

Hugo Cayuela

PhD in Ecology & Evolution

- Nationality: French
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RESEARCH INTERESTS

I am broadly interested in ecology and evolution. My research focuses on three main items:

1. I focus on demographic processes and life history evolution. I investigate the synergic effects of internal state variables and environmental factors (e.g., climate) on demographic rates and population long-term viability. I also examine how local environmental variation drives life history strategies in wild populations. Furthermore, I investigate the evolution of senescence and its ecological correlates in ectotherm tetrapods, a group of amniotes that have been neglected for a long time by aging studies.
2. I focus on dispersal ecology and evolution. I examine how social and environmental factors affect dispersal decisions. I also investigate how genetic background and transgenerational plasticity determine related-traits dispersal and the architecture of dispersal syndromes, i.e., covariation patterns between dispersal and individual phenotype. In addition, I seek to understand how context-dependent dispersal and dispersal syndromes affect neutral and adaptive genetic variation in spatially structured populations.
3. I investigate population genomic, local adaptation, and other evolutionary processes (e.g., gene flow and introgression among lineages) using next-generation sequencing technologies. In addition, I examine how sequence polymorphism, structural variants, gene expression and methylation profiles along the genome determine phenotypic variation (e.g., dispersal-related and life history traits) in wild and experimental populations.

CURRENT ACTIVITY

Postdoctoral researcher, Louis Bernatchez's Lab, Laval University, Québec, CANADA.

EDUCATION

- 2018-to present: Postdoctoral fellow, Louis Bernatchez's Lab, Laval University, Québec, CANADA, Banting postdoctoral fellowship.
- 2017-2018: Postdoctoral fellow, Louis Bernatchez's Lab, Laval University, Québec, CANADA, funded by the FRQNT.
- 2016: Postdoctoral fellow, ATER, University Claude Bernard, FRANCE.
- 2015: State license for animal experimentation (level 1) accredited category C by Federation of European Laboratory Animal Science Associations (FELASA)
- 2012-2016: PhD, CNRS, UMR 5023 - LEHNA (Laboratoire d'Ecologie des Hydrosystèmes Naturels et Anthropisés), University Claude Bernard, France. Thesis, March 11, 2016, <http://www.theses.fr/2016LYSE1034>

TEACHING & STUDENT FORMATION

- 2018-to present: Co-supervision of the PhD thesis of Laurent Boualit, Lausanne University.
- 2018-to present: PhD committees of Julia Dayon (EPHE) and Igor Boyer (Poitiers University)
- 2015-2016: Regular teaching activities at Bachelor level, University Claude Bernard.
- 2012-to present: Supervision of 14 students in Master degree.

GRANTS & AWARDS

- 2018-to present: Banting Postdoctoral fellowship: Genomic bases of dispersal evolution in a protist: parallelism or convergence? with Prof. Bernatchez, Laval University, Québec; 140 k\$
- 2017-2018: FRQNT Postdoctoral fellowship: Population genomics, life history and adaptive variation in *Mallotus villosus*, with Prof. Bernatchez, Laval University, Québec; 45 k\$
- 2015-2016: Bombina project: Dispersal syndromes, life history variation and population genetics, with Prof. Joly, University Claude Bernard; 25 k€

