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An International Research Network on bipedalism

15th annual ESHE meeting, 25-27 September 2025, Paris, France

The members of the International Research Network "Bipedal Equilibrium"

Gilles Berillon, Jérémy Duveau, Quentin Cosnefroy, Peter Aerts, Valentina Agostini, Amélie Beaudet, Lia Betti, Alicia Blasi-Toccacceli, Paul Boursin, Jaroslav Bruzek†, Cécile Callou, Marine Cazenave, Tara Chapman, Tony Chevalier, Lloyd A. Courtenay, Christine Couture-Veschambre, Kris d'Août, Guillaume Daver, François Druelle, Barbara Fischer, Pierre Frémondière, Marco Ghislieri, Dominique Grimaud-Hervé, Nicole D. S. Grunstra, Franck Guy, Martin Haeusler, Anthony Herrel, Franck Lamberton, Mathilde Lequin, Victoria A. Lockwood, Chloé Martin, Philipp Mitteröcker, Franck Multon, Zoé Nowicki, Laurent Pallas, Antoine Perrier, Amira Perrot, Victoria Poltze, Rebeka Rmoutilova, Karen R. Rosenberg, Ekaterina Stansfield, Pierre Tessier, Lionel Tholon, Nicole Torres-Tamayo, Benjamin Tournan, Bruno Watier, Laura M. Watson, Nicole Webb, Ashleigh L. Wiseman, François Marchal

The Bipedal Equilibrium Project

The International Research Network (IRN) "Bipedal Equilibrium: diversity, foundations, control, and evolution" is a program funded by the Centre National de la Recherche Scientifique Ecologie & Environnement. It functions as a network facilitating exchanges and research between more than **50 members** from **23 international laboratories** working in **various disciplines** (paleoanthropology, primatology, biomechanics, anatomy, computer science, ichnology).

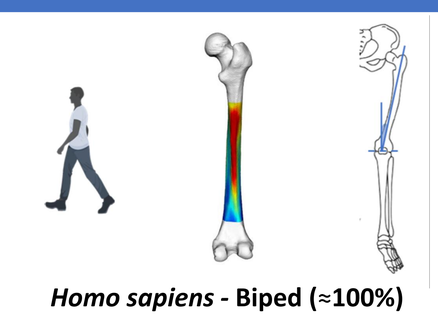
Its aim is to study bipedalism through a transdisciplinary approach in an evolutionary and comparative framework. It strives to provide fundamental knowledge about bipedalism, improve tools, and develop new methodological approaches in an open science spirit. To this end, the research activities of this network are divided into **3 thematic axes** and **3 transversal workshops**, which are described throughout this poster.

Thematic axis 1: Anatomical foundations of bipedalism

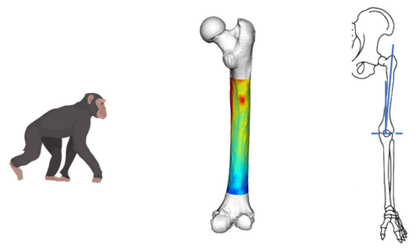
Goal: explore the functional relationships between anatomical traits and bipedalism.

Main actions:

- Comparison of the locomotor anatomy of extant human and non-human primates.
- Application of the anatomical indicators to fossil hominin specimens.
- Evaluate the relevance of locomotor grades (facultative, habitual, obligate bipedalism).

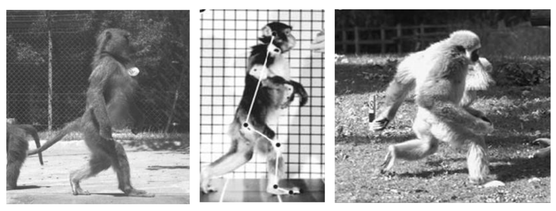


***Homo sapiens* - Biped (≈100%)**

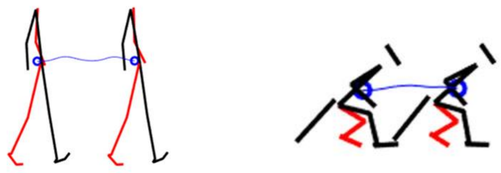


***Pan troglodytes* - Knuckle-walker (≈84%)**

Thematic axis 2: Biomechanics of human and non-human walking



Terrestrial bipedalism in non-human primates



Homo sapiens
energy recovery ≈ 52%

Papio anubis
energy recovery ≈ 19%

Movement of the center of mass (in blue)
Modified from Druelle et al., 2025

Goal: study the biomechanics of bipedalism in extant humans and non-human primates to better infer fossil morphology.

