

## PHD PROPOSAL FOR THE DOCTORAL SCHOOL « Ecologie, Géosciences, Agronomie, Alimentation »

### GENERAL INFORMATION

<b>Thesis title:</b> Impact of the increase in plant diversity on the resistance of biodiversity to climate change on an urbanization gradient
<b>Acronym:</b> BIODIVCLIM
<b>Disciplinary field 1:</b> Ecology <b>Disciplinary field 2:</b> Agronomy
<b>Three keywords:</b> Biodiversity, resistance to climatic stress, climatic gradient
<b>Research unit :</b> UMR 6553 ECOBIO «Ecosystèmes, Biodiversité, Evolution»
<b>Name of the thesis director:</b> VAN BAAREN Joan <b>Email address of the thesis director:</b> joan.van-baaren@univ-rennes.fr <b>Name of the thesis co-supervisor 1 (if applicable):</b> PRINZING Andreas <b>Email address of the thesis co-supervisor 1:</b> andreas.prinzing@univ-rennes.fr <b>Name of the thesis co-supervisor 2:</b> Jean Nabucet <b>Email :</b> jean.nabucet@univ-rennes2.fr
<b>Thesis grant (funding origin and amount):</b> 113 217,12 Euros. ½ ARED (in process) ½ Chaire Fondation Biodiversité et changement climatique (acquired)
<b>Contact(s) (mailing address and E-mail):</b> Joan van Baaren (joan.van-baaren@univ-rennes.fr) UMR 6553 ECOBIO Université de Rennes I, Campus de Beaulieu Avenue du Général Leclerc 35 042 Rennes cedex
<b>Recruitment process:</b> Recruitment process depends on thesis funding. To select the corresponding recruitment process, please visit the EGAAL website <a href="#">here</a> . This information is needed for proposal publication. <input checked="" type="checkbox"/> <b>Doctoral school contest</b> <input type="checkbox"/> <b>Interview</b> <input type="checkbox"/> <b>Other (indicate) :</b>

**All sections must be filled. Once filled, please save the proposal form in pdf format using the following naming: Supervisor Name\_Unit\_Subject Acronym\_EN.pdf**

#### ED EGAAL

**Direction :** 65 rue de Saint-Brieuc – CS 84215 – 35042 Rennes Cedex – France

**Tél :** 02 23 48 52 75

**Mail :** [ed-EGAAL@u-bretagne-loire.fr](mailto:ed-EGAAL@u-bretagne-loire.fr)

**Site Web :** <https://ed-egaal.u-bretagne-loire.fr>

## SCIENTIFIC DESCRIPTION OF THE PhD PROJECT

**Socio-economic and scientific context : (10 lines)** According to the Millennium Ecosystem Assessment report, we are currently witnessing the sixth biodiversity extinction crisis that affects all taxonomic groups and all ecosystems, terrestrial or marine. Climate change, characterized by the increase in average temperatures but also by an increase in the frequency and intensity of extreme events such as heat waves, is one of the major causes of this loss of biodiversity. These effects are amplified in the city by urbanization processes, and we observe a particular phenomenon, the urban heat island. Thus, in the city, organisms are subject to increasingly long, intense, frequent and unpredictable thermal and water stresses, which affect population dynamics and lead to a simplification of food webs. Promoting and strengthening plant biodiversity seems to be a good way to protect plant and animal biodiversity because plants both reduce temperatures, limiting thermal and water stress on surrounding organisms, and constitute a food resource for many species (phytophagous), with repercussions at all trophic levels. The challenge is therefore to explore the type of plant enrichment, between and within shrub and herbaceous strata and to improve their connectivity to optimize habitat conditions for urban biodiversity, in terms of microclimate (climate refuge) and nutrient resources.

**Assumptions and questions (8 lines)** Diversified vegetation would provide microhabitats with greater thermal inertia (i.e. it buffers variations in temperature and humidity), which is favorable to biodiversity. The objective is to explore the variability of the role of vegetation, understood in terms of plant strata (trees, shrubs, herbaceous vegetation) and/or plant species, on (i) the microclimate, since they have no same type of photosynthesis, opening of stomata, morphology of leaves and roots and (ii) the resistance of insects and plants to the microclimate, by providing leaves and flowers of different nutritional quality to insects, and root mycorrhizae of different quality and quantity to neighboring plants. The major hypothesis is that a vegetation that is both specifically, phylogenetically and functionally diversified will allow (i) a better survival and growth of plants in the face of climatic stresses and (ii) the maintenance of a more diversified fauna both specifically, evolutionarily and functionally, with more complex food webs and more resistant to heat stress. We will study which lineages and guilds of plants or insects depend the most on this plant diversity.

