UNIVERSITÉ DE GENÈVE

Genève, le *31 Octobre 2023*

RAPPORT D'ACTIVITÉS DANS LE CADRE DU RENOUVELLEMENT DU MANDAT DE *PROFESSEUR ASSOCIÉ* DE M. *MATHIEU BROCHET*

- **Période du mandat :** du *[01/08/2020]* au *[30/09/2024]*.

- **Activités d'enseignement**

Teaching responsibilities

2023- **Medical sciences, 1st year bachelor – co-director,** Faculty of Medicine, University of Geneva (~700 students)

2022-23 **Medical sciences, "From molecules to cells" module – co-director**, first year medical students, Faculty of Medicine, University of Geneva (~700 students)

2021- **Medical sciences, "Infection" module - co-director**, third year medical students, Faculty of Medicine, University of Geneva (~120 students, 40 professors/MDs, 4 weeks)

2020- **Master of Advanced Studies in microbiology** - University of Geneva, steering committee

Teaching

2020- **Introduction to microbiology**, first year medical students, Faculty of Medicine, University of Geneva (6h/year, ~650 students)

General Microbiology, third year students, Faculty of Science, University of Geneva (4h/year, ~50 students)

2017- **Problem-based learning in bacteriology - tutor**, third year medical students, Faculty of Medicine, University of Geneva (20h/year, ~12 students)

"**Chapitres choisis"**, tutor and speaker (6h/year, ~8 students)

Signal transduction and parasitism, third year students, Faculty of Science, University of Geneva (4h/year, ~50 students)

Research supervision

During the last five years, I directly supervised 2 postdoctoral fellows, 4 PhD students, 3 visiting scientists, 1 PREM student, 1 master, 1 apprentice and 1 senior lab technician.

2024-now	Postdoc supervision of C. Boulet **(SNSF post-doctoral fellowship)**
2023-now	PhD supervision of A. Hackmann
2023-2024	Master supervision of C. Bourguignon
2021-now	PhD supervision of E. Ganga
2022	Supervision D. Hemsteg - 2nd year medical student
2021	Visit of S. Hernandez, **EMBO STF** (lab of Ellen Bushell)
2021	Visit of L. Akkerman, **Beyond the Frontiers Program** (lab of T Kooij)
2020	Master supervision of V. Saez Morganella
2020-now	PhD supervision of R. Kühnel
2019-now	Postdoc supervision of R. Rashpa
2019-now	Postdoc supervision of L. Brusini
2019	Visit of C. Simon, **EMBO STF** (lab of J. Guizetti)
2018	Visit of PhD student E. Hitz (lab of T. Voss)
2017-21	PhD supervision of A. Balestra – **Best PhD award from the doctoral school**

▪ Activités de recherche :

Research overview
Our work led to the most detailed analysis of a signalling pathway in *Plasmodium*. We showed how external stimuli are translated into intracellular signals mediated by cGMP and Ca^{2+} to initiate parasite replication in the mosquito. Most importantly, we found that the same signalling module regulates other crucial stages of the parasite lifecycle including exit and invasion of erythrocytes, colonisation of the mosquito midgut and infection of liver cells. These findings define this signalling pathway as a key *Plasmodium* vulnerability and allow to understand the functional requirements of important drug targets.

Our work also highlighted the peculiarities of microtubule cytoskeletons that are important for the proliferation, reproduction and dissemination of *Plasmodium* parasites. This includes structures conserved across eukaryotes such as the mitotic spindle and associated kinetochores for cell division or the basal body nucleating axonemes for sexual reproduction. We have also recently discovered a tubulin ring unique to *Plasmodium* at the apex of motile cells that is likely key to sustain motility and host cell invasion. These results are important as they bring new evolutionary insights into structures conserved across all eukaryotes but also defines *Plasmodium* specificities that could be targeted by new therapeutic interventions.

