in support of UNICEF USA and Malagasy organizations Centre ValBio and Zara Aina.

The fun and family-friendly event featured endless ping pong, food, and creative mocktails. The hosts, Susan Cummings-Findel and SPiN co-founder Franck Raharinosy, did an amazing job of combining protecting Madagascar with a great atmosphere!

Save the Lemurs NYC Gala

Eric Trepanier and Dr. Patricia Wright co-hosted CVB's first ever Save the Lemurs NYC Gala at The Explorers Club. We were honoured to welcome Stony Brook University President Samuel L. Stanley, who gave the opening address, along with special guest Dr. Claude Arsène Ratsimbasoa, General Secretary of the Madagascar Ministry of Public Health, and two other guests from Madagascar, Diana Ratsiambakaina and Nicole Manavany.

Over $130,000 was raised for lemur conservation through ticket sales and auction items.

The auction was a great success, with board member Robin Herrnstein winning the opportunity to name a new species of leech and board member Noel Rowe purchasing the opportunity to name a new macrophage (a virus that eats bacteria). Auction items were donated by (amongst others) Madacasse chocolate, Ny'Ala Skin Care, Mr. Recipe's spice basket, and Madaworks. Board member Steig Johnson very kindly funded graduate student tickets to the event. CVB would like to give a huge thank you to Eric Trepanier and Hodan Hassan for making the Save the Lemurs NYC Gala possible at The Explorers Club, and hope this can become an annual event.

2018 Donor Acknowledgments

We are extremely grateful and wish to acknowledge everyone who supported Centre ValBio's work in 2018.

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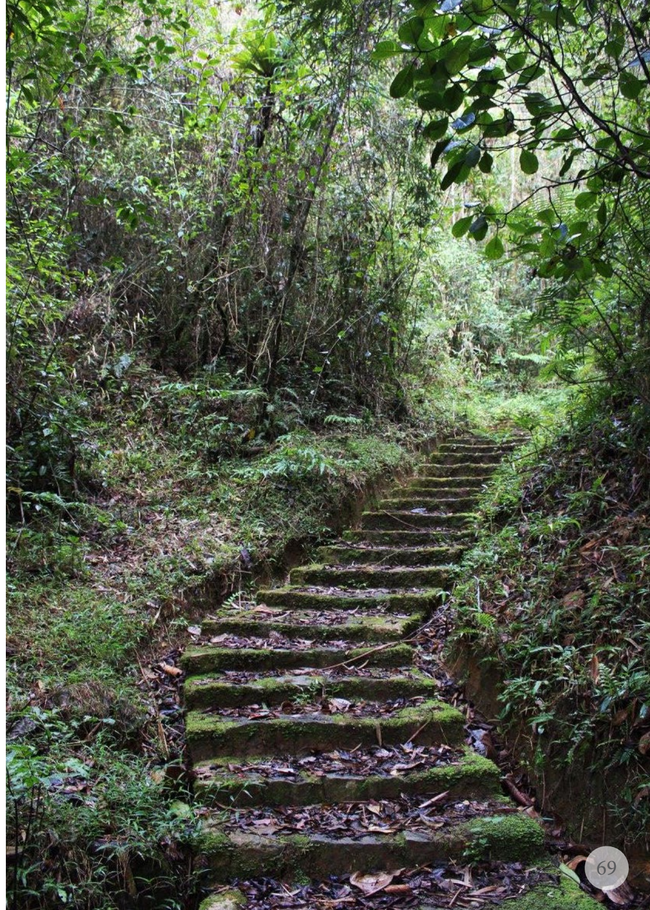

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