**The main steps of the thesis and scientific procedure (10-12 lines)** This thesis will be carried out on the city of Rennes and its peri-urbanization, on a panel of sites reflecting an urbanization gradient, both landscape and climatic. In each site, it will be a question of observing the composition and the diversity of the herbaceous and shrubby strata, isolated or combined. In each of these strata, evolutionarily or functionally diverse and uniform plots will be identified, using in particular foliar, floral and mycorrhizal characters available in databases. In the herbaceous layer, functional diversity will be manipulated locally by adding/removing species that contribute the most/least to this diversity. The microclimate within the vegetation will be monitored from in-situ sensors for air temperatures and by thermal imaging allowing 2D and 3D spatialization (by photogrammetry) of surface temperatures. Different taxa will be monitored for two years (2-3 seasons minimum) with in particular taxa of phytophagous, predator-parasitoids and pollinators, as well as the vitality of the plants (phytophagy, phenology, yellowing) and their rate of mycorrhization. Food webs will be constructed to characterize specific and functional biodiversity.

**Methodological and technical approaches considered (4-6 lines)** - The analysis of climate data will be available at 3 spatial scales: (i) the urban spot thanks to the RUN measurement network (Rennes Urban Network, Dubreuil & al, 2022), (ii) the site by instrumentation specific to the using temperature and humidity probes (hobo), and finally (iii) the individual with the exploitation of thermal imaging on the ground or on board (FLIR UAV) - Fauna monitoring of different taxa (trapping, observation transects, breeding)

**Scientific and technical skills required by the candidate** Interest in the naturalistic field approach (plant and animal taxa) and statistical analyses. Taste for teamwork. Spatialization of information (minimum GIS), bases in remote sensing would be appreciated.

## THESIS SUPERVISION<sup>1</sup>

<b>Unit name:</b> UMR 6553 ECOBIO «Ecosystèmes, Biodiversité, Evolution»	<b>Team name:</b> Theme “Paysabio”
<b>Unit director name:</b> Joan Van Baaren	<b>Team director name:</b> Cendrine Mony/Christophe Piscart
<b>Mailing address of the unit director:</b> UMR 6553 ECOBIO, Université de Rennes, Campus de Beaulieu, bat. 14A, 35042 RENNES CEDEX, FRANCE +33.2.23.23.50.27 joan.van-baaren@univ-rennes.fr	<b>Mailing address of the team director:</b> UMR 6553 ECOBIO, Université de Rennes, Campus de Beaulieu, bat. 14A, 35042 RENNES CEDEX, FRANCE Cendrine.mony@univ-rennes.fr
<b>Thesis director</b> Surname, first name: VAN BAAREN Joan Position: Professor Obtained date of the HDR (Habilitation thesis to supervise research): 2001 Employer: University of Rennes Doctoral school affiliation: EGAAL Rate of thesis supervision in the present project (%): 40% Total rate of thesis supervision in ongoing theses (supervisions and co-supervisions) (%): PhD Léna Jego (40%), PhD Ruining Li (40%), PhD Cem Turanoglu (20%). Number of current thesis supervisions/co-supervisions: 3	
<b>Thesis co-supervisor 1 (if applicable)</b> Surname, first name: PRINZING Andreas Position: Professor Habilitation thesis to supervise research <input checked="" type="checkbox"/> yes <input type="checkbox"/> no If yes, date diploma received: Employer: Rennes University Doctoral school affiliation: EGAAL Rate of thesis supervision in the present project (%): 30% Total rate of thesis supervision in ongoing theses (supervisions and co-supervisions) (%): 0 Number of current thesis supervisions/co-supervisions: 0	

<sup>1</sup> In EGAAL Doctoral School, if only one scientist in thesis supervision = 100% of supervision rate; if 2 people involved in thesis supervision = from 50% to 70% of supervision rate for the director; if 3 people involved in thesis supervision = 40% / 30% / 30% of supervision rate distribution among supervisors.

