

Barbara Class, PhD

Personal information

- Contact: barbara.a.class@gmail.com
- Website: barbaraclass.com
- Social media: ResearchGate, Twitter (@BA_Class)
- Date and place of birth: 30/10/1990, Strasbourg, France
- Languages: French (mother tongue), English (fluent)

Education

- 01/12/2013-09/11/2017 **PhD**, doctoral program in Biology, Geography and Geology, University of Turku, Finland
- 01/09/2011-25/06/2013 **MSc** in Ecophysiology and Ethology, University of Strasbourg, France
- 01/09/2008-09/06/2011 **BSc** in Cell Biology and Physiology, University of Strasbourg, France

Research experience

- 01/02/2022- **Post-doctoral project:** "Quantitative genetic variation in urban vs. non-urban great tits", Supervised by Dr. Anne Charmantier, Centre d'Ecologie Fonctionnelle et Evolutive (CNRS UMR 5175), Montpellier, France
- 09/03/2020-05/11/2021 **Post-doctoral project:** "Individual differences, social behaviour, and disease ecology in Eastern water dragons", Supervised by Dr. Celine Frere, University of the Sunshine Coast, Australia
- 01/11/2017-31/08/2019 **Post-doctoral project:** "Evolutionary quantitative genetics in wild birds", Supervised by Dr. Jon Brommer, University of Turku, Finland
- 01/12/2013-31/10/2017 **PhD project:** "Evolutionary quantitative genetics of animal personality in the wild", Supervised by Dr. Jon Brommer, University of Turku, Finland
- 01/01/2013-30/06/2013 **MSc project:** "Animal personality in the blue tits: ecological relevance and the importance of parental interactions". Supervised by Dr. Jon Brommer, University of Turku, Finland
- 15/05/2012-30/06/2012 **Scientific internship:** "Effect of glucocorticoids and environmental conditions on chick growth and output in Adélie penguins". Supervised by Dr. Thierry Raclot, University of Strasbourg, France
- 1/10/2011-30/11/2011 **Scientific internship:** "Individual decision-making in road crossing pedestrians". Supervised by Dr. Cédric Sueur, University of Strasbourg, France

Teaching

- 23/10/2020-18/11/2020 **Evaluator** for Honours Thesis "Anthropogenic noise effects on anuran mating behaviour" by Charmaine Schou, University of the Sunshine Coast, Australia
- 2017-2019 **Co-organizer** of the course "Introduction to programming in R and its application in studying ecology and evolution", University of Turku, Finland
- 01/11/2017-15/12/2017 **Lecturer** for the course "Advanced evolutionary Biology 2", University of Turku, Finland
- 01/09/2016-30/09/2016 **Evaluator** for MSc Thesis "Early weaning impacts personality and occurrence of stereotypic behavior in the domestic cat (*Felis catus*)" by Milla Ahola, University of Turku, Finland

Supervision and mentoring

- 03/2020- **Co-supervision of PhD student** Coralie Delmé, University of the Sunshine Coast. “Social tolerance in a gregarious lizard: consistency, lifetime changes and fitness consequences”
- 03/2020- **Mentoring of PhD students** Sarah Ball (PhD accepted), Katrin Hohwieler (PhD accepted), and Nicola Kent (PhD ongoing) at the University of the Sunshine Coast and Cameron Baker (PhD ongoing) at the University of Queensland.
- 07/2020- **Co-supervision of Honours student** Jessica Tacey, University of the Sunshine Coast. “Do
08/2021 Eastern water dragons (*Intellagama lesueurii*) modify their social behaviour to avoid fungal infection?”
- 01/2018- **Co-supervision of MSc student** Marc Gilles, University of Strasbourg. “Blue tits (*Cyanistes*
06/2018 *caeruleus*) and caterpillars in a boreal forest: focus on the impacts of early food conditions on nestling development, survival and personality”.
- 04/2015- **Co-supervision of MSc student** Kees Schreven, University of Groningen. “The relation of
10/2015 personality with early life body mass in the Blue Tit *Cyanistes caeruleus*”.