Funding
During the last five years I secured CHF 3,136,031 for my lab.
2023 **Confirm grant**, HUG foundation, main co-PI (50%), CHF 600,000
2022 Swiss National Fund, **Project Grant** (310030_208151, 2022-2026), PI 100%, CHF 908,000
2021 Swiss National Fund, **Sinergia grant**, (CRSII5_198545), Co-PI 25%, CHF 3,198,008
2020 **Novartis foundation** grant, PI 100%, CHF 59,529
2019 **EMBO young investigator** grant, PI 100%, CHF 20,000
2019 **Confirm grant**, HUG foundation, main co-PI (50%), CHF 600,000
2018 Swiss National Fund, **Project Grant** (31003A_179321, 2019-2022), PI 100%, CHF 429,000
2018 NCCR Chemical Biology **High-impact chemical biology screening** (2018), PI 100%, CHF 20,000

I was also co-applicant on two R'Equip calls
2022 **R'Equip**, co-applicant (316030_213531), CHF 1,000,000
2021 **R'Equip**, co-applicant (316030_205686), CHF 537,244

Members of my team have also been awarded grants to support their projects in my lab
2023 Swiss National Fund, **Swiss Postdoctoral fellowship**, CHF 260,285 - Dre Boulet
2022 **Novartis foundation**, CHF 80,000 - Dr Brusini

▪ Activités cliniques : Non applicable

▪ Publications pendant la période du mandat :

- 35 original research articles (15 as corresponding author and 8 as first author), 2 reviews, 3 book chapters, 1 news and views, 1 preprint under review, 1 review under review, 1 editorial
- 2444 citations, h-index = 27 (25/10/2023)
- Complete list: google scholar, ORCID, Pubmed
- # = corresponding author, + = Contributed equally

Available at bioarxiv or under review
2023 **A multistage *Plasmodium* $CRL4^{WIG1}$ ubiquitin ligase is critical for the formation of functional microtubule organisation centres in microgametocytes**
Rashpa R, Smith C, Artavanis-Tsakonas K, and **Brochet M**[#]. Under review at ***Plos pathogens***
Available at https://www.biorxiv.org/content/10.1101/2023.07.19.549332v2

Apicomplexan phosphodiesterases in cyclic nucleotide turnover: conservation, function, and therapeutic potential
Moss WJ, Brusini L, Kuehnel RM, **Brochet M**[#], KM Brown[#]. In revision at ***mBio***

Original research

2023 **A *Plasmodium* membrane receptor platform integrates cues for egress and invasion in blood forms and activation of transmission stages**
Kuehnel RM[+], Ganga E[+], Balestra AC[+], Suarez C, Wyss M, Klages N, Brusini L, Maco B, Brancucci N, Voss T, Soldati-Favre D, and **Brochet M**[#]. ***Science Advances*** 9(24):eadf2161

- Highlighted by: - The Swiss radio RTS
  - The French radio France culture

The Skp1-Cullin1-FBXO1 complex is a pleiotropic regulator required for the formation of gametes and zoites in *Plasmodium berghei*
Rashpa R[#], Klages N, Schvartz D, Pasquarello C, **Brochet M**[#]. ***Nature communications*** 4(1):1312

***Plasmodium* ARK2-EB1 axis drives the unconventional spindle dynamics, scaffold formation and chromosome segregation of sexual transmission stages**
Zeeshan M, Rea E, Abel S, Vukušić K, Markus R, Brady D, Eze A, Rashpa R, Balestra AC, Bottrill AR, **Brochet M**, Guttery DS, Tolić IM, Holder AA, Le Roch KG, Tromer EC, and Tewari R. Accepted at ***Nature communications***
Available at https://www.biorxiv.org/content/10.1101/2023.01.29.526106v1

An Sfi1-like centrin-interacting centriolar plaque protein affects nuclear microtubule homeostasis
Wenz C, Simon CS, Romão TP, Stürmer V, Machado M, Klages N, Klemmer A, Voß Y, Ganter M, **Brochet M**, Guizetti M[#]. ***Plos pathogens*** 19(5):e1011325