**Professional status of previous PhD students supervised by both director and co-supervisors (from 5 years)**

*Please provide the following information for each PhD students supervised*

Surname, first name: Tougeron Kevin

Date of PhD beginning and PhD defence: 2014-2017

Thesis supervision: Joan van Baaren, Jacques Brodeur (Univ Montréal), Cécile Le Lann

Professional status and location: Teacher-Researcher, Univ Mons (Belgium)

Contract profile (post-doc, fixed-term, permanent): permanent

List of publications from the thesis work:

Tougeron K, van Baaren J, Burel F, Alford L. (2016) Comparing thermal tolerance across contrasting landscapes; first steps towards understanding how landscape management could modify ectotherm thermal tolerance. **Insect Conservation and Diversity** 9 (3): 171-180. doi: 10.1111/icad.12153.

Tougeron K., Le Lann C., Brodeur J. & van Baaren J. 2017. Are aphid parasitoids from mild winter climates losing their winter diapause? **Oecologia** 183:(3), 619-629.

Tougeron K, Hraoui G, Le Lann C, van Baaren J & Brodeur J. 2017. Competition for hosts induces offspring summer diapause in aphid parasitoids. **Insect Science**, 00, 1–9, DOI 10.1111/1744-7917.12491

Alford L, Tougeron K, Pierre JS, Burel F, van Baaren J. 2018. The effect of landscape complexity and microclimate on the thermal tolerance of a pest insect. **Insect Science** 25 (5): 905-915. DOI

10.1111/1744-7917.12460

Tougeron K, van Baaren J, Brodeur J, Llopis S, Ridet A, & Le Lann C. 2018. Disentangling plasticity from local adaptations in diapause expression of parasitoids from and within contrasted thermal environments. **Biological Journal of the Linnean Society** 124(4): 756-764. DOI:

10.1093/biolinnean/bly079

Tougeron K, Damien M, Le Lann C, Brodeur J & van Baaren J. 2018. Changes in host-parasitoid communities over the years in cereal crops of Western France: Does climate warming matters? **Frontiers in Ecology and Evolution-Population and Evolutionary Dynamics** 6:173.

doi: 10.3389/fevo.2018.00173

Tougeron K, Le Lann C, & van Baaren J., Brodeur J. 2019. Diapause expression in a Quebec population of the parasitoid *Aphidius ervi* (Hymenoptera: Braconidae). **The Canadian Entomologist** 151: 345–349.

Tougeron K., Brodeur J., van Baaren J., Renault D. and Le Lann C. 2019. Sex makes them sleepy: host reproductive status induces diapause in a parasitoid population experiencing harsh winters. bioRxiv 371385, ver. 6 peer-reviewed and recommended by **PCI Ecology**. doi: **10.1101/371385**

Tougeron K, Brodeur J, Le Lann C, van Baaren J. 2019. How climate changes affect parasitoids' seasonal ecology? **Ecological Entomology** 45, 167-181. DOI: 10.1111/een.12792

van Baaren J., Wist T, Soroka J, Tougeron K. 2020. Host-parasitoids network in extreme conditions: the case of cereal aphids in wheat crops in Saskatchewan, Canada. **Entomologia generalis** 40 (1): 63-77.

[10.1127/entomologia/2019/0807](https://doi.org/10.1127/entomologia/2019/0807). [hal-02530838](https://hal.archives-ouvertes.fr/hal-02530838)

Tougeron K, Devogel M, van Baaren J, Le Lann C, Hance T. 2020. Trans-generational effects on diapause and life-history-traits of an aphid parasitoid. **Journal of Insect Physiology**. 121. 104001.

<https://doi.org/10.1016/j.jinsphys.2019.104001>

Tougeron K., van Baaren J., Town J., Nordin, D., Dumonceaux T. & Wist T. 2021. Body-color plasticity of the English grain aphid in response to light in both laboratory and field conditions. **Evolutionary Ecology** 35 (1): 163-163 [Oct, 10.1007/s10682-020-10088-4, 2020](https://doi.org/10.1007/s10682-020-10088-4).

---

Surname, first name: DAMIEN Maxime

Date of PhD beginning and PhD defence: 2015-2018

Thesis supervision: Joan van Baaren, Nicolas Desneux (INRAE Sophia Antipolis), Cécile Le Lann

Professional status and location : Post-doc Canada (3 years)

Contract profile (post-doc, fixed-term, permanent):

List of publications from the thesis work:

Damien M, Le Lann C, Desneux N, Alford L, Al-Hassan D, Georges R, Van Baaren J. 2017. Change in plant phenology during winter increases pest control but not trophic link diversity. **Agriculture Ecosystems and Environment** 247: 418-425

