



FIELD STATION PROFILES

CENTRE VALBIO RESEARCH STATION: INTERNATIONAL CENTRE FOR THE VALORIZATION OF BIODIVERSITY

Ryan S. Rothman^{1,2*}, Katherine J. Kling^{1,2}, Laza H. Andrianandrianina³, Dina Andrianoely³, Pascal Rabeson³, Paul Rakotonirina³, Jean de Dieu Ramanantsoa³, Desire Randrianarista³, Justin Solo³, Michael Docherty³, Jean Claude Razafimahaimodison³, and Patricia C. Wright²⁻⁴

¹Interdepartmental Doctoral Program in Anthropological Sciences, Stony Brook University, Stony Brook, New York, 11794

²Institute for the Conservation of Tropical Environments, Stony Brook University, Stony Brook, New York, 11794

³Centre ValBio Research Station, BP 33 Ranomafana, Ifanadiana 312, Madagascar

⁴Department of Anthropology, Stony Brook University, Stony Brook, New York, 11794

* **Corresponding Author:** ryan.rothman@stonybrook.edu

NAME OF FIELD STATION

International Centre for the Valorization of Biodiversity
(Centre International pour la Valorisation de la Biodiversité
– Shortened to “Centre ValBio” or “CVB”)

GEOGRAPHIC LOCATION

- Madagascar, Region of Vatovavy, District of Ifanadiana, Commune of Ranomafana
- Lat. -21.25° S, Long. 47.42° E; 751303.44 Easting, 7647805.15 Northing, UTM Zone 38K

HABITAT

Centre ValBio (CVB) maintains a state-of-the-art research station, located adjacent to Ranomafana National Park (RNP) in southeastern Madagascar (see Figure 1). The main goal of CVB is to encourage and promote scientific research, training, and conservation. The landscape is dominated by submontane rainforest, which receives a mean annual rainfall of 3,635 mm. The rainy season is from November through March, with August, September, and October typically receiving the least rainfall. Many white-water streams and rivers flow through the park from the highlands of the west to the lowlands of the east. Notably, the Namorona River and a parallel paved road (Route 25) bisect the park into northern and southern parcels, with a third parcel on the western boundary to the north. The park's highest mean elevation is located at its western side (approx.

1,700 m) and lowest at its southeastern border at around 600 m. Its highest mountain peak, Mount Ambohimaneva (1,775 m), lies to the northeast. The soils within the park are mainly oxisols with a high red clay component.

Ranomafana National Park was subject to extensive historic logging from 1986 to 1989, when logging concessions for valuable hardwood trees were issued by the Malagasy government. In 1991, approximately 41,601 hectares of the cloud rainforest were designated as a national park (Wright et al. 2002). Patricia Wright, then at Duke University, spearheaded the initial park project, an Integrated Conservation and Development Project (ICDP) conducted simultaneously with research on lemurs and other aspects of biodiversity. Management of the park transitioned to Stony Brook University (SBU) when Wright moved to SBU in 1991. While retaining management of research in RNP, SBU handed over park management in 1998 to Madagascar's national park system: The Association Nationale de Gestion des Aires Protégées (ANGAP), or the National Association for the Management of Protected Areas. In 2009, ANGAP became Madagascar National Parks (MNP). In 2007 Ranomafana became one of seven of Madagascar's rainforest national parks to be named a UNESCO World Heritage Site.

Ranomafana National Park is one of the densest rainforests of Madagascar. Its biodiversity ranks among the highest of Madagascar's national parks (see Figure 2), housing a relatively large number of lemur, chameleon, and frog species, many of which are threatened with extinction. The unique and high diversity of plants, orchids, tree ferns,