2022 **Composition and organization of kinetochores show plasticity in apicomplexan chromosome segregation**
Brusini L[#], Dos Santos Pacheco N, Tromer EC, Soldati-Favre D, **Brochet M**[#]. ***Journal of Cell Biology*** 221(9):e202111084

Conoid extrusion serves as gatekeeper for entry of glideosome components into the pellicular space to control motility and invasion in Apicomplexa
Dos Santos Pacheco N, Brusini L, Haase R, Tosetti N, Maco B, **Brochet M**, Vadas O, Soldati-Favre D[#]. ***Nature microbiology*** 7(11):1777-1790

Expansion microscopy of *Plasmodium* gametocytes reveals the molecular architecture of a microtubule organisation centre coordinating mitosis with axoneme assembly.
Rashpa R[#] and **Brochet M**[#]. ***PloS pathogens*** 18(1):e1010223

Genome-wide functional analysis reveals key roles for kinesins in the mammalian and mosquito stages of the malaria parasite life cycle
Zeeshan M, Rashpa R, Ferguson DJ, Abel S, Chahine Z, Brady D, Moores CA, Le Roch KG, **Brochet M**, Holder AA, Tewari R[#]. ***Plos biology*** 20(7):e3001704

N-Acetylation of secreted proteins is widespread in Apicomplexa and independent of acetyl-CoA ER-transporter AT1.
Nyonda MA, Boyer JB, Belmudes L, Krishnan A, Pino P, Couté Y, **Brochet M**, Meinnel T[#], Soldati-Favre D[#], Giglione C[#]. ***Journal of Cell Science*** 135(15):jcs.259811

- Highlighted by: Apicomplexa N-acetylation that is independent of AT1, ***J Cell Sci*** 135(15):jcs.e135_e1501

2021 **Calcium signals critical for egress and gametogenesis in malaria parasites depend on a multipass membrane protein that interacts with PKG.**
Balestra AC[+], Koussis K[+], Klages N, Howell SA, Flynn HR, Bantscheff M, Pasquarello C, Perrin AJ, Brusini L, Arboit P, Sanz O, Peces-Barba Castaño L, Withers-Martinez C, Hainard A, Ghidelli-Disse S, Snijders AP, Baker DA, Blackman MJ[#], **Brochet M**[#]. ***Science Advances*** 7(13):eabe5396

Expansion Microscopy provides new insights into the cytoskeleton of malaria parasites including the conservation of a conoid.

Bertiaux E[+], Balestra[+] AC, Bournonville L, Louvel E, Maco B, Soldati-Favre D, **Brochet M**[#], Guichard P[#], Hamel V[#]. ***PloS Biology***, 19(3):e3001020

- Highlighted by: - a preLight of the Company of Biologists
  - Apicomplexans: A conoid ring unites them all, ***PloS Biology*** 19(3):e3001105
  - The Swiss radio RTS
  - Pour la science, a French popular science magazine

Protein Phosphatase 1 regulates atypical chromosome segregation and cell polarity during mitotic and meiotic division in *Plasmodium* sexual stages.

Zeeshan M, Pandey R, Subudhi AK, Ferguson DJP, Kaur G, Rashpa R, Nugmanova R, Brady D, Bottrill AR, Vaughan S, **Brochet M**, Bollen M, Pain A, Holder AA, Guttery DS, Tewari R[#]. ***Communication biology*** 4(1):760.

2020 **A divergent cyclin/cyclin-dependent kinase complex controls the atypical replication of *Plasmodium berghei* during gametogony and parasite transmission.**

Balestra AC[+], Zeeshan M[+], Rea E, Pasquarello C, Klages N, Mourier T, Kumar AS, Arboit P, Brusini L, Pandey R, Brady D, Vaughan S, Holder A, Pain AA, Ferguson D, Hainard A, Tewari R[#], **Brochet M**[#]. ***eLife*** 9:e56474

PfMAP2 is essential for male gametogenesis in the malaria parasite *Plasmodium falciparum*.

