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## Marc Choisy

Gender: Male

Citizenship: French

Date of birth: 30 October 1976

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## Research

I study the ecology and evolution of infectious diseases. The questions that I explore include the seasonality and spatial dynamics of infectious diseases, as well as the interactions between different pathogens. I am particularly keen on basic research questions that have potential practical applications. I have thus been working extensively on the optimization of vaccine policies and I am currently taking up research on the evolution of antibiotic resistance in bacteria. Methodologically, I develop and use statistical, mathematical and computational models. I have a special interest in data-driven model development and model calibration to real data. More recently, I expanded my expertise to data mining of big data employing machine learning techniques.

## Education

2004: PhD *Integrative Biology*, University of Montpellier, France

2001: MSc *Biostatistics*, University of Montpellier, France

2000: MSc *Ecology & Evolution*, University of Montpellier, France

2000: MSc *Agronomy*, Montpellier SupAgro, Montpellier, France

## Employment

Since 2020: Research Fellow, Nuffield Department of Medicine, University of Oxford, UK

Since 2020: Head of Mathematical Modelling, *Oxford University Clinical Research Unit*, Saigon, Vietnam

2012-2020: Visiting Scientist, *Oxford University Clinical Research Unit*, Hanoi, Vietnam

2010-2020: Senior Research Scientist, *Institute of Research for Development*, France

2006-2010: Junior Research Scientist, *Institute of Research for Development*, France

2004-2006: Post-doctoral Researcher, Odum School of Ecology, *University of Georgia*, USA

1998-1999: Research Assistant, College of Natural Resources, *University of Wisconsin*, USA

## Teaching

Since 2016: Organizer of the CBID (*Computational Biology for Infectious Diseases*, [www.cbid.asia](http://www.cbid.asia)) annual summer school at ICISE ([www.icisequynhon.com](http://www.icisequynhon.com)), Quy Nhon, Vietnam. Every year: 10 days, 20 professors, 90 students, 20-25 nationalities.

Since 2014: Teaching *Infectious Diseases Modeling* to graduate students of the University of Malaya in Sarawak, Malaysia: 30 h / year.

Since 2009: Teaching *Phylogeny and Molecular Evolution* to MSc students of USTH (University of Science and Technology of Hanoi), Hanoi, Vietnam: 10 h / year.

2008-2012: Teaching *Global Environmental Changes and Health* to MPH students of EHESP (French School of Public Health), Paris, France: 30 h / year.

2007-2012: Teaching *Quantitative Epidemiology* to MSc students of the University of Montpellier, Montpellier, France: 30 h / year.

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I also run a blog on R programming (see [choisy.github.io](https://choisy.github.io)) and post R tutorials on *RPubs* (see [rpubs.com/choisy](https://rpubs.com/choisy)).

## Supervision

### Post-doctoral researchers

Period	Researcher	Topic	Co-supervised with
2019-2020	Quentin Richard	Transmission strategies of vector-borne parasites	Ramsès Djidjou-Demasse
2013-2014	Guilhem Rascalou	Control of Chagas disease vectors	
2013	Soudeh Ehsani	Emergence of antibiotics resistance in hospitals	Heiman Wertheim
2012	Étienne Kouokam	Age-structured models of infectious diseases	Jean-Daniel Zucker

### PhD students

Period	Student	Topic	University	Co-supervised with
2018-21	Nguyen Thi Nhung	Transmission and dynamics of antimicrobial resistance in zoonotic and commensal bacteria in small-holder farming systems in Vietnam	Open University, UK	Juan Carrique-Mas Steve Baker
2017-21	Gonché Danesh	Phylogenetic analysis of transmission and virulence of HIV and coinfecting viruses	University of Montpellier, France	Samuel Alizon
2017-20	Nguyen Van Cuong	Antimicrobial Reduction in Chicken Production in Vietnam	Open University, UK	Juan Carrique-Mas
2017-20	Vu Tien Viet Dung	Optimizing surveillance network for efficiently monitor and control antibiotic resistance in Vietnam	University of Montpellier, France	Marisa Peyere Rogier van Doorn
2015-20	Hannah Brindle	Encephalitis in Northern Vietnam: aetiology and epidemiology	University of Liverpool, UK	Behzad Nadjm Rob Christley Michael Griffiths
2015-18	Pham Hoang Nguyen	Causality in epidemiological time series	University of Paris, France	Jean-Daniel Zucker
2012-16	Tran Thi Cam Giang	Optimisation of vaccine policies in space	University of Paris, France	Jean-Daniel Zucker
2012-15	Le Viet Thanh	Phylodynamics of dengue viruses in Hanoi	University of Montpellier, France	Heiman Wertheim
2010-13	Pham Quang Thai	Spatial dynamics of seasonal influenza in Vietnam	Open University, UK	Peter Horby Maciej Boni