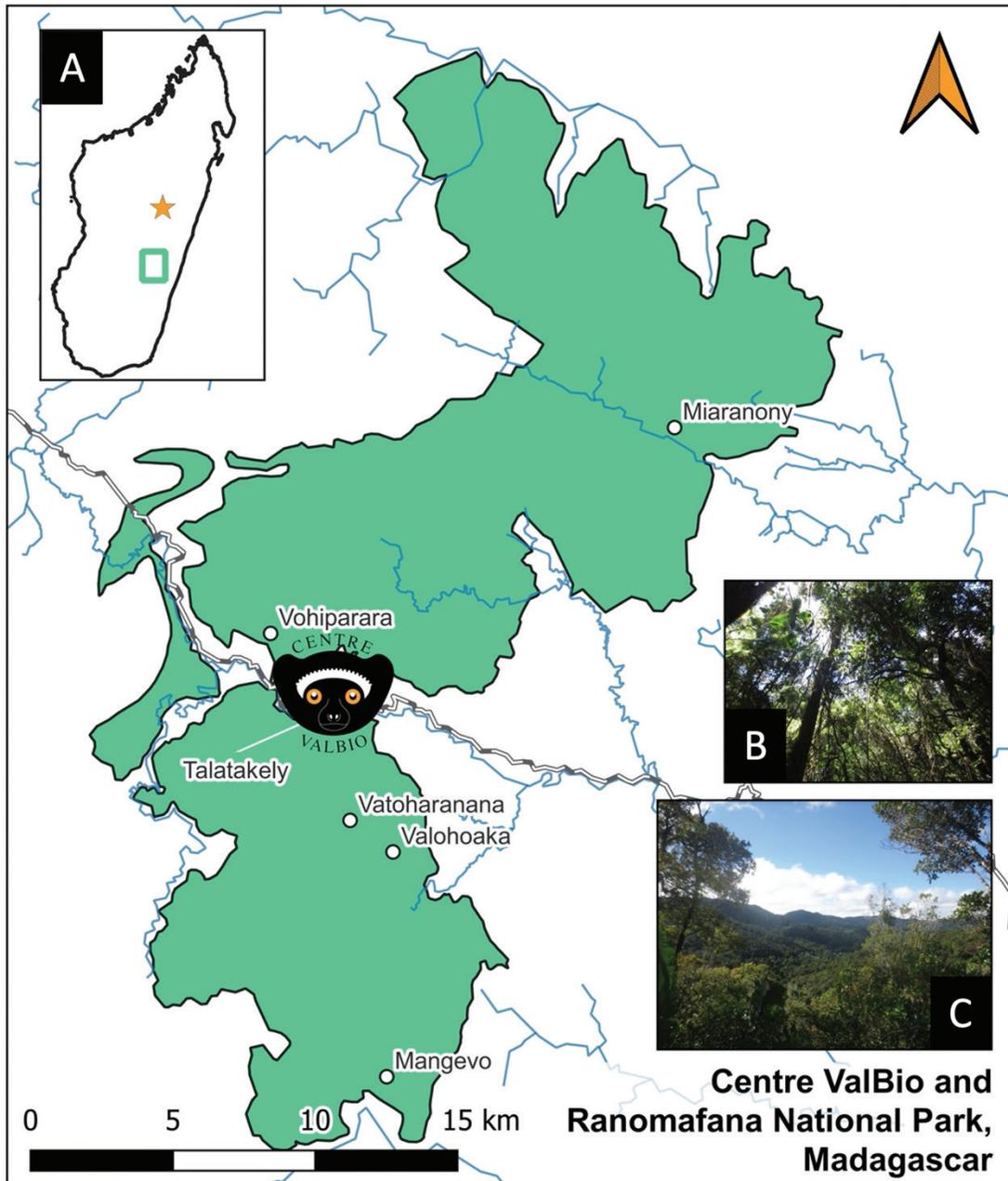


Figure 1: Map of the 41,600-hectare Ranomafana National Park (RNP). The location of Centre ValBio Research Station (CVB) is marked with the centre's logo, and the research trail-system locations are marked with white dots on the map. **A)** The insert map of Madagascar shows the relative location of RNP as well as the location of the capital Antananarivo marked with an orange star. **B)** Forest canopy cover from the undisturbed primary rainforest of Valohoaka. **C)** Landscape depicting the lightly-logged Talatakely site. Photographs (B, C) ©Ryan Rothman

palms, moss, and giant bamboos attract numerous tourists and scientists to the area. CVB hosts hundreds of researchers, students, and eco-tourists each year, where they learn about and still continue to discover new species.