Hitz E, Balestra AC, **Brochet M**, Voss T[#]. ***Scientific reports*** 10(1):11930

- **Activités diverses :**
  (charges administratives, charges de direction, charges de personnel, participation à des commissions, services à la Cité, etc.) *en effectuant cette démarche sur le site https://rli.unige.ch avec indication du nom de votre supérieur hiérarchique direct en fin de procédure.*

Institutional responsibilities

2021-now **Director of the proteomic core facility** (1 coordinator, 2 senior scientists, 2 research assistants, ~40 user groups/year), Faculty of Medicine

2020-now Member of the **steering committee of the bioimaging centre**, (4 staff scientists, ~110 user groups/year), Faculty of Medicine

2021- 1 commission de nomination

Thesis examinations

Thesis examiner: N. Katris (2017, University of Melbourne), H. Bisio (2020, University of Geneva), M.L. Wilde (2021, The Walter and Eliza Hall Institute), J. Li (2023, University of Melbourne), S.S. Sahraoui (2023, University of Geneva), S. Yu (2023, University of Geneva), C.M. Castellano (2023, University of Montpellier)
Member of **15 thesis advisory committees** since 2017 (University of Geneva x12, University of Montpellier x2, Paul Scherrer Institute x1)

Conference organisation

Workshop organiser on Expansion microscopy 19th BioMalPar conference (2023
Departmental retreat (with M. Schmolke, 2023)
EMBO YIP sectorial meeting: Cell polarity and Cytoskeleton; with M. Gotta, S. Martin, N. Geldner, and P. Meraldi (2021)

- **Activités accessoires ou extérieures :** (liste des activités accessoires ou extérieures effectuées pendant la durée du mandat)

Editorial responsibilities

Associate editor at *PLOS pathogens*
Section editor at *microlife*

Reviewing activities

Selected journals: *ACS Infectious Diseases*, *Cellular Microbiology*, *Cell Discovery*, *Cell Reports*, *Cellular Signalling*, *Current Biology*, *EMBO journal, EMBO reports*, *International Journal of Parasitology*, *Journal of Biochemical Chemistry, Journal of Cellular and Molecular Medicine, Nature communications, mBio*, *Microbiology Open*, *Molecular Microbiology*, *Molecular & Biochemical Parasitology*, *Open biology*, *Plos Biology*, *Plos Neglected Tropical Diseases*, *Plos One*, *Plos Pathogens, Scientific Reports, Trends in Parasitology*.

Early career reviewer at *elife*
Funding agencies: Swiss National Fund (CH), Boehringer Ingelheim Foundation (Ge), Wellcome Trust (UK), BBSRC (UK), Medical Research Council (UK), Institut Pasteur (Fr), Agence Nationale pour la Recherche (Fr), European Science Foundation, ZonMw (the Netherlands).

Membership
Member of Life Sciences Switzerland (LS^2)

Brochet Mathieu

UNIVERSITÉ DE GENÈVE
DIVISION DES RESSOURCES HUMAINES

CAHIER DES CHARGES
(corps enseignant)

FONCTION Professeur associé

Nom et prénom du/de la titulaire	BROCHET Mathieu
Taux d'activité ou heures de cours (selon la fonction)	100 %
Faculté, école, institut	Faculté de médecine
Section ou département	Département de microbiologie et médecine moléculaire
Nom et prénom du responsable hiérarchique	SOLDATI-FAVRE Dominique