### MSc students

Year	Student	Diploma	University
2019	Zineb Bentounsi	MSc Global Health	Oxford University, UK
2018	Ana Bonell	MSc Epidemiology	LSTMH, London, UK

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2018	Jethro Zawolo	MPH Global Health	Oxford University, UK
2018	Gerald Makuka	MPH Global Health	Oxford University, UK
2018	Trinh Son Tung	MSc Biotechnology	Napier U., Edinburgh, UK
2018	Dang Duy Hoang Giang	MSc Data Science	UCL, London, UK
2017	James Mbinta Fenibe	MPH Global Health	HMU, Hanoi, Vietnam
2017	Tatiana Ngassa Tchoudjeuh	MSc Computer Science	VNU, Hanoi, Vietnam
2016	Jakub Voznica	MSc Ecology & Evolution	ENS, Cachan, France
2016	Sara Bosshardt	MSc Ecology & Evolution	ENS, Paris, France
2015	Lionel Jaderne Houssou	MSc Computer Science	IFI, Hanoi, Vietnam
2015	Damien Philippon	MSc Computer Science	IFI, Hanoi, Vietnam
2014	Progress Udoh	MSc Computer Science	IFI, Hanoi, Vietnam
2014	Nguyen Ngoc Anh	MSc Pharmacology	USTH, Hanoi, Vietnam
2013	Noy Souliyaseng	MPH Global Health	IFMT, Vientiane, Lao PDR
2013	Selain Kasereka	MSc Computer Science	IFI, Hanoi, Vietnam
2012	Philavanh Sitboulang	MPH Global Health	IFMT, Vientiane, Lao PDR
2012	Malyvanh Vongpanhya	MPH Global Health	IFMT, Vientiane, Lao PDR
2011	Tran Thi Cam Giang	MSc Computer Science	IFI, Hanoi, Vietnam
2011	Fanny Gascuel	MSc Ecology & Evolution	ENS, Lyon, France
2009	Ségolène Charaudeau	MSc Biomathematics	SupÉlec, Paris, France
2009	Fred Andayi	MPH Global Health	EHESP, Paris, France
2009	Étienne Gignoux	MPH Global Health	EHESP, Paris, France
2008	Mohamed Rafik	MSc Biomathematics	Univ of Toulouse, France
2007	Lamine Condet	MSc Biomathematics	Univ of Toulouse, France

#### Undergraduate students

Year	Student	University
2020	Taishi Nakase	Princeton University, USA
2016	Muriël van Oers	University of Rotterdam, Netherlands
2016	Anagha Prasanna	Princeton University, USA
2016	Maria Malik	Princeton University, USA

#### Research assistants

Year	Student	University
2017-2019	Lucie Contamin	University of Grenoble, France
2012-2013	Raaka Kumbhakar	Columbia University, New York, USA
2012-2013	Mai Ngoc Khuong	IFI, Hanoi, Vietnam

## Services

Associate Editor for *PLoS Neglected Tropical Diseases*.

#### Scientific reviews

- Regular reviewer for journals in **ecology, evolution, medical sciences, biomathematics**, as well as journals of general science. See [publons.com/a/1170064](https://publons.com/a/1170064) for details.
- Acted as **invited editor** for *PLoS Computational Biology* since 2017.
- Nominated **top-30 referee** in 2012 by the *Proceedings B* journal.

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## Academic reviews

Occasional referee for **MRC** (*Medical Research Council*, UK), **NSF** (*National Science Foundation*, USA), **AIRD** (*Agence Internationale de la Recherche pour le Développement*, France) and **ANR** (*Agence Nationale de la Recherche*, France).

Since 2015: Jury member of PhD fellowship awarding, on behalf of the French Embassy in Vietnam.

Since 2012: Jury member of PhD fellowship awarding, *Pharmacology/Biotechnology* department, University of Science & Technology of Hanoi (USTH), Vietnam.

Since 2012: Jury member of MSc *Pharmacology/Biotechnology* of the University of Science & Technology of Hanoi (USTH), Vietnam.

2009-2012: Experts committee of the Training Department of the *Institute of Research for Development*.

