



Microbiote intestinal du nourrisson

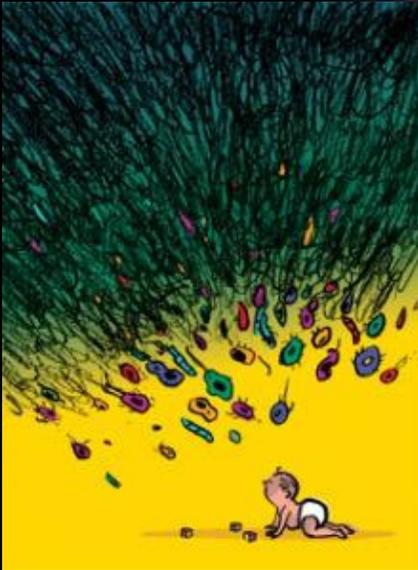
Dr Alexis Mosca

Hôpital Robert Debré (Paris)

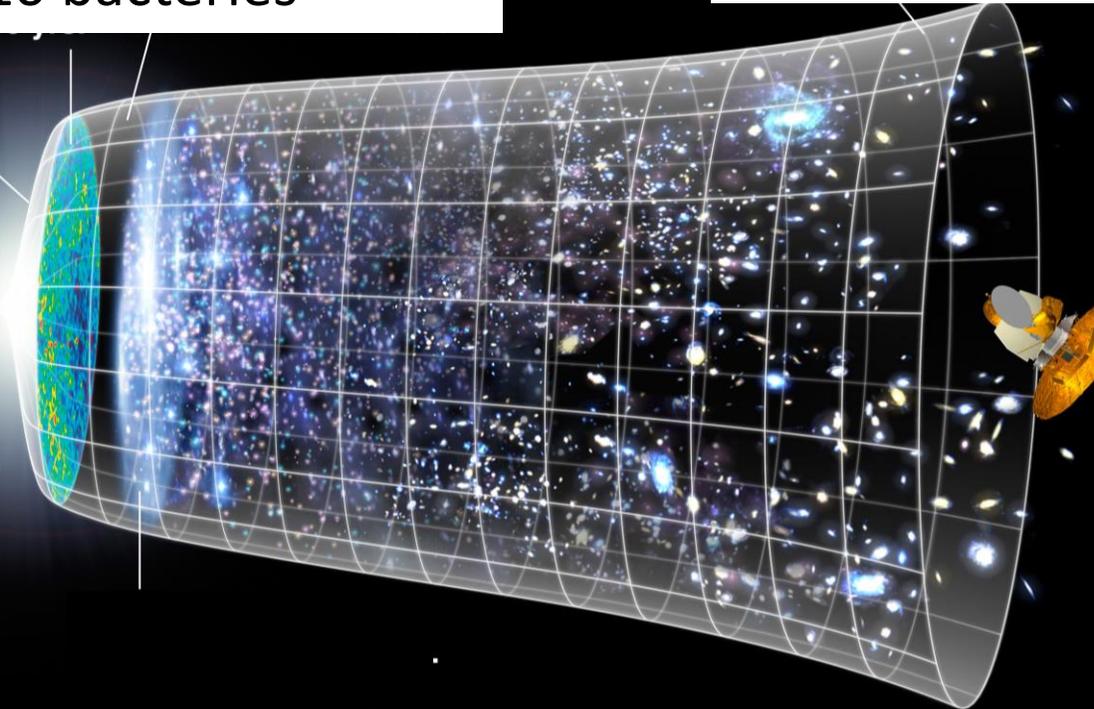
SFGM-TC Scientific Day, Paris, 20/10/2022

Un Big Bang à la naissance !

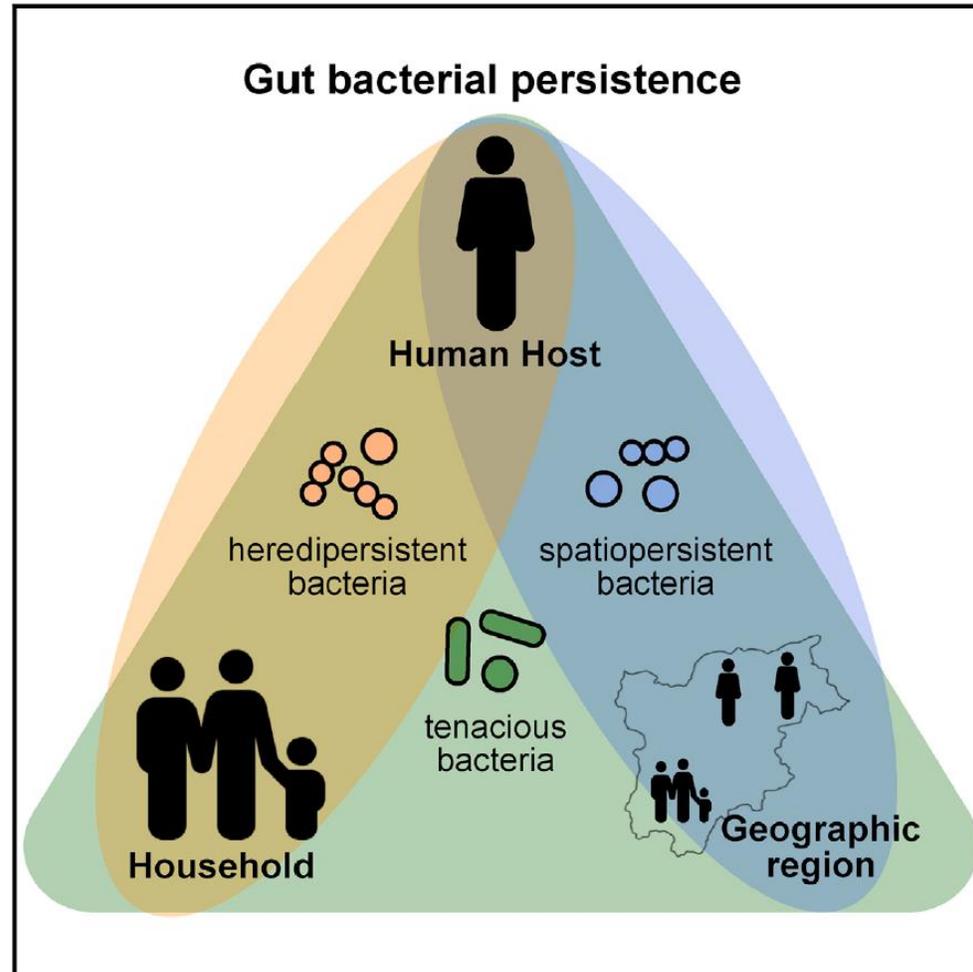
A 2-5 jours de vie :
 10^8 à 10^{10} bactéries



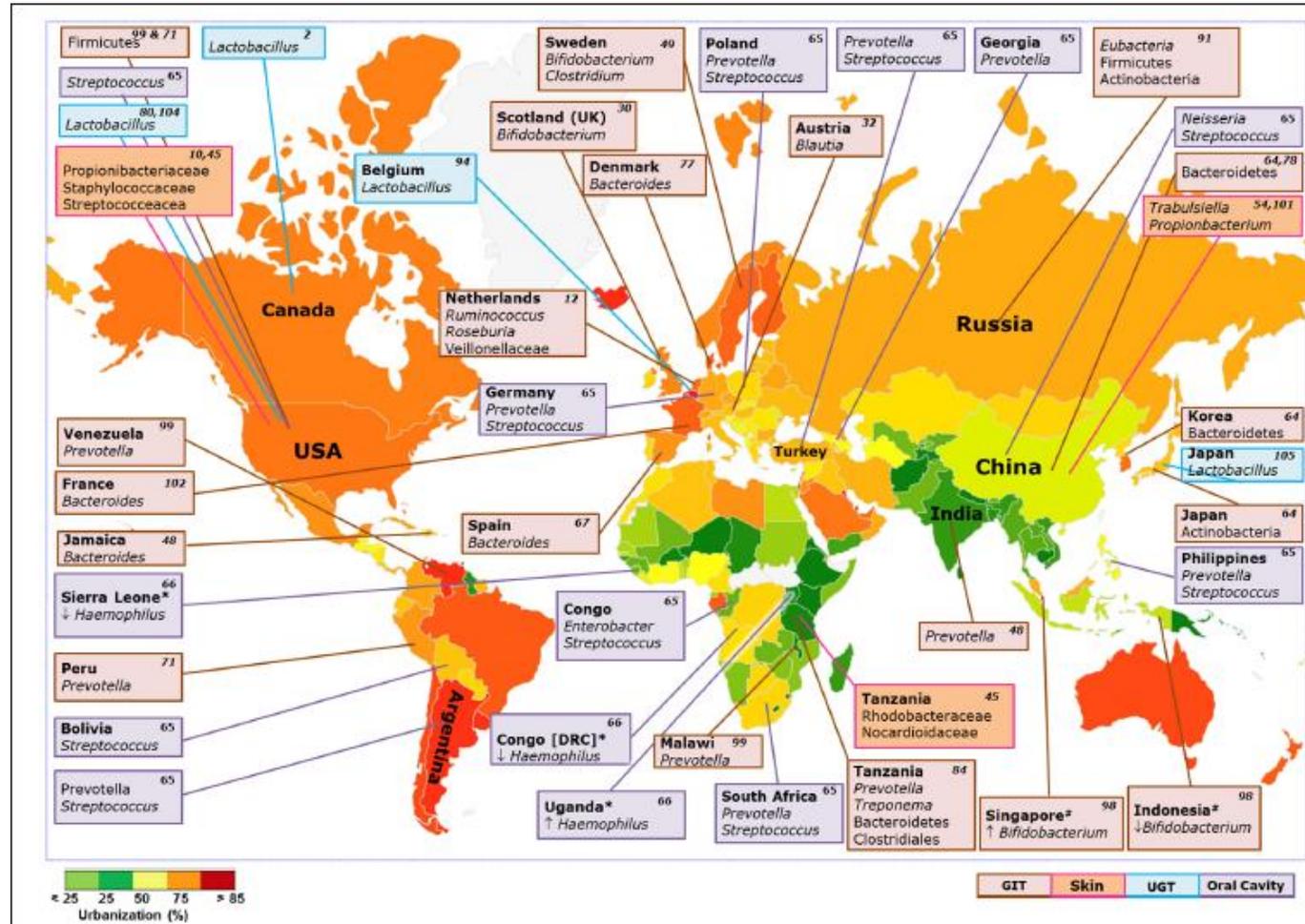
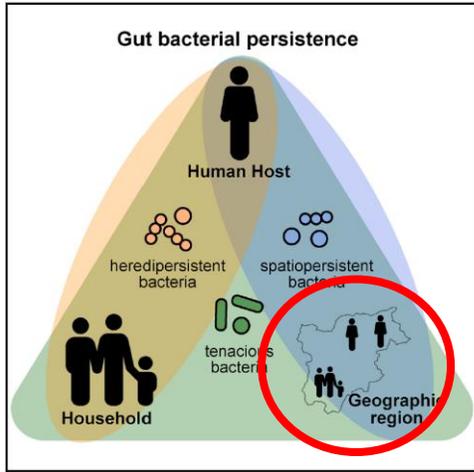
A 3-5 ans :
 10^{13} bactéries



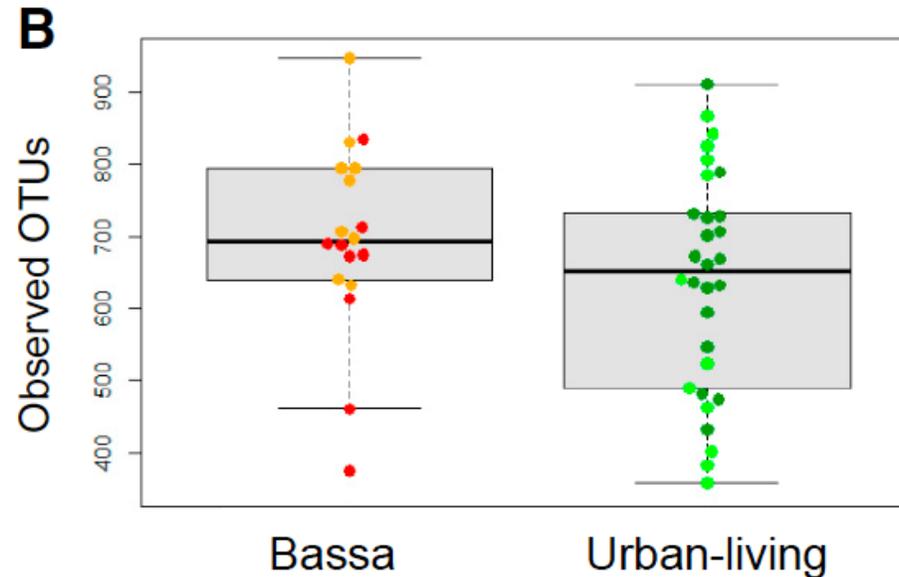
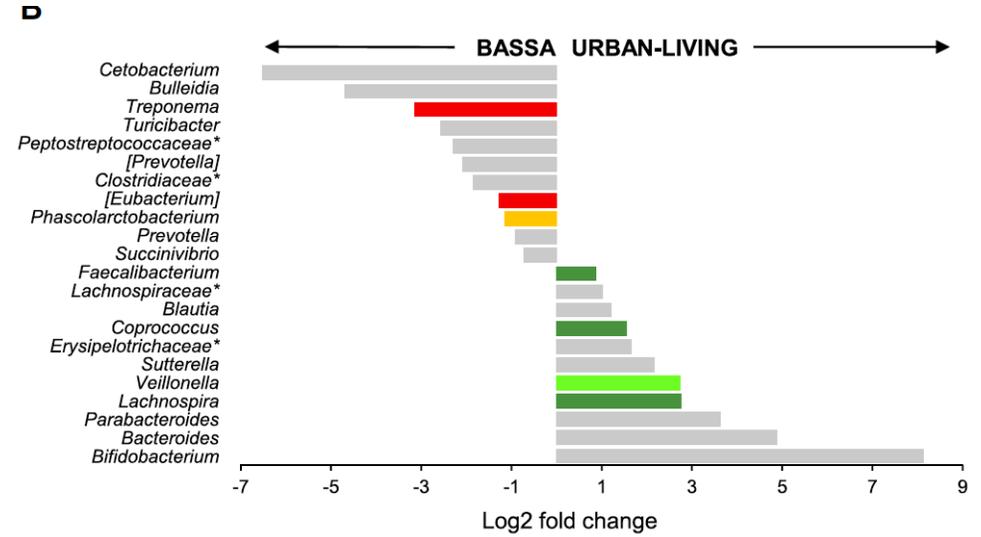
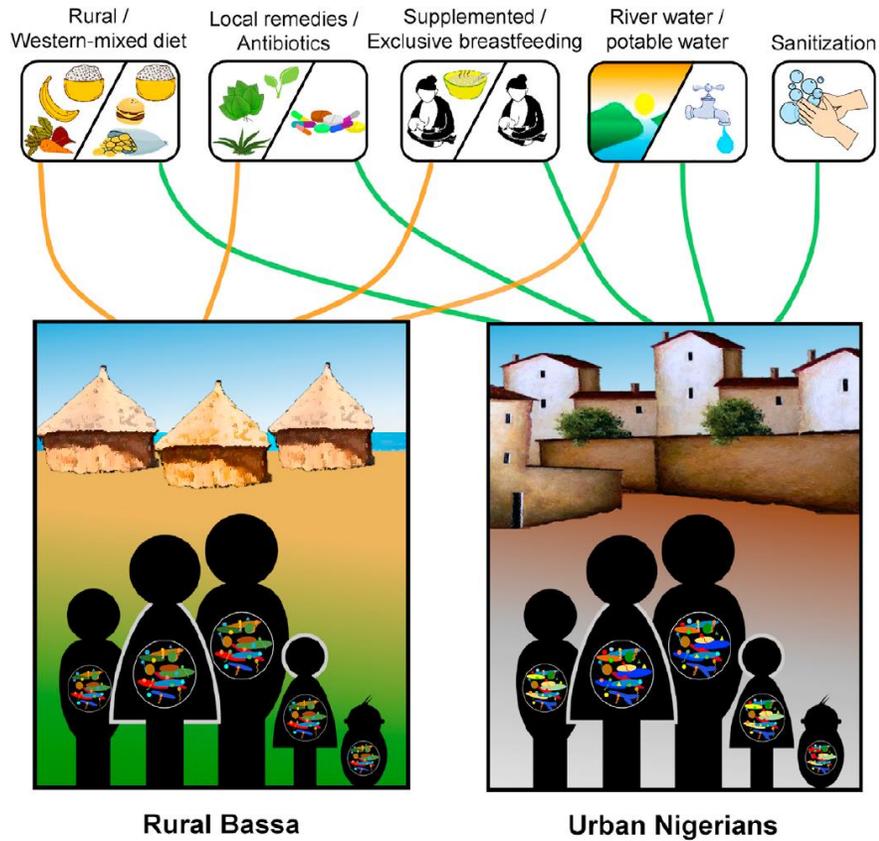
D'où vient notre microbiote ?