Tougeron K, Damien M, Le Lann C, Brodeur J & van Baaren J. 2018. Changes in host-parasitoid communities over the years in cereal crops of Western France: Does climate warming matters? **Frontiers in Ecology and Evolution- Population and Evolutionary Dynamics**. 6:173.

doi: 10.3389/fevo.2018.00173

Damien M, Barascou L, Ridel A, Van Baaren J, Le Lann C 2019. Food or host: do physiological state and flower type affect foraging decisions of parasitoids? **Behavioral Ecology and Sociobiology** 73:156. <https://doi.org/10.1007/s00265-019-2758-9>

Damien M, Llopis S, Desneux N, Van Baaren J and Le Lann C. 2020. How does floral nectar quality affect life history strategies in parasitic wasps. **Entomologia generalis** 40(2): 147 – 156. ArtNo. ESP146004002003 DOI: 10.1127/entomologia/2020/0906

Surname, first name: JEAUVONS Emma

Date of PhD beginning and PhD defence: 2017-2020

Thesis supervision: Joan van Baaren, Cécile Le Lann + Eleonor Germain, Cécile Lharridon, Valérie Terrien (entreprise Yves Rocher - PhD CIFRE)

Professional status and location: Post-doc INRAE SAD

Contract profile (post-doc, fixed-term, permanent): post-doc

List of publications from the thesis work:

Jeavons E, van Baaren J, Le Lann C. 2020. Resource partitioning among a pollinator guild: 1 a case study of flower monocultures under high honeybee pressure. **Acta Oecologia** 104. 103527. <https://doi.org/10.1016/j.actao.2020.103527>.

Jeavons E, van Baaren J, Le Ralec A, Buchard C, Duval F, Llopis S, Postic E, Le Lann C. 2021. Third and fourth trophic level composition shift in an aphid-parasitoid-hyperparasitoid food web limits aphid control in an intercropping system. *J Appl Ecol* 59 (1): 300-313. <https://doi.org/10.1111/1365-2664.14055>. Dryad, Dataset, <https://doi.org/10.5061/dryad.d51c5b049>. (hal-03464364)

Jeavons E, Chevrier O, Le Lann C, Renault D, Floch M, Bourgeois T, Bodiguel R, Fontaine-Breton T, van Baaren J. 2021. Exploitative competition for floral resources reduces sugar intake but differently impacts the foraging behaviour of two non-bee flower visitors. **Oikos**, (10.1111/oik.08576). (hal-03510631)

Jeavons E, Le Lann C, van Baaren J. Interactions among beneficial arthropods: combining ecological theory with agroecological management. In press *Entomologia generalis*

Surname, first name: ALFARO-TAPIA Armando

Date of PhD beginning and PhD defence: 2016-2022 (January)

Thesis supervision: Joan van Baaren, Blas Lavandero (Univ Talca, Chili), Cécile Le Lann

Professional status and location: Permanent position in a company in Chile

Contract profile (post-doc, fixed-term, permanent): permanent

List of publications from the thesis work:

Alfaro-Tapia A, Alvarez-Baca J, Tougeron K, Lavandero B, Le Lann C, Van Baaren J 2022. Overwintering strategies and life-history traits of different populations of *Aphidius platensis* along a latitudinal gradient in Chile. **Entomologia Generalis** 42 (1), pp.127-145. (10.1127/entomologia/2021/11860171-8177/2021/1186). (hal-03629547)

Alvarez-Baca J, Alfaro-Tapia A, Lavandero B, Le Lann C, Van Baaren J. 2020. Suitability and profitability of a cereal aphid for the parasitoid *Aphidius platensis* in the context of conservation biological control of *Myzus persicae* in orchards. **Insects**, 11 (6), 381; doi:10.3390/insects11060381

Alfaro-Tapia A, Alvarez-Baca JK, Tougeron K, Van Baaren J, Lavandero B, Le Lann C. 2022. Composition and food web structure of winter aphid-parasitoid along latitudinal gradient in Chile. *Oecologia*. (10.1007/s00442-022-05270-0). (hal-03832988)

Surname, first name: Ait Mouheb, Hocine  
Date of PhD beginning and PhD defence: 12/2013 – 6/2019  
Thesis supervision: co-supervision, director: L. Kadik at Univ der Alger  
Professional status and location : docent at Université Yahia Fares de Médea  
Contract profile (post-doc, fixed-term, permanent): permanent  
List of publications from the thesis work:

Ait Mouheb, H., Kadik, L., Albert, C.H., Berrached, R., & Prinzing, A. (2018). How do steppe plants follow their optimal environmental conditions or persist under suboptimal conditions? The differing strategies of annuals and perennials. *Ecology and Evolution* 8: 135–149.