## Softwares and databases

I mostly use the R programming language for data analysis and visualization ([cran.r-project.org](http://cran.r-project.org)). In that context, I have developed a number of R packages, most notably `gamar` (see [choisy.github.io/gamar](http://choisy.github.io/gamar)), an R interface to the GAMA agent-based model simulator. My big data projects also led me to develop integrated databases such as the `epix` project (see [choisy.github.io/Rpackages](http://choisy.github.io/Rpackages) and [github.com/epix-project](https://github.com/epix-project)). See [github.com/choisy](https://github.com/choisy) for more details on my programming contributions. I also actively contribute to the *Project Tycho* ([www.tycho.pitt.edu](http://www.tycho.pitt.edu)).

## Invited conferences

**Choisy M.** Turning traditional surveillance systems into Big Data: Vietnam as a case study. *NIH Workshop on Big Data for the surveillance and control of infectious diseases in low- and middle-income countries*, 30 October – 1 November 2017, NIH, Bethesda, USA.

**Choisy M.** Modeling aspects related to biodiversity and health. *Symposium on Biodiversity and Health*, 17-19 November 2014, Phnom Penh, Cambodia.

**Choisy M.** Spatial dynamics of infectious diseases: mathematical models, statistical approaches and public health applications. *Diseases Modeling Workshop*, 5 September 2014, Kuching, Malaysia.

**Choisy M.** Spatial dynamics of infectious diseases: consequences for their control. *Challenges in Asia: scientific research and policy making*, 4-6 June 2014, Jakarta, Indonesia.

**Choisy M.** Latitudinal gradients and climate associations of influenza-like illness in Vietnam. *Regional Symposium on Emerging Infectious Diseases in Southeast Asia*, 11-12 March 2014, Phnom Penh, Cambodia.

**Choisy M.** Host demography and the spread of infectious diseases, *NIH/RAPIDD workshop*, 22-24 March 2010, Emory University, USA.

## Publications

1718 citations,  $h = 22$ ,  $i10 = 36$ , see [scholar.google.com/citations?user=PvviNu8AAAAJ&hl](https://scholar.google.com/citations?user=PvviNu8AAAAJ&hl) for more detail.

Pham T.Q., Rabaa M., Duong L.H., Dang T.Q., Tran Q.D., Quach H.L., Hoang N.A., Phung D.C., Ngu N.D., Tran A.T., La N.Q., Tran M.P., Vinh C., Nguyen K.C., Dang D.A., Tran D.N., Thwaites G.E., van Doorn H.R. & **Choisy M.** (2020) The first 100 days of SARS-CoV-2 control in Vietnam *Clin. Infect. Dis.* In Press.

