Association Vahatra

CONTENTS

A MESSAGE FROM THE PRESIDENT OF VAHATRA, ACHILLE RASELIMANANA, DR. HDR

For Association Vahatra, the year 2016 was one of numerous challenges and at the same time that of considerable satisfaction. One of the more important tests of this past year, other than those associated with our general activities since 2007, was the commencement of what can be considered a monumental project, an update of a book published in 1989 by Martin Nicoll and Olivier Langrand under the title "Madagascar: Revue de la conservation et des aires protégées" [Madagascar: Review of conservation and its protected areas]. This new adventure sees the involvement of numerous national and international scientists from different disciplines, management and conservation experts, and environmental law specialists. Vahatra is the pivot organization for all that concerns biological aspects and our principal collaborator, the Madagascar Biodiversity Fund, is responsible for all juridical and legal aspects. Several different donors, particularly the Critical Ecosystem Partnership Fund and The Helmsley Charitable Trust, as well as private individuals, are supporting this project. It will terminate in the form of a bilingual (French-English) book published by The University of Chicago Press and Association Vahatra, planned for the last portion of 2018. Bringing together all these people from different sectors to work in concert is a major challenge, especially for such a relatively young organization such as Vahatra.

Testing acquired knowledge to provide different means of advancement and opening new horizons to better serve science and protected area managers are part of the association's important role, specifically "serve to flourish and to acquire". This modest slogan is our leitmotif to undertake various activities that provide tools to help decision-makers and enrich available information concerning Malagasy biodiversity. A good example of this interface was a series of biological inventories conducted during the year in northeastern Madagascar, a zone that is experiencing the odd combination of increasing ecotourism and deforestation associated with commercial logging. Another example is the association's commitment to provide new information on invasive animal species impacting Madagascar, with the intent of assisting with their eradication or at least some form of control.

The year 2016 also represented a moment of introspection for the association and its different members, specifically to assess if the majority of intended achievements were indeed met. Given Vahatra's solid reputation concerning aspects of Malagasy biodiversity, ecology, and conservation biology, as well as one of its centerpieces being the development of scientific capacity, the programs this past year have been diverse. We hope that you will agree after reading this report that these different projects have advanced in a satisfactory manner. One of many examples is that seven Malagasy graduate students (three PhDs and four Master's) working in direct affiliation with the association completed their higher degrees. In addition to these concentrated efforts, the four scientific and founding members of the association are involved in mentoring and serving on the committees of literally dozens of graduate students in the national university system, as well as overseas. Further, publications of the association members appeared in diverse international scientific journals and covered a range of topics.

These different achievements, perspectives, and visions for the future, particularly on the eve of the association's 10th anniversary in 2017, are the "milestones" of the organization. These aspects, from both physical and philosophical perspectives, will guide our programs in 2017 and the future and help to fulfill our commitments to serve better the important causes of science, capacity building, and biodiversity management on Madagascar.

Achille P. Raselimanana

LONG-TERM GOALS

The long-term goals of Association Vahatra are to advance Malagasy scientists, in particular graduate students within the university system, as well as other members of the national conservation biology community, and make important advances in understanding the island's unique biota. Our sincere intent is to generate an organization with a long-term future. A critical aspect to mention is that we have created this vision largely based on the scientists and students working with the association, and, hence, distinctly Malagasy in prospective. This is in comparison, for example, to large international organizations that might not necessarily have the interests of Madagascar as their principal point of perspective. This aspect is fundamental for the long-term strength of the association, since members are engaged and committed by conviction with regard to the study and conservation of their natural heritage.

The seed was planted for Association Vahatra in what is now approaching three decades ago in the context of a project organized by WWF-Madagascar and known as The Ecology Training Program (ETP). Steve Goodman and Achille Raselimanana were the coordinators of the project for many years, during which time several generations of Malagasy students finished their higher degrees within the university system in animal and conservation biology. Many of these graduates are amongst the major actors in the current Malagasy conservation biologist community. These individuals are now responsible for the advancement of new generations of national field biologists in at least three different manners: 1) lecturers and professors within the national university system, 2) active scientific members of the Vahatra staff, and 3) playing important roles and holding key positions in the non-governmental and governmental sectors. Association Vahatra places strong emphasis on capacity building and continues this tradition and the body of well-trained nationals continues to grow.

VAHATRA – PERMANENT STAFF

1. Professor Achille P. Raselimanana – President of Vahatra and Professor, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo. Founding member. Achille was in the first generation of ETP graduates (see above) and did his DEA and Ph.D. in the context of this program. In 2011, he presented his "Habilitation à Diriger des Recherches" (HDR) at l'Université de La Réunion, which is the highest scientific degree in the French university system. Achille is a herpetologist with considerable experience in aspects ranging from field studies, classical taxonomy to molecular systematics. Before the creation of Association Vahatra, he held for nearly a decade the position of Biodiversity Program Officer for WWF-Madagascar.
2. Dr. Marie Jeanne Raherilalao – Co-editor of the journal *Malagasy Nature* produced by Vahatra and Professor, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo. Founding member. Marie Jeanne did her Ph.D. associated with the ETP (see above). She works on bird ecology, biogeography, and systematics.
3. Dr. Voahangy Soarimalala – Scientific Coordinator at Vahatra; Head Curator, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo; and Professor, Université de Fianarantsoa. Founding member. Voahangy did her DEA and Ph.D. in association with the ETP (see above). Voahangy is a mammalogist with a particular interest in rodents and tenrecs.
4. Professor Steven M. Goodman – Scientific Advisor at Vahatra; co-editor of the journal *Malagasy Nature* produced by Vahatra; and Lecturer, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo. Founding member. Steve works on both mammals and birds. He holds the post of MacArthur Field Biologist, Field Museum of Natural History, Chicago, and is based in Madagascar most of the year. For his considerable efforts, support to the university, and contributions in the advancement of science and capacity building on Madagascar, The University of Antananarivo awarded him in 2013 the grade of "Docteur Honoris Causa".
5. Mrs. Sabrina Raharinirina – Financial & Administration Manager. Sabrina joined the association in October 2015. During the last months of 2015 and early 2016, she worked closely with Madame Malalarisoa Razafimpahanana, who formerly held the post of General Secretary, to provide a smooth transition concerning aspects associated with financing and running the office.
6. Mr. Rachel Razafindravao called "Ledada" – logistic coordinator. Ledada started working with the ETP some 25 years ago and transferred to Vahatra in October 2007. He has helped organize logistics for

something approaching 340 field missions to some of the remotest areas on Madagascar.

7. Mrs. Ratsirahaingotiana Sandra Cathy – domestic help. She has worked with Vahatra since May 2016.

8-10. Mr. Elisa Malaimbohitsy, Mr. Mara Avisoa, and Mr. Mbola Marivosoa Alexandre – guardians.

VAHATRA'S BOARD OF DIRECTORS

In order to provide needed guidance and counseling for the current and future programs associated of Vahatra, a Board of Directors has been named, which includes the following individuals:

Malagasy nationals

1. Professor Daniel Rakotondravony – Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
2. Mrs. Nanie Ratsifandrihamanana – Country Director, WWF, Madagascar.
3. General Guy Ratrimoarivony – Général de Corps d'Armée, Director of Strategy Seminar, Center for Diplomatic and Strategic Studies.
4. Mrs. Chantal Andrianarivo – Former Head of Research and Biodiversity, Madagascar National Parks and now Technical Advisor at Western Indian Ocean Coastal Challenge – Islands Project.
5. Professor Joelisoa Ratsirarison – Département des Eaux et Forêts de l'Ecole Supérieure des Sciences Agronomiques, Université d'Antananarivo and Vice President of the University of Antananarivo in Charge of International Relations.
6. Mr. Jean Chrysostome Rakotoary – General Director of the Office National pour l'Environment (ONE).
7. Professor Raoelina Andriambololona – Institut National des Sciences et Techniques Nucléaires (INSTN), Université d'Antananarivo, General Director of INSTN and Member of the Malagasy Academy.

Foreign members

1. Professor Jörg U. Ganzhorn – Professor, Tierökologie und Naturschutz, University of Hamburg.
2. Mr. Paul Goodman – Principal, Kingfisher Group.
3. Mr. Olivier Langrand – Executive Director, Critical Ecosystem Partnership Fund (CEPF).
4. Mr. John McCarter – Former president of the Field Museum.
5. Mr. Michael Polsky – President, Invenergy.

STUDENTS

We are currently working directly with Malagasy students registered within the national university system and conducting their Master's II, "Licence", or Ph.D. degrees. In recent years, the Malagasy national university has shifted from a classical French system to that of an Anglophone License-Masters-Doctorate (LMD) system. Further, the scientific members of Vahatra are also in contact with many other Malagasy students as secondary advisors and members of thesis and mémoire committees. We have made a dedicated effort to work with graduate students in universities outside of the capital city of Antananarivo, including the former provincial capitals of Antsiranana, Toliara, Fianarantsoa, Toamasina, and Mahajanga. In addition, Vahatra staff members advise many other Malagasy students on aspects of their research, access to literature based on the fine library housed at the association, and other forms of mentorship. Furthermore, several PhD candidates working with other institutions or NGOs frequent request Vahatra scientists to be members of their thesis committees.

Since Vahatra open its doors in late 2007, something approaching 2000 different student and research visitors not directly part of the association's mentoring program have visited the office to use the library facilities or consult with the scientific staff. (These figures are based on a sign-in notebook.) In 2016 alone, something approaching 310 different student and researcher visits were made to the library and many hundreds of documents (books, reprints, theses, etc.) consulted. Over the past few years, the number of people consulting the Association Vahatra library has continued to increase.

Malagasy students passing through the Vahatra program have considerable success finding permanent jobs within governmental and non-governmental sectors on the island. In many cases, these posts are in domains related to biology and conservation, for example, university appointments, working within NGOs, associated with the Madagascar National Parks, etc. Some of the former students hold key posts, for example, in different managerial capacities, such as the Madagascar Biodiversity Foundation, mining companies, and The Ministry of Forestry and Environment. Hence, one of the mandates of the association, to advance science and conservation on Madagascar with focused mentorship of graduate students, is indeed meeting the original expectations. A good example of this is that numerous Vahatra graduates have obtained university appointments, providing an even greater means to advance capacity building for Malagasy field and conservation biologists. Below is the list of 2016 graduate students working on Licence, Master's II, and PhD degrees under the direction of Vahatra scientists. After receiving their higher degrees from the university in collaboration with Association Vahatra, these well-trained young scientists are for the most part dynamic and with long-term visions, capable of designing and implementing future research projects, and obtaining associated funding.