Surname, first name: Barbe, Lou  
Date of PhD beginning and PhD defence: 10/2014 - 12/2017  
Thesis supervision: co-direction [33%] with V. Jung and C. Mony  
Professional status and location : postdoctoral teaching assistant  
Contract profile (post-doc, fixed-term, permanent): fixed-term  
List of publications from the thesis work:

Barbe, L., Mony, C., Jung V., Uroy L., Prinzing A. 2020. Associational decomposition: After-life traits and interactions among decomposing litters control during-life aggregation of plant species. *Functional Ecology* 34, 1956-1966.

Barbe, L., Prinzing, A., Mony, C., Abbott, B. W., Santonja, M., Hoeffner, K., Guillocheau, S. Cluzeau, D., Francez, A.-J., Le Bris, N. and Jung, V. Opposing effects of community assembly maintain constant litter decomposition over a 25-years grassland chronosequence. *Ecosystems* 23: 124-136.

Barbe L., Mony C., Jung V., Santonja M., Bartish I. & Prinzing A. (2018). Functionally or phylogenetically distinct neighbors turn antagonism among decomposing litter species into synergy. *Journal of Ecology* 106:1401-1414.

Barbe, L., Jung, V\*, Prinzing, A\* (\* these authors contributed equally), Bittebière, A.-K., Butenschoen, O. & Mony, C. (2017) Functionally dissimilar neighbors accelerate ecosystem functioning of two focal plant species: experimental evidence on decomposition of grass litter. *New Phytologist*. 214, 1092-1102.

Surname, first name: Pihain, Mickael  
Date of PhD beginning and PhD defence: 10/2017 - 2/2022  
Thesis supervision: co-direction [50%] with P. Gerhold, Univ. Tartu (Estonie)  
Professional status and location : postdoctoral teaching assistant  
Contract profile (post-doc, fixed-term, permanent): fixed-term  
List of publications from the thesis work:

Deniau, M., Pihain, M., Béchade, B., Jung, V., Brunellière, M., Gouesbet, V., Prinzing, A. .2021. Seeds and seedlings of oaks suffer from mammals and molluscs close to phylogenetically isolated, old adults. *Annals of Botany* 127, 787-798.

Pihain, M. Gerhold, P., Ducouso, A., Prinzing, A. 2019. Evolutionary response to coexistence with close relatives: increased resistance against specialist herbivores without cost for climatic-stress resistance. *Ecology Letters*. 22, 1285-1296.

Prinzing A., Ozinga, W. Brändle, M. Courty, P.-E. Hennion F., Labandeira C., Parisod C., Pihain, M., Bartish I. (2017) Benefits From Living Together? Clades Whose Species Use Similar Habitats May Persist as a Result of Eco-Evolutionary Feedbacks. *New Phytologist*.213: 66-82.

Surname, first name: Mallick, Soumen  
Date of PhD beginning and PhD defence: 11/2018 –(1 year of severe illness) - 12/2022  
Thesis supervision: co-direction [60%] with F. Molleman  
Professional status and location : postdoctoral position ensured  
Contract profile (post-doc, fixed-term, permanent): fixed-term  
List of publications from the thesis work:

Mallick, S., Molleman, F., Yguel, B., Bailey, R., Müller, J., Jean, F. Prinzing, A. 2023. Ectophagous folivores do not profit from rich resources on phylogenetically isolated trees. *Oecologia* 203, 1 –18.

### Major publications of the last 5 years of the supervisors on thesis subject:

Le Lann C, van Baaren J & Visser B. Dealing with predictable and unpredictable temperatures in a climate change context: the case of parasitoids and their hosts 2021 **Journal of Experimental Biology**, Cambridge University Press, 224 Issue: Pt Suppl 1 [10.1242/jeb.238626](https://doi.org/10.1242/jeb.238626) ([hal-03157277](https://hal.archives-ouvertes.fr/hal-03157277))

Tougeron K, Couthouis E, Hecq F, Barascou L, Baudry J, Boussard H, Burel F, Couty A, Doury G, Francis C, Le Roux V, Marrec R, Pétilon J, Spicher F, Hance T & van Baaren J. 2022. Where and when the biological control service can be maximized? **STOTEN** 822, 153569. DOI: 10.1016/j.scitotenv.2022.153569