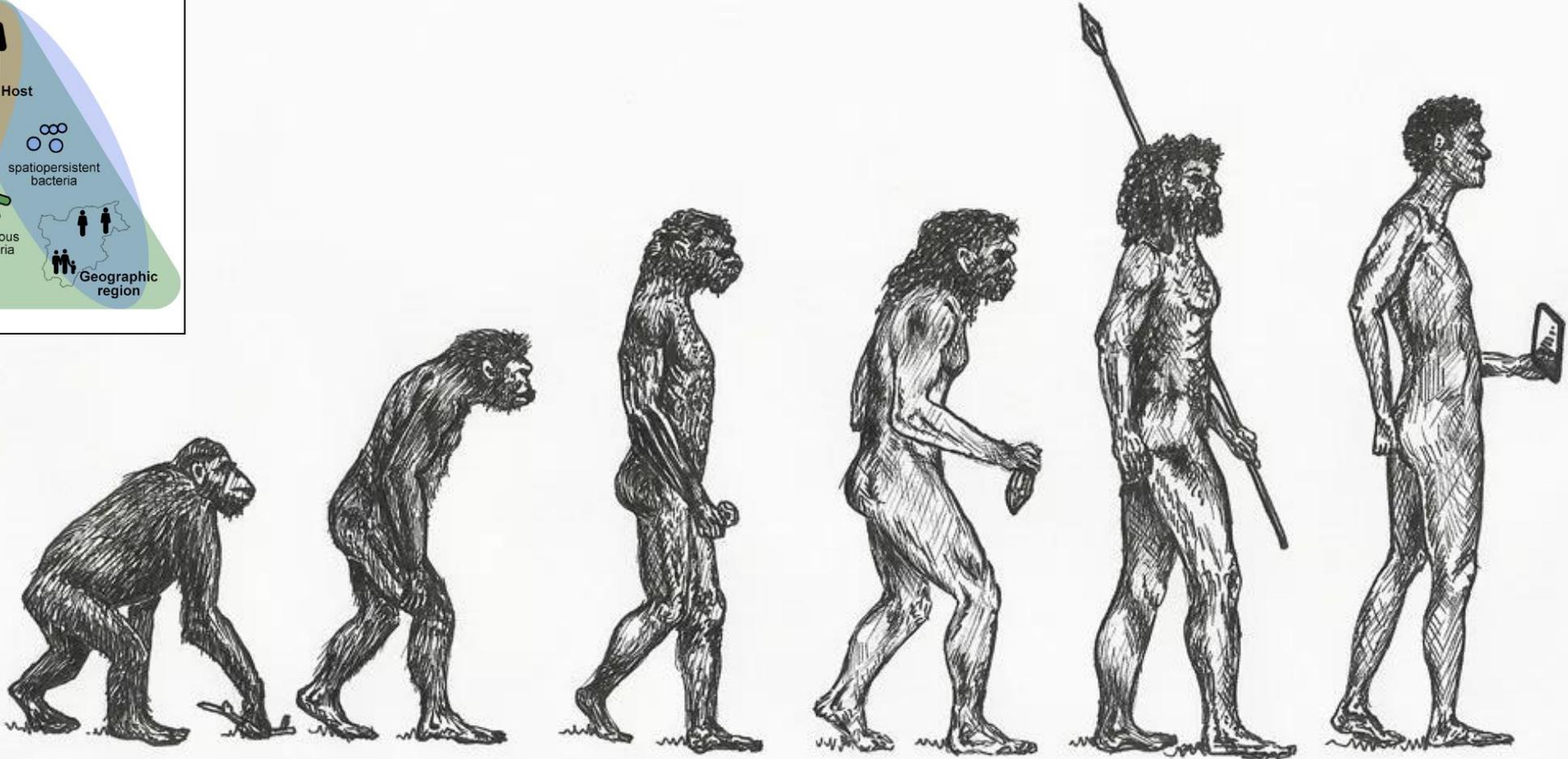
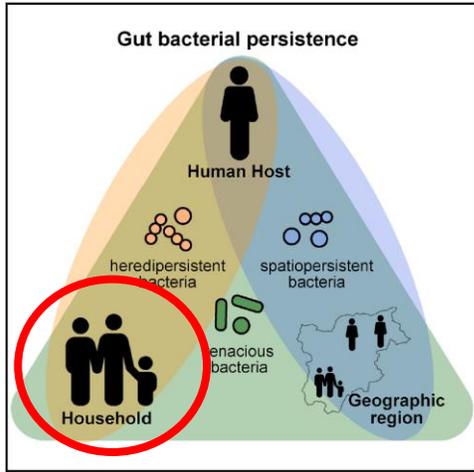
Influence du microbiote de l'environnement



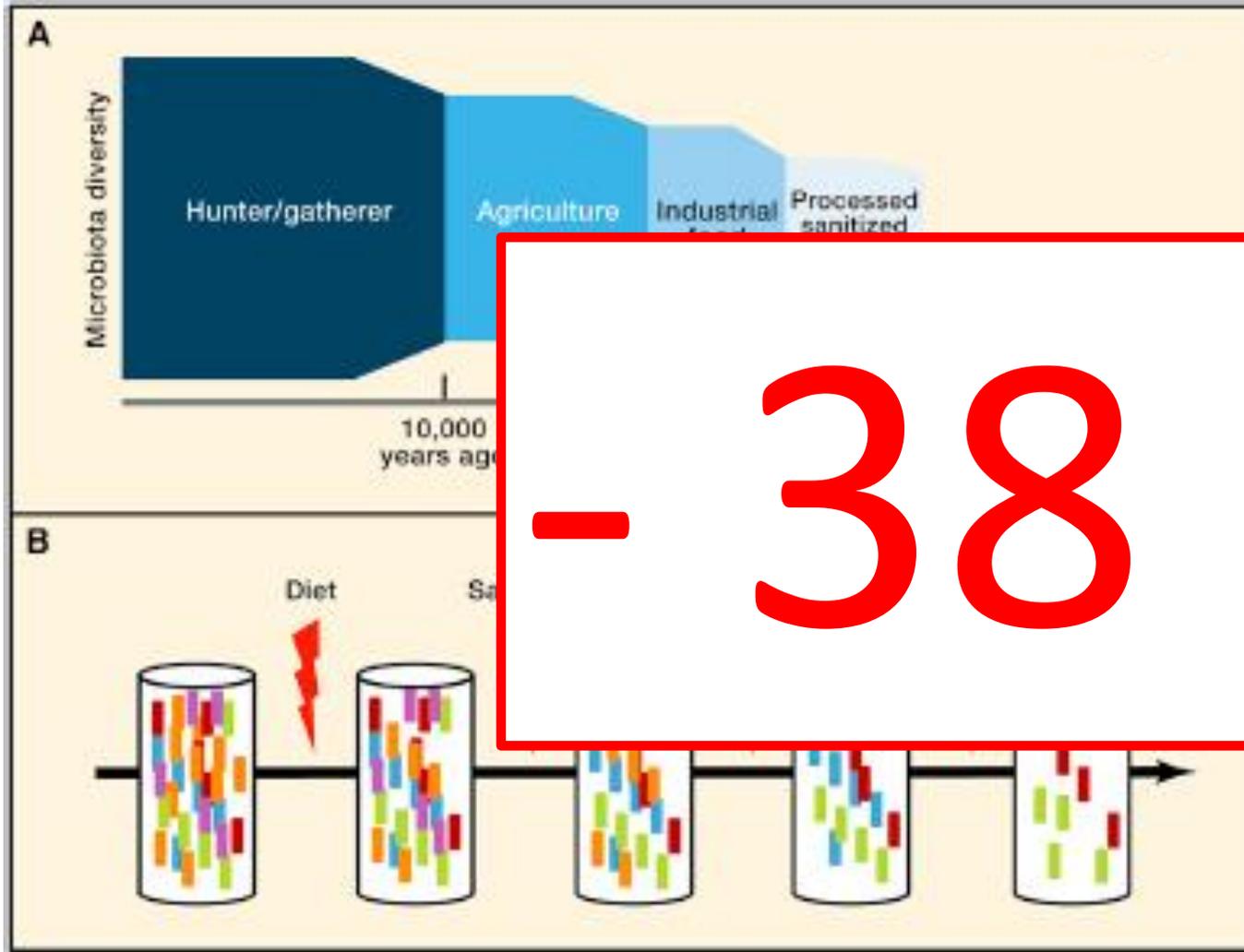
Infant and Adult Gut Microbiome and Metabolome in Rural Bassa and Urban Settlers from Nigeria



Il était une fois, *Homo Sapiens* ...



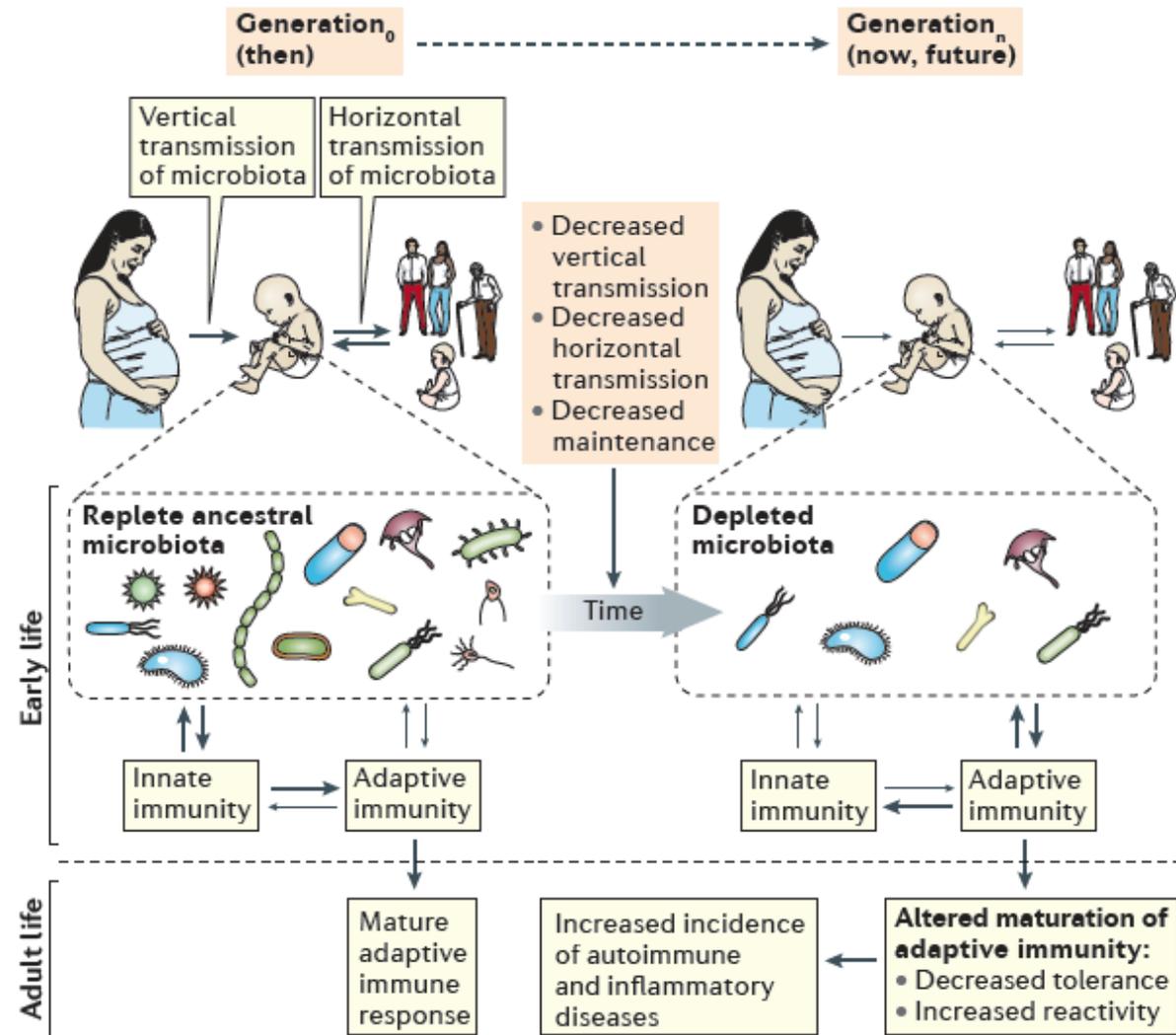
Son microbiote s'appauvrit au fil des millénaires ...