Graduate diplomas presented in 2016 or in preparation

As can be seen from the following lists, the scientific members of Vahatra are extensively involved in the advancement of Malagasy graduate students. We consider this one of the hallmarks of the association. Further, we encourage students to publish the results of their scientific work (see below, "Scientific outputs of Vahatra during 2016").

A) Licence, Master's, and Ph.D. diplomas presented by student members of Association Vahatra and under the close direction of Vahatra scientific members

1. Andriafidison, D. 2016. Ecologie et conservation de *Pteropus rufus* E. Geoffroy, 1803 (Pteropodidae) dans les régions sèches et humides de Madagascar. Thèse de Doctorat de Troisième Cycle, Département de Biologie Animale, Université d'Antananarivo.

2. Andriamiravo, M. F. 2016. Les effets de la reforestation sur la population des papillons dans la région de Kianjavato, Mananjary. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
3. Andrianiaina, F. A. 2016. Etude des critères d'âge, structure de la population de *Rattus rattus* Linné 1758 et prévalence des groupes d'ectoparasites. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
4. Benjamina, G. S. 2016. Impacts des rongeurs introduits sur le milieu agriculture à Mahatsara, Commune Rurale d'Andasibe. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
5. Faliarivola, M. L. 2016. Distribution verticale des oiseaux de sous-bois de la péninsule de Masoala, Madagascar. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
6. Fanomezantsoa, E. R. D. 2016. Contribution à la distribution des petits mammifères du Parc National Tsimanampetsotsa, Plateau Mahafaly, Toliara. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
7. Nomenjanahary, R. O. H. 2016. Contribution au suivi écologique d'herpétofaune de la forêt d'Analasoa, Parc National Tsimanampetsotse. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
8. Rabarison, H. 2016. Aperçu de la bioécologie et régime alimentaire des chauves-souris dans la Réserve Naturelle Intégrale de Betampona, Région Atsinanana. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
9. Rabemananjara, P. B. 2016. Contribution à l'étude de la distribution des reptiles du Parc National Tsimanampetsotsa, Plateau Mahafaly, Toliara. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
10. Raharinoro, N. A. 2016. Inventaire des micromammifères non-volants (Rodentia, Afrosoricida et Soricomorpha) de la RNI de Betampona, Est de Madagascar. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
11. Rakotondratsimba, H. M. 2016. Analyse de la tendance biogéographique de cinq groupes de vertébrés terrestres de Madagascar. Thèse de Doctorat, Faculté des Sciences, Université d'Antananarivo.
12. Randriamoria, T. 2016. Etude éco-biologique des petits mammifères du District de Moramanga et de leurs tiques (Ordre des Ixodida) dans les habitats forestiers et anthropogéniques. Thèse de Doctorat, Faculté des Sciences, Université d'Antananarivo.
13. Randriamalala, D. M. T. 2016. Contribution au suivi écologique des oiseaux d'Analasoa, Parc National Tsimanampetsotsa, Toliara. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
14. Randrianarisata, M. 2016. Impacts des rongeurs introduits sur le milieu agriculture de la Commune Rurale de Beforona. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
15. Raoelinjanakolona, N. N. 2016. Structure et distribution spatiale de la communauté herpétofaunique de la Réserve Spéciale de Mangerivola, Est de Madagascar. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
16. Razakafamantanantsoa, A. 2016. Impacts des rongeurs introduits sur le milieu agriculture dans la Commune Rurale d'Ambatolaona, Manjakandriana, Antananarivo. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
17. Razanajatovo, O. N. 2016. Contribution à l'étude de la taille du groupe de population d'*Eulemur fulvus* pour l'amélioration de l'écotourisme de la forêt d'Anjiamangirana. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.

B) Licence, Master, and Ph.D. diplomas defended with implication of Vahatra scientific members as a supervisor, lecture committee member or jury member

1. Elimanantsoa, I. 2016. Contribution à l'étude de la population des grenouilles pandanicoles dans la forêt de Sahamalaotra, Parc National Ranomafana.

Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.

2. Lalanirina, M. C. 2016. Dynamique et distribution saisonnières de la communauté d'amphibiens de cours d'eau suivant le gradient altitudinale dans le Massif d'Ankaratra. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
3. Noromalala, E. 2016. Aperçu sur les ossements dans les Grottes d'Anjohingidrobe et d'Anjohimaletsy, Forêt de Beanka, Région Melaky, Ouest de Madagascar. Mémoire de Recherche pour l'Obtention du Diplôme de Master II en Sciences de la Terre et de l'Evolution, Faculté des Sciences, Université d'Antananarivo.
4. Rajaonarivelo, J. A. 2016. Répartition verticale des Vangidae dans la forêt sèche de Kirindy CNFEREF, Morondava, Madagascar. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo, Antananarivo.
5. Ralph, T. M. C. 2016. Aspects of the molecular systematics, taxonomy and population genetics of *Otomops* (Chiroptera: Molissidae) in Africa and Madagascar. Ph.D. thesis, The University of Kwa-Zulu Natal.
6. Randrianarivelo, J. 2016. Détermination de pelote de régurgitation trouvée dans la forêt de Beanka, Région Melaky a l'ouest de Madagascar. Mémoire de Recherche pour l'Obtention du Diplôme de Master II en Sciences de la Terre et de l'Evolution, Faculté des Sciences, Université d'Antananarivo.
7. Rasoazanakolona, J. 2016. Diversité de la communauté aviaire de la forêt sèche de la Nouvelle Aire Protégée d'Oronjia, Antsiranana, Madagascar. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo, Antananarivo.
8. Rasoloariniaina, J. R. 2016. Aspects quantitatifs, qualitatifs et ichtyologiques des eaux souterraines de la région Mahafaly, Sud-ouest de Madagascar. Thèse de Doctorat, Faculté des Sciences, Université d'Antananarivo.

C) Licence, DEA, Ph.D. diplomas in preparation in direct collaboration with scientific members of the Associated Vahatra

1. Andrianjafy, N. P. In preparation. Etude étho-écologique de *Falco concolor*. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
2. Gauthier, N. E. In preparation. Etude de la préférence en habitat de *Passer domesticus* et de *Foudia madagascariensis* dans la ville de Fénérive-Est. Mémoire de Master II, Institut Supérieur de Sciences, Environnement et Développement Durable, Université de Barikadimy, Toamasina.
3. Jao, N. M. In preparation. Etude de la structure des populations murines dans les villages d'Antsahatsaka et de Mahatsara, District Moramanga, Région Alaotra-Mangoro. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
4. Magnina, T. G. In preparation. Contribution à l'étude de la taille du groupe de population de *Propithecus coquereli* pour l'amélioration de l'écotourisme de la forêt d'Anjiamangirana. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
5. Mamialijaona, N. In preparation. Les effets de la reforestation sur la population des lézards dans la région de Kianjavato, Mananjary. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
6. Nahavitatsara, E. R. In preparation. Analyse de la structure de population et de la distribution écologique entre zones de culture et zones d'habitation humaine de *Dattyphrynus melanostictus*. Mémoire de Master II, Institut Supérieur de Sciences, Environnement et Développement Durable, Université de Barikadimy, Toamasina.
7. Narivony, D. In preparation. Relation entre régime alimentaire et fréquentation d'habitat chez *Dattyphrynus melanostictus*. Mémoire de Master II, Institut Supérieur de Sciences, Environnement et Développement Durable, Université de Barikadimy, Toamasina.
8. Noroalintseheno Lalarivoniaina, O. S. In preparation. Dynamique de population de *Rousettus madagascariensis*, G. Grandidier, 1928 (Yinpterochiroptera : Pteropodidae) de la grotte des chauves-souris du Parc National d'Ankarana, Nord de Madagascar. Thèse de Doctorat, Faculté des Sciences, Université d'Antananarivo.
9. Rafanoharana, J. In preparation. Evaluation des prédateurs de populations murines dans le village d'Antsahatsaka, District de Moramanga, Région Alaotra-Mangoro. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
10. Raharinirina, D. In preparation. Evaluation des prédateurs de populations murines dans le village de Mahatsara, District de Moramanga, Région Alaotra-Mangoro. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
11. Raharisoa, D. M. In preparation. Evaluation des prédateurs naturels de rats, en vue de lutter contre l'invasion de la population Murine : cas du village d'Antsahatsaka, Commune Rurale d'Andasibe. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
12. Rahobilalaina, S. S. In preparation. Répartition écologique des hérons dans les zones côtières du Complexe Mahavavy Kinkony, Madagascar. Répartition écologique des hérons dans les zones côtières du Complexe Mahavavy Kinkony, Madagascar. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
13. Rajemison, F. I. In preparation. Etude bio-écologique des mouches ectoparasites de chauves-souris, Nycteribiidae et Streblidae (Diptera) chez *Rousettus*

madagascariensis (Pteropodidae) dans le Parc National Ankarana, Madagascar. Thèse de Doctorat, Faculté des Sciences, Université d'Antananarivo.

14. Rakotomalala, D. F. In preparation. Biodiversité insulaire malgache. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
15. Rakotomavo, L. A. In preparation. Etude des communautés d'oiseaux limicoles dans les mangroves du Complexe Mahavavy – Kinkony. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
16. Rakotonandrasana, A. In preparation. Influence des habitats riverains et des cours d'eau sur la distribution spatiale et la dispersion de *Dattyphrynus melanostictus*. Mémoire de Master II, Institut Supérieur de Sciences, Environnement et Développement Durable, Université de Barikadimy, Toamasina.
17. Rakotovao, V. F. In preparation. Evaluation des dégâts causés par les rats dans le village de Mahatsara, District de Moramanga, Région Alaotra-Mangoro. Mémoire de Licence, Institut des Sciences et Techniques de l'Environnement, Université de Fianarantsoa.
18. Rasoanoro, M. In preparation. Etude des parasites sanguins de chauves-souris de la partie orientale de Madagascar. Thèse de Doctorat, Faculté des Sciences, Université d'Antananarivo.
19. Razaiarisoa, O. In preparation. Les oiseaux aquatiques de la ville d'Antananarivo. Mémoire de Master II, Mention Zoologie et Biodiversité Animale, Université d'Antananarivo.
20. Sylvestre, M. H. In preparation. Etude de la préférence en habitat de *Passer domesticus* et de *Foudia madagascariensis* dans la ville de Toamasina, Région Atsinanana. Institut Supérieur de Sciences, Environnement et Développement Durable, Université de Barikadimy, Toamasina.
21. Vololona, J. In preparation. Etude des interactions entre *Rousettus madagascariensis* G. Grandidier 1928, (Pteropodidae) et les plantes vasculaires du Parc National d'Ankarana par des analyses polliniques. Thèse de Doctorat, Faculté des Sciences, Université d'Antananarivo.