Awards and funding:

- 2020 ○ 30 000€ Finnish cultural foundation, 1-year post-doctoral research grant (00200217), “Ecological and evolutionary mechanisms of assortative mating in wild animals”
- 35 000\$ (CAD) Merit scholarship program for foreign students (PBEEE), 1-year post-doctoral research grant (291406): “Mechanisms and consequences of assortative mating: a comparative approach”
- ECR Scholarship to attend the ICQG6 conference, 3-13 November 2020, Brisbane, Australia
- 2019 ○ 500€ Oikos Finland prize for the best PhD thesis in Ecology and Evolution 2017
- 2016 ○ 570€ travel grant from the doctoral program in Biology, Geography, and Geology to attend the ISBE conference in Exeter.
- 2015 ○ 3 years funded doctoral position (~75000€, University of Turku Graduate School)
- 2500€ for organizing AURA symposium 2016 (Foundation of the University of Turku)
- 2014 ○ 9894€ young researcher grant (Foundation of the University of Turku)
- 3000€ for fieldwork expenses (Societas Pro fauna et Flora Fennica)
- 4000€ for fieldwork expenses (Oskar Öflunds Stiftelse)

Scientific publications

I have (co) authored 16 published articles including 11 as a first author, and co-authored of 1 book chapter (h-index=10, 289 citations, 08/06/2022, Google Scholar).

Peer-reviewed journal articles

16. **Class, B.**, Dingemanse, N.J. (2022) A variance partitioning perspective of assortative mating: Proximate mechanisms and evolutionary implications. Journal of Evolutionary Biology, 35, 483-490.

Significance: In this editorial for the special issue of JEB on “Assortative mating for quantitative traits: mechanisms, estimation, and evolutionary consequences”, we detail how the phenotypic covariance between mated partners can be partitioned into components that capture one or several of five distinct mechanisms with diverse evolutionary causes and consequences.

15. **Class, B.**, Masoero, G., Terraube, J., Korpimäki, E. (2021) Estimating the long-term repeatability of food-hoarding behaviours in an avian predator. Biology Letters, 17, 20210286.

Significance: We proposed that long-term repeatability in food-hoarding behaviour reflects consistent variation in how individuals cope with starvation risks. Using data from a boreal avian predator experiencing large fluctuations in food abundance and predictability, we provided the first estimates of repeatability for food-hoarding behaviours in the wild.

14. Dingemanse, N.J., **Class, B.**, Holtmann, B. (2021) Nonrandom mating for behavior in the wild? Trends in Ecology & Evolution 36, 177-179.

Significance: In this letter, we commented the recently published review from Munson et al. (2020) on mate choice and behavioural types and forcefully highlight the need to understand the proximate causes for phenotypic resemblance between mates before exploring ultimate explanations for assortative mating. We demonstrated how this can be done through appropriate study design and statistical approaches.

13. Westneat, D.F., Araya-Ajoy, Y.G., Allegeue, H., **Class, B.**, Dingemanse, N., Dochtermann, N.A., Garamszegi, L.Z., *et al.* (2020) Collision between biological process and statistical analysis revealed by mean centring. Journal of Animal Ecology, 89, 2813-2824.

Significance: In this simulation study, we demonstrated the importance of considering absolute vs. relative environmental values when studying individuals' plastic responses, and we provided a number of recommendations for empiricists.

12. **Class, B.**, Brommer, J.E. (2020) Contrasting multilevel relationships between behavior and body mass in blue tit nestlings. Behavioral Ecology, 31, 702-710.

Significance: This is a rare empirical study considering the relationships between growth and behaviour in a species with determinate growth. Using an innovative combination of multivariate mixed models and structural equation models, we found this relationship to be determined by a variety of mechanisms, which can occur simultaneously and have opposing effects.

11. **Class, B.**, Brommer, J.E. (2020) Can dominance genetic variance be ignored in evolutionary quantitative genetic analyses of wild populations? Evolution, 74, 1540-1550.

Significance: Thanks to an exceptional dataset, we were able to provide rare estimates of dominance genetic variance in a wild animal population, for an array of traits. Our simulations also explored the consequences of ignoring this variance component in quantitative genetic studies of wild animals.

10. **Class, B.**, Brommer, J.E., van Oers, K. (2019) Exploratory behavior undergoes genotype–age interactions in a wild bird. Ecology and Evolution, 9, 8987-8994.

Significance: We demonstrated that the heritability of exploratory behaviour decreases over individuals' lifetime because of genotype-age interactions in a wild passerine. Thanks to an unprecedented dataset, we provided rare evidence of this phenomenon in a model species and a commonly used measure of animal personality.