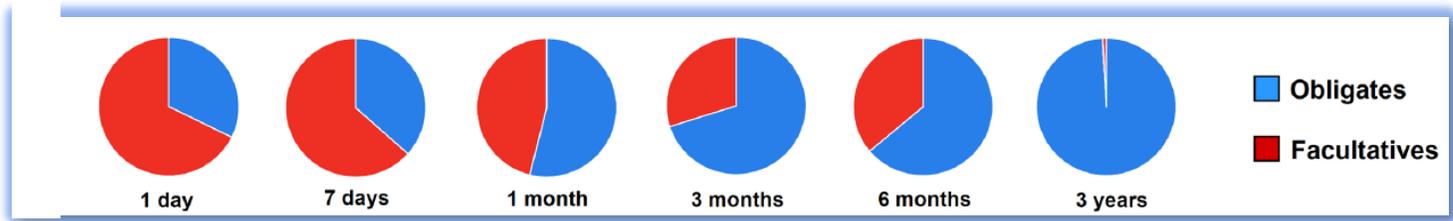
- 38 %



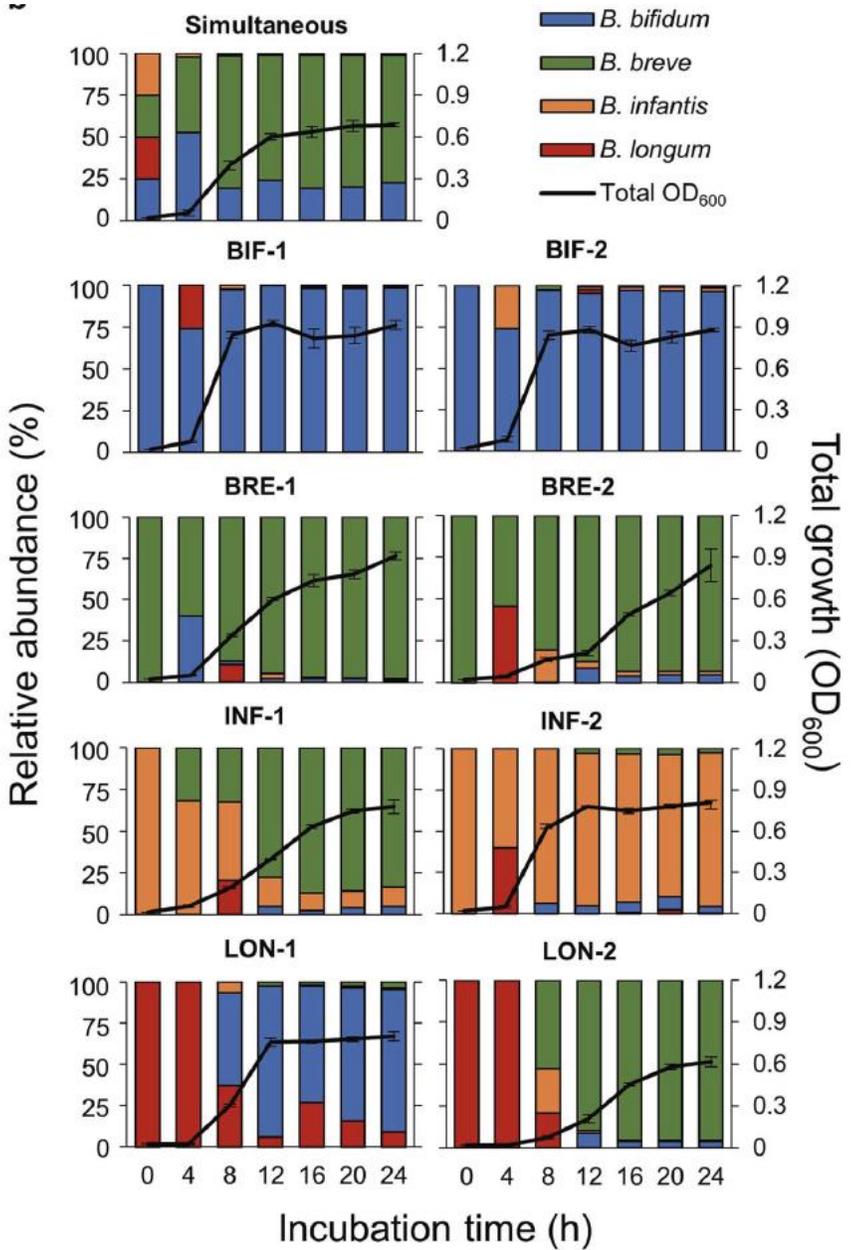
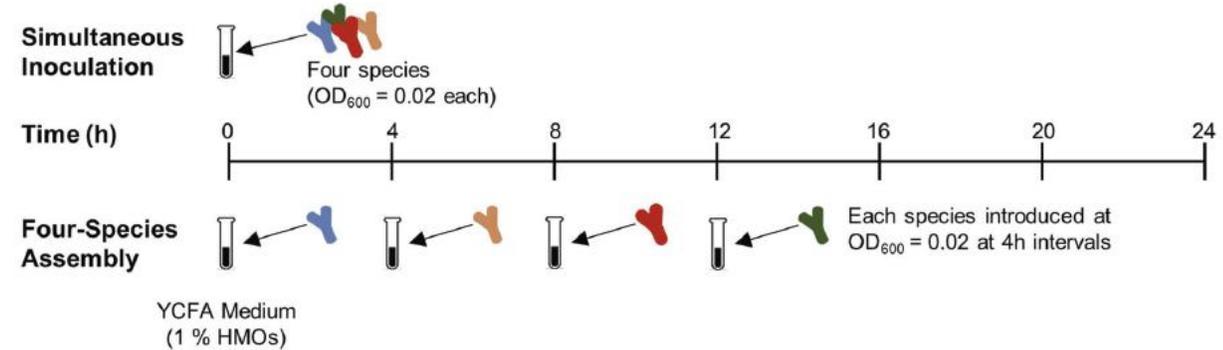
La théorie de disparition du microbiote et l'apparition d'épidémies de maladies chroniques



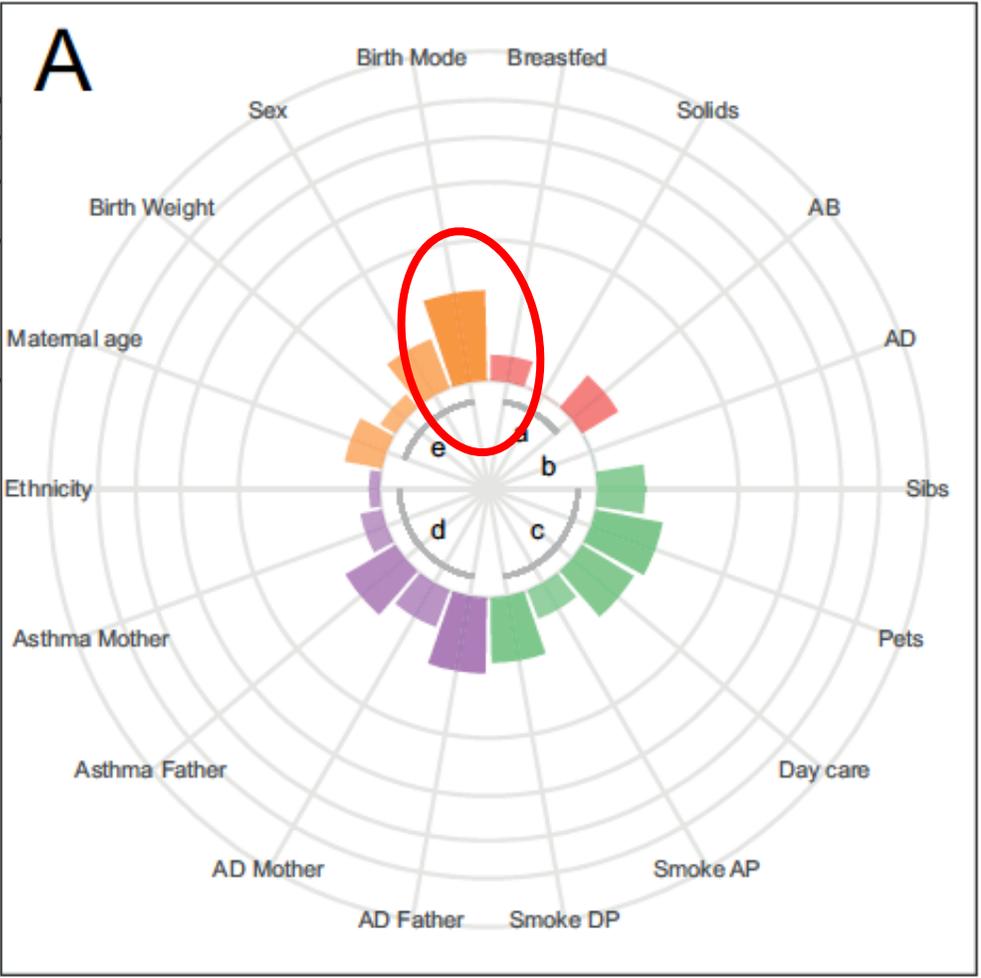
Une mise en place sous contrainte écologique



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 Priority effects shape the structure of infant-type *Bifidobacterium* communities on human milk oligosaccharides

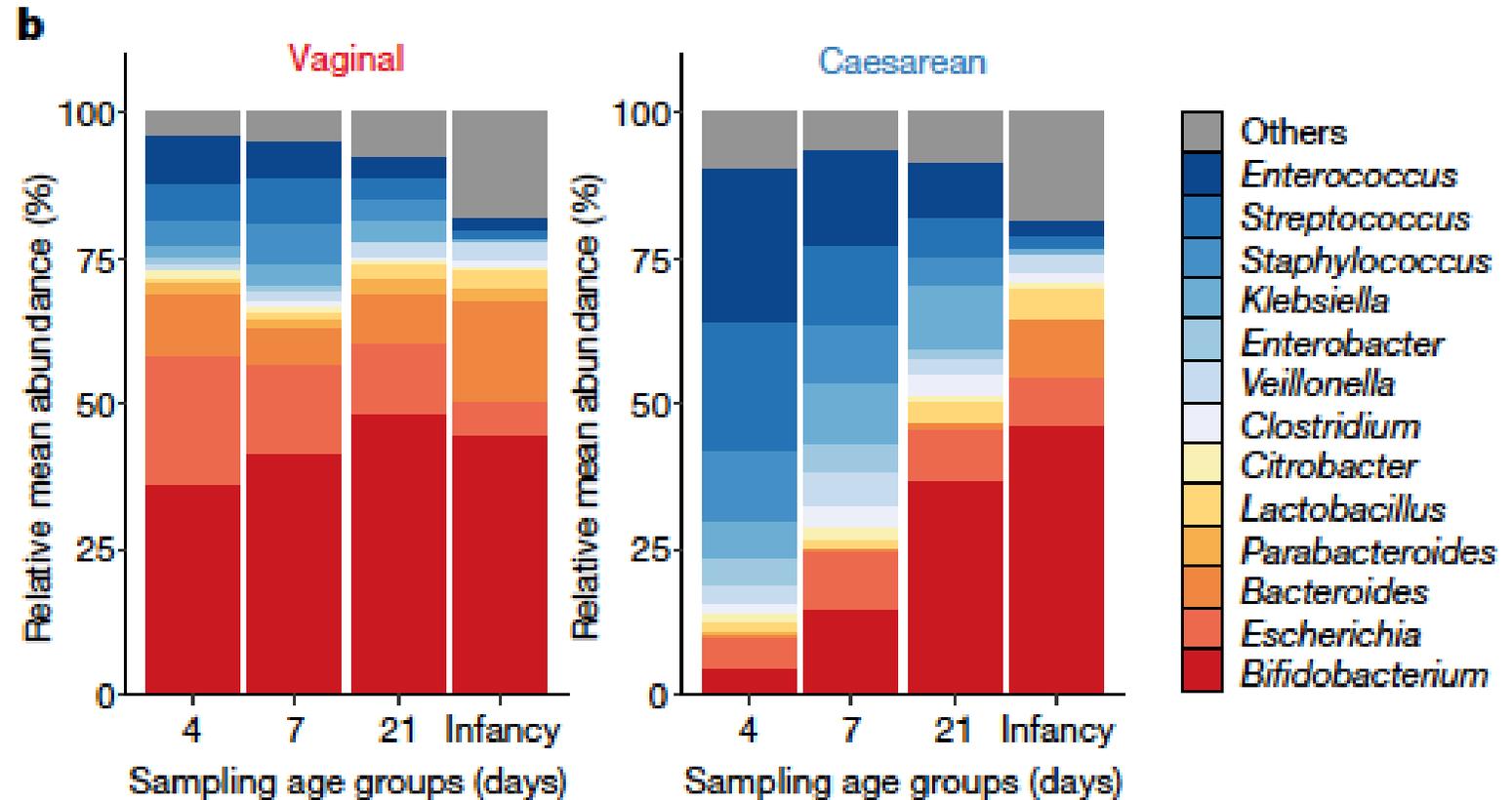
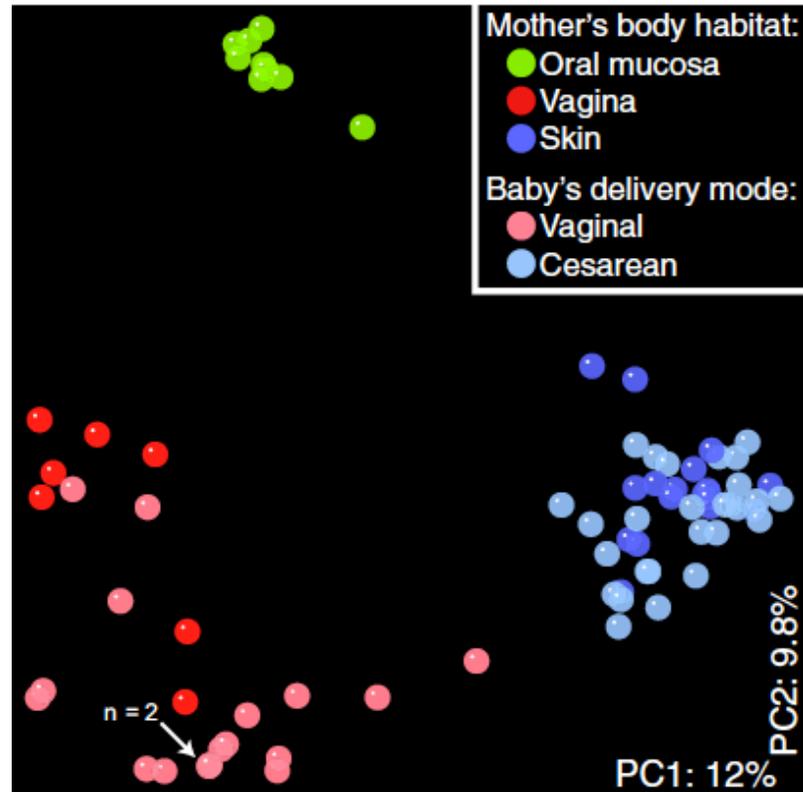


Facteurs influençant la composition du microbiote du nourrisson



A 5 semaines de vie

Le mode d'accouchement : une empreinte à long terme ...