Taux : le total des points 1, 2 et 3 doit atteindre 100%

1. ENSEIGNEMENT ET ENCADREMENT DES ETUDIANTS

Taux consacré 20%

Pré-gradué :
- Bachelor de médecine:
  * 3e année: Responsable de l'unité infection et tuteur dans l'APP infection
  * 1ère année: Responsable de la première année, responsable du module de la molécule à la cellule et cours Introduction à la Microbiologie
- Bachelor de biologie: cours de parasitologie
- Bachelor de biochimie: cours de signalisation intracellulaire
- Master de médecine et sciences biomédicales: supervision de travaux de master

Post-gradué :
- Cours et séminaires postgrades dont programme doctoral en sciences biomédicales
- Direction et supervision de thèses de doctorat

2. RECHERCHE

Taux consacré 75%

Recherche fondamentale sur la biologie des parasites du paludisme.

Collaboration avec des équipes locales, nationales et internationales.

Obtention de subsides compétitifs auprès du FNS et d'autres agences ou fondations au niveau national, européen ou international. Actuellement :
Swiss National Fund, Project Grant (310030_208151, 2022-2024), PI 100%, CHF 908,000
Confirm grant, HUG foundation, main co-PI (50%), CHF 600,000
Swiss National Fund, R'Equip, co-applicant (316030_213531), CHF 1,000,000
Sinergia grant, Swiss National Fund, Co-PI (25%), CHF 3,198,008
Novartis foundation grant, PI 100%, CHF 59,529

Publications des résultats de la recherche sous forme d'articles originaux et de revues dans des journaux internationaux à politique éditoriale.

3. AUTRES TACHES

3.1. GESTION, ORGANISATION, ADMINISTRATION, DIRECTION

Taux consacré 5%

Responsabilité de gestion des fonds de recherche.

Gestion des ressources humaines des collaborateurs scientifiques et administratifs du groupe de recherche.

En cas d'absence, le Professeur Brochet est remplacé par un autre professeur du Département de microbiologie et médecine moléculaire

Participation à des commissions et aux séances du Collège des professeurs de la Faculté de médecine

Le/la titulaire participera aux tâches de gestion et d'organisation qui sont liées au domaine spécifique qui lui est confié.

3.2. SERVICES A LA CITE

Dans le cadre de son activité, le/la titulaire doit être prêt-e, le cas échéant, à exercer vis-à-vis de la collectivité, une fonction de service rentrant dans la mission de l'Université, ce type d'activité faisant *ipso facto* partie du cahier des charges.

4. AUTRES DISPOSITIONS

Responsabilité académique de la plateforme de protéomique de la Faculté de Médecine

Par sa signature, le/la candidat/e atteste qu'il/elle a pris connaissance de la proposition de cahier des charges afférent au poste mis au concours qui sera soumise à l'autorité de nomination/d'engagement. La proposition de cahier des charges signée ne saurait en aucun cas être considérée comme un acte d'engagement. Seule la décision de nomination et/ou la signature d'un contrat de travail par l'autorité compétente selon le règlement sur le personnel de l'Université valent acte d'engagement.

Date et signature du responsable hérarchique

Date et signature du/de la titulaire

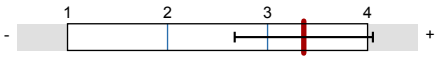
26/10/2023

Mémento de l'Unige ¦ 0241 : Etablir un cahier des charges pour toutes les fonctions du corps enseignant

Microbiologie
Prof Mathieu Brochet
Nombre de répondants : 65 (31.9%)

Indicateurs globaux

Index global



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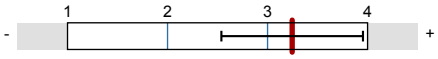
s.=0,7

1. Evaluation globale



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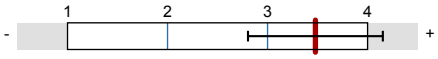
s.=0,7