GRANTS & AWARDS (continued)	<ul style="list-style-type: none"> ▪ 2012-2016: PhD fellowship: Responses to spatiotemporally variable environment: sex, dispersal and life history tactics, with Prof. Joly, University Claude Bernard; 65 k€
CONFERENCE ORGANISATION	27 June-1 July 2016: Congress "Ecology & Behavior", University Claude Bernard, FRANCE (organization committee, treasurer) https://eb2016.sciencesconf.org/?lang=frb
SUBMITTED ARTICLES OR IN PREPARA- TION *Co-first authors	<p>50. CAYUELA H., WELLBAND, K., JACOB S., SHTICKZELLE N., PHILIPPE H., LEGRAND D., BERNATCHEZ L. Transcriptional bases of transgenerational plasticity of dispersal and its trade-offs. In preparation.</p> <p>49. CAYUELA H., ROUGEUX C., MEROT C., LAPORTE M., LEITWEIN M., DORANT Y., NORMANDEAU E., PRAEBEL K., KENCHINGTON E., BERNATCHEZ L. DNA methylation better predicts environmentally-driven life history variation than mutation point in a marine fish. In preparation.</p> <p>48. BOYER I., CAYUELA H., BERTRAND R., ISSELIN-NONDEDEU F. Considering the evolutionary history of glacial lineages matters to model past and future distribution under dispersal limitation in an amphibian. In preparation.</p> <p>47. CAYUELA H., LEMAITRE J.-F., LENA J.-P., CLAVEL J., [...], MILLER, D. Genetic sex determination system determines aging rate across amphibians. In preparation.</p> <p>46. CAYUELA H.*, LEITWEIN M.*, BERNATCHEZ L. Local genetic diversity, stocking effort, and recombination determine genome-wide introgression pattern in Brook Charr populations. Submitted to <i>Evolution Letters</i>.</p> <p>45. CAYUELA H., LEMAITRE J.-F., RUGIERO L., CAPULA M., LUISELLI L. Asynchrony of actuarial and reproductive senescence: lesson from an indeterminate grower. Submitted to <i>Journal of Evolutionary Biology</i>.</p> <p>44. CAYUELA H., DORANT Y., MEROT C., LAPORTE M., NORMANDEAU E., GAGNON-HARVEY S., SIROIS P., BERNATCHEZ L. Thermal adaptation rather than demographic history drives genetic structure inferred by copy number variants in a marine fish. Submitted to <i>Molecular Ecology</i>. (preprint on bioRxiv: https://doi.org/10.1101/2020.04.05.026443)</p> <p>43. VALENZUELA-SANCHEZ A., CAYUELA H., WILBER M., CANESSA S., BACIGALUPE L., MUTHS E., CUNNINGHAM A. A., OZGUL A., JOHNSON P., SCHMIDT B.R. Why disease ecology needs life history theory: A host perspective. Submitted to <i>Biological Reviews</i>.</p> <p>42. DORANT Y., CAYUELA H., WELLBAND K., LAPORTE M., ROUGEMONT Q., MEROT C., NORMANDEAU E., ROCHETTE R., BERNATCHEZ L. Copy number variants outperform SNPs to reveal genotype-temperature association in a marine species. Submitted to <i>Molecular Ecology</i>. (preprint on bioRxiv: https://www.biorxiv.org/content/10.1101/2020.01.28.923490v1)</p> <p>41. CAYUELA H., JACOB S., SHTICKZELLE N., VERDONCK R., PHILIPPE H., LAPORTE M., HUET M., BERNATCHEZ L., LEGRAND D. Transgenerational dispersal plasticity and its fitness consequences are under genetic control. Submitted to <i>The American Naturalist</i> (preprint on bioRxiv: https://www.biorxiv.org/content/10.1101/791210v1).</p> <p>40. CAYUELA H.*, ROUGEMONT Q.*, LAPORTE M., MEROT C., NORMANDEAU E., DORANT Y., TORRESEN O.K., HOFF S.N.K., JENTOFT S., SIROIS P., CASTONGUAY M., JANSEN T., PRAEBEL K., CLEMENT M., BERNATCHEZ L. Standing genetic variation and chromosomal rearrangement facilitate local adaptation in a marine fish. Submitted to <i>Molecular Ecology</i> (preprint on bioRxiv: https://www.biorxiv.org/content/10.1101/782201v1).</p> <p>39. CAYUELA H., PRUNIER J., LAPORTE M., GIPPET J., BOUALIT L., PREISS F., LAURENT A., FOLETTI F., JACOB G. Demography, genetic, and extinction process in a spatially structured population of lekking birds. In preparation. Submitted to <i>Oecologia</i>. (preprint on bioRxiv: https://doi.org/10.1101/705301)</p>
PUBLISHED ARTICLES *Co-first authors	<p>38. CAYUELA H., BESNARD A., COTE J., LAPORTE M., BONNAIRE E., PICHENOT J., SHTICKZELLE N., BELLEC A., JOLY P., LENA J.P. (2020) Anthropogenic disturbance determines dispersal syndrome, demography, and gene flow in spatially structured amphibian populations. <i>Ecological Monographs</i>, accepted.</p> <p>37. CAYUELA H., GRIFFITHS R., ZAKARIA N., ARNTZEN P., PRIOL P., LENA J.P., BESNARD A., JOLY P. (2020) Drivers of amphibian population dynamics and asynchrony at local and continental scales. <i>Journal of Animal Ecology</i>, accepted.</p>

PUBLISHED
ARTICLES
(continued)