MYUNG J. CHU / LOS ANGELES TIMES VIA GETTY

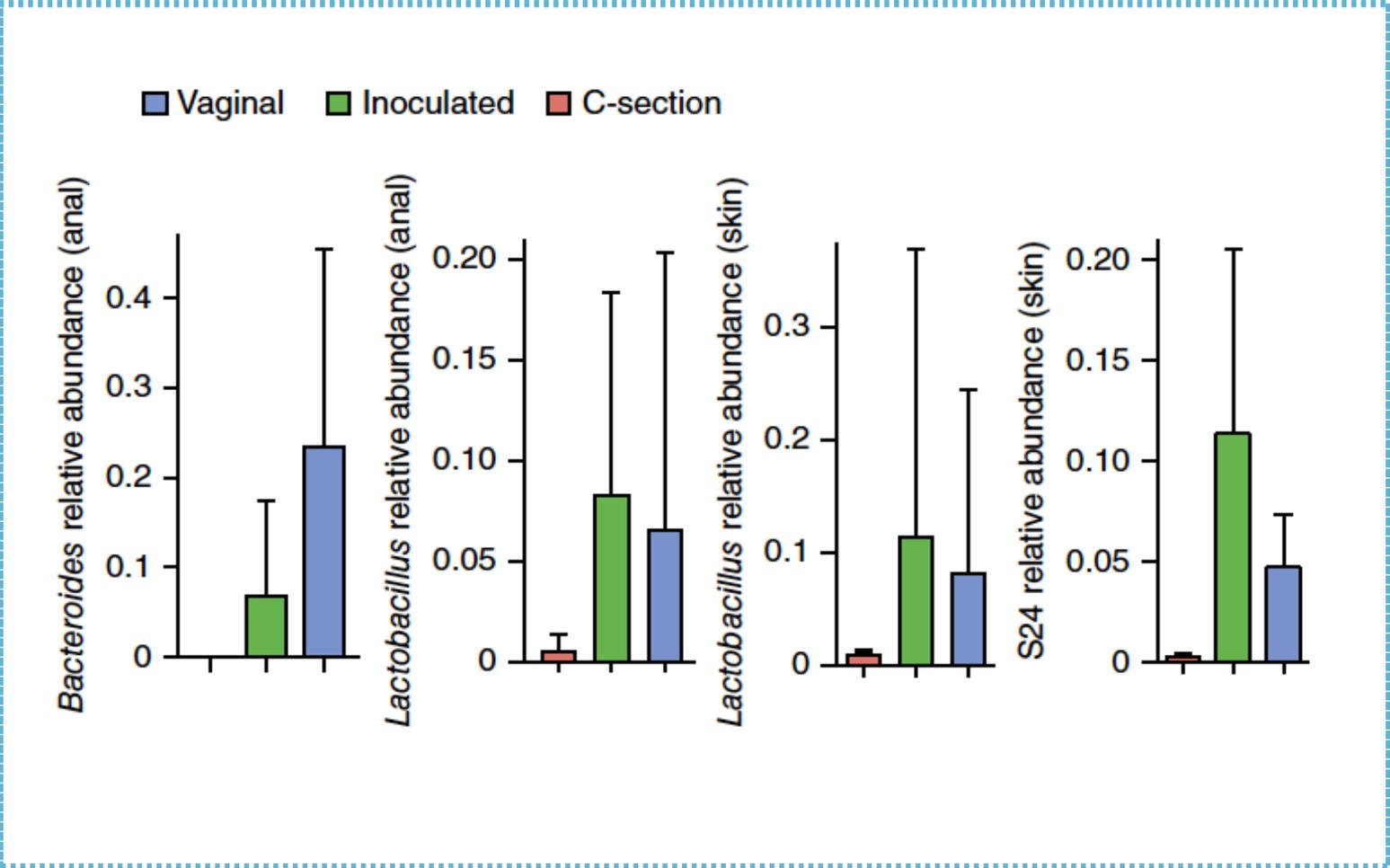


Babies born by caesarean section harbour different microbes than do those born vaginally.

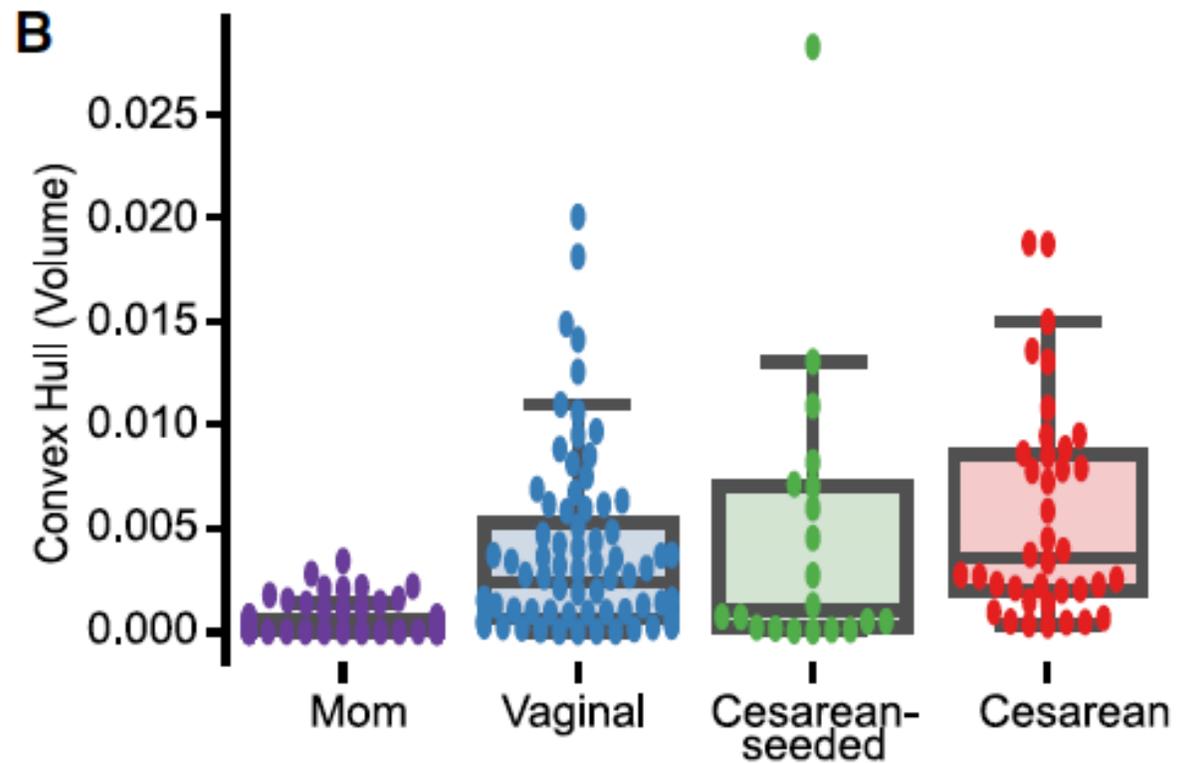
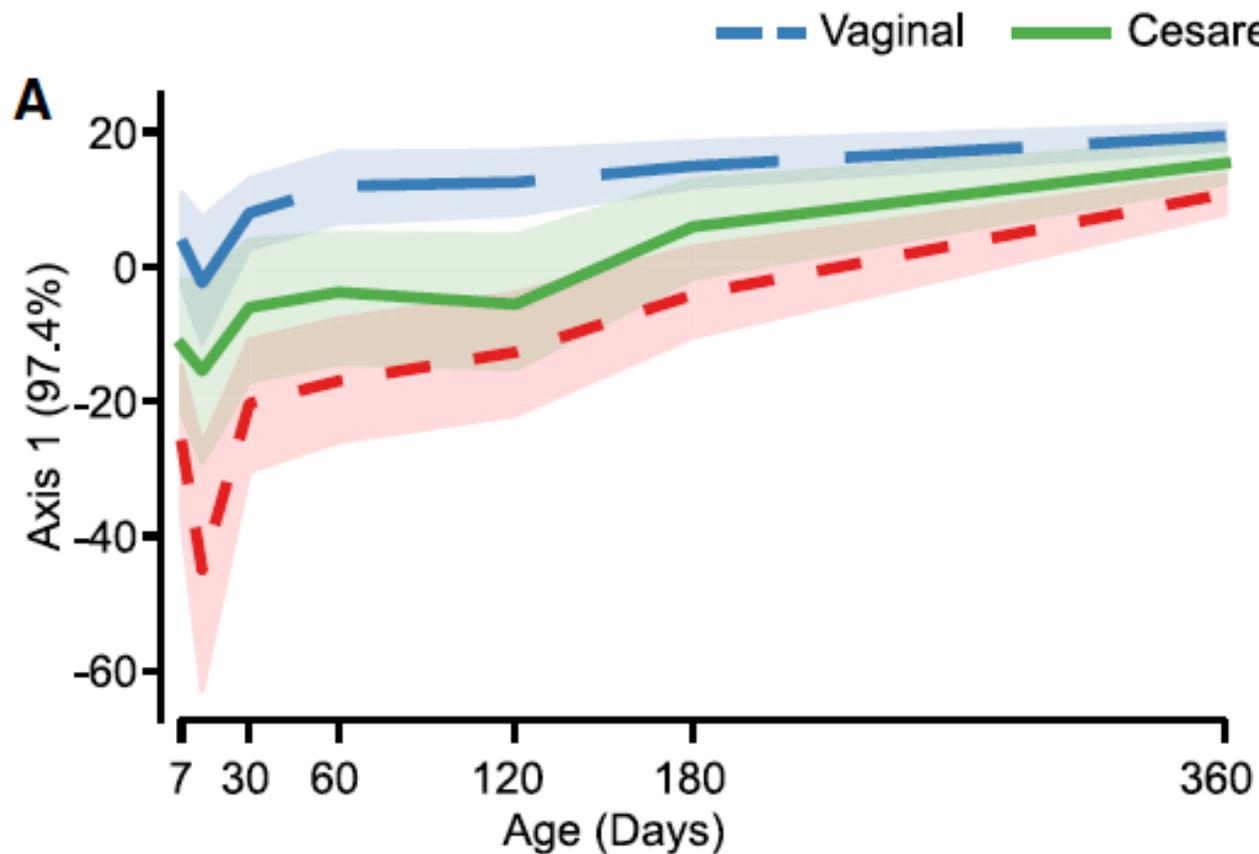
HEALTH

Do C-section babies need mum's microbes?

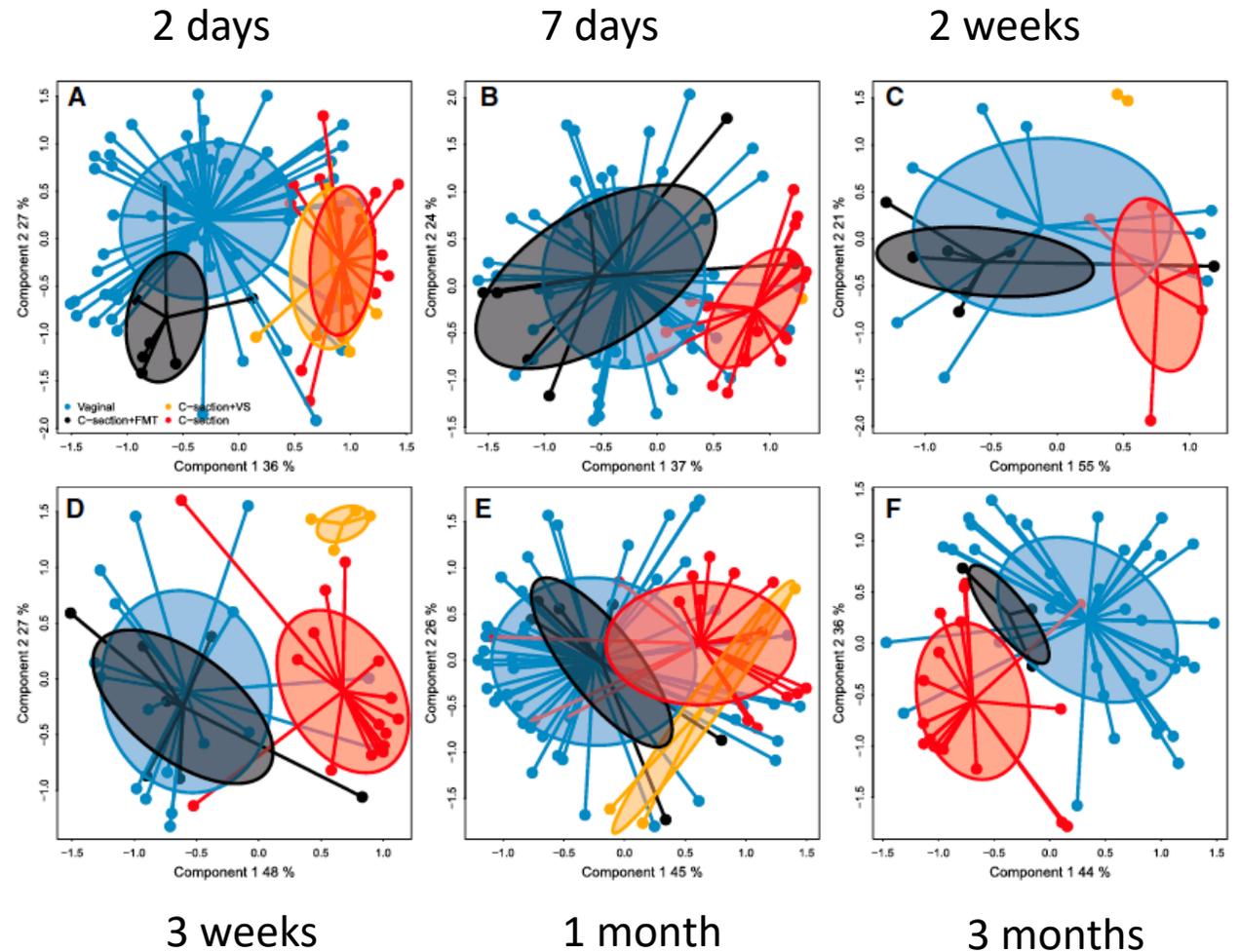
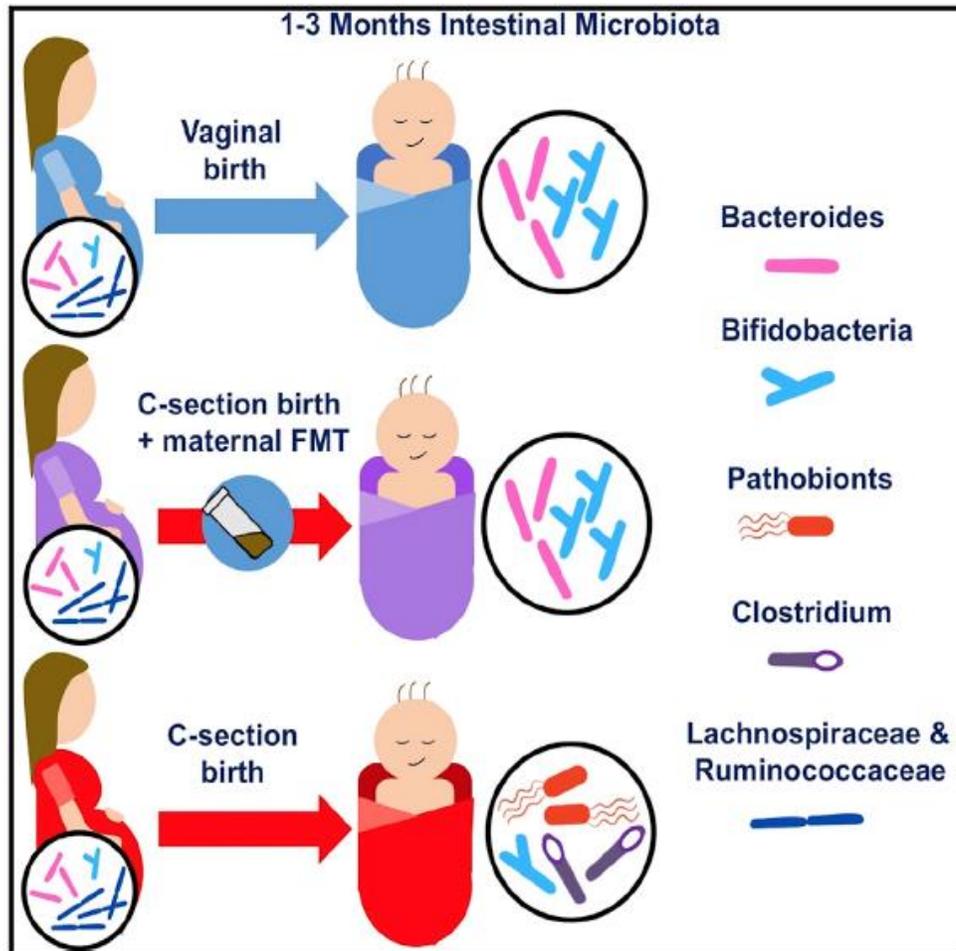
L'encementement vaginal « Vaginal seeding »