- Clapham H., Hay J., Routledge I., Takahashi S., **Choisy M.**, Cummings D., Grenfell B., Metcalf C.J., Mina M., Rodriguez-Barraquer I., Salje H. & Tam C. (2020) Sero-epidemiological study designs for understanding SARS-COV-2 transmission and immunity *Emerg. Infect. Dis.* In Press.
- Bonell A., Contamin L., Pham Q.T., Hoang T.T.T., van Doorn H.R., White R., Nadjm B. & **Choisy M.** (2020) Does sunlight drive seasonality of TB in Vietnam? A retrospective environmental ecological study of tuberculosis seasonality in Vietnam from 2010-2015 *BMC Infect. Dis.* 20:184.
- Carrique-Mas J., **Choisy M.**, Cuong N.V., Thwaites G. & Baker S. (2020) An estimation of total antimicrobial usage in humans and animals in Vietnam. *Antimicrob. Resist. Infect. Control* In Press.
- Anh D.D., **Choisy M.**, Clapham H.E., Cuong H.Q., Dung V.T.V., Duong T.N., Hang T.N., Ha H.T.T., Hien N.T., Hoa T.T.N., Hung T.T.M., Huong V.T.L., Huyen D.T.T., Khanh N.C., Lewycka S.O., Linley E., Mai L.T.Q., Nadjm B., Nghia N.D., Pebody R., Phuong H.V.M., Tan L.M., Tan L.V., Thai P.Q., Thanh L.V., Thanh N.T.L., Thuy N.T.T., Thuong N.T., Thanh L.T., Thao N.T.T., Tuan N.A., Uyen P.T.N. & van Doorn H.R. (2020) Plans for nationwide serosurveillance network in Vietnam. *Emerg. Infect. Dis.* In Press.
- Van N.T.B., Yen N.T.P., Nhung N., Cuong N., Kiet B., Hoang, N.V., Hien V., Niwat C., **Choisy M.**, Ribas A., Campbell J., Thwaites G. & Carrique-Mas J. (2019) Characterization of viral, bacterial, and parasitic causes of disease in small-scale chicken flocks in the Mekong Delta of Vietnam. *Poultry Science.* In Press.
- Viet D.V.T., Nga D.T.T., Rydell U., Nilsson L.E., Olson L., Larsson M., Hanberger H., **Choisy M.**, Trinh D., van Doorn H.R., Kinh Nguyen V., Trung Nguyen V. & Wertheim H.F.L. (2019) Antimicrobial susceptibility testing and antibiotic consumption results from 16 hospitals in Viet Nam: the VINARES project, 2012-2013 *J. Glob. Antimicrob. Resist.* 18: 269-278.
- Choisy M.**, Nguyen V.C., Truong D.B., Bach T.K., Bo V.H., Ho V.T., Chansiripornchai N., Setyawan E., Thwaites G., Rushton J. & Carrique-Mas J. (2019) Assessing antimicrobial misuse in small-scale chicken farms in Vietnam from an observational study *BMC Vet. Res.* 15: 206.
- Nguyen V.C., Doan H.P., Nguyen T.B.V., Truong D.B., Bach T.K., Bo V.H., Ho T.V.T., **Choisy M.**, Padungtod P., Thwaites G. & Carrique-Mas J. (2019) High resolution monitoring of antimicrobial consumption in Vietnamese small-scale chicken farms highlights discrepancies between study metrics. *Frontiers in Vet. Sci.* 6: 174.
- Nguyen V.T., Le T.H., Vu M.D., Dang T.H., Tran M.H., Vu N.L., Phan V.L., Lewycka S.O., **Choisy M.**, Bryant J.E., Nadjm B., Van Doorn H.R., Richards A.L. & Nguyen V.K. (2019) Clinical presentation and molecular diagnosis of rickettsial diseases in northern Vietnam, 2015-2017 *Emerg. Infect. Dis.* 25(4): 633-641.
- Choisy M.**, Trinh S.T., Nguyen T.N.D., Nguyen T.H., Mai Q.L., Pham Q.T., Tran N.D., Dang D.A., Horby P.W., Boni M.F., Bryant J., Lewycka S.O., Nadjm B., van Doorn H.R. & Wertheim H.F.L. (2019) Sero-prevalence surveillance to predict vaccine-preventable disease outbreaks; a lesson from the 2014 measles epidemic in northern Vietnam *Open Forum Infect. Dis.* 6(3): ofz030.
- Nguyen V.T., Le T.H., Vu M.D., Dang T.H., Tran M.H., Vu N.L., Phan V.L., Lewycka S.O., **Choisy M.**, Bryant J.E., Nadjm B., van Doorn H.R., Richards A.L. & Nguyen V.K. (2019) Clinical presentation and molecular diagnosis of rickettsial diseases in northern Vietnam, 2015-2017 *Emerg. Infect. Dis.* 25(4): 633-641.

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- Lai S, Johansson M.A., Yin W., Wardrop N.A., Van Panhuis W.G., Wesolowski A., Kraemer M.U.G, Bogoch I., Kain D., Findlater A., **Choisy M.**, Huang Z., Mu D., Li Y., He Y., Chen Q., Khan K., Tatem A.J. & Yu H. (2018) Seasonal and interannual risks of dengue introduction from South-East Asia into China, 2005-2015 *PLoS Negl Trop Dis* 12(11): e0006743.
- Abbate J.L., Ezenwa V.O., Guégan J.-F., **Choisy M.**, Nacher M. & Roche B. (2018) Disentangling complex parasite interactions: protection against cerebral malaria by one helminth species is jeopardized by co-infection *PLoS Negl Trop Dis* 12(5): e0006483.
- Ho T.H., Thompson C., Le N.T.N., Hoang M.T.V., Nguyen T.D., Tran M.P., Vo M.Q., Nguyen T.H., Ha M.T., Nguyen V.V.C., Wolbers M., Thwaites G.E., **Choisy M.** & Baker S. (2018) Retrospective analysis assessing the spatial and temporal distribution of paediatric acute respiratory tract infections in Ho Chi Minh City, Vietnam *BMJ Open* 8(1): e016349.
- Choisy M.**, Keomalaphet S., Xaydalasouk K., Quet F., Latthaphasavang V. & Buisson Y. (2017) Prevalence of hepatitis B virus (HBV) infection among pregnant women attending antenatal clinics in Vientiane, Laos, 2008-2014 *Hepatitis Research and Treatment* 2017: 1284273.
- Lefèvre T., Ohm J., Dabiré K., Cohuet A., **Choisy M.**, Thomas M. & Cator L. (2017) Transmission traits of malaria parasites within the mosquito: genetic variation, phenotypic plasticity, and consequences for control *Evolutionary Applications* 11(4): 456-469.
- Delabougliise A., **Choisy M.**, Phan D.T., Antoine-Moussiaux N., Peyre M., Vu D.T., Pfeiffer D.U. & Fournié G. (2017) Seasonality of demand for livestock products driving infectious diseases dynamics: the case of avian influenza in Vietnam *Scientific Reports* 7(1): 5905.
- Pham Q.T., Horby P., Tran D.D., Vu D.T., Nguyen T.Y., Nguyen T.H., Weiss D.J., Boni M.F., **Choisy M.** (2017) Absolute humidity drives the epidemiology of influenza-like illness in Vietnam. *ASM Science Journal* (special issue ICT-Bio) p. 87-89. ISSN 1823-6782.
- Drogoul A., **Choisy M.**, Gaudou B., Marilleau N., Philippon D. (2017) Large-scale epidemiological modelling: exploring the impact of the ASEAN economic corridors policy on the dengue fever epidemic. *ASM Science Journal* (special issue ICT-Bio) p. 69-71. ISSN 1823-6782.
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- Philippon D., **Choisy M.**, Drogoul A., Gaudou B., Marilleau N., Taillandier P., Quang C.T. (2017) Exploring Trade and Health Policies Influence on Dengue Spread with an Agent-Based Model. In: Nardin L., Antunes L. (eds) *Multi-Agent Based Simulation XVII. MABS 2016. Lecture Notes in Computer Science*, vol 10399. Springer.
- Boithias L., **Choisy M.**, Souliyaseng N., Jourden M., Quet F., Buisson Y., Thammahacksa C., Silvera N., Sengtaheuanghoung O., Pierret A., Rochelle-Newall E., Becerra S. & Ribolzi O. (2016) Hydrological regime and water shortage as drivers of the seasonal