RNP has a park office in the town of Ranomafana (population: 9,705 as of 2018). The region surrounding RNP

includes 130 small villages (each village approx. 200 inhabitants) and a population of nearly 10,000 rural farmers. Primary agricultural products from this region are bananas, rice, beans, and cassava. This region is inhabited by two Malagasy ethnic groups, the Betsileo and Tanala, the latter so-named as “people of the forest.” Among RNP’s main

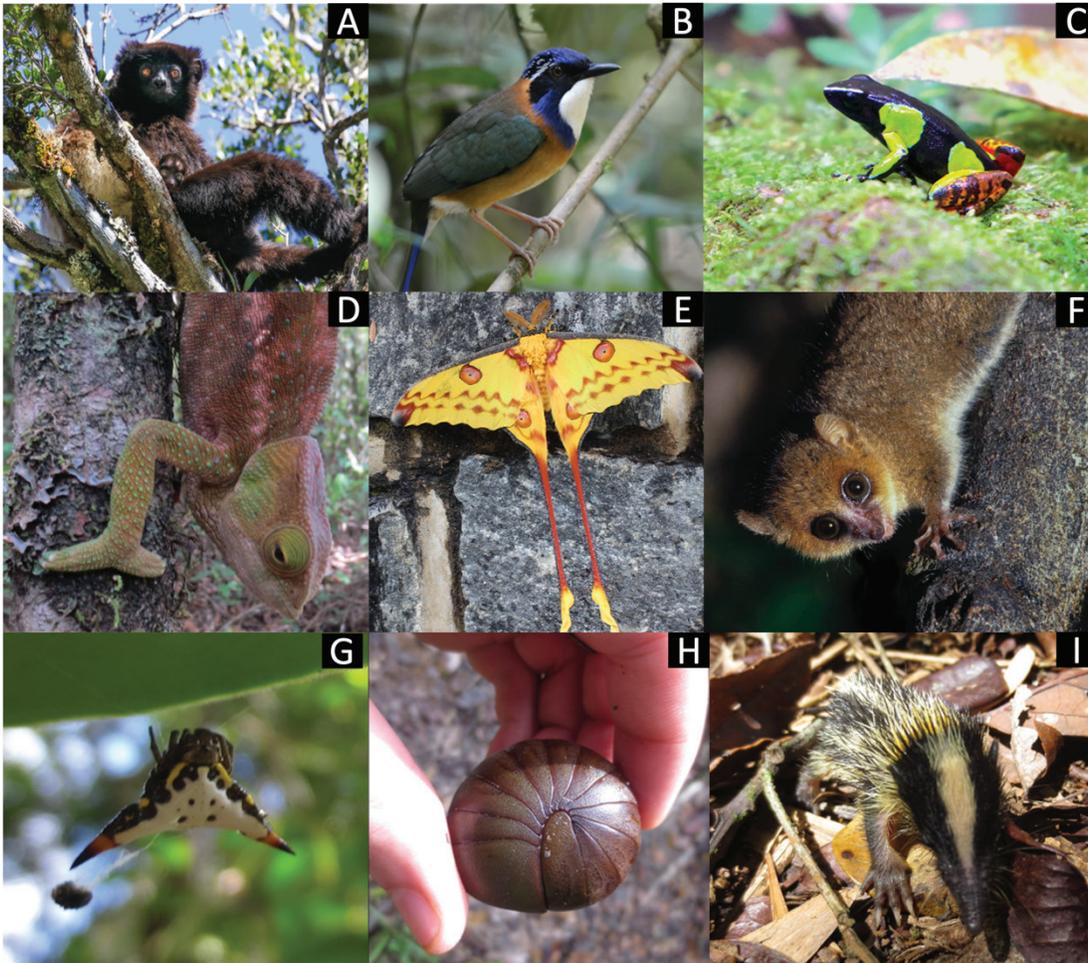


Figure 2: An example of the faunal diversity that can be found in the rainforest of Ranomafana National Park. **A)** Milne-Edwards sifaka (*Propithecus edwardsi*), **B)** pitta-like ground roller (*Atelornis pittoides*), **C)** Malagasy painted mantella (*Mantella madagascariensis*), **D)** O'Shaughnessy's chameleon (*Calumma oshaughnessyi*), **E)** comet moth (*Argema mittrei*), **F)** brown mouse lemur (*Microcebus rufus*), **G)** spiny kite orb-weaver (*Acrosomoides acrosomoides*), **H)** Vatovavy giant pill millipede (*Sphaeromimus vatovavy*), **I)** lowland streaked tenrec (*Hemicentetes semispinosus*). ©Noel Rowe (A-C, E-F) and Ryan Rothman (D, G-I)

objectives are to protect the forest from illegal logging and from *tavy*, the ancestral practice of slash-and-burn agriculture.

LINK TO LISTS OF FAUNA AND FLORA OF RNP

<https://www.inaturalist.org/places/ranomafana-national-park>

INFRASTRUCTURE AND FEES

There are six sites set up for research within the park with extensive trail systems, each covering an area roughly 4 km²: Mangevo, Valohoaka, Vatoharanana, Talatakely, Miaranony, and Vohiparara. Four of these sites (Vatoharanana,

Valohoaka, Miaranony, and Mangevo) are in undisturbed or minimally disturbed areas of the park and have bush-camp facilities. One site (Talatakely) is easily accessed from the CVB station. Access to CVB from the nearby city of Fianarantsoa is by Regional Road Route #45 (RN45), a paved road from the junction Alakamisy to Vohiparara village. The main entrance to both RNP and CVB is off of Road Route #25 (RN25) which connects with RN45 at Vohiparara. The international airport is in the capital city of Antananarivo, a ten- to twelve-hour drive northwest. A regional airport is located in Fianarantsoa, an hour and a half southwest of the CVB research station. CVB's first research station was built in 1989 near the entrance to RNP. This structure was a small, one-story log cabin. In 2003, the station was upgraded to a three-story stone facility along the Namorona River and