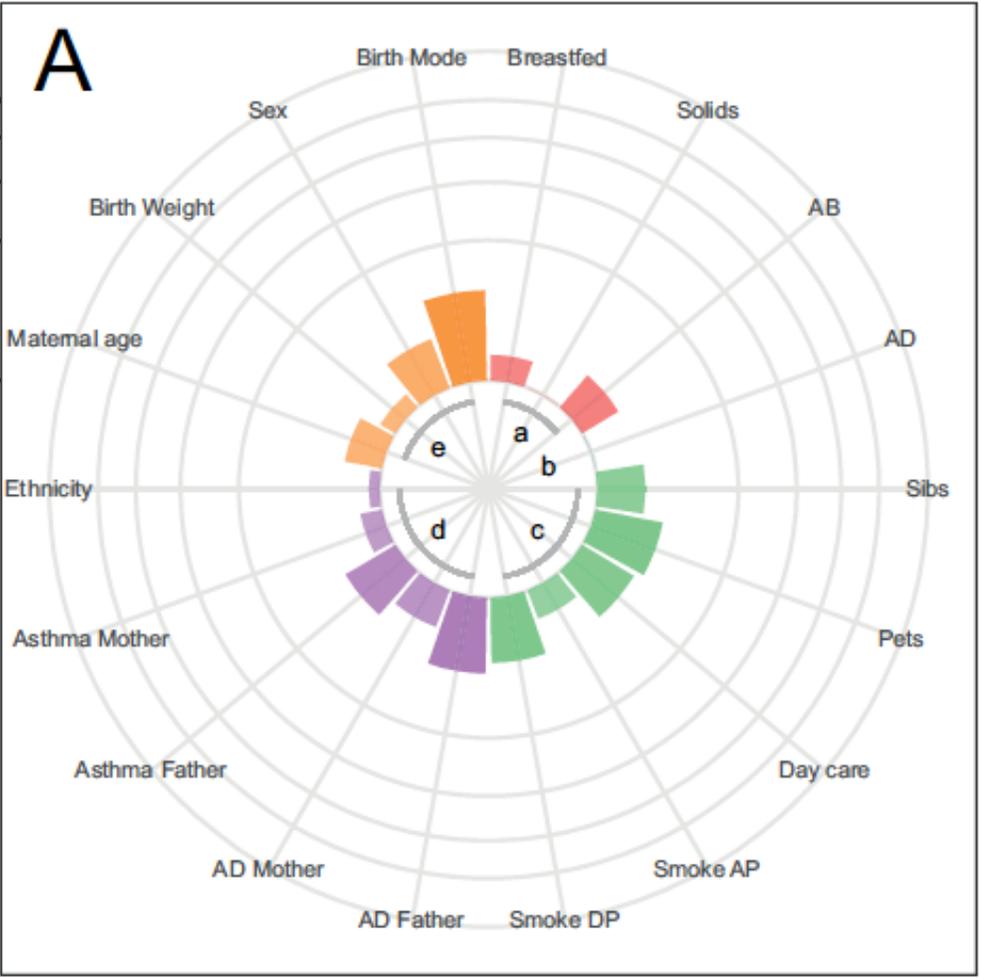
Fecal microbiota



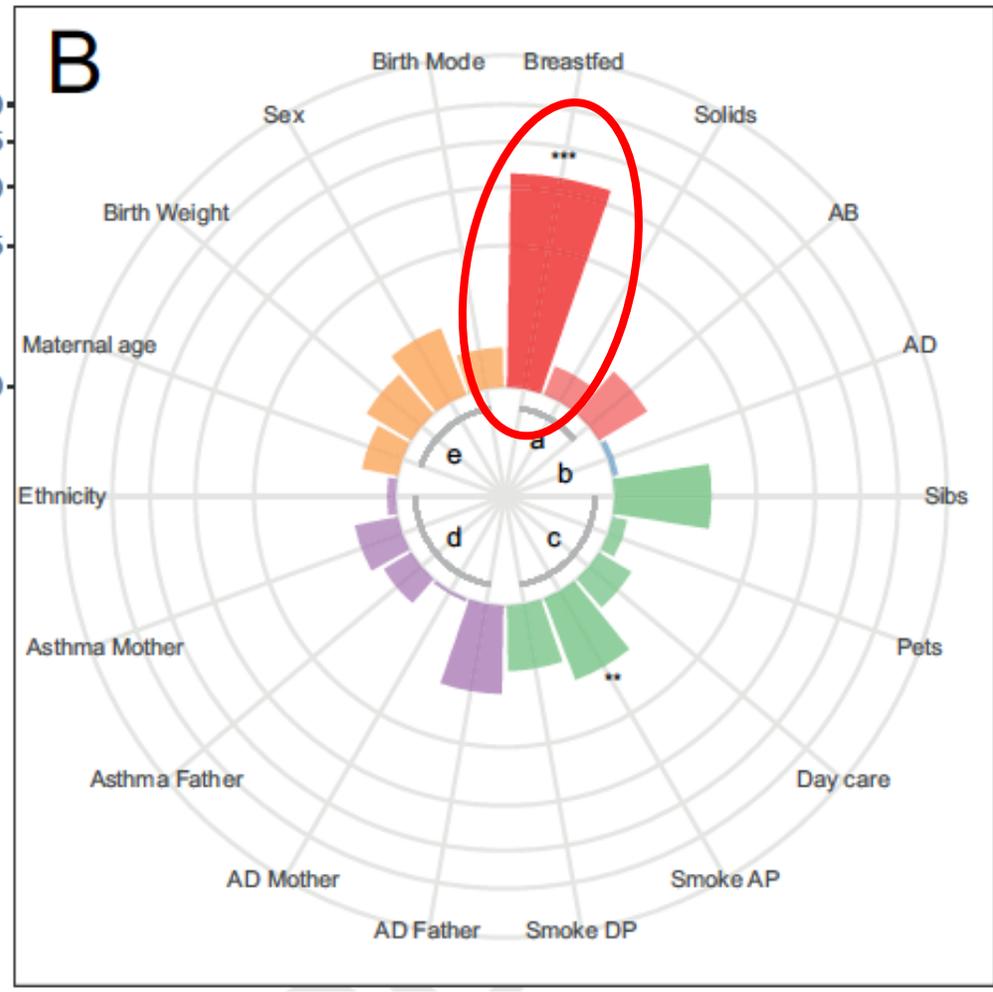
FMT for Cesarean-Born Infants



Facteurs influençant la composition du microbiote du nourrisson

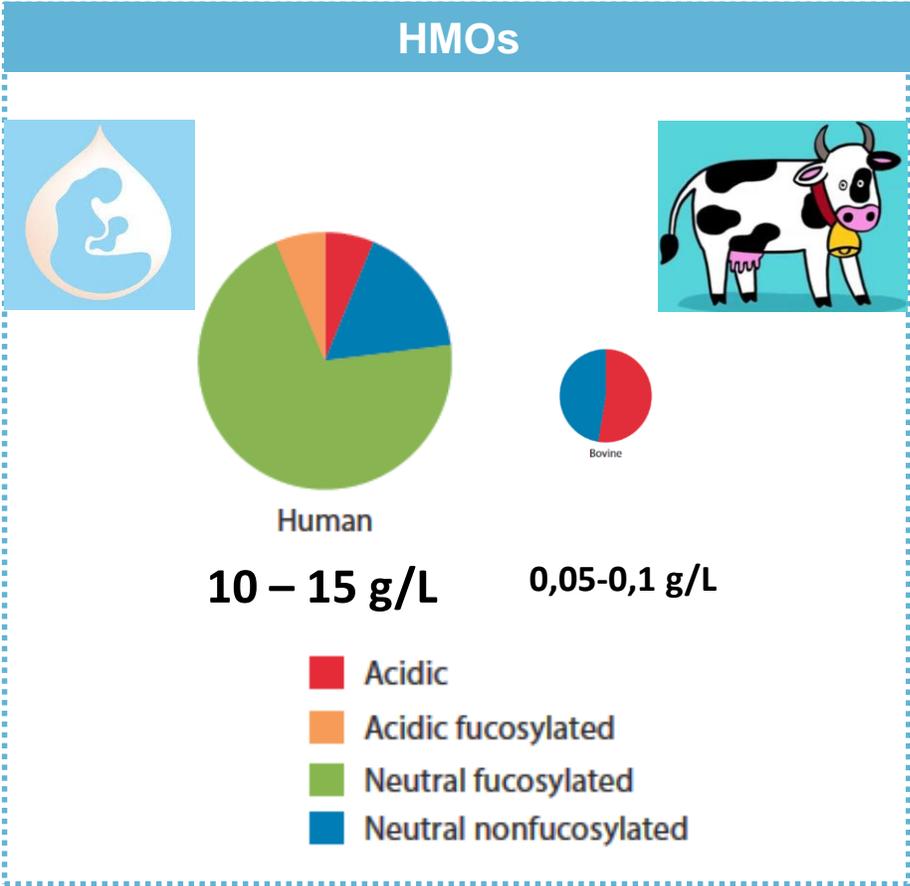


A 5 semaines de vie

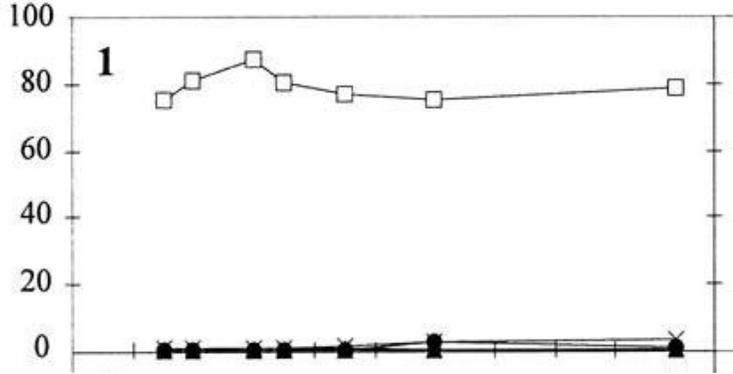


A 13 semaines de vie

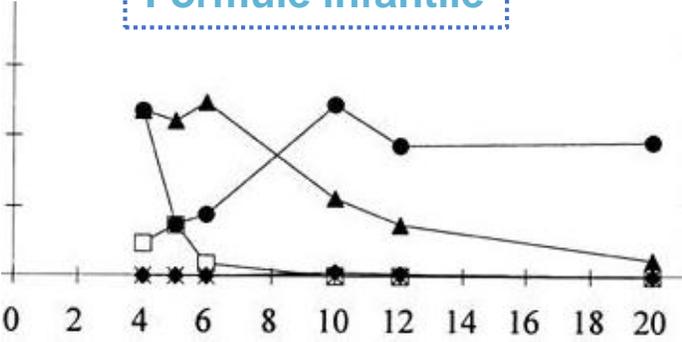
Les HMOs influencent fortement la composition du microbiote intestinal du bébé