36. **CAYUELA H.**, LEMAITRE J.-F., BONNAIRE E., PICHENOT J., SCHMIDT B. (2020) Population position along the fast-slow life-history continuum predicts intraspecific variation in actuarial senescence. *Journal of Animal Ecology*, accepted. DOI: 10.1111/1365-2656.13172
35. **CAYUELA H.**, VALENZUELA-SANCHEZ A., TEULIER L., MARTINEZ-SOLANO I., LENA J.-P., MERILÄ J., MUTHS E., SHINE R., QUAY L., DENOËL M., CLOBERT J., SCHMIDT B.R. (2020) Determinants and consequences of dispersal in vertebrates with complex life cycles: a review in pond-breeding amphibians. *The Quarterly Review of Biology*, accepted.
34. LEITWEIN M., **CAYUELA H.**, FERCHAUD A.-L., NORMANDEAU E., GAGNAIRE P.-A., BERNATCHEZ L. (2019) The role of recombination on genome-wide patterns of local ancestry exemplified by supplemented Brook Charr populations. *Molecular Ecology*, 28, 4755-4769. DOI: 10.1111/mec.15256
33. **CAYUELA H.**, OLGUN K., ANGELINI C., UZUM N., PEYRONEL O., MIAUD C., AVCI A., LEMAITRE J.-F., SCHMIDT B.R. (2019) Slow life-history strategies are associated with negligible actuarial senescence in western Palearctic salamanders. *Proceedings of the Royal Society B: Biological Sciences*, 286. DOI: 10.1098/rspb.2019.1498
32. **CAYUELA H.**, BOUALIT L., LAPORTE M., PRUNIER J., PREISS F., LAURENT A., FOLETTI F., CLOBERT J., JACOB G. (2019) Kin-dependent dispersal influences relatedness and genetic structuring in a lek system. *Oecologia*, 191, 97-112. DOI: 10.1007/s00442-019-04484-z
31. **CAYUELA H.**, AKANI G.C., HEMA E.M., ENIANG E.A., AMADI N., AJONG S.N., DENDI D., PETROZZI F., LUISELLI L. (2019) Life history and age-dependent mortality processes in tropical reptiles. *Biological Journal of the Linnean Society*, 128, 251-262. DOI: 10.1093/biolinnean/blz103
30. **CAYUELA H.**, BONNAIRE E., ASTRUC G., BESNARD A. (2019) Transport infrastructures severely impact amphibian dispersal regardless of life stage. *Scientific Reports*, 9, 8214. DOI: 10.1038/s41598-019-44706-1
29. **CAYUELA H.**, GILLET L., LAUDELOUT A., BESNARD A., BONNAIRE E., LEVIONNOIS P., MUTHS E., DUFRENE M., KINET T. (2019) Survival cost to relocation does not reduce population self-sustainability in an amphibian. *Ecological Applications*, 29, e01909. DOI: 10.1002/eap.1909
28. **CAYUELA H.**, CRUICKSHANK S. S., BRANDT H., OZGÜL A., SCHMIDT B.R. (2019) Habitat-driven life history variation in an amphibian metapopulation. *Oikos*, 128, 1265-1276. DOI: 10.1111/oik.06286
27. VALENZUELA-SANCHEZ A., **CAYUELA H.**, SCHMIDT B.R., CUNNINGHAM A. A., SOTO-AZAT C. (2019) Slow natal dispersal across a homogeneous landscape suggests the use of mixed movement behaviours in the Darwin's frog. *Animal Behaviour*, 150, 77-86. DOI: 10.1016/j.anbehav.2019.01.026
26. BOUALIT L., PICHENOT J., BESNARD B., JOLY P., HELDER R., **CAYUELA H.** (2019) Environmentally mediated breeding success predicts dispersal decisions in an early successional amphibian. *Animal Behaviour*, 149, 107-120. DOI: 10.1016/j.anbehav.2019.01.008
25. **CAYUELA H.**, SCHMIDT B.R., WEINBACH A., BESNARD A., JOLY P. (2019) Multiple density-dependent processes shape the dynamics of a spatially structured amphibian population. *Journal of Animal Ecology*, 88, 164-177. DOI: 10.1111/1365-2656.12906
24. **CAYUELA H.**, ROUGEMONT Q., PRUNIER J., MOORE J.S., CLOBERT J., BESNARD A., BERNATCHEZ L. (2018) Demographic and genetic approaches to study dispersal in wild animal populations: a methodological review. *Molecular Ecology*, 27, 3976-4010. DOI: 10.1111/mec.14848
23. **CAYUELA H.**, GROLET O., JOLY P. (2018) Context-dependent dispersal, public information and heterospecific attraction in newts. *Oecologia*, 188, 1069-1080. DOI: 10.1007/s00442-018-4267-3
22. **CAYUELA H.**, BESNARD A., QUAY L., HELDER R., LENA J.P., JOLY P., PICHENOT J. (2018) Demographic response to patch destruction in a spatially structured amphibian population. *Journal of Applied Ecology*, 55, 2204-2215. DOI: 10.1111/1365-2664.13198
21. DENOËL M., DALLEUR S., LANGRAND E., BESNARD A., **CAYUELA H.** (2018) Dispersal and alternative breeding site fidelity strategies in an amphibian. *Ecography*, 41, 1-13. DOI: 10.1111/ecog.03296
20. **CAYUELA H.**, PRADEL R., JOLY P., BONNAIRE E., BESNARD A. (2018) Estimating dispersal in spatiotemporally variable environments using multievent capture-recapture modeling. *Ecology*, 99, 1150-1163. DOI: 10.1002/ecy.219
19. WEINBACH A., **CAYUELA H.**, GROLET O., BESNARD A., JOLY P. (2018) Resilience to climate variation in a spatially structured amphibian population. *Scientific Reports*, 8, 14607. DOI: 10.1038/s41598-018-33111-9