- incidence of diarrheal diseases in a tropical montane environment *PLoS Negl Trop Dis* 10(12): e0005195.
- Nguyen T.V.A., Bañuls A.-L., Tran T.H.T., Pham K.L.T., Nguyen T.S., Nguyen H.V., Nguyen N.L.T., Nguyen N.L.T., Dang D.A., Marks G.B. & **Choisy M.** (2016) Mycobacterium tuberculosis lineages and anti-tuberculosis drug resistance in reference hospitals across Vietnam *BMC Microbiology* 16(1): 167.
- Mai D.T., Peacock T.P., Bich V.T.N., Fabrizio T., Dang N.H., Tho N.D., Diep N.T., Minh N., Hoa L.N.M., Trang H.T.T., **Choisy M.**, Inui K., Newman S., Trung N.V., van Doorn F.R., To T.L., Iqbal M. & Bryant J.E. (2016) Prevalence and diversity of H9N2 avian influenza in chickens of Northern Vietnam, 2014 *Infect Genet Evol* 44: 530-540.
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- Peyre M., **Choisy M.**, Sobhy H., Kilany W.H., Gély M., Tripodi A., Dauphin G., Saad M., Roger F., Lubroth J. & Jobre Y. (2016) Added value of avian influenza (H5) day old chick vaccination for disease control in Egypt *Avian Diseases* 60(1 Suppl): 245-252.
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- Trang N.V., **Choisy M.**, Nakagomi T., Chinh N.T.M., Doan Y.H., Yamashiro T., Bryant J.E., Nakagomi O. & Anh D.D. (2015) Determination of cut-off cycle threshold values in routine RT-PCR assays to assist differential diagnosis of norovirus in children hospitalized for acute gastroenteritis *Epidemiology & Infection* 143(15): 3299-3299.
- Le Viet T., **Choisy M.**, Bryant J.E., Vu T.D., Pham Q.T., Le Q.M., Horby P., Nguyen T.H. & Wertheim H.F.L. (2015) A dengue outbreak on a floating village at Cat Ba island in Vietnam *BMC Public Health* 15: 940.
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- Choisy M.**, Sitboulang P., Vongpanhya M., Saiyavong C., Khamphaphongphanh B., Phommasack B., Quet F., Buisson Y., Zucker J.-D. & van Pahuiss W. G. (2015) *Rescuing public health data. In Environmental Changes and Infectious Diseases in Asia*. (Morand S., Dujardin J.-P., Lefait-Robin R., Apiwathnasorn C. eds), Springer-Verlag, Singapore.

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- Gascuel F., **Choisy M.**, Duplantier J.-M., Débarre F. & Brouat C. (2013) Host resistance, population structure and the long-term persistence of bubonic plague: contributions of a modelling approach in the Malagasy focus. *PLoS Comput Biol* 9(5): e1003039.
- Berngruber W.T., Froissart R., **Choisy M.** & Gandon S. (2013) Evolution of virulence in emerging epidemics. *PLoS Pathog* 9(3): e1003209.
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