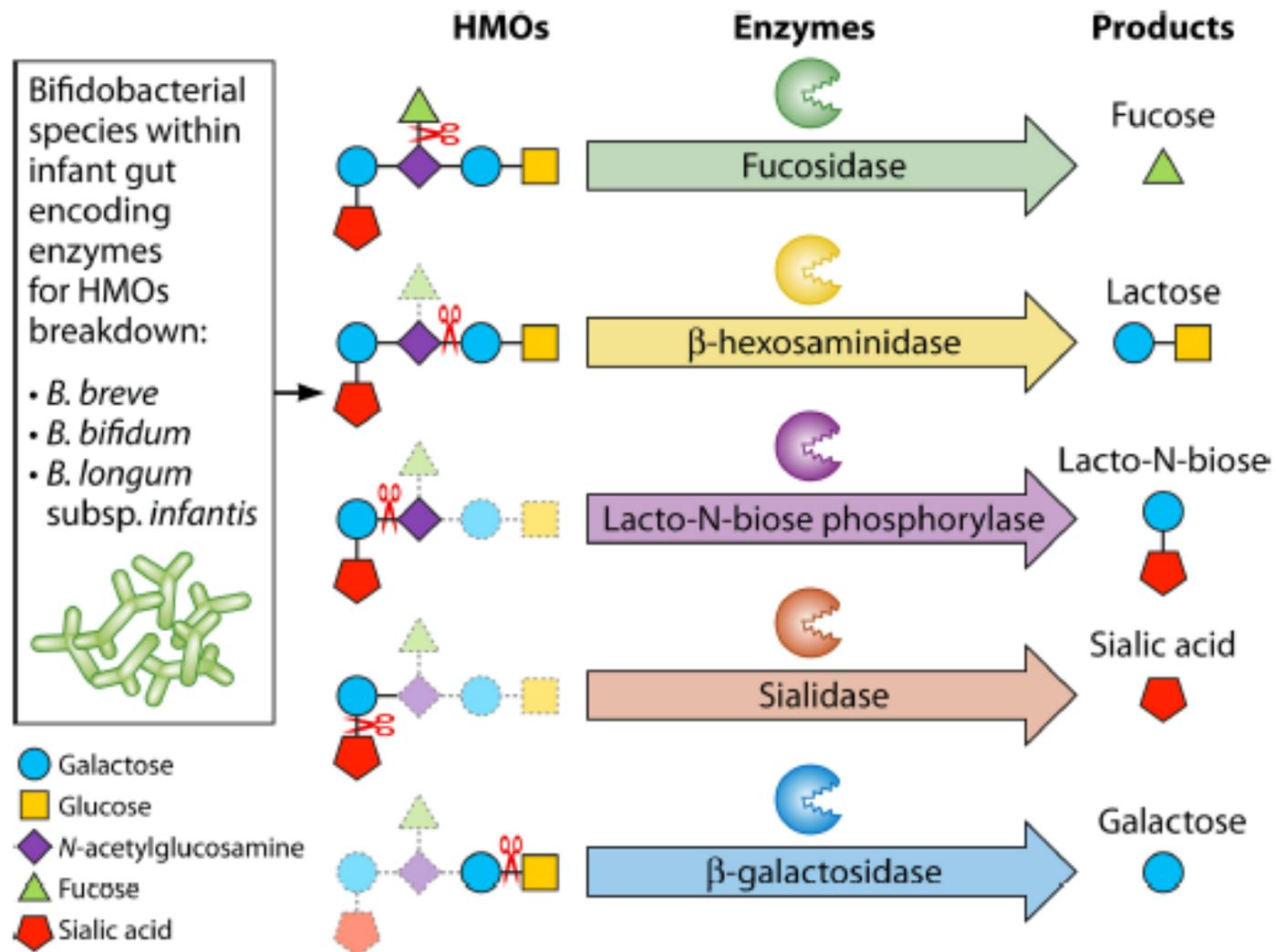
Allaitement au sein



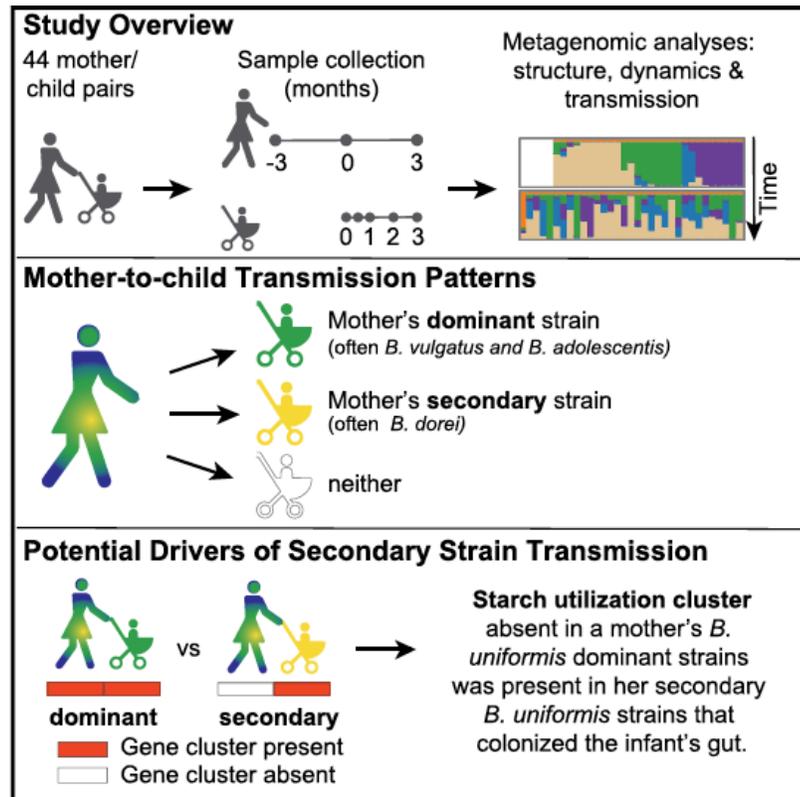
Formule infantile



Les HMOs et leurs bactéries

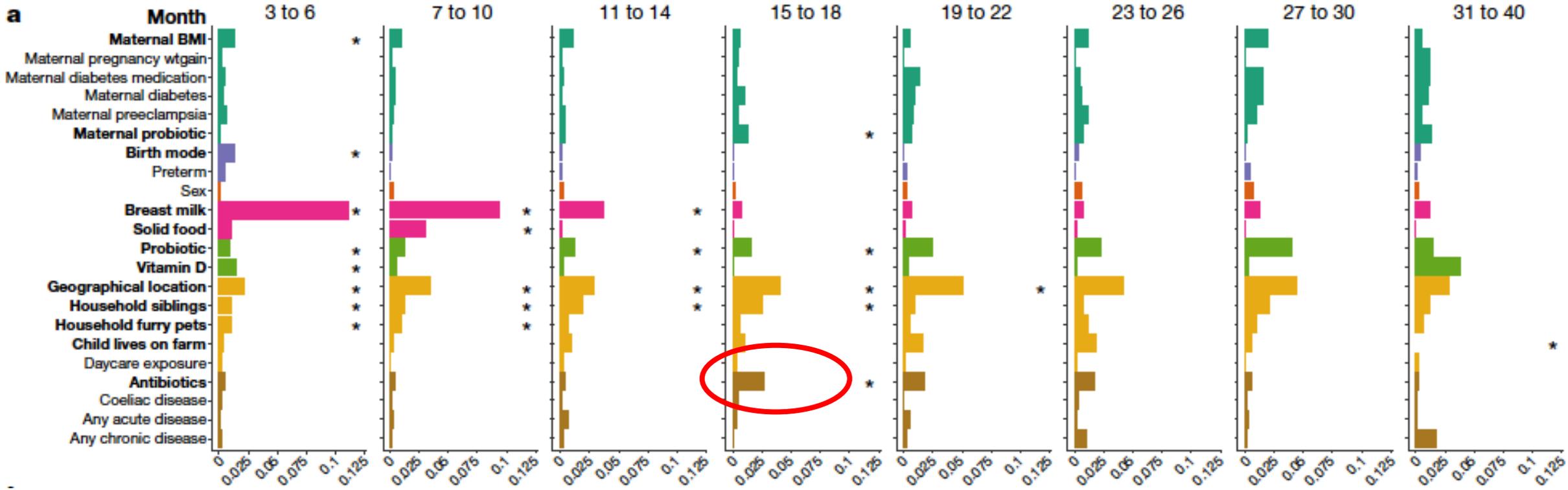


Exemple : transmission bactérienne de la mère à son bébé

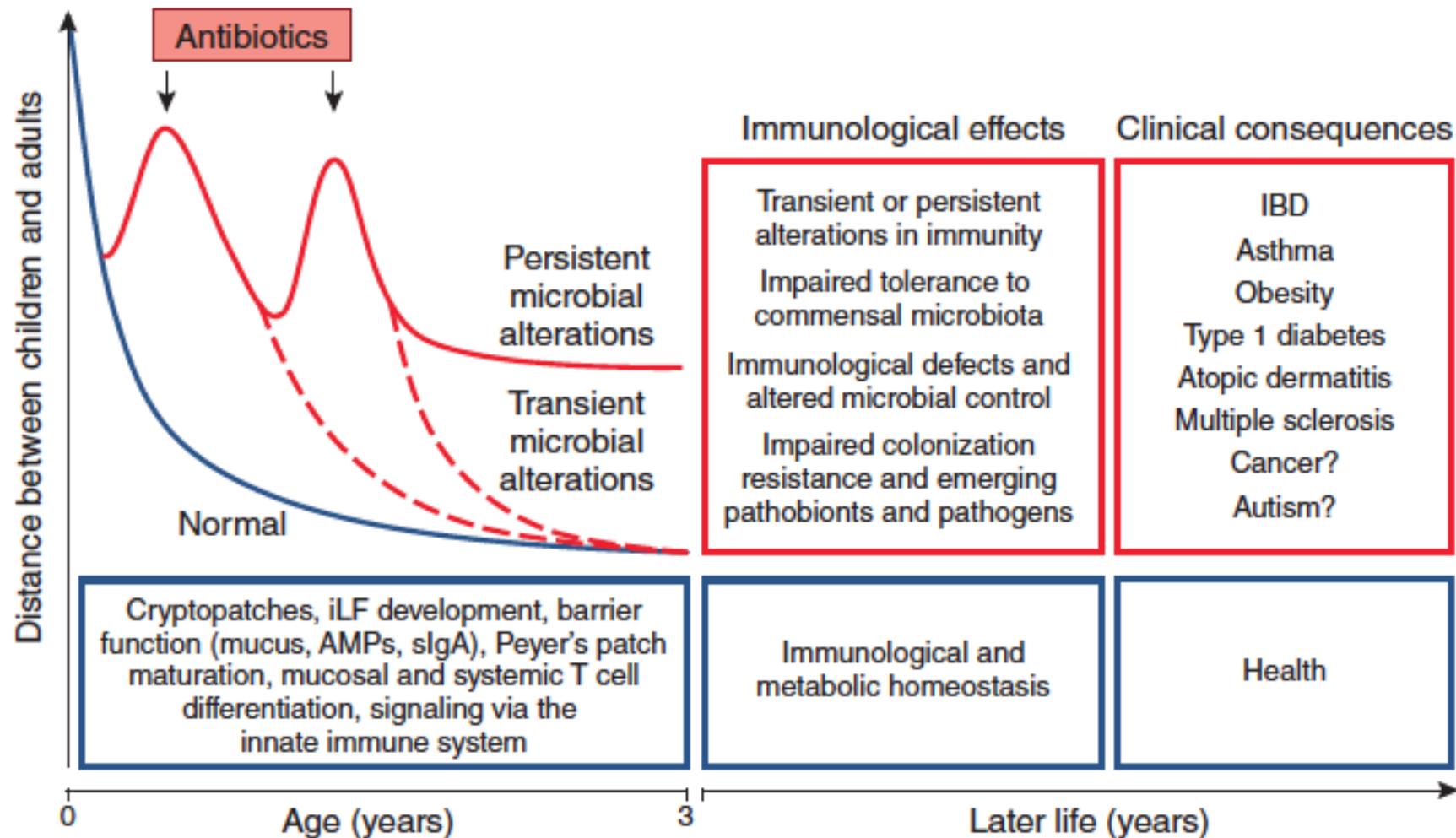


- Souvent la **souche dominante de la mère est transmise à l'enfant**
- **Occasionnellement ses souches secondaires colonisent le microbiote de l'enfant**
- Dans les familles où la souche secondaire a été héritée, le gène d'utilisation était **absent de la souche dominante de la mère**