VAHATRA MEMBERS AS REVIEWERS OF PAPERS SUBMITTED TO SCIENTIFIC JOURNALS

As an indication of the role of Association Vahatra scientific members in the realm of published scientific papers, they served in 2016 as reviewers for about 22 papers submitted to the following international journals:

- *Acta Chiropterologica*,
- *Biological Conservation*,
- *Biological Journal of the Linnean Society*,
- *BMC Evolutionary Biology*,
- *International Journal of Primatology*,
- *Journal of Mammalogy*,
- *Malagasy Nature*,
- *Mammalia*,
- *Molecular Ecology*,
- *PLoS One*,
- *Zoological Society of the Linnean Society*,
- *Zootaxa*.

MALAGASY NATURE

Our intention with the scientific journal *Malagasy Nature* is to publish peer-reviewed papers of high scientific and technical standards. As it has an ISSN number, it is considered an international scientific journal published in Madagascar. Manuscripts in French or English are passed through an editorial team, including a review process of international norms. We work closely with Malagasy authors, particularly graduate students and young researchers, to help them understand the process of composing, writing, and editing scientific articles. In many cases, the first publication of a researcher poses considerable hurdles and *Malagasy Nature* provides the means for these individuals to negotiate such problems. Based on this approach, this outlet plays an important role in regional capacity building, which in turn separates it from other international journals, for which the editors and associated editorial committee are not readily available to help with initial manuscript submission and revisions. Further, the journal allows Malagasy scientists to return information to the worldwide scientific world. All of these aspects together, provide professional advancement for the Malagasy scientific community, specifically a certain sense of responsibility and for national authors to understand the importance of invested efforts when producing scientific articles. The manner the journal is published also guarantees the local availability of research results in the fields of ecology and biology conducted on Madagascar and neighboring islands, as compared to foreign scientific journals with copies or electronic files not readily downloadable or repatriated to Madagascar. All recent numbers of the journal are available on line and with free access (http://www.vahatra.mg/malagasynaturefr.html).

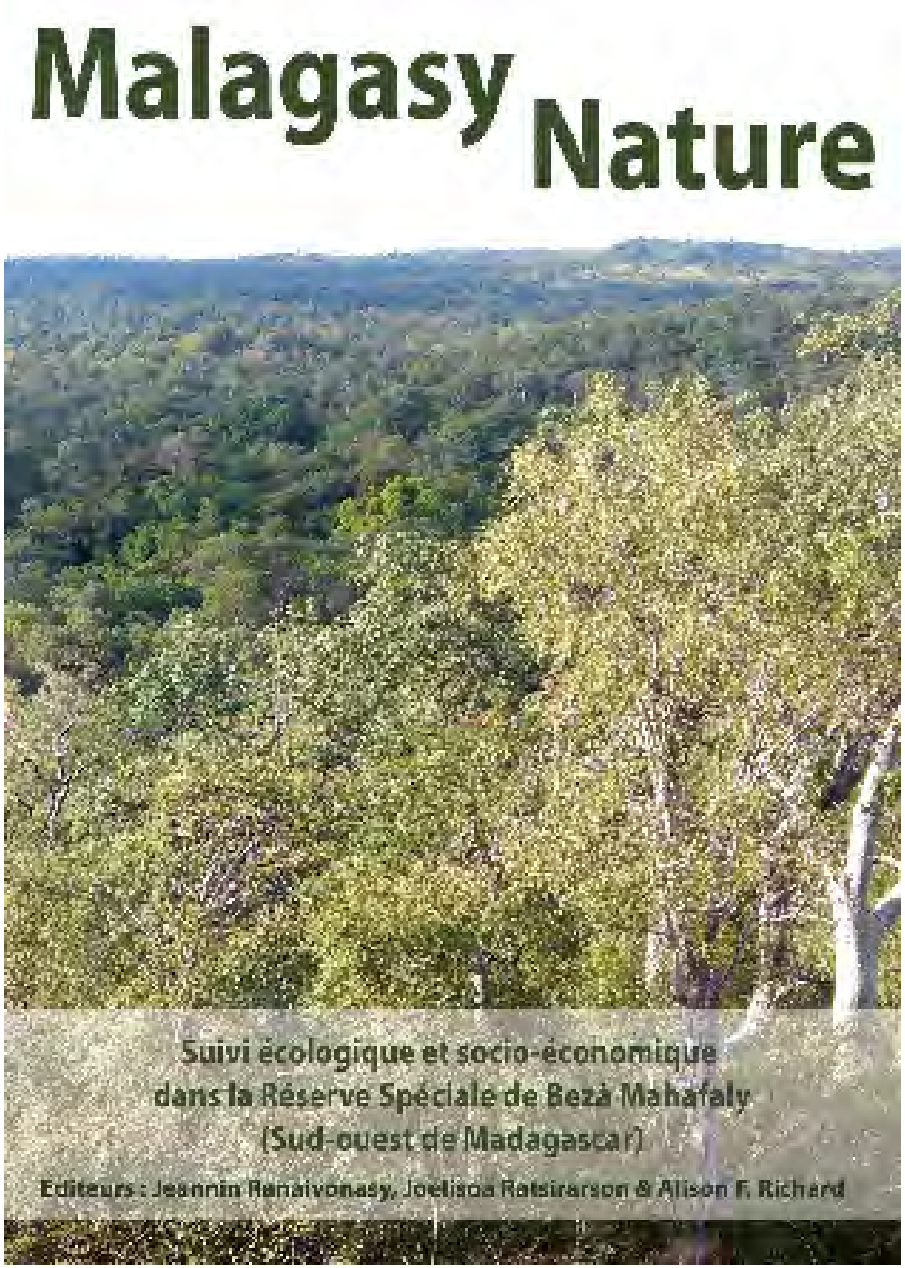
Marie Jeanne Raherilalao and Steven M. Goodman are the Editors of *Malagasy Nature* and a group of Associated Editors assists in different aspects

with submitted manuscripts. At least one volume of the journal is published each year. The editorial board of *Malagasy Nature* is composed of both national and international scientists, from the Anglophone and Francophone worlds, made up of the following individuals:

The most recent issue of the journal, published in April 2016, was a monograph dedicated to a protected area in southwestern Madagascar and entitled: “Suivi écologique et socio-économique dans la Réserve Spéciale de Bezà Mahafaly (Sud-ouest de Madagascar) and with three guest editors - Jeannin Ranaivonasy, Joelisoa Ratsirarson, and Alison F. Richard. The monograph contains the following articles (http://www.vahatra.mg/volume10fr.html):

Volume 10 (2016, 110 pp.):

- **Variabilité et changement du climat à Bezà Mahafaly** — Notahinjanahary Rasamimanana, Joelisoa Ratsirarson, Edouard Ramahatratra, Jeannin Ranaivonasy & Alison Richard
- **Dynamique de la couverture forestière dans la Réserve Spéciale de Bezà Mahafaly et ses environs** — Jeannin Ranaivonasy, Joelisoa Ratsirarson, Notahinjanahary Rasamimanana & Edouard Ramahatratra
- **Mammalian biodiversity at Bezà Mahafaly: An update** — Alison Richard, Joelisoa Ratsirarson, Enafa Jaonarisoa, Ibrahim A. Youssouf Jacky, Isabella Fiorentino & Jeannin Ranaivonasy
- **Diurnal lemurs at Bezà Mahafaly: Resilience and risk** — Alison Richard, Joelisoa Ratsirarson, Enafa Jaonarisoa, Sibien Mahereza, Ibrahim A. Youssouf Jacky, Michelle Sauther & Isabella Fiorentino
- **Dynamique de l’herpétofaune de Bezà Mahafaly** — Jeannin Ranaivonasy, Joelisoa Ratsirarson, Notahinjanahary Rasamimanana & Efitiria
- **Suivi de l’avifaune de Bezà Mahafaly** — José C. Rahendrimanana, Joelisoa Ratsirarson, Notahinjanahary Rasamimanana, Efitiria & Jeannin Ranaivonasy
- **Dynamiques socio-économiques et utilisation des ressources naturelles dans la Réserve Spéciale de Bezà Mahafaly et ses environs** — Jeannin Ranaivonasy, Joelisoa Ratsirarson, Notahinjanahary Rasamimanana, Andry S. Randrianandrasana, Edouard Ramahatratra, Efitroarany & Alison F. Richard
- **Gouvernance de la Réserve Spéciale de Bezà Mahafaly** — Jeannin Ranaivonasy, Joelisoa Ratsirarson, Sibien Mahereza, Alison F. Richard & Andry W. S. Randrianandrasana
- **Epilogue : Progrès et perspectives** — Joelisoa Ratsirarson, Alison F. Richard & Jeannin Ranaivonasy



THE PUBLISHING HOUSE OF ASSOCIATION VAHATRA

The year 2011 marked an important advancement for Association Vahatra with the creation of its own publishing house, focusing on a series entitled "Guides sur la diversité biologique de Madagascar" [Guides to the biological diversity of Madagascar]. For individuals that have grown up over the past 40 years in, for example, North America, portions of Latin America or western Europe, information on regional plants and animals are readily available in field guide format. These types of books, generally presented by taxonomic group (e.g. ferns, reptiles, birds, etc.) and region, revolutionized making information on biodiversity available and penetrable for members of different age and social groups in many different regions of the world. Such guides provide the means for individuals to become familiar with different plants and animals found in areas where they live or travel, and, most critically, integrating this familiarity into how they conceive the importance of the natural world. It is not an exaggeration to state that this type of guides have led to the "greening" of different sectors of society in a numerous countries. For Madagascar, which is so rich in biological diversity and being one of the principal conservation priorities in the tropics, the lack of such books is a considerable void, which Association Vahatra strongly believes need to be filled.