adjacent to the park overlooking the rainforest, called “Lov-aBe” (536 m²), which houses administrative offices, a small laboratory, and a dining hall that serves up to 125 people. This scientific research and education hub is headed by SBU and the Institute for the Conservation of Tropical Environments (ICTE) located in Stony Brook, New York. Founding institutions include SBU and the Universities of Antananarivo, Fianarantsoa, and Helsinki. A second four-story building called “NamanaBe” (1,456 m²) opened in 2012 and is equipped with high-speed internet, modern genetics and molecular biology laboratories, an audio/visual/computer center (with recording capability) and living accommodations for up to 54 researchers and students (see Figure 3). A third building, “AinaBe” (99 m²), was opened in 2021 and includes an herbarium, insect collection, fossil collection, researcher office space, and a conference room. Electricity for hot water at CVB is provided by eight solar panels, while remaining electricity needs are met from a nearby hydroelectric power plant. Clean drinking water is available from a small stream and pumped to the research station where it is filtered and treated.

CVB receives authorization to do research from the government of Madagascar’s Ministry of the Environment and Sustainable Development, and works closely with the MNP, especially on conservation management. CVB’s administration oversees the station’s departments of Research, Logistics, Information Technology, Reforestation, and Community Outreach, the latter including Health and Education initiatives. Over 130 local staff, many trained as research technicians and Malagasy biodiversity experts, work at CVB, and live in the villages surrounding the park. The Health and Education teams provide training and outreach programs to over 50 villages surrounding RNP. Reforestation with native species and medicinal plant gardens managed

by traditional healers are two important components of Centre ValBio’s outreach efforts. Thirty-three youth conservation clubs foster appreciation for conservation, while a cooperative of artisanal women weavers (FAMIOVA) contributes to sustainable local economies. CVB owns six 4x4 vehicles for logistics and transportation.