Main actions:

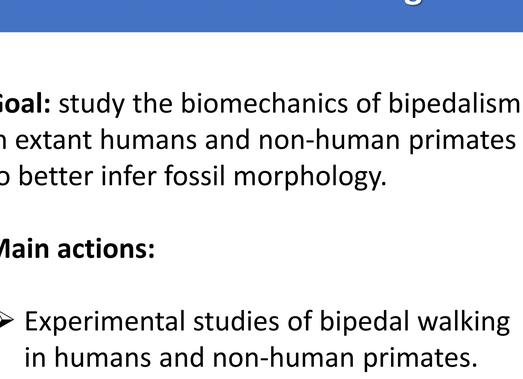
- Experimental studies of bipedal walking in humans and non-human primates.
- Quantitative analyses of kinematics and kinetics of locomotion.
- Identification of biomechanical markers that can inform fossil interpretations.

Thematic axis 3: Paleo-obstetrics and interactions with locomotion

Goal: understand the emergence of major obstetrical specificities (rotational birth, dystocic labor) during human evolution and test the pelvic floor hypothesis.

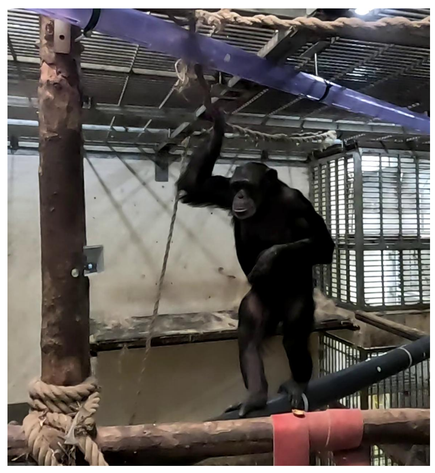
Main actions:

- Dissections on non-human primates (*Papio, Trachypithecus, Semnopithecus*).
- Anatomical description and digital modelling of the pelvic floor.
- Comparative framework to reconstruct possible pelvic floor in early hominins.



3D modelling of a Homo sapiens female pelvis and fetal head
Frémondière et al. 2022

Transversal workshop 1: Methodologies



Captive chimpanzee engaging in assisted bipedalism on SABRE (Simulated Arboreal Bipedalism Research Equipment)
Developed by Lockwood et al.

Focus: develop and share methodological tools for the reconstruction, experimentation and simulation of bipedalism.

Ongoing projects:

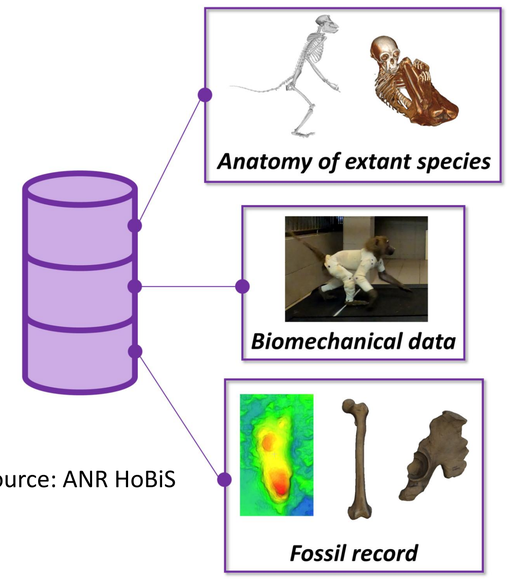
- Design of experimental setups encouraging arboreal bipedalism in captive chimpanzees.
- Collection and analysis of video data at La Vallée des Singes (France).
- Development of protocols for digital reconstructions and simulations in extant and fossil taxa.

Transversal workshop 2: Database

Focus: create and manage databases dedicated to the anatomy and biomechanics of bipedalism in extant and fossil primates.

Ongoing projects:

- Compilation of anatomical and biomechanical data on locomotion.
- Integration of fossil and extant datasets in a comparative framework.
- Promotion of open access and data sharing within the network.



Source: ANR HoBiS

Transversal workshop 3: Epistemology of the concept of bipedalism

Take part in our survey

Focus: rethinking how hominin bipedalism is defined and conceptualized.

Ongoing projects:

- Evaluating the specificity and sensitivity of anatomical traits as proxies for past hominin bipedalism.
- Building a clearer methodological and analytical framework for hominin locomotion.
- International survey on how researchers understand bipedalism and its key factors.

In memory of our friend and colleague Jaroslav Bruzek

https://natur.cuni.cz/en/biology/departments-and-work-places/department-of-anthropology-and-human-genetics/about-department/news/8293-memoirs-of-prof-jaroslav-bruzek

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