Since 2011, six books have been published in the series, which is edited by Marie Jeanne Raherilalao and Steven M. Goodman and designed and typeset by Madame Malalarisoa Razafimpahanana:

1. *Les chauves-souris de Madagascar* [The bats of Madagascar] by Steven M. Goodman, 2011, 129 pp.
2. *Les petits mammifères de Madagascar* [The small mammals of Madagascar] by Voahangy Soarimalala & Steven M. Goodman, 2011, 176 pp.
3. *Histoire naturelle des familles et sous-familles endémiques d'oiseaux de Madagascar* [The natural history of the families and subfamilies of endemic Malagasy birds] by Marie Jeanne Raherilalao & Steven M. Goodman, 2011, 146 pp.
4. *Les Carnivora de Madagascar* [The Carnivora of Madagascar] by Steven M. Goodman, 2012, 158 pp.

5. *Les animaux et écosystemes de l'Holocene disparus de Madagascar* [The extinct Holocene animals and ecosystems of Madagascar] by Steven M. Goodman & William L. Jungers, 2013, 249 pp.
6. *Les amphibiens des zones arides de l'Ouest et du Sud de Madagascar*" [The dry forest amphibians of western and southwestern of Madagascar] by Franco Andreone, Gonçalo M. Rosa & Achille P. Raselimanana, 2014, 180 pp.

The production of the first three books in the series was financed by a grant from the Critical Ecosystem Partnership Fund (CEPF). A generous grant from the Ellis Goodman Family Foundation allowed additional guides in the series to be published, which include the books on Carnivora, extinct animals, and dry forest amphibians. Additional volumes to be published in the series over the next few years and graciously subsidized by the Ellis Goodman Family Foundation and Paul Goodman include:

1. *The amphibians of northern Madagascar* – by Franco Andreone, Angelica Crottini, Andolalao Rakotoarison, Achille P. Raselimanana, Gonçalo M. Rosa & Mark D. Scherz. This bilingual French-English book is anticipated in 2017 or early 2018.
2. *The ant genera of Madagascar* – by Brian Fisher & Christian Peeters. This bilingual French-English book is anticipated in 2017.
3. *The damselflies and dragonflies of Madagascar* - by K. D. Dijkstra & colleagues. This bilingual French-English book is anticipated in 2017.

To date, other than free or at production costs diffusion of Vahatra Press books to Malagasy students and scientists, numerous copies have been sold to people coming to the Vahatra office, at different fairs in Antananarivo, and through overseas booksellers. We are pleased with the interest these books have generated, which includes seeing young Malagasy students and naturalists carrying and consulting the books on field trips to different forested areas. Further, these books are important resources for national students and researchers, as well as reference works for different university courses. The University of Chicago Press is now responsible for the distribution of books in this series in North America and Europe, as well as the *Atlas of selected vertebrates of Madagascar* published in late 2013 (see http://www.press.uchicago.edu/ucp/books/publisher/pu3431914_3431915.html).

SOME ACTIVITIES OF VAHATRA, INCLUDING NEW PROJECTS

The association is involved in a number of collaborative projects and below are details on some of these.

1. Helmsley Charitable Trust - capacity building, phase II

This new project, entitled "Development of scientific capacity for Malagasy conservation biologists", which will start in January 2017, has four different aspects: 1) two field schools per year for young Malagasy university graduate students to help in their scientific orientation and skill development; the participant groups will also include some individuals working in protected areas management (e.g. Madagascar National Parks) and field practitioners for conservation organizations (most to be selected from other HCT financed projects); 2) field studies and different forms of mentoring for four PhD students and four Master's II students enrolled at The University of Antananarivo; 3) continued advancement of scientific and general publications associated with Vahatra scientists and students, as well as the Malagasy scientific community, and 4) the publication of a large-scale synthesis on the protected areas of Madagascar.

2. Wellcome Trust

In the context of a project financed by the Wellcome Trust, in collaboration with Dr. Sandra Telfer, University of Aberdeen, and the Institut Pasteur de Madagascar, Association Vahatra is directly involved in research on the ecology of endemic and introduced small mammals. The intent is to overlay natural history traits of captured small mammals and their ectoparasites on different aspects of diseases they are in contact with and potentially transmitted to humans. The final year of the project was 2016 and during this period, two different Vahatra students engaged in the Wellcome Trust project obtained their graduate degrees: Toky Randriamoria (Ph.D.) and Angelo Andrianiaina (Master's). During the course of this project, numerous sites were surveyed in the general vicinity of Moramanga containing a variety of habitats: natural forest (sometimes disturbed), agricultural fields and rice paddy, regenerating anthropogenic savanna (*savoka*), and zones surrounding villages.

3. Helmsley Charitable Trust - invasive species in collaboration with Island Conservation

In the context of creating new connectivity between organizations currently receiving funding from the Helmsley Charitable Trust, Island Conservation in collaboration with Association Vahatra received a grant to advance different research projects and public education associated with problems imposed on Madagascar's ecosystems and the Malagasy people by invasive animal species. In 2016, a large group of students and researchers were organized to conduct biological inventories of some offshore islands in northeastern Madagascar, including one with a large seabird colony. A monograph associated with this project will be published in early 2017. A follow-up to this work was the advancement of a plan to remove rats from several of these islands, which pose an important threat to the local native fauna. Numerous other projects were conducted in the general Toamasina region on the natural history, distribution, and density of invasive alien species, more precisely birds and the Asian common toad. Five Master's students from the Institut Supérieur de Sciences, Environnement et Développement Durable, Université de Toamasina, are involved in this project, as well as two License students from the Ecole Supérieure des Sciences Agronomiques, Université d'Antananarivo.

4. StopRats: Sustainable technology to overcome pest rodents in Africa through science

This multi-partner project, financed by a grant from The Secretariat of the African, Caribbean and Pacific Group of States, includes participating organizations from Namibia, Madagascar, Sierra Leone, South Africa, Swaziland, Tanzania, and United Kingdom, and the central organizing group is The Natural Resources Institute, University of Greenwich. Association Vahatra is the Madagascar partner. The overall objectives are to strengthen science, technology, and innovation about rodent biology and management and contribute to African-Malagasy sustainable development by enabling institutions to address key indicators of poverty through the impacts of rodents on agricultural production systems and food security. Furthermore, the specific objectives are to build and strengthen Afro-Malagasy science technology and innovation capacity across a range of specialties that will enhance socio-economic development by tackling policy issues, knowledge dissemination, and technical competence to deliver sustainable rodent management. The principal role of Vahatra in this project is capacity building for Afro-Malagasy participants, largely through field schools and in this context, in 2016 Vahatra organized a field school in Sierra Leone. Further, five Malagasy student projects have been launched to understand the impacts of rodents in different areas of the country on agricultural output and other problems these animals cause (destruction of grain stocks and other domestic contexts). This project ends in late 2016.

5. Madagascar Biodiversity Fund

In the context of assessing the impact of illegal rosewood extraction in protected areas on different groups of land vertebrates, a project under the sponsorship of UNESCO (World Heritage Sites) and the Madagascar Biodiversity Foundation was conducted. The field portion of the project also included training of conservation agents and local people working with Madagascar National Parks on different aspects of biodiversity, conservation, and ecological monitoring. Forty different individuals were trained, 10 from Masoala National Park and 30 from Marojejy National Park.

6. Critical Ecosystem Protection Fund (CEPF)

In late 2015, Association Vahatra received a three-year grant from CEPF to conduct a large-scale review of the protected areas system of Madagascar. The project that will terminate with a bilingual book on this subject, which

will be co-published by Association Vahatra and The University of Chicago Press. There will also be a website with a large array of documents accessible for free downloading. During 2016, major advancements were made in downloading, scanning, and compiling a vast number of documents, writing detailed introductory sections, inventories of poorly known protected areas to complete available information, molecular identification of about 2,000 reptiles and amphibians, taxonomic work by specialists in l'Université d'Antananarivo museum collection, and the development of collaborations with vertebrate and plant systemacists for up-to-date and clear taxonomies employed in this project.

RECENT AND CURRENT GRANTS

- Ellis Goodman Family Foundation – Financing for the "Guides sur la diversité biologique de Madagascar" series.
- Critical Ecosystem Protection Fund – Madagascar's protected areas: A bilingual book and associated database reviewing their history, biodiversity and guiding the future, 2015-2018.
- Wellcome Trust – Zoonotic disease risk in Madagascar, 2013-2016.
- Helmsley Charitable Trust – Development of scientific capacity for Malagasy conservation biologists, 2017-2020.
- Helmsley Charitable Trust – Connectivity Project -- Protecting biodiversity, food security, and livelihoods in Madagascar, 2015-2017.
- The Secretariat of the African, Caribbean and Pacific (ACP) Group of States – StopRats or Sustainable Technology to Overcome Pest Rodents in Africa through Science, 2014-2017.
- UNESCO and Madagascar Biodiversity Foundation – Emergency support to the World Heritage Site of Eastern Humid forests of Madagascar.

We wish to acknowledge the kind gifts made by Joyce & Bruce Chelberg, Connie & Dennis Keller, and Tanya & Michael Polsky associated with different on-going projects to advance conservation science on Madagascar.

ACTIVITIES OF VAHATRA PERMANENT MEMBERS DURING 2016

Members of the Vahatra scientific staff were involved in a variety of activities, some of which are summarized below on a monthly basis.

January

During the first portion of the month, Voahangy, Achille, and Marie Jeanne, were actively involved in analyzing data and reporting results from a field mission to the Masoala National Park, which focused on biological inventory data from several sites and comparing different ecological aspects after the large-scale and local illegal extraction of rosewood. This project was under the sponsorship of UNESCO (World Heritage Sites) and the Madagascar Biodiversity Foundation. Steve spent the first portion of the month with two Vahatra Ph.D. students in the caves of Ankarana collecting data on long-term population trends in a species of fruit bat.

Voahangy supervised the advancement of six student "License mémoires" associated with different research projects, which were presented at the end of the month at the Université de Fianarantsoa. As January was part of an academic semester at the Université d'Antananarivo, Marie Jeanne and Achille spent considerable time teaching at the university. In the first portion of the month, Achille chaired two Master's degree defenses at the same university. Marie Jeanne was also occupied with Steve in editing the Bezà Mahafaly monograph for *Malagasy Nature* (http://www.vahatra.mg/volume10fr.html).