Daily station fees are MGA 140,000 (US \$35) a day for students and MGA 220,000 (\$55) a day for professors and researchers. This includes a dorm room, three meals a day, and access to hot showers and high-speed internet. Some private rooms are also available. There is a laboratory fee of MGA 200,000 (\$50) per group of researchers per week. Access price list for all CVB station fees and services <https://www.stonybrook.edu/commcms/centre-valbio/documents/CVB%20Price%20List%202021.pdf>.

LEGAL REQUIREMENTS AND PERMITS

Research at CVB and the collection and export of biological samples require permits from the CAF/CORE: Commission *Ad hoc* Faune et Flore / Comité d’Orientation sur la Recherche Environnementale (*Ad hoc* Commission on Flora and Fauna / Committee for the Guidance of Environmental Research) of the Madagascar Ministry of the Environment and Sustainable Development. A formal agreement with a Malagasy cooperation partner is mandatory for research, with CVB operating under the “ICTE Accord de Siège” with the Madagascar Ministry of Foreign Affairs. Applications for research must be submitted in French, and ICTE has a sister organization, MICET (Malagasy Institut pour la Conservation des Ecosystèmes Tropicaux), which helps translate and submit permits to the government. All research projects must train and fund a Malagasy graduate student. It is advisable to contact MICET as early as possible before the onset of a planned field study to begin the research permit process, at least three months prior to date of travel to Madagascar.

KEY RESEARCH

Centre ValBio runs long-term research programs that work to train scientists (at all levels) through field-based courses, collaborations, and academic exchanges. Among its numerous programs, CVB especially prioritizes biodiversity research, ecological assessments of tropical ecosystems, and community-based conservation. When the RNP project was initiated in 1986, its primary goal was to protect the habitat of two important endemic lemur species, the then-newly discovered golden bamboo lemur (*Haplemur aureus*) and the rediscovered greater bamboo lemur (*Prolemur simus*). Since that time, intensive surveys conducted



Figure 3: View of the Centre ValBio’s NamanaBe building with the rainforest of Ranomafana National Park in the background.

©James Ewing Photography

over a period of 35 years have identified numerous species of non-volant mammals in the area, including 14 species of lemurs. Long-term research projects and biodiversity monitoring have firmly cemented RNP as one of the most important mammal sites in Madagascar. Mammal species are represented by at least 13 rodent species, 20 insectivore, and six bat species (including the endemic species *Myzopoda aurita*, the Madagascar sucker-foot bat). Ranomafana is home to six carnivorous mammal species (five of which are endemic), including the broad-striped mongoose (*Galidictis fasciata*), ring-tailed mongoose (*Galidia elegans*), and the rare fanalouc (*Eupleres goudotii*). The apex mammalian predator in Madagascar, *Cryptoprocta ferox*, the fossa, is also found in RNP. Surveys of birds have documented 118 species, all well represented in RNP. These include cryptic forest birds such as the yellow-browed oxylabes (*Crossleyia xanthophrys*), Crossley's vanga (*Mystacornis crossleyi*), slender-billed flufftail (*Sarothrura watersi*), and the vocal but elusive ground rollers: the short-legged ground roller (*Brachypteracias leptosomus*) and pitta-like ground roller (*Atelornis pittoides*).