9. **Class, B.**, Klunen, E., Brommer, J.E. (2019) Tail color signals performance in blue tit nestlings. Journal of Evolutionary Biology, 32, 913-920.

Significance: This is one of the few studies using quantitative genetics to empirically investigate the “indirect benefits” hypothesis for mate choice based on colouration. We found evidence for a genetic relationship between plumage colouration and measures of performance in blue tit nestlings, although the heritability of colouration was low.

8. **Class, B.**, Brommer, J.E. (2018) Shared environmental effects bias phenotypic estimates of assortative mating in a wild bird. Biology Letters, 14, 20180106.

Significance: This study empirically applied the method advocated in Class et al. (2017) to investigate the presence of assortative mating and other sources of phenotypic covariance in a wild bird population. Our results indicated that phenotypic correlations, a commonly used measure of assortative mating, often misestimate assortative mating because they are mostly driven by shared environmental effects.

7. **Class, B.**, Dingemanse, N.J., Araya-Ajoy, Y.G., Brommer, J.E. (2017) A statistical methodology for estimating assortative mating for phenotypic traits that are labile or measured with error. Methods in Ecology and Evolution, 38, 42–49.

Significance: In this study, we highlighted the challenges of estimating assortative mating for traits that are plastic or measured with error, introduced several statistical approaches, and compared their performances using simulations. Bivariate mixed models are the only approach providing estimates of assortative mating that are not biased by environmental effects or measurement error. Finally, we showed how empiricists can assess the power of their existing data to detect assortative mating or choose appropriate sampling designs.

6. Brommer, J.E., **Class, B.** (2017) Phenotypic correlations capture between-individual correlations underlying behavioral syndromes. Behavioral Ecology and Sociobiology, 71, 50.

Significance: Phenotypic correlations between behaviours are often assumed to capture behavioural syndrome, although individual-level correlations obtained using covariance partitioning approaches are predicted to be less biased (e.g. by short-term environmental effects). We compiled estimates from studies using these approaches and found this assumption to be generally supported although we cautioned against using phenotypic correlations as a proxy for behavioural syndromes because mismatches are likely occur.

5. **Class, B.**, Brommer, J.E. (2016) Senescence of personality in a wild bird. Behavioral Ecology and Sociobiology, 70, 733-744.

Significance: In this study, we investigated how two behavioural responses to handling change over the lifetime of individuals in adult blue tits. We found that handling aggression, which positively correlates with fitness (see Class et al. 2014), declines as individuals age and that individual differ in their trajectories (individual-age interactions), which aligns with patterns predicted for senescence in fitness-related traits.

4. Brommer, J.E., **Class, B.** (2015) The importance of genotype-by-age interactions for the development of repeatable behavior and correlated behaviors over lifetime. Frontiers in Zoology, 12, S2.

Significance: We demonstrated using simulations, how repeatability and behavioural syndromes can change during the lifetime of individuals and we reviewed empirical evidence suggesting that genotype-age or individual-age interactions are common in behaviours.

3. **Class, B.**, Brommer, J.E. (2015) A strong genetic correlation underlying a behavioural syndrome disappears during development because of genotype-age interactions. Proceedings of the Royal Society B, 282, 20142777.

Significance: We presented empirical evidence that a strong genetic correlation underlying a behavioural syndrome in blue tit nestlings disappears as individuals reach adulthood and we demonstrated the occurrence of genotype-age interactions underlying this change.

2. **Class, B.**, Brommer, J.E., Klun E. (2014) Evolutionary quantitative genetics of behavioral responses to handling in a wild passerine. Ecology and Evolution, 4, 427-440.

Significance: This study gave an evolutionary quantitative genetics overview of behavioural responses to handling in adult blue tits. Using a combination of statistical methods (quantitative genetic, mark-recapture analyses, mixed models) and a unique dataset consisting of pedigreed adults with repeated behavioural measures and reciprocal cross-fostering of nestlings, we showed that these responses are heritable and correlated to survival and reproductive success (through parental care only).

1. Sueur C., **Class B.**, Hamm C., Meyer X., Pelé M. (2013) Different risk thresholds in pedestrian road crossing behaviour: a comparison of French and Japanese approaches. Accident Analysis & Prevention, 58, 59-63.

Significance: We quantified and compared the behaviour of pedestrians when crossing roads in France and Japan and found risk-taking to be higher in the former, which suggests a role of culture in shaping decision-making under risky circumstances in humans.