Harvey, Jeffrey; Tougeron, Kévin; Gols, Rieta; Heinen, Robin; Abarca, Mariana; Abram, Paul; Basset, Yves; Berg, Matty; Boggs, Carol; Brodeur, Jacques; Cardoso, Pedro; de Boer, Jetske; de Snoo, Geert; Deacon, Charl; Dell, Jane; Desneux, Nicolas; Dillon, Michael; Duffy, Grant; Dyer, Lee; Jacintha, Eilers; Espíndola, Anahí; Fordyce, James; Forister, Matthew; Fukushima, Caroline; Gage, Matthew; Garcia-Robledo, Carlos; Gely, Claire; Gobbi, Mauro; Hallmann, Casper; Hance, Thierry; Harte, John; Hochkirch, Axel; Hof, Christian; Hoffmann, Ary; Kingsolver, Joel; Lamarre, Greg; Laurance, William; Lavandero, Blas; Leather, Simon; Lehmann, Philipp; Le Lann, Cécile; Lopez-Urbe, Margarita; Ma, Chun-Sen; Ma, Gang; Moiroux, Joffrey; Monticelli, Lucie; Nice, Chris; Ode, Paul; Pincebourde, Sylvain; Ripple, William; Rowe, Melissa; Samways, Michael; Sentis, Arnaud; Shah, Alisha; Stork, Nigel; Terblanche, John; Thakur, Madhav; Thomas, Matthew; Tylianakis, Jason; van Baaren, Joan; Van de Pol, Martijn; van der Putten, Wim; Van Dyck, Hans; Verberk, Wilco; Wagner, David; Weisser, Wolfgang; Wetzel, William; Woods, H. Arthur; Wyckhuys, Kris; Chown, Steven 2022. Scientists Warning on climate change, climatic extremes and insects. Ecological monographs, [http://doi.org/10.1002/ecm.1553](https://doi.org/10.1002/ecm.1553).

Roudine S, Le Lann C, Bouvaine S, Le Ralec A, van Baaren J. 2023. Could natural enemy enhancement strategies be efficient to control vector-borne plant viruses? In press *Journal of Pest Science*.

Bartish, I.V., Bonnefoi, S., Aïnouche, A., Bruelheide, H., Bartish, M., **Prinzing, A.** (in press) Fewer chromosomes, more co-occurring species within plant lineages—a likely effect of local survival and colonization. *American Journal of Botany*.

Molleman, F, Walczak, U., Melosik, I., Baraniak, E., Piosik, Ł., **Prinzing, A.** 2022. What Drives Caterpillar Guilds on a Tree: Enemy Pressure, Leaf or Tree Growth, Genetic Traits, or Phylogenetic Neighbourhood? *Insects* 13 (4), 367.

**Prinzing, A.**, Pavoine, S, Jactel, H., Hortal, J., Hennekens, S.M., Ozinga, W.A., Bartish, I.V, Helmus, M.R, Kühn, I., Moen, D.S, Weiher, E., Brändle, M., Winter, M, Violle, C., Venail, P., Purschke, O., Yguel, B. 2021. Disturbed habitats locally reduce the signal of deep evolutionary history in functional traits of plants. *New Phytologist* 232, 1849-1862.

Hidasi-Neto, J., Bailey, R.I, Vasseur, C., Woas, S., Ulrich, W., Jambon, O, Santos, A.M.C, Cianciaruso, M.V. & **Prinzing, A.** 2018. A forest canopy as a living archipelago: why phylogenetic isolation may increase and age decrease diversity. *Journal of Biogeography* 46: 158-169

Gerhold, P., Carlucci, M.B., Procheş, S., **Prinzing, A.** (2018). The deep past controls the phylogenetic structure of present, local communities. *Annual Review of Ecology, Evolution, and Systematics* 49: 477-499.

## THESIS FUNDING

**Origin(s) of the thesis funding:** ½ ARED (in process)

½ Chaire Fondation Biodiversité et changement climatique (acquired)

**Gross monthly salary:** 2023: 2044,12€; 2024: 2100 €; 2025: 2200 €; 2026: 2300 €

Thesis funding state : Partly acquired (co-funding)

Funding beginning date/Funding ending date: october 2023 / 36 months

Date: 13/03/2023

Name, signature of unit director: J. Pétillon



**Julien PÉTILLON**  
Directeur adjoint de l'UMR ECOBIO

Name, signature of team director: NA (organisation in themes not teams)

Name, signature of thesis project director: Joan Van Baaren