Facteurs influençant la composition du microbiote du nourrisson

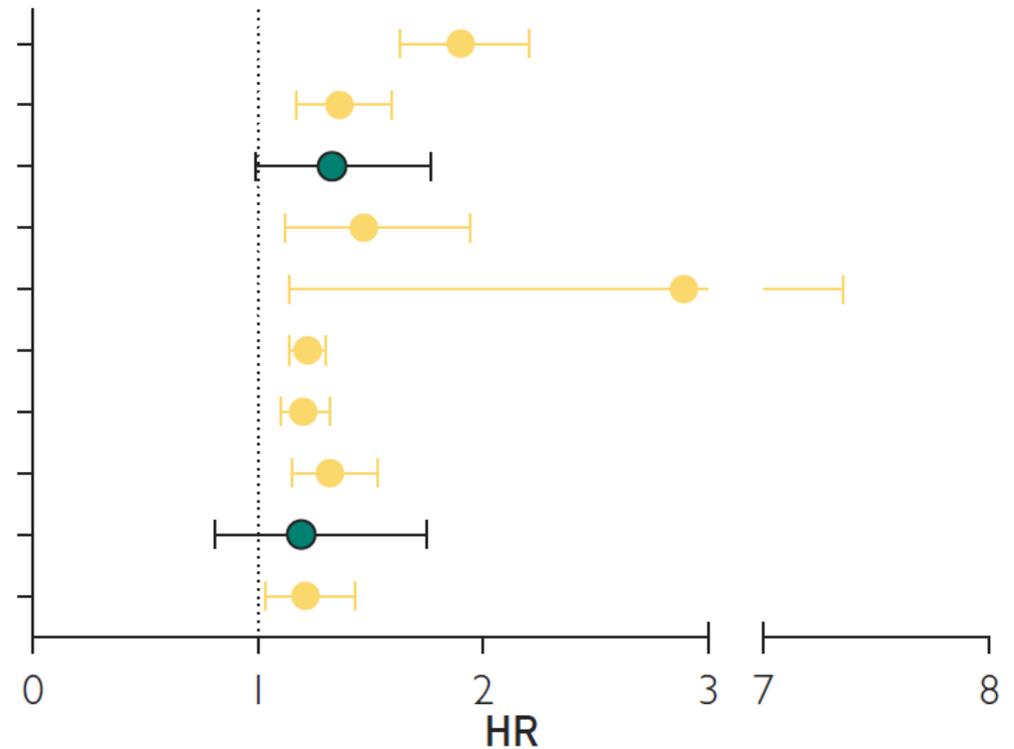


Conséquences des ATB précoces

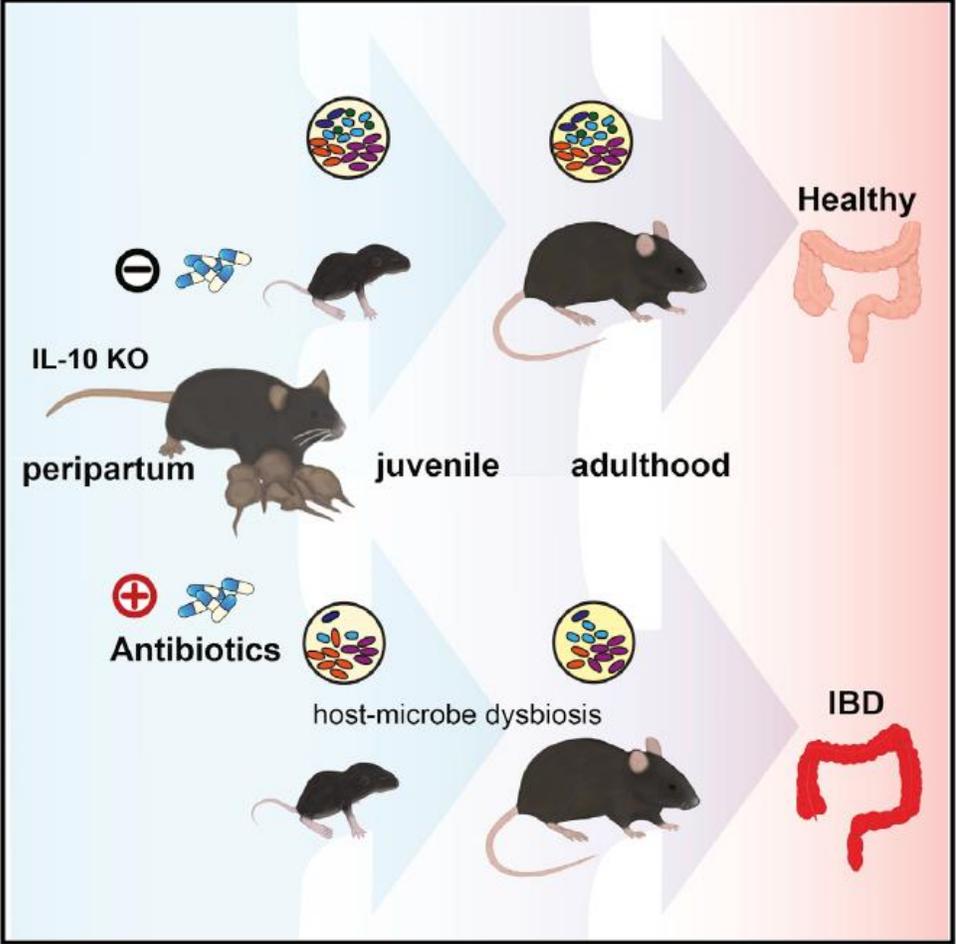


Association of Infant Antibiotic Exposure With Childhood Health Outcomes

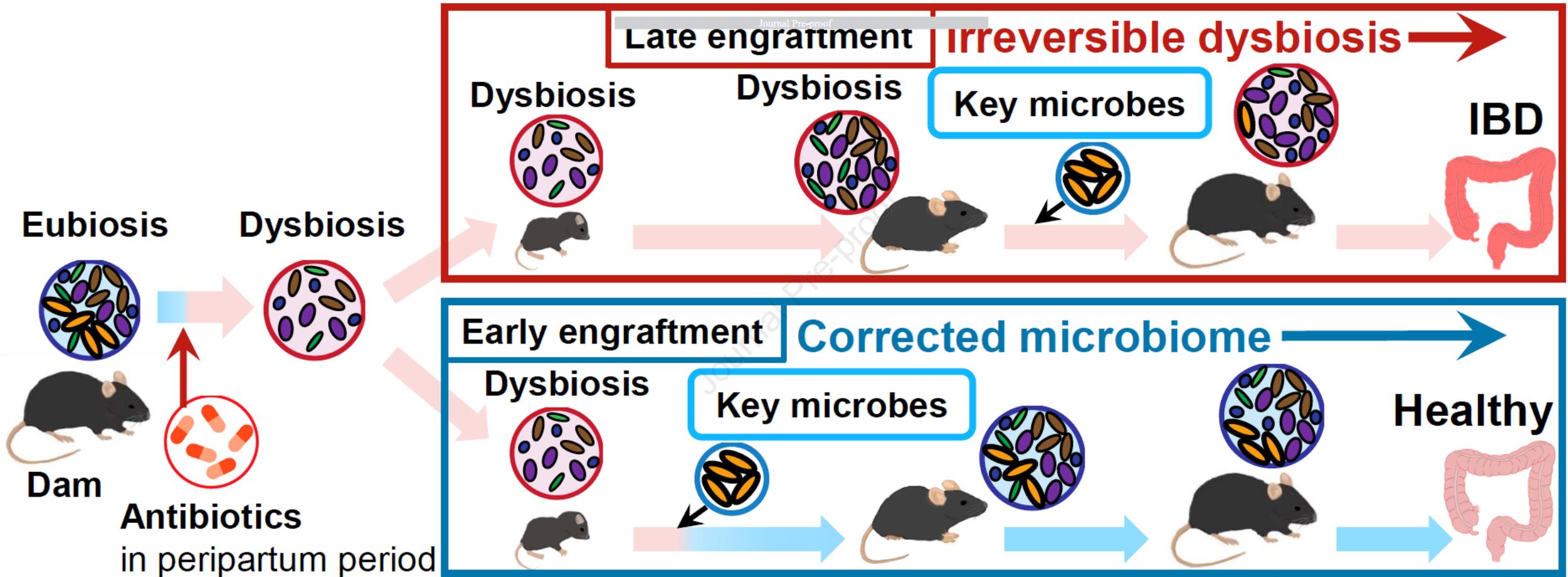
Condition	No. of subjects	No. of events	HR (95% CI)	P value
Asthma	14,299	1176	1.90 (1.63-2.20)	<.001
Allergic rhinitis	14,545	971	1.36 (1.17-1.59)	<.001
Food allergy	14,402	261	1.33 (0.99-1.77)	.054
Atopic dermatitis	14,166	297	1.47 (1.12-1.94)	.006
Celiac disease	14,569	45	2.89 (1.14-7.35)	.025
Overweight	12,873	4856	1.22 (1.14-1.30)	<.001
Obesity	13,649	2567	1.20 (1.10-1.32)	<.001
ADHD	14,572	1085	1.32 (1.15-1.53)	.001
Autism	14,571	142	1.19 (0.81-1.75)	.385
Learning disability	14,392	751	1.21 (1.03-1.43)	.022



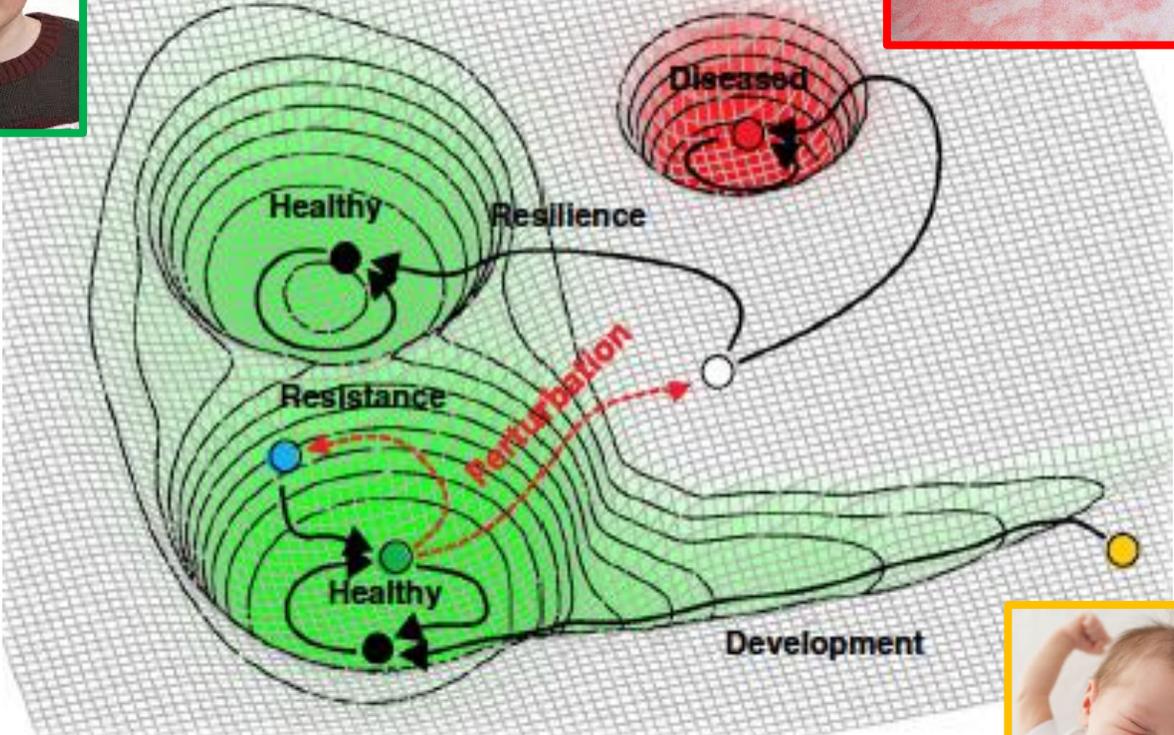
ATB per partum et développement d'une colite chez la souris



Early-life microbial restitution reduces colitis risk promoted by antibiotic-induced gut dysbiosis in IL-10^{-/-} mice

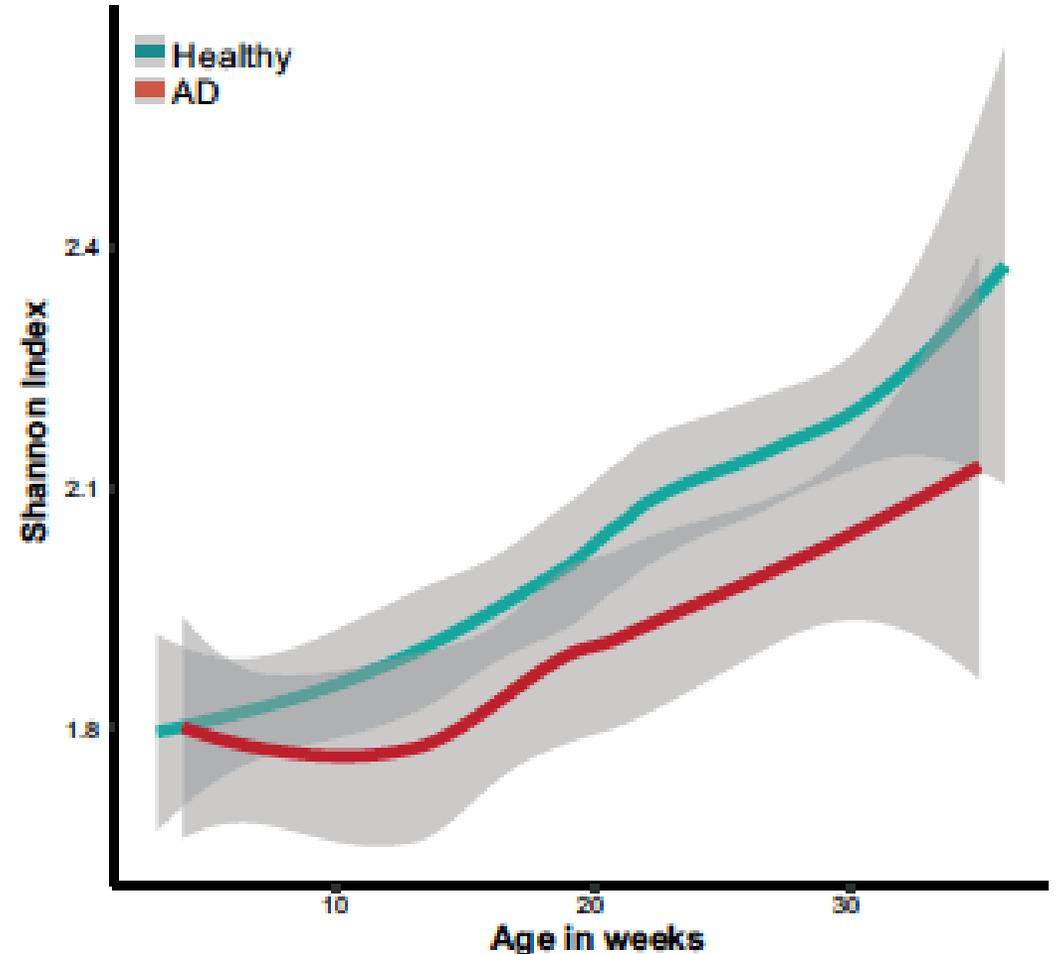


Trajectoire du microbiote intestinal : un enjeu pour la santé ?

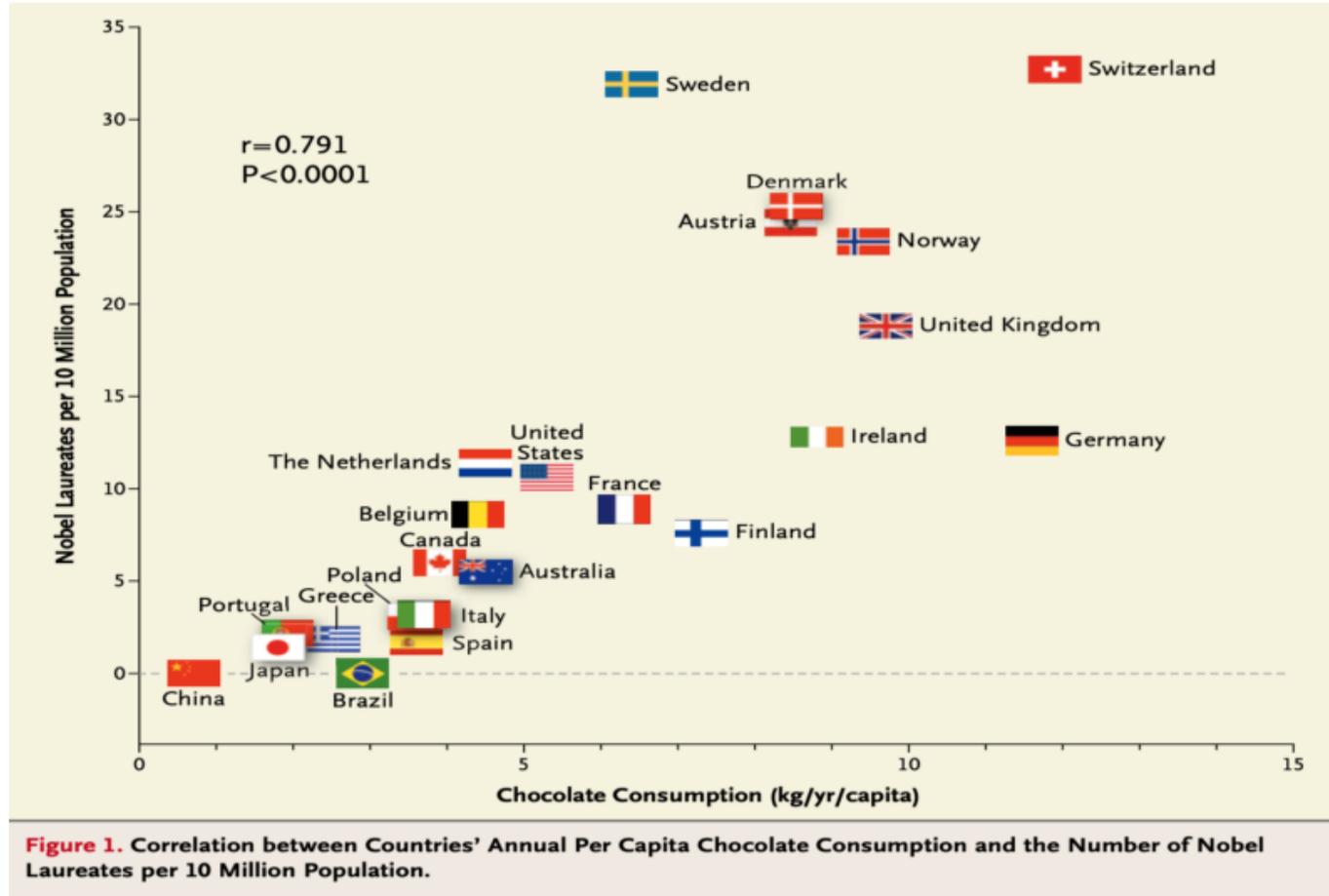


La composition et la diversité du microbiote du nourrisson sont liées au développement ultérieur de la dermatite atopique