Achille, Steve, and Marie Jeanne had a meeting with the Director of the Institut Supérieur de Sciences, Environnement et Développement Durable (ISSEDD), Université de Toamasina, in eastern Madagascar, in the context of an invasive species project funded by Helmsley Charitable Trust. Five students from that institution were identified to be involved in research activities on invasive species in the greater Toamasina area.

February

In the middle portion of the month, Achille, Marie Jeanne, Steve, and Voahangy organized a field school in the Anjozorobe Forest that was funded by the Helmsley Charitable Trust; the site is part of a new protected area, Corridor Anjozorobe-Angavo. Eight individuals attended this field school, most of who are working with the local communities surrounding the protected area in different capacities, such as tourist guides and conservation agents, for the organization responsible for the management of the site.

During a portion of the month, Voahangy was at the Université de Fianarantsoa to present some courses. She also attended a conference in Belgium associated with the «StopRats» project, which Association Vahatra is a participant. As this month was part of an academic semester at the Université d'Antananarivo, Marie Jeanne and Achille spent considerable time teaching at the university. Marie Jeanne also helped two Master's II degree students from the same university edit their memoires. In early February, Steve attended a meeting of the advisory group of Critical Environment Partnership Fund's (CEPF) western Indian Ocean program. Steve and colleagues from the Madagascar Biodiversity Fund had a series of meetings in Antananarivo with different management organizations, to explain in detail a project to conduct a large-scale review of Madagascar's terrestrial protected area network, a project funded by CEPF.

March

During the first two weeks of the month, Achille, Steve, and Voahangy, together with a number of colleagues and students from national and overseas institutions, conducted an inventory of the terrestrial plants and animals occurring on islands in the extreme northeast, known as the Nosy Ankao island group. One student from the Université d'Antsiranana will use collected data on small mammals for his Master's II degree. The general research results will be published as a monograph in early 2017.

During this latter portion of the month, Voahangy pursued courses at the Université de Fianarantsoa, and carried out a field school in the Ranomafana National Park for students from the same institution. Marie Jeanne supervised three Master's II degree projects of students from the Université d'Antananarivo and worked closely with five students from the Université de Toamasina. As this month was part of an academic semester at the Université d'Antananarivo, Marie Jeanne and Achille spent considerable time teaching at that university.

April

At the beginning of the month, Achille, Marie Jeanne, and Steve conducted fieldwork in the greater Toamasina region on invasive introduced species, specifically House Sparrows and Asian common toads, and associated with the research of five Master's students from the Université de Toamasina. In the latter portion of April, Achille, Voahangy, and Marie Jeanne were actively involved in the preparation of a large-scale field trip to the Marojejy National Park. Steve served as the co-director of a Ph.D. thesis presented at the Université d'Antananarivo.

May

Achille, Voahangy, and Jeanne, spent the complete month conducting fieldwork in the Marojejy National Park, in the far north, in the context of assessing the impact of illegal extraction of rosewood in the protected area on different groups of land vertebrates, a project under the sponsorship of UNESCO (World Heritage Sites) and the Madagascar Biodiversity Foundation. The field portion of the project also included training of conservation agents and local people working for Madagascar National Parks on different aspects of biodiversity, conservation, and ecological monitoring. Forty different individuals were trained in the context of this project, 10 from Masoala National Park (in late 2016) and 30 from Marojejy National Park.

Steve worked closely with several Master's and Ph.D. students at the Université d'Antananarivo in the last stages of finalization of their mémoires or theses, four of which presented this same month.

June

In the first portion of the month, Achille, Marie Jeanne, and Voahangy organized a workshop in Antananarivo as part of a project funded by the Helmsley Charitable Trust to help with capacity building of field agents working with a conservation-development organization in the Corridor Anjozorobe-Angavo protected area; many of these same individuals attended the February field school at the site. In mid-June, Voahangy left for Sierra Leone to organize a capacity building field school in the context of StopRats project. This formation included 18 participants coming from different research and national institutions involved in different aspects of agricultural and community development. About the same time, Steve left for his northern summer trip to The Field Museum in Chicago.

On the academic front, this month marked the start of the new academic year at the Université d'Antananarivo. Achille and Marie Jeanne commenced their courses and spent a considerable amount of time at the university. Jeanne also helped two students to develop their Master's II proposal, and assisted one of them with the preparation of associated fieldwork. She also was involved in a Master II presentation at the same university.

July

Voahangy prepared a field school for students from the Université de Fianarantsoa. She also supervised the advancement of seven students working on their "License mémoire" at the same university. Steve left Chicago to attend the five-day International Bat Research Conference in Durban, South Africa, where he presented an invited plenary lecture. During the month, Steve consolidated the different reports from the research groups that took part in the March inventory of the Nosy Ankao group, many of which were translated from the French, and started the process of converting the associated information into a manuscript.

Marie Jeanne and Achille pursued their academic activities at the Université d'Antananarivo. Marie Jeanne was also actively involved in the compilation of reports associated with the May fieldwork in the Marojejy National Park. She worked with Achille, Voahangy, and different members of the field team from the Marojejy and Masoala National Parks to design manual guides for ecological monitoring and brochures on the unique and key species of these two sites. Both Achille and Marie Jeanne were members of jury of a Master's II presentation at the Université d'Antananarivo. Another student working with Achille on a critically endangered species of *Mantella* frog successfully defended her Master's II mémoire.

August

Under the auspices of the Madagascar Biodiversity Fund and in collaboration with an organization known as Asity, Marie Jeanne and two Master's II students from the Université d'Antananarivo conducted fieldwork in the Kinkony-Mahavavy Complex in the north-west, specifically associated with the monitoring of freshwater bird communities. The two students will use associated data for their degree research projects.

Voahangy participated to the Ecosummit 2016 conference in Montpellier, France. In the third week of the month, Steve returned to Antananarivo. Marie Jeanne and Achille were rather occupied with exams at the Université d'Antananarivo. Marie Jeanne was also involved with the presentation of a Master's II student and Steve and Achille served as co-director and committee member, respectively, for a Vahatra Ph.D. student working on biogeographical patterns of terrestrial vertebrates; all the these students were from the Université d'Antananarivo.

September

In our annual fashion, this month commenced our fieldwork season. Voahangy together with five students from the Université de Fianarantsoa conducted research in Moramanga region in the context of StopRats project, specifically aspects of the ecology of introduced rodent species. Steve left for two weeks in the caves of Ankarana for fieldwork with two Vahatra Ph.D. students, part of a continuing long-term project on the population dynamics of a fruit bat species. In the last days of the month, Steve went to Orlando, Florida, to present a plenary presentation at the International Entomological Conference. While in transit in Paris, he had a meeting with the botanists responsible for writing different sections for the protected areas book.

Marie Jeanne worked on the Masoala and Marojejy reports and associated manuals and brochures. She was involved in the presentation of Master's II mémoire at the Université d'Antananarivo. At the same university, Achille was the president of a Master's II presentation, and as the co-director with Steve of a Ph.D. thesis. Voahangy supervised two students working on their "Environnemental Technician mémoire" at the Université de Fianarantsoa.

October

Achille, Marie Jeanne, and Voahangy organized a field school in the context of collaboration between the Association Vahatra, WWF-Madagascar, and the Germany project known as SuLaMa (Sustainable Land use Management on the Mahafaly Plateau). The field school was conducted in the Tsimanampetsotse National Park, extreme southwestern Madagascar, and Steve joined the group for several days. The field school involved 13 students coming from the Mention Zoologie et Biodiversité Animale, Université d'Antananarivo; the Institut des Sciences et Techniques de l'Environnement (ISTE), Université de Fianarantsoa; and the Département de Biologie Animale, Université de

Toliara. Further, five conservation agents from Madagascar National Parks and staff of SuLaMa project joined the group. During the month, Steve made several presentations to different natural history tour groups passing through Antananarivo. This month was also a period of finalizing the manuscript on the Nosy Ankao group inventory and its submission.

November

Achille spent 10 days in the Maromizaha Forest in the central east to set-up a research program for a Master's II student working on frogs. He also profited to explore some aspect of the local herpetological community. Steve spent several days at the beginning of the month giving introductory lectures and conducting field excursions for Malagasy and international students attending the Tropical Biology Association course in Kirindy, central western Madagascar. In the middle portion of the month, he returned to the caves of Ankarana to continue fieldwork there with two Malagasy Ph.D. students working on fruit bat ecology. Voahangy continue lab work associated with field studies conducted in the Moramanga region last month in the context of the StopRats project.

Vahatra in collaboration with the partner organization Madagascar Biodiversity Fund conducted a one-day workshop to bring together the different the groups responsible for the management of the island's terrestrial protected areas. The main purpose of the meeting was to inform the different organizations on advancements associated with the large-scale review of the island's protected areas being conducted by Vahatra, Madagascar Biodiversity Fund, and numerous collaborators, and present in a clear manner the next planned stages.

Marie Jeanne and Achille spent an important portion of their time teaching at the Université d'Antananarivo, as well as with the advancement of Master's II students from that university and the Université de Toamasina. Marie Jeanne also assisted in the preparation of field trips for two students from the Mention Sciences Animales, Ecole Supérieure des Sciences Agronomiques, Université d'Antananarivo, working on invasive species along the east coast of Madagascar. Moreover, she followed the proofs and printing of the Masoala and Marojejy reports, and associated manuals and brochures. Achille chaired the defense of Master's II student from Vahatra working on rodents in the central east; Steve was also a member of the jury. At the end of the month, Voahangy and Steve went to Arusha, Tanzania, to attend the final meeting of the StopRats project.

December

Steve and Achille, together with some other colleagues, conducted a biological inventory within a protected area known as Betampona, in the central east, in part to fill in information on the locally occurring vertebrates for the review concerning Malagasy protected areas. Achille then returned to the Maromizaha Forest to continue his supervision of the research of three Master's II students.

Marie Jeanne pursued her teaching activities at the University of Antananarivo, as well as editing papers for *Malagasy Nature*. Achille worked on three Ph.D. theses from that same university, all scheduled for presentation in the first portion of 2017. A workshop conducted by a researcher from The University of Alaska (Fairbanks) was organized at Vahatra for graduate students from the Mention Zoologie et Biodiversité Animale, Université d'Antananarivo, on the utilization of the software R. The feedback from the ~25 student participants was very positive.