PUBLISHED
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18. **CAYUELA H.**, LENA J.P., LENGAGNE T., KAUFMANN B., MONDY N., KONECNY L., DUMET A., VIENNEY A., JOLY P. (2017) Relatedness levels predict male mating success in a pond-breeding amphibian. *Animal Behaviour*, 130:251-261, DOI: 10.1016/j.anbehav.2017.05.028
17. TOURNIER E., BESNARD A., TOURNIER V., **CAYUELA H.** (2017) Manipulating waterbody hydroperiod affects movement behavior and occupancy dynamics in an amphibian. *Freshwater Biology*, 62:1768-1782. DOI: 10.1111/fwb.12988
16. **CAYUELA H.**, JOLY P., SCHMIDT B.R., PICHENOT J., BONNAIRE E., PRIOL P., PEYRONEL O., LAVILLE M., BESNARD A. (2017) Life history tactics shape amphibians' demographic responses to the North Atlantic Oscillation. *Global Change Biology*, 23, 4620-4638. DOI: 10.1111/gcb.13672
15. **CAYUELA H.**, PRADEL R., JOLY P., BESNARD A. (2017) Analysing movement behavior and dynamic space-use strategies among habitats using multievent capture-recapture modeling. *Methods in Ecology and Evolution*, 8:1124-1132. DOI: 10.1111/2041-210X.12717
14. **CAYUELA H.**, LENGAGNE T., JOLY P., LENA J.P. (2017) How females trade-off the uncertainty of breeding resource suitability with male quality during mate choice in an anuran? *Animal Behaviour*, 123, 179-185. DOI: 10.1016/j.anbehav.2016.11.002
13. **CAYUELA H.**, BOUALIT L., ARSOVSKI D., BONNAIRE E., PICHENOT J., BELLEC A., MIAUD C., LENA J.P., JOLY P., BESNARD A. (2016) Does habitat unpredictability promote the evolution of a colonizer syndrome in amphibian metapopulations?. *Ecology*, 97, 2658-2670. DOI: 10.1002/ecy.1489
12. **CAYUELA H.**, LENGAGNE T., KAUFMANN B., JOLY P., LENA J.P. (2016) Larval competition risk shapes male-male competition and female mate choice in an anuran. *Behavioral Ecology*, arw100. DOI: 10.1093/beheco/arw100
11. **CAYUELA H.**, ARSOVSKI D., THIRION J.M., BONNAIRE E., PICHENOT J., BOITAUD S., MIAUD C., JOLY P., BESNARD A. (2016) Demographic responses to weather fluctuation are context-dependent in a long-lived amphibian. *Global Change Biology*, 22, 2076-2087. DOI: 10.1111/gcb.13290
10. **CAYUELA H.**, ARSOVSKI D., THIRION J.M., BONNAIRE E., PICHENOT J., BOITAUD S., BRISON A. L., MIAUD C., JOLY P., BESNARD A. (2016) Contrasting patterns of environmental fluctuation promote divergent life histories among populations of a long-lived amphibian. *Ecology*, 97, 980-991. DOI: 10.1890/15-0693.1
9. **CAYUELA H.**, ARSOVSKI D., BONNAIRE E., DUGUET R., JOLY P., BESNARD A. (2016) Severe droughts impact survival, fecundity and population persistence in an endangered amphibian. *Ecosphere*, 7, e01246. DOI:10.1002/ecs2.1246
8. **CAYUELA H.**, ARSOVSKI D., BOITAUD S., BONNAIRE E., BOUALIT L., MIAUD C., JOLY P., BESNARD A. (2015) Slow life history and rapid extreme flood: demographic mechanisms and their consequences for population viability in an endangered amphibian. *Freshwater Biology*, 60, 2349-2361. DOI: 10.1111/fwb.12661
7. **CAYUELA H.**, QUAY L., MIAUD C., DUMET A., LENA J.P., RIVIERE V. (2015) Intensive vehicle traffic impacts morphology and endocrine stress response in an endangered amphibian. *Oryx*, 2015, 1-7. DOI: 10.1017/S0030605315000812
6. **CAYUELA H.**, LAMBREY J., VACHER J.P., MIAUD C. (2015) Highlighting the impacts of land-use changes on a threatened amphibian in a human-dominated landscape. *Population Ecology*, 57, 433-443. DOI: 10.1007/s10144-015-0483-4
5. **CAYUELA H.**, BESNARD A., BONNAIRE E., PERRET H., RIVOALEN J., MIAUD C., JOLY P. (2014) To breed or not to breed: environmental cues and past breeding status drive current breeding decision in a long-lived amphibian. *Oecologia*, 177, 107-116. DOI: 10.1007/s00442-014-3003-x
4. **CAYUELA H.**, BESNARD A., JOLY P. (2013) Multi-event models reveal the absence of interaction between an invasive frog and a native endangered amphibian. *Biological Invasions*, 15, 2001-2012. DOI: 10.1007/s10530-013-0427-x
3. RODRIGUEZ-PEREZ H., **CAYUELA H.**, HILAIRE S., OLIVIER A., MESLEARD F. (2013) Is the exotic red swamp crayfish (*Procambarus clarkii*) a current threat for the Mediterranean tree frog (*Hyla meridionalis*) in the Camargue (Southern France)?. *Hydrobiologia*, 723, 145-156. DOI: 10.1007/s10750-013-1481-1
2. **CAYUELA H.**, BESNARD A. BECHET A., DEVICTOR V., OLIVIER A. (2012) Reproductive dynamics of three amphibian species in Mediterranean wetlands: the role of local precipitation and hydrological regimes. *Freshwater Biology*, 57, 2629-2640. DOI: 10.1111/fwb.12034
1. **CAYUELA H.**, CHEYLAN M., JOLY P. (2011) The best of a harsh lot in a specialized species: breeding habitat use by the yellow-bellied toad (*Bombina variegata*) on rocky riverbanks. *Amphibia-Reptilia*, 32, 533-539. DOI: 10.1163/156853811X614461