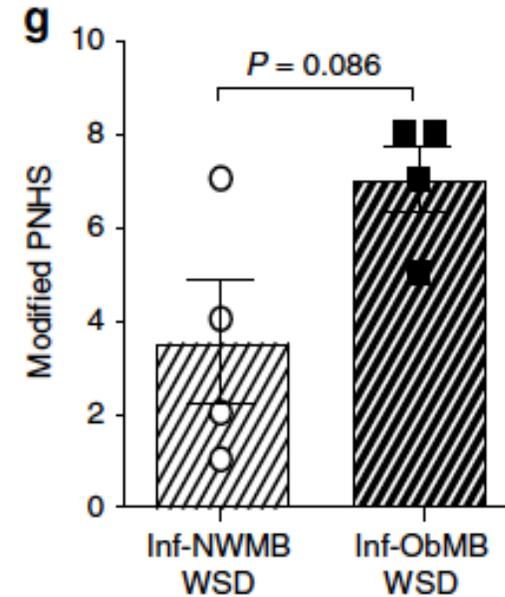
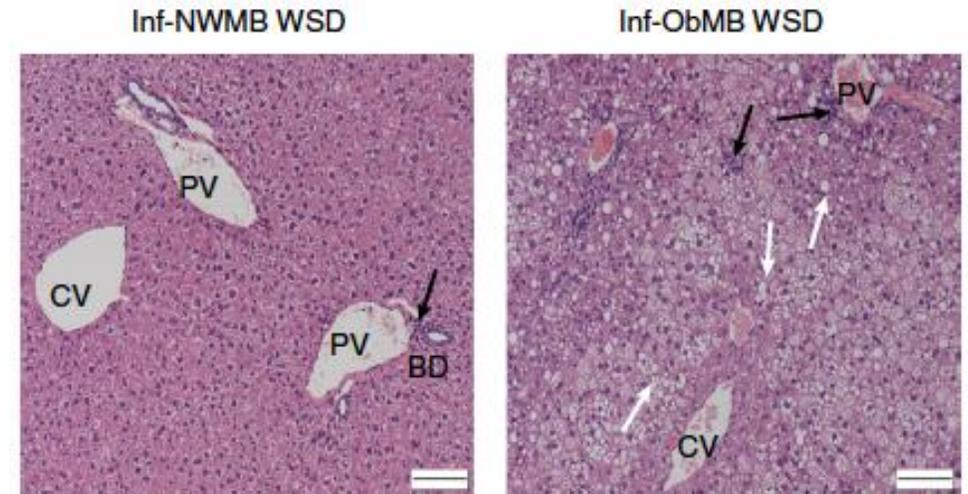
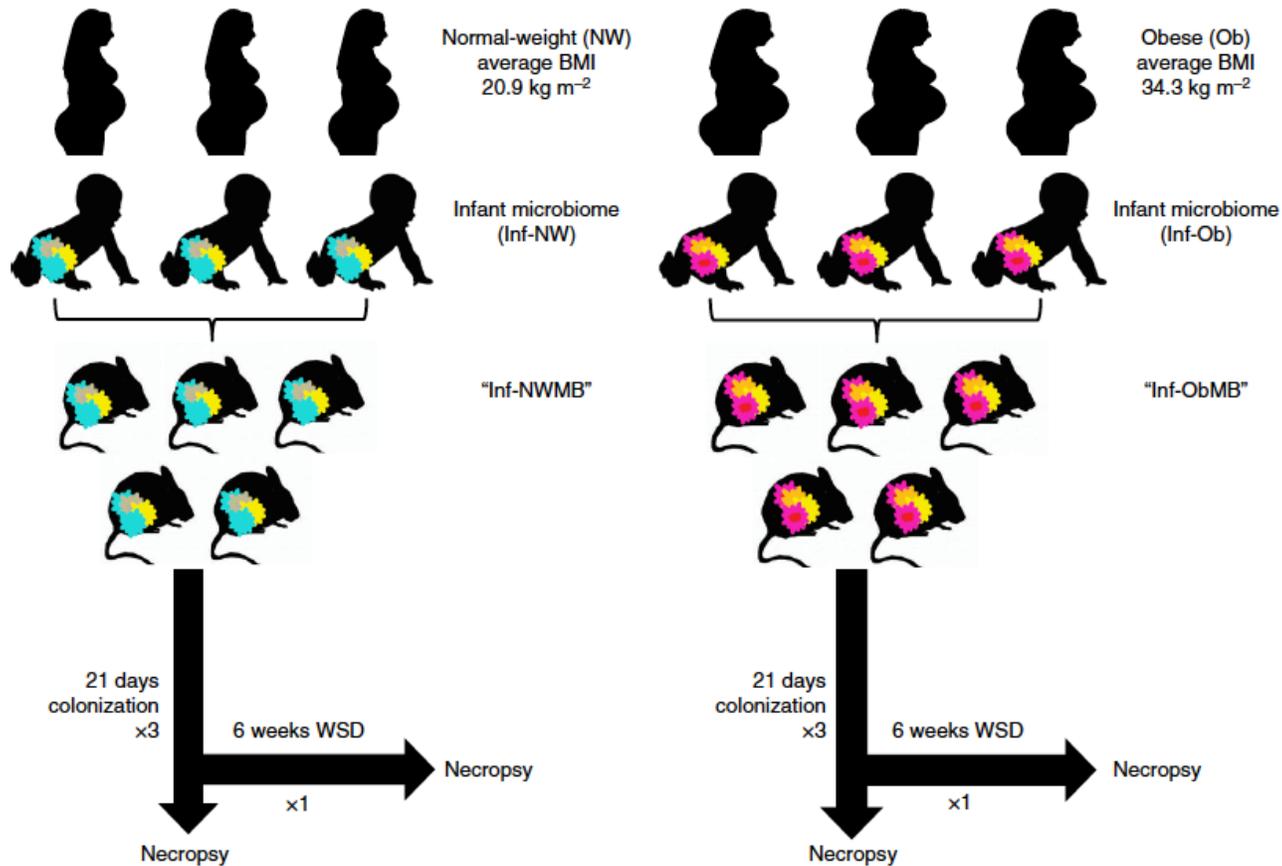
- 440 children (49.3% girls, 24.8% CS)
- 1453 stool samples, at 5, 13, 21 and 31 weeks post-partum (infants), and once at school-age (6–11 years)
- Children were followed through 3 years of age for development of atopic dermatitis



Corrélation ou causalité ?

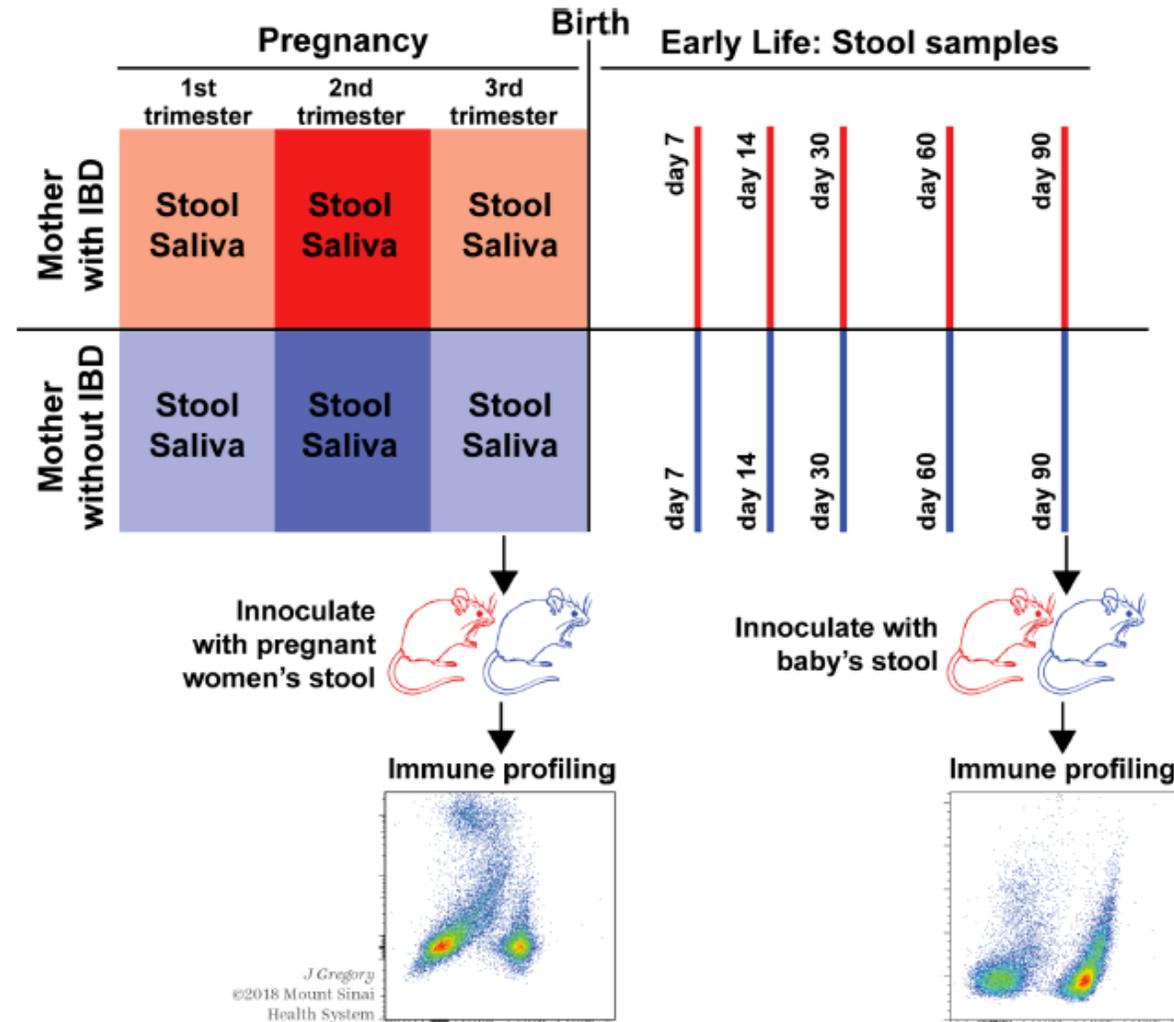


Le microbiote intestinal des nourrissons de mères obèses augmente la sensibilité à la NAFLD des souris GF

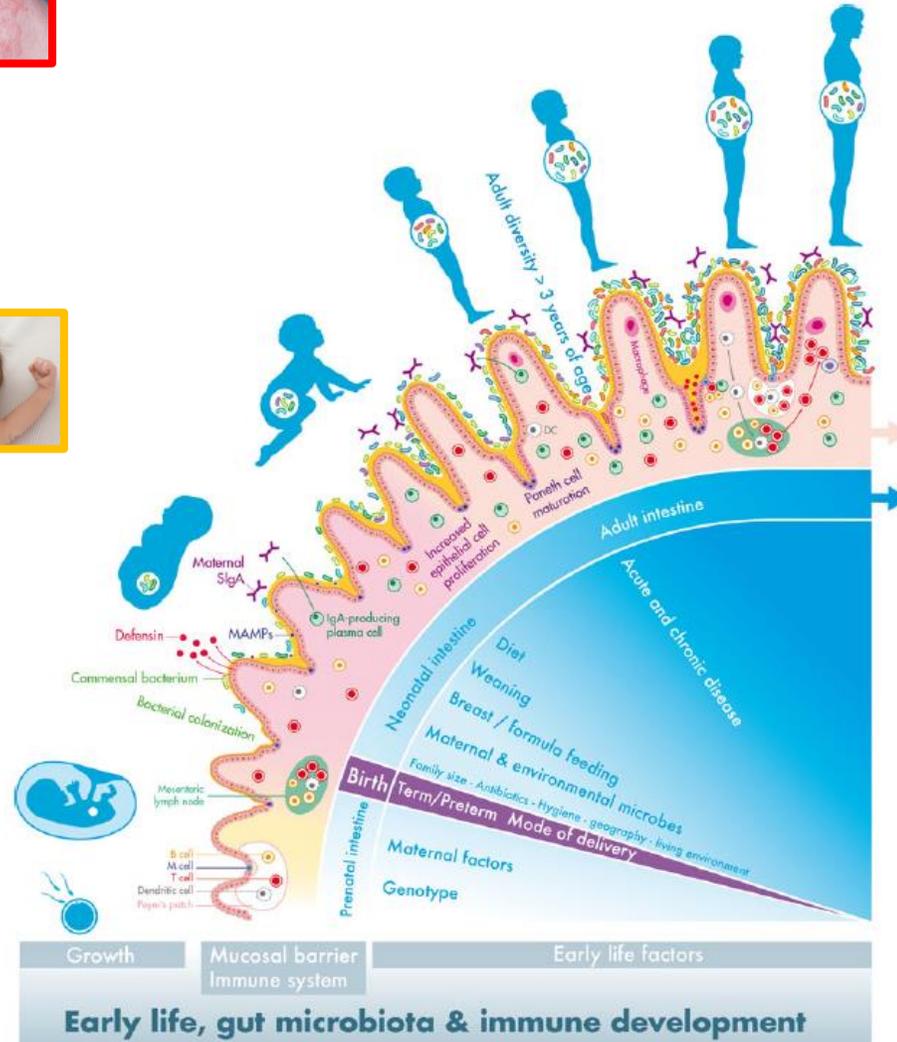
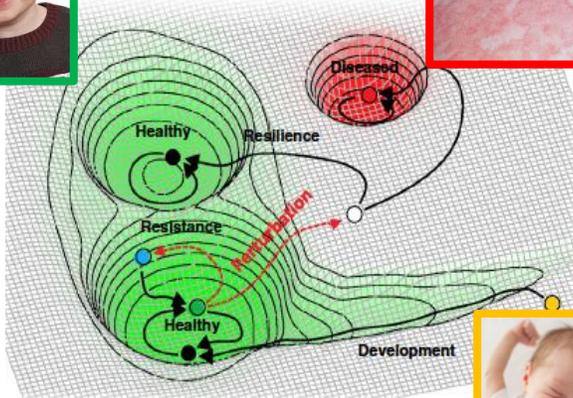


Modified Pediatric NAFLD Histological Score (PNHS) for Inf-NWMB and Inf-ObMB mice fed a Western-style diet (WSD)

Le microbiote intestinal des nourrissons de mères ayant une MICI entraîne des anomalies du système immunitaire aux souris GF

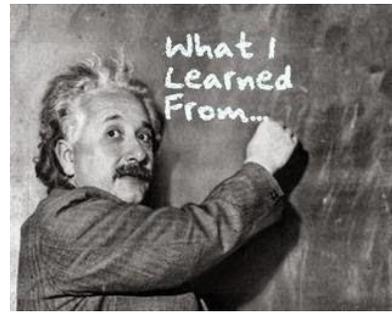


Une fenêtre d'opportunité



- **Obésité**
- **Allergies**
- **Maladies auto-immunes**
- **Pathologies infectieuses**

Take-Home messages



- **L'appauvrissement du microbiote intestinal au fil des générations** pourrait favoriser l'émergence de maladies 'occidentales'
- **La mère peut transférer** une sensibilité à la maladie à son enfant par la transmission de son propre **microbiote 'dysbiotique'**
- Les facteurs qui déterminent majoritairement la composition du microbiote intestinal du nourrisson sont : **l'environnement, la voie d'accouchement, l'alimentation** et la **prise d'antibiotiques**
- La **trajectoire précoce** de l'évolution de la composition du microbiote intestinal du nourrisson peut avoir des **conséquences ultérieures sur sa santé**