Book chapter

Brommer, J.E., **Class, B.** (2017) Personality from the perspective of behavioral ecology. In: Vonk J., Weiss A., Kuczaj S. (eds) Personality in Nonhuman Animals. Springer, Cham

Preprint

Brommer, J., **Class, B.**, & Covarrubias-Pazaran, G. (2019). Multivariate Mixed Models in Ecology and Evolutionary biology: Inferences and implementation in R. EcoEvoRxiv

Class, B., Powell, D., Terraube, J., Albery, G., Delmé, C., Bansal, S., Frère, C. (2021) “The epidemiology and genomics of a virulent emerging fungal pathogen in an Australian reptile”. BioRxiv

Submitted to journals

Frere, C., **Class, B.**, Ilany, A. “Social inheritance of avoidances shapes the structure of animal social networks”

Terraube, J., Ball, S., **Class, B.**, Crampton, J., Cristescu, R., Delmé, C., Gardiner, R., *et al.* “Landscape of health: combining multiple markers to improve wildlife conservation outcomes”

Tacey, J., Class, B., Delmé, C., Frère, C. “No impact of fungal infection on dyadic social interactions in a wild agamid lizard”.

Conference contributions

Conference talks

Accepted	“Contrasting multilevel relationships between behavior and body mass in blue tit nestlings”, ISBE 2020 conference (Melbourne, Australia). Conference postponed/cancelled.
06/11/2020	“Can dominance genetic variance be ignored in evolutionary quantitative genetic analyses of wild populations?”, ICQG6 conference (Brisbane, Australia)
28/08/2019	“Tail colour signals performance in blue tit nestlings”, EOU conference (Cluj-Napoca, Romania)
20/08/2017	“How to estimate assortative mating for labile traits in the wild? “, EOU conference (Turku, Finland)
01/08/2016	“Senescence of personality in a wild bird”, ISBE Conference (Exeter, UK)
03/02/2016	“Senescence of personality in a wild bird”, Nordic Oikos Conference (Turku, Finland)
03/04/2014	“Evolutionary quantitative genetics of behavioral responses to handling in a wild passerine”, AURA symposium (Turku, Finland)

Invited talks

05/02/2019	“Evolutionary quantitative genetics of animal personality in the wild”, Oikos Finland Conference (Oulu, Finland)
03/07/2016	“How to estimate assortative mating for repeatable traits in the wild? “, Post-conference symposium “Statistical quantification of individual differences: educational and statistical

approaches informing study design, analysis and inferences of multi-level behavioural data”
(Exeter, UK)

Organization of scientific events

- 19/08/2019-24/08/2019 **Symposium organizer:** “Assortative mating for quantitative traits: mechanisms, estimation, and evolutionary consequences”, co-organized with prof. Niels Dingemanse, ESEB conference (Turku, Finland)
- 18/08/2017-22/08/2017 **Member of the organizing team,** EOU Conference (Turku, Finland)
- 06/04/2016-07/04/2016 **Chair of the organizing committee,** AURA symposium (Turku, Finland)

Skills and other academic activities

Statistics and programming

R (good level in coding, mixed models, simulations), **R markdown** (see my website barbaraclass.com created using R markdown), **ASReml** standalone and **ASReml-R** (extensively used since 2014), **MARK**

Referee activity

I reviewed 32 manuscripts for top-ranked journals in the fields of ecology and evolution such as Ecology Letters, Evolution, Journal of Animal Ecology, Heredity, Journal of Evolutionary Biology, and Animal Behavior (see my Publons profile: <https://publons.com/researcher/1458196/barbara-class/>)

Editorial activity

I have co-edited, with Prof. Niels Dingemanse, a **special issue of Journal of Evolutionary Biology** on the theme “Assortative mating for quantitative traits: mechanisms, estimation, and evolutionary consequences”.

Fieldwork experience

- 2020-2021: **Weekly behavioural surveys** (data collection), design and collection of **focal behavioural data**, and **catching and processing**, in an urban population of Eastern water dragons in Brisbane, Australia.
- 2014-2019: **Monitoring a population of wild blue tits** during the breeding season (01/05-21/06), Coordination and data collection (observation, catching and processing), Tammisaari, Finland

Memberships

I am a member of SQuID (Statistical Quantification of Individual Differences), an international collaborative research network which aims to **promote the teaching and use of mixed models** in the fields of ecology and evolutionary biology, through research, workshops, and the development of educational tools.