PEOPLE FROM VAHATRA IN FOCUS

Dr. Toky Randriamoria

In 2009, Association Vahatra conducted a field school for young graduate students from the Mention Zoologie et Biodiversité Animale, Université d'Antnanarivo. These field schools serve numerous functions, two of which are: 1) advancement of scientific capacity for young Malagasy graduate students and 2) an excellent means to pick qualified and passionate students for future mentoring during the course of their graduate studies. Amongst those attending the 2009 field school, was a young Toky Randriamoria. In his quiet demeanor, it was clear that he was very engaged to advance on his graduate studies and soon there after he was brought into the fold as one of the graduate students that would work closely with scientists from Association Vahatra.

The subject of his Mémoire de Diplôme d'Etudes Approfondies was the structure of reptile and amphibian communities in the Beanka Forest of west central Madagascar. He conducted detailed fieldwork at the site, under some difficult conditions, in a relatively direst and quick manner worked up the results, and made the formal mémoire presentation in 2011, receiving a very high grade. He was subsequently engaged by Association Vahatra in the context of the StopRats project to do a thesis on small mammals, with particular reference to their ecology, ectoparasites, and aspects of zoonoses transmission. His Ph.D. was presented at Université d'Antananarivo in 2016, and, once again, we received the highest note possible for his thesis work. During the period of his thesis, he attended different meetings and workshops associated with the StopRats project in Tanzania and South Africa.

After the completion of his thesis, Toky was engaged for the start of 2017 as a post-doc in the context of the Helmsley Charitable Trust grant to Island Conservation and Association Vahatra to develop a project to remove introduced rats from an island in the Nosy Ankao group that has one of the most important tern colonies in the western Indian Ocean. Part of his post-doc will include attending a course given by the Durrell Conservation Trust on Mauritius associated with different conservation biology techniques. The hope is that many of the techniques he will learn about, particularly invasive species eradication, will be applied in a practical manner upon his return to Madagascar.

Toky has been an exemplar student, always calm and posed, reflective, and notably keen on fieldwork and different types of analyses. He has authored several scientific papers as a single or co-author in different international journals. On following his academic trajectory, it is clear that the extra attention and training he received from Vahatra helped mold the manner he sees himself fitting into the scientific world and instilling an important level of passion. We wish him the best for the future stages of his scientific career.

NEW SPECIES OF ANIMALS DESCRIBED IN 2016 BY VAHATRA SCIENTISTS

One of the direct results of the biological inventories conducted by Vahatra and associated collected specimens, is the discovery of species previously unknown to science. Vahatra scientists described this past year one new species of bat and several species of bird feather mites from Madagascar.

1. Goodman, S. M., A. Rakotoarivelo, M. C. Schoeman & S. Willows-Munro. 2016. How many species of *Hipposideros* have occurred on Madagascar since the Late Pleistocene? *Zoological Journal of the Linnean Society*, 177: 228-249.
2. Skoracki, M., B. M. OConnor, S. M. Goodman, N. Marciniak & B. Sikora. 2016. New species and records of syringophilid mites (Acariformes: Prostigmata) associated with Malagasy birds. *Systematic and Applied Acarology*, 21: 1534-1546.

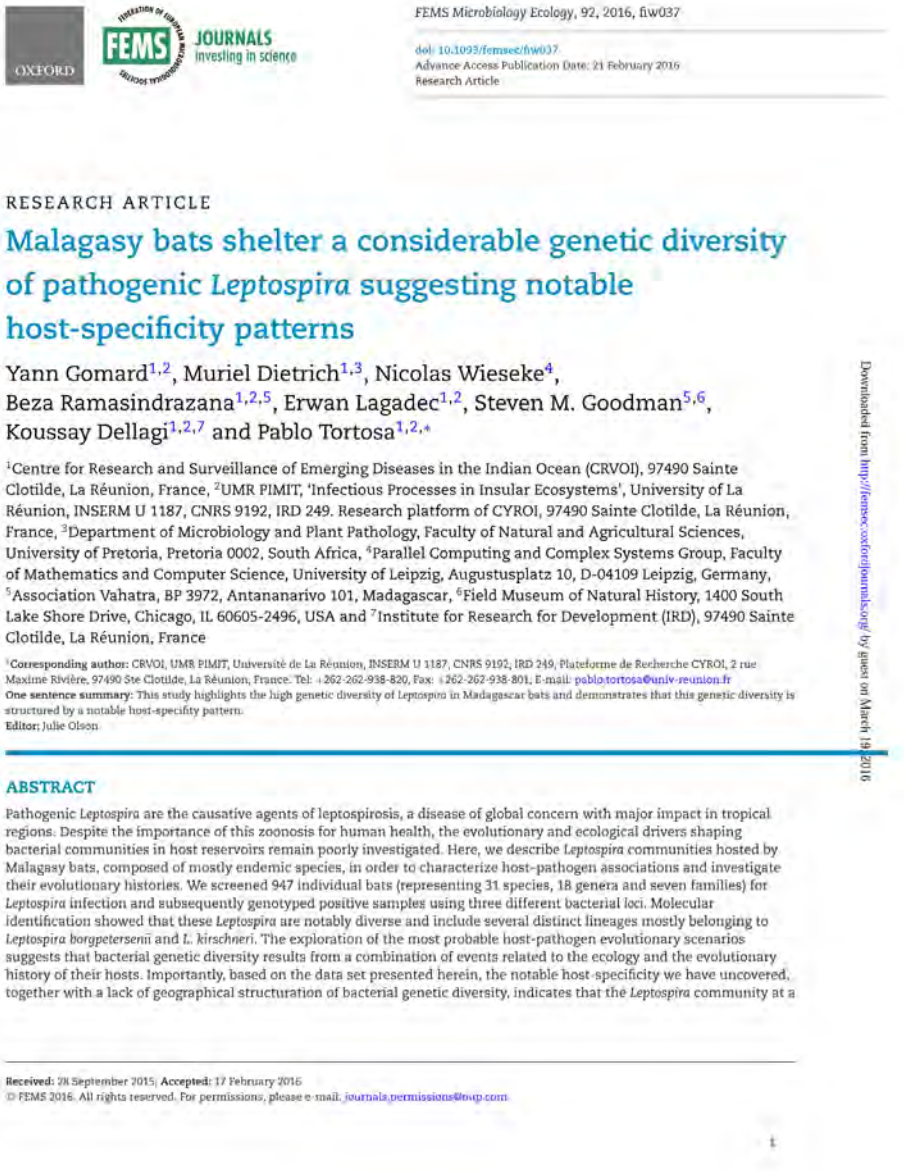
A number of papers are in press with descriptions of a variety of new animals to science and that will be published in 2017.

SCIENTIFIC OUTPUTS OF VAHATRA DURING 2016

Publications from 2016, including in press and submitted manuscripts. Names in **bold** are those of scientific members and a research associate of Vahatra and those in *italics* are current or past Malagasy student members working with the Association.

1. Armstrong, K. N., **S. M. Goodman**, P. Benda & S. Hand. 2016. A common name for the bat family Rhinonycteridae—the Trident Bats. *Zootaxa*, 4179 (1): 115-117.
2. Baab, K. L., P. Brown, D. Falk, J. T. Richtsmeier, C. F. Hildebolt, K. Smith & **W. L. Jungers**. 2016. A critical evaluation of the Down Syndrome diagnosis for LB1, type specimen of *Homo floresiensis*. *PLoS ONE*, 11(6): e0155731.
3. Boria, R., L. E. Olson, **S. M. Goodman** & R. P. Anderson. 2016. A single-algorithm ensemble approach to estimating suitability and uncertainty: Cross-time projections for four Malagasy tenrecs. *Diversity and Distributions,* DOI: 10.1111/ddi.12510
4. Dammhahn, M., *T. M. Randriamoria* & **S. M. Goodman**. In press. Niche differentiation using stable isotopes between invasive non-native *Rattus* spp. in anthropogenic and natural habitats of central eastern Madagascar. *BMC Biology*.
5. Dietrich, M., Y. Gomard, E. Lagadec, *B. Ramasindrazana*, G. Le Minter, V. Guernier, A. Benlali, G. Rocamora, W. Markotter, **S. M. Goodman**, K. Dellagi & P. Tortosa. Submitted. Biogeography of *Leptospira* in wild animal communities inhabiting the insular ecosystem of the western Indian Ocean islands and neighboring Africa. *Molecular Ecology*.
6. Everson, K. M., **V. Soarimalala, S. M. Goodman** & L. E. Olson. 2016. A multilocus reassessment of the phylogeny, biogeography, and taxonomy of Madagascar's tenrecs (Mammalia: Tenrecidae). *Systematic Biology,* DOI:10.1093/sysbio/syw034.
7. Fernández, P. J., N. B. Holowka, B. Demes & **W. L. Jungers**. 2016. Form and function of the human and chimpanzee forefoot: Implications for early hominin bipedalism. *Nature, Scientific Reports*, 6: 10.1038/srep30532.
8. Foley, N. M., **S. M. Goodman**, C. V. Whelan, S. J. Puechmaille & E. C. Teeling. In press. Towards navigating the Minotaur's Labyrinth: Cryptic diversity and taxonomic revision within the speciose genus *Hipposideros* (Hipposideridae). *Acta Chiropterologica*.
9. Fuchs, J., D. Lemoine, J. L. Parra, J.-M. Pons, **M. J. Raherilalao**, R. Prys-Jones, C. Thebaud, B. H. Warren & **S. M. Goodman**. 2016. Long-distance dispersal and inter-island colonization across the western Malagasy Region explain diversification in brush-warblers (Passeriformes: *Nesillas*). *Biological Journal of the Linnean Society* DOI: 10.1111/bij.12825.
10. Galante, P., B. Alade, R. Muscarella, S. Jansa, **S. M. Goodman** & R. P. Anderson. Submitted. Two approaches for selecting optimal complexity in ecological niche models: A comparison for the Malagasy rodent *Eliurus majori*. *Ecogeography*.
11. Gaubert, P., R. Patel, G. Veron, **S. M. Goodman**, R. Vasconcelos, A. Lourenço, M. Sigaud, F. Justy & A. Wilting. 2016. Molecular biogeography of the small Indian civet (*Viverricula indica*) and origin of introductions on western Indian Ocean islands. *Journal of Heredity,* doi: 10.1093/jhered/esw085.
12. Ghawar, W., H. Pascalis, J. Bettaieb, J. Mélade, A. Gharbi, M. A. Snoussi, D. Laouini, **S. M. Goodman**, Salah, A. B. & Dellagi, K. In press. Insight into the global evolution of Rodentia associated *Morbilli-related* paramyxoviruses. *Nature, Scientific Reports*.
13. Godfrey, L. R., M. C. Granatosky & **W. L. Jungers**. 2016. The hands of subfossil lemurs. In *The evolution of the primate hand*, eds. T. L. Kivell, P. Lemelin, B. G. Richmond & D. Schmitt, pp. 421-453. Springer Science+Business Media, New York.
14. **Goodman, S. M.** & K. Muldoon. 2016. A new subfossil locality for the extinct large Malagasy eagle *Stephanoaetus mahery* (Aves: Falconiformes): implications for time of extinction and ecological specificity. *The Holocene*, 26: 985-989.
15. **Goodman, S. M.**, *Y. Anbdou*, Y. Andriamiarantsoa, B. L. Fisher, O. Griffiths, B. Keitt, J.-J. Rafanomezantsoa, E. T. Rajoelison, J.-C. Rakotonirina, L. Ranaivoarisoa, P. Ranirison, **V. Soarimalala**, M. L. Tantely, P. Tortosa & **A. P. Raselimanana**. In press. Results of a biological inventory of the Nosy Ankao island group, Parc National de Loky-Manambato, northeastern Madagascar. *Malagasy Nature*, 11: 1-59.