REVIEWING I have reviewed papers for: *Evolution*, *Molecular Ecology*, *Global Change Biology*, *Methods in Ecology and Evolution*, *Functional Ecology*, *Journal of Biogeography*, *Evolutionary Applications*, *Ecological Applications*, *Biological Conservation*, *Biological Journal of the Linnean Society*, *Evolutionary Biology*, *Plos One*, *Ecology and Evolution*, *Ethology*, *Ecosphere*, *Biodiversity and Conservation*, *The Science of Nature*, *Canadian Journal of Zoology*, *Journal of Wildlife Management*, *Hydrobiologia*, *Amphibia-Reptilia*, *Journal of Herpetology*, *Herpetological Journal*.

**POPULAR
SCIENCE
WRITINGS**

1. **CAYUELA H.** (2015) Méthode de suivi de l'herpétofaune. In : GROSSI J.L., FONTERS R. (eds) Atlas des amphibiens et des reptiles de Rhône-Alpes. LPO Rhône-Alpes Edition.
2. **CAYUELA H.** (2015) Monographie du sonneur à ventre jaune. In : GROSSI J.L., FONTERS R. (eds) Atlas des amphibiens et des reptiles de Rhône-Alpes. LPO Rhône-Alpes Edition.
3. **CAYUELA H.**, GIPPET J., DEGRAMONT N., EME D. (2015) Herpétofaune et changements climatiques dans la région Rhône-Alpes. In : GROSSI J.L., FONTERS R. (eds) Atlas des amphibiens et des reptiles de Rhône-Alpes. LPO Rhône-Alpes Edition.