Another particularity of Ranomafana biodiversity is its high richness and diversity in insects and frogs. Sixty-three insect families have been documented, of which seven characterize butterflies (Hesperiidae, Papilionidae, Pieridae, Nymphalidae, Satyridae, Acraeidae, and Lycaenidae). Over 300 species of butterflies are found in RNP. Carabid beetles (Coleoptera: Carabidae) have been inventoried and show a remarkably high seasonal variation in diversity and abundance. The park boasts more than 350 known species of spider, including the assassin spider (*Eriauchenus ranavalona*) and spiny kite orb-weaver (*Acrosomoides acrosomoides*). The giraffe-necked weevil's (*Trachelophorus giraffa*) spectacular courtship and mating behaviors attract many observers. More than 112 species of frogs make Ranomafana one of the most frog-rich of any rainforest park in Madagascar (Vieites et al. 2009). RNP also contains 24 species of lizard, 22 species of snake, and 16 chameleon species.

New species and extensions of known distribution ranges have also been confirmed within RNP, among them, many lemur species such as the golden bamboo lemur (*Hapalemur aureus*), the furry-eared dwarf lemur (*Cheirogaleus crossleyi*) just south of CVB in Talatakely, Sibree's dwarf lemur (*C. sibreei*) on Mount Maharira, the small-toothed sportive lemur (*Lepilemur microdon*) in Vohiparara, Betsileo sportive lemur (*L. betsileo*) and Peyrieras' woolly lemur (*Avahi peyrierasi*) in Talatakely and south of the Namorona River. New species of frogs have been discovered, like the fossorial diamond frog (*Rhombophryne nilevina*) from RNP's northern parcel, and new spider species such as *Gallieniella mygaloides* from Maharira summit.

CVB runs several research projects on plant taxonomy, ecology, phenology, and reforestation and monitoring. Among these are the *Tropical Ecology Assessment and Monitoring* (TEAM), Tree phenology, and Missouri Botanical Garden monitoring programs. The majority of plant species belong to the families of Myrtaceae, Rubiaceae, Lauraceae, Malvaceae, Buddlejaceae, Canellaceae, Ericaceae, Menispermaceae, and Stilbaceae. Most of the individual trees within RNP can be identified at the family, genus, or species level. The total plant species for Ranomafana National Park is around 1,400 species (Missouri Botanical Garden records). For 35 years, approx. 1,000 trees have been monitored monthly for fruiting and flowering phenology, with DBH taken every year. Palms are well represented by the genera *Dypsis* and *Phloga*, both within the family Arecaceae. Epiphytes are numerous due to the very high humidity of the cloud rainforest. Existing species include the orchids *Angraecum sesquipedale*, *Bulbophyllum* spp., *Cynorkis fastigiata*, *Disperis tripetaloides*, *Eulophia macra*, *Oeonia volucris*, and fern species such as *Asplenium nidus*. In 2021 the CVB station began to collect and catalogue a small herbarium of woody plants found in RNP. CVB's goal with this project is to have an inclusive collection of all RNP plant species, stored in professional cabinets.

From the park's initiation in 1991, 52 PhD dissertations and 135 Master's theses have been completed. Many of these studies have focused on diurnal lemurs, conducting research on their behavioral ecology, demography, life history, reproductive biology, stress and reproductive hormones, parasites, feeding and nutritional ecology, morphometrics, predation, communication, and cognition. Nocturnal lemurs have been studied less intensively, with emphasis on genetics, reproduction, hibernation, parasites, and vocalizations. There have also been extensive studies of reptiles and amphibians and some studies of the region's rodents, carnivores, birds, and bats. Moreover, research in ecosystem dynamics and conservation, with an emphasis on lemur seed dispersal, disease ecology, climate, and tree phenology are also ongoing (Dew & Wright 1998, Wright et al. 2020, Wright et al. 2005, Zhody et al. 2016). In total, over 1,000 academic publications have been produced from different research projects conducted at CVB since 2003.

FIVE SELECTED PUBLICATIONS

Wright PC, Erhart EM, Tecot SR, Bade, AL, Arrigo-Nelson SL, Herrera J, Morelli TL, Blanco MB, Deppe A, Atsalsi S, Johnson S, Ratelolahy F, Tan C, Zohdy S (2013). Long-term lemur research at Centre ValBio, Ranomafana National Park, Madagascar. In: Long-term Field Studies of Primates (Eds. Kappeler PM, Watts DP). Springer-Verlag Berlin Heidelberg, pp. 67-100.