16. **Goodman, S. M.**, T. Kearney, M. M. Ratsimbazafy & A. Hassanin. In press. Description of a new species of *Neoromicia* (Chiroptera: Vespertilionidae) from southern Africa: A name for "*N.* cf. *melckorum*". *Zootaxa*.
17. **Goodman, S. M.**, *A. Rakotoarivelo*, M. C. Schoeman & S. Willows-Munro. 2016. How many species of *Hipposideros* have occurred on Madagascar since the Late Pleistocene? *Zoological Journal of the Linnean Society*, 177: 228-249.
18. **Goodman, S. M.**, *F. I. Rajemison* & *O. S. Noroalintseheno Lalarivoniaina*. In press. Morphometric patterns of sexual dimorphism and seasonal differences of *Rousettus madagascariensis* in northern Madagascar. *Acta Chiropterologica*.
19. Gomard, Y., M. Dietrich, N. Wieseke, *B. Ramasindrazana*, E. Lagadec, **S. M. Goodman**, K. Dellagi & P. Tortosa. 2016. Malagasy bats shelter a considerable genetic diversity of pathogenic *Leptospira* suggesting notable host-specificity patterns. *FEMS Microbiology Ecology*, 92: fiw037.
20. **Jungers, W. L.** 2016. These feet were made for walking. *eLife*, 5: e22886.
21. **Jungers, W. L.**, M. Grabowski, K. G. Hatala & B. G. Richmond. 2016. The evolution of body size and shape in the human career. *Philosophical Transactions of the Royal Society B*, 371: 20150247.
22. Lagadec, E., Y. Gomard, G. Le Minter, C. Cordonin, E. Cardinale, *B. Ramasindrazana*, M. Dietrich, **S. M. Goodman**, P. Tortosa & K. Dellagi. 2016. Identification of *Tenrec ecaudatus*, a wild mammal introduced to Mayotte Island, as the reservoir of the newly identified human pathogen *Leptospira mayottensis*. *PLoS Neglected Tropical Diseases* 10(8): e0004933. doi:10.1371/journal.pntd.0004933.
23. Lebarbenchon, C., B. Ramasindrazana, L. Joffrin, S. Bos, E. Lagadec, G. Le Minter, Y. Gomard, P. Tortosa, D. Wilkinson, **S. M. Goodman** & P. Mavingui. Submitted. Astroviruses in bats, Madagascar. *Emerging Microbes & Infections*.
24. Mélade, J., S. McCulloch, *B. Ramasindrazana*, E. Lagadec, M. Turpin, H. Pascalis, **S. M. Goodman**, W. Markotter & K. Dellagi. 2016. Serological evidence of Lyssaviruses among bats on southwestern Indian Ocean islands. *PLos ONE* 11(8): e0160553.
25. Mélade, J., N. Wieseke, *B. Ramazindrasana*, O. Flores, E. Lagadec, Y. Gommard, **S. M. Goodman**, K. Dellagi & H. Pascalis. 2016. An eco-epidemiological study of Morbilli-related paramyxovirus infection in Madagascar bats reveals host-switching as the dominant macro-evolutionary mechanism. *Nature, Scientific Reports*, 6: 23752.
26. Monadjem, A. & **S. M.** Goodman. In press. Family Nesomyidae. In *Handbook of Mammals of the World,* eds. D. E. Wilson & R. A. Mittermeier. Lynx Edicions, Barcelona.
27. Murphy, A. J., **S. M. Goodman**, Z. J. Farris, S. M. Karpanty, V. Andrianjakarivelo & M. J. Kelly. 2016. Landscape trends in small mammal occupancy in the Makira-



OXFORD FEMS JOURNALS investing in science

FEMS Microbiology Ecology, 92, 2016, fiw037
doi: 10.1093/femsec/fiw037
Advance Access Publication Date: 21 February 2016
Research Article

RESEARCH ARTICLE

Malagasy bats shelter a considerable genetic diversity of pathogenic *Leptospira* suggesting notable host-specificity patterns

Yann Gomard[1,2], Muriel Dietrich[1,3], Nicolas Wieseke[4], Beza Ramasindrazana[1,2,5], Erwan Lagadec[1,2], Steven M. Goodman[5,6], Koussay Dellagi[1,2,7] and Pablo Tortosa[1,2,*]

[1]Centre for Research and Surveillance of Emerging Diseases in the Indian Ocean (CRVOI), 97490 Sainte Clotilde, La Réunion, France, [2]UMR PIMIT, 'Infectious Processes in Insular Ecosystems', University of La Réunion, INSERM U 1187, CNRS 9192, IRD 249. Research platform of CYROI, 97490 Sainte Clotilde, La Réunion, France, [3]Department of Microbiology and Plant Pathology, Faculty of Natural and Agricultural Sciences, University of Pretoria, Pretoria 0002, South Africa, [4]Parallel Computing and Complex Systems Group, Faculty of Mathematics and Computer Science, University of Leipzig, Augustusplatz 10, D-04109 Leipzig, Germany, [5]Association Vahatra, BP 3972, Antananarivo 101, Madagascar, [6]Field Museum of Natural History, 1400 South Lake Shore Drive, Chicago, IL 60605-2496, USA and [7]Institute for Research for Development (IRD), 97490 Sainte Clotilde, La Réunion, France

*Corresponding author: CRVOI, UMR PIMIT, Université de La Réunion, INSERM U 1187, CNRS 9192, IRD 249, Plateforme de Recherche CYROI, 2 rue Maxime Rivière, 97490 Ste Clotilde, La Réunion, France. Tel: +262-262-938-820, Fax: +262-262-938-801, E-mail: pablo.tortosa@univ-reunion.fr

One sentence summary: This study highlights the high genetic diversity of Leptospira in Madagascar bats and demonstrates that this genetic diversity is structured by a notable host-specifity pattern.

Editor: Julie Olson

ABSTRACT

Pathogenic *Leptospira* are the causative agents of leptospirosis, a disease of global concern with major impact in tropical regions. Despite the importance of this zoonosis for human health, the evolutionary and ecological drivers shaping bacterial communities in host reservoirs remain poorly investigated. Here, we describe *Leptospira* communities hosted by Malagasy bats, composed of mostly endemic species, in order to characterize host-pathogen associations and investigate their evolutionary histories. We screened 947 individual bats (representing 31 species, 18 genera and seven families) for *Leptospira* infection and subsequently genotyped positive samples using three different bacterial loci. Molecular identification showed that these *Leptospira* are notably diverse and include several distinct lineages mostly belonging to *Leptospira borgpetersenii* and *L. kirschneri*. The exploration of the most probable host-pathogen evolutionary scenarios suggests that bacterial genetic diversity results from a combination of events related to the ecology and the evolutionary history of their hosts. Importantly, based on the data set presented herein, the notable host-specificity we have uncovered, together with a lack of geographical structuration of bacterial genetic diversity, indicates that the *Leptospira* community at a

Received: 28 September 2015; Accepted: 17 February 2016

Masoala protected areas, northeastern Madagascar. *Journal of Mammalogy,* doi.org/10.1093/jmammal/gyw168/gyw168

28. Naidoo, T., M. C. Schoeman, **S. M. Goodman**, P. J. Taylor & J. M. Lamb. 2016. Discordance between mitochondrial and nuclear genetic structure in the bat *Chaerephon pumilus* (Chiroptera: Molossidae) from southern Africa. *Mammalian Biology*, 81: 115-122.
29. Naidoo, T., **S. M. Goodman**, M. C. Schoeman, P. J. Taylor & J. M. Lamb. 2016. Partial support for the classical ring species hypothesis in the *Chaerephon pumilus* species complex (Chiroptera: Molossidae. *Mammalia*, 80: 627-643.
30. Noroalintseheno Lalarivoniaina, O. S., F. I. Rajemison & **S. M. Goodman**. In press. Survie et variation temporelle de la taille de la population de *Rousettus madagascariensis* (Chiroptera : Pteropodidae) de la Grotte des Chauves-souris d'Ankarana, nord de Madagascar. *Malagasy Nature*.
31. Peichl, L., A. Kaiser, F. Rakotondraparany, **S. M. Goodman**, R. R. Dubielzig & P. M. Kappeler. In press. Diversity of photoreceptor arrangements in nocturnal, cathemeral and diurnal Malagasy lemurs. *Journal of Comparative Neurology*.
32. **Raherilalao, M. J**., **A. Raselimanana, V. Soarimalala** & **S. M. Goodman**. 2016. Manuel de suivi écologique pour le Parc National de Masoala, Madagascar. Association Vahatra, Antananarivo.
33. **Raherilalao, M. J**., **A. Raselimanana, V. Soarimalala** & **S. M. Goodman**. 2016. Manuel de suivi écologique pour le Parc National de Marojejy, Madagascar. Association Vahatra, Antananarivo.
34. *Rajemison, F. I*., *O. S. Noroalintseheno Lalarivoniaina* & **S. M. Goodman**. In press. Bat flies (Diptera: Nycteribiidae, Streblidae) of *Rousettus madagascariensis* (Chiroptera: Pteropodidae) in the Parc National d'Ankarana, Madagascar: species diversity, rates of parasitism and sex ratio. *African Entomology*.
35. *Rajemison, F. I*., *O. S. Noroalintseheno Lalarivoniaina* & **S. M. Goodman**. In press. Parasitism by Nycteribiidae and Streblidae flies (Diptera) of a Malagasy fruit bat (Pteropodidae): Effects of body size and throat gland development on parasite abundance. *Journal of Medical Entomology*.
36. *Rajemison, F. I*., *O. S. Noroalintseheno Lalarivoniaina*, A. Andrianarimisa & **S. M. Goodman**. Submitted. Host-parasite relationship between a Malagasy fruit bat, *Rousettus madagascariensis* (Chiroptera: Pteropodidae), and associated bat fly, *Eucampsipoda madagascarensis* (Diptera: Nycteribiidae): seasonal variation of host body condition and the possible impact of parasite abundance. *Parasite*.
37. *Rakotomanga, M. N*., **S. M. Goodman**, **V. Soarimalala**, S. Boyer & D. Apanaskevich. In press. Les tiques (Acari : Ixodidae) ectoparasites des micromammifères non-volants dans la forêt d'Ambohitantely, Madagascar. *Malagasy Nature*.
38. *Rakotondramanana, C. F*. & **S. M. Goodman**. In press. A review of the bacular morphology of Malagasy bats. *Acta Chiropterologica*.
39. *Ramasindrazana, B.*, K. Dellagi, E. Lagadec, M. Randrianarivelojosia, **S. M. Goodman** & P. Tortosa. 2016. Diversity, host specialization and geographic structuration of filarial nematodes infecting Malagasy bats. *PLoS ONE* 11(1): e0145709. doi:10.1371/journal.pone.0145709.
40. *Randrenjarison Andriniaina, H. R*., J.-C. Beaucournu, **V. Soarimalala**, S. Boyer & **S. M. Goodman**. In press. Sex-ratio chez les puces (Insecta : Siphonaptera) d'Ambohitantely, Hautes Terres Centrales de Madagascar. *Malagasy Nature*.
41. Richards, L., R. V. Rambau, **S. M. Goodman**, P. J. Taylor, M. C. Schoeman, F. Yang & J. M. Lamb. 2016. Karyotypic evolution in Malagasy flying foxes (Pteropodidae, Chiroptera) and their hipposiderid relatives as determined by comparative chromosome painting. *Cytogenetics and Genome Research*, 148(2-3):185-198.
42. Skoracki, M., B. M. OConnor, **S. M. Goodman**, N. Marciniak & B. Sikora. 2016. New species and records of syringophilid mites (Acariformes: Prostigmata) associated With Malagasy birds. *Systematic and Applied Acarology*, 21: 1534-1546.
43. Sutikna, T., M. W. Tocheri, M. J. Morwood, E. W. Saptomo, E. W., Jatmiko, R. D. Awe, S. Wasisto, K. E. Westaway, M. Aubert, B. Li, J.-X. Zhao, M. Storey, B. V. Alloway, M. W. Morley, H. J. M. Meijer, G. D. van den Bergh, R. Grün, A. Dosseto, A. Brumm, **W. L. Jungers** & R. G. Roberts. 2016. Revised stratigraphy and chronology for *Homo floresiensis* at Liang Bua in Indonesia. *Nature*, 532: 366-369.
44. Swanepoel, L. H., C. M. Swanepoel, P. R. Brown, S. J. Eiseb, **S. M. Goodman**, M. Keith, F. Kirsten, H. Leirs, T. A. M. Mahlaba, R. H. Makundi, P. Malebane, E. F. von Maltitz, A. W. Massawe, A. Monadjem, L.S. Mulungu, G. R. Singleton, P. J. Taylor, **V. Soarimalala** & S. R. Belmain. In press. A systematic review of rodent pest research in Afro-Malagasy small-holder farming systems: Are we asking the right questions? *PLoS ONE*.
45. Tantely, L., **S. M. Goodman** & S. Boyer. 2016. Review of West Nile virus circulation and outbreak risk on Madagascar: Entomological and ornithological perspectives. *Parasite*, 23: 49.
46. Tocheri, M. W., R. Dommain, S. C. McFarlin, S. E. Burnett, D. T., Case, C. M. Orr, N. T. Roach, B. Villmoare, A. B. Eriksen, D. C. Kalthoff, S. Senck, Z. Assefa, C. P. Groves & **W. L. Jungers**. 2016. The evolutionary origin and population history of the Grauer Gorilla. *Yearbook of Physical Anthropology*, 159: S4-S18.
47. Veron, G. & **S. M. Goodman**. In press. One or two species of the rare Malagasy carnivoran *Eupleres* (Eupleridae)? New insights from molecular data. *Mammalia*.
48. Veron, G., D. Dupré, A. Jennings, C. Gardner, A. Hassanin & **S. M. Goodman**. In press. Molecular systematics of Malagasy mongoose-like carnivorans (Carnivora, Eupleridae, Galidiinae). *Journal of Zoological Systematics and Evolutionary Research*.

Ecology and Evolution

Open Access

Potential merger of ancient lineages in a passerine bird discovered based on evidence from host-specific ectoparasites

Nicholas L. Block[1,2], Steven M. Goodman[2,3], Shannon J. Hackett[2], John M. Bates[2] & Marie J. Raherilalao[3,4]

[1]Biology Department, Stonehill College, 320 Washington Street, Easton, Massachusetts 02357
[2]Field Museum of Natural History, 1400 S. Lake Shore Dr., Chicago, Illinois 60605
[3]Association Vahatra, BP 3972, Antananarivo (101), Madagascar
[4]Département de Biologie Animale, Université d'Antananarivo, BP 906, Antananarivo (101), Madagascar

Keywords
Birds, despeciation, ectoparasites, Madagascar, microsatellites.

Correspondence
Nicholas L. Block, Biology Department, Stonehill College, 320 Washington Street, Easton, MA, 02357, USA.
Tel: +508 565 1495; Fax: +508 565 1469
E-mail: nblock@stonehill.edu

Funding Information
This study was funded by the Field Museum's Council on Africa, the American Ornithologists' Union Research Award, the Frank M. Chapman Memorial Fund, a Sigma Xi Grant-in-Aid of Research, and the University of Chicago's Committee on Evolutionary Biology Hinds Fund. Certain field samples were collected with support to the Association Vahatra from the Field Museum, John D. and Catherine T. MacArthur Foundation, and the Volkswagen Foundation. NLB was supported by a National Science Foundation Graduate Research Fellowship and an NSF GAANN fellowship.

Received: 21 January 2015; Revised: 10 July 2015; Accepted: 13 July 2015

Abstract

The merger of formerly isolated lineages is hypothesized to occur in vertebrates under certain conditions. However, despite many demonstrated instances of introgression between taxa in secondary contact, examples of lineage mergers are rare. Preliminary mtDNA sequencing of a Malagasy passerine, *Xanthomixis zosterops* (Passeriformes: Bernieridae), indicated a possible instance of merging lineages. We tested the hypothesis that *X. zosterops* lineages are merging by comparing mtDNA sequence and microsatellite data, as well as mtDNA sequence data from host-specific feather lice in the genus *Myrsidea* (Phthiraptera: Menoponidae). *Xanthomixis zosterops* comprises four deeply divergent, broadly sympatric, cryptic mtDNA clades that likely began diverging approximately 3.6 million years ago. Despite this level of divergence, the microsatellite data indicate that the *X. zosterops* mtDNA clades are virtually panmictic. Three major phylogroups of *Myrsidea* were found, supporting previous allopatry of the *X. zosterops* clades. In combination, the datasets from *X. zosterops* and its *Myrsidea* document a potential merger of previously allopatric lineages that likely date to the Pliocene. This represents the first report of sympatric apparent hybridization among more than two terrestrial vertebrate lineages. Further, the mtDNA phylogeographic pattern of *X. zosterops*, namely the syntopy of more than two deeply divergent cryptic clades, appears to be a novel scenario among vertebrates. We highlight the value of gathering multiple types of data in phylogeographic studies to contribute to the study of vertebrate speciation.

doi: 10.1002/ece3.1639

Introduction

The widespread merger of formerly isolated lineages – sometimes referred to as despeciation or speciation in reverse – is hypothesized to be possible for vertebrates under certain conditions, which often involve human alteration of habitat or introduction of non-native species (Rhymer and Simberloff 1996; Seehausen 2006; Seehausen et al. 2008). Despite many documented instances of introgression between vertebrate taxa in secondary contact, examples of complete lineage mergers, as indicated by total genetic mixing, are rare. The only genetically documented examples of complete lineage mergers in vertebrates, to our knowledge, involve recently diverged lake

49. Wilkinson, D., O. Duron, C. Cordonin, Y. Gomard, *B. Ramasindrazana*, P. Mavingui, **S. M. Goodman** & P. Tortosa. 2016. The bacteriome of bat flies (Nycteribiidae) from the Malagasy region: A community shaped by host-ecology, bacterial transmission mode, and host-vector specificity. *Applied and Environmental Microbiology* 82(6): 1778-1788.
50. Yoder, A. D., C. R. Campbell, M. Blanco, J. U. Ganzhorn, **S. M. Goodman**, K. E. Hunnicutt, P. A. Larsen, P. M. Kappeler, R. M. Rasoloarison, J. M. Ralison, D. L. Swofford & D. W. Weisrock. 2016. Geogenetic patterns in mouse lemurs (genus *Microcebus*) reveal the ghosts of Madagascar's forests past. *Proceedings of the National Academy of Science, USA* doi/10.1073/pnas.1601081113.

B.P. 3972, Ambohidempona-Tsiadana, Antananarivo 101, Madagascar - +261 20 22 277 55 - associatvahatra@moov.mg - www.vahatra.mg