- Razafindratsima OH, Gentles A, Drager A, Razafimahaimodison JC, Ralazampirenena CJ, Dunham A. (2018). Consequences of lemur loss for above-ground carbon stocks in a Malagasy rainforest. *Int. J. Primatol.*, 39: 415-426. DOI: 10.1007/s10764-018-0042-x
- Tecot SR, Baden AL (2018). Profiling caregivers: hormonal variation underlying allomaternal care in wild red-bellied lemurs, *Eulemur rubriventer*. *Physiol. Behav.* 193 (Pt A): 135-148. DOI: 10.1016/j.physbeh.2017.12.007
- Scheffers BR, Edwards DP, Macdonald SL, Senior RA, Andriamahohatra LR, Roslan N, Rogers AM, Haugaasen T, Wright PC, Williams SE (2017). Extreme thermal heterogeneity in structurally complex tropical rain forests. *Biotropica* 49(1): 39-44. DOI:10.1111/btp.12355
- Wright PC (2004). Centre ValBio: long-term research commitment in Madagascar. *Evol. Anthropol.* 13(1): 1-2. DOI:10.1002/evan.10132

Access our repository of research publications (1987-2021) conducted both at Centre ValBio and within Ranomafana National Park
<https://www.stonybrook.edu/commcms/centre-valbio/science/publications.php#2020>.

Website Links and Contact Information:

<https://www.stonybrook.edu/commcms/centre-valbio/>
<https://twitter.com/CentreValBio>
<https://www.facebook.com/CentreValBio>
<https://www.instagram.com/centrevalbio/>
<https://www.youtube.com/channel/UCy-ibXFhKs-UOpSlyKROj7A>

Centre ValBio Research Campus

BP 33 Ranomafana, Ifanadiana 312, Madagascar International phone: (+261) 34 135 8171
 Email contact: visit@valb.io

REFERENCES

- Dew JL, Wright PC. 1998. Frugivory and seed dispersal by four species of primates in Madagascar's eastern rainforest. *Biotropica* 30:425-437. <https://doi.org/10.1111/j.1744-7429.1998.tb00076.x>
- Vieites DR, Wollenberg KC, Andreone F, Köhler J, Glaw F, Vences M. 2009. Vast underestimation of Madagascar's biodiversity evidenced by an integrative amphibian inventory. *PNAS* 106: 8267-8272. <https://doi.org/10.1073/pnas.0810821106>
- Wright PC, Jimenez BJ, Rakotonirina P, Andrianoely DH, Shea A, Ratalata B, Razafimahaimodison JC. 2020. The progressive spread of the vascular wilt-like pathogen of *Calophyllum* detected in Ranomafana National Park, Madagascar. *Frontiers in Forests and Global Change* 3:91. <https://doi.org/10.3389/ffgc.2020.00091>
- Wright PC, Razafindratsita VR, Pochron ST, Jernvall J. 2005. The key to Madagascar frugivores. In: Dew JL, Boubli JP (eds) *Tropical Fruits and Frugivores*. Springer, Dordrecht, pp. 121-138
- Wright PC, Andriamihaja B, Terborgh JE, van Schaik C, Davenport L, Madhu R (2002). Making a rain forest national park work in Madagascar: Ranomafana National Park and its long-term research commitment. In: Terborgh J, van Schaik C, Rao M, Davenport L (eds). *Making Parks work: Strategies for preserving tropical nature*. Island Press, Washington DC, pp. 112-136.
- Zohdy S, Derfus K, Headrick EG, Andrianjafy MT, Wright PC, Gillespie TR. 2016. Small-scale land-use variability affects *Anopheles* spp. distribution and concomitant *Plasmodium* infection in humans and mosquito vectors in southeastern Madagascar. *Malaria Journal* 15:114. <https://doi.org/10.1186/s12936-016-1164-2>