2. Dimensions

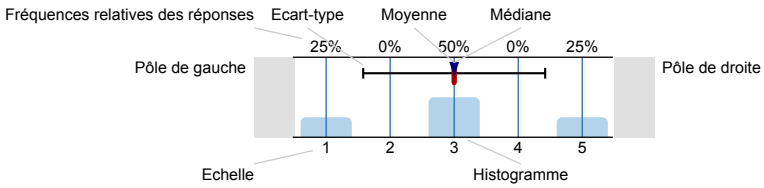


m.=3,5
s.=0,7

Résultats des questions prédéfinies

Légende

Question



n.= nombre
m.= moyenne
md.=Médiane
s.=Ecart-type
ab.=abstention

Index de qualité

Description des symboles de qualité:

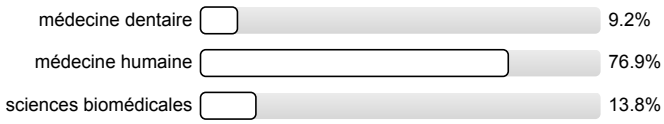
Moyenne au-dessous de la directive de qualité.

Moyenne dans la marge de conformité.

Moyenne conforme ou au-delà de la directive de qualité.

1. Evaluation globale

1.1) Je suis étudiant.e en

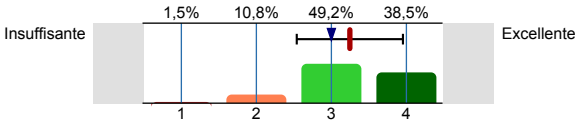


n=65

1.2) J'ai suivi les enseignements de ce bloc

n=64

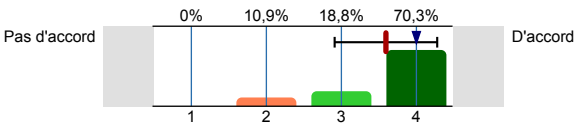
1.3) Mon évaluation globale de ce bloc



n=65
m.=3,2
md.=3
s.=0,7

2. Dimensions

2.1) Les objectifs d'apprentissage ont été clairement explicités



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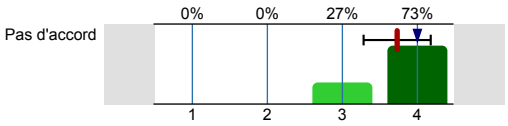
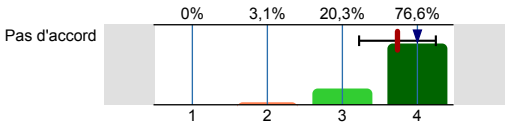
m.=3,6
md.=4
s.=0,7
ab.=1

2.2) Les objectifs ont été traités



n=63
m.=3,7
md.=4
s.=0,4
ab.=1

2.3) Les enseignements de ce bloc sont cohérents entre eux



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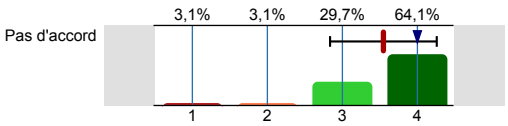
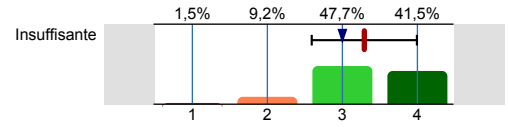
m.=3,7
md.=4
s.=0,5
ab.=1

2.4) Le niveau prérequis des connaissances est adapté



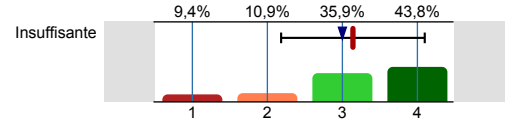
n=64
m.=3,5
md.=4
s.=0,7

2.5) Clarté et structure des supports de cours



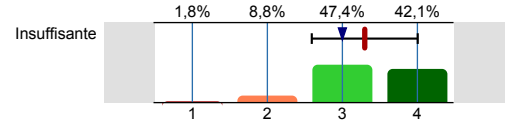
n=65
m.=3,3
md.=3
s.=0,7

2.6) Clarté et structure de la présentation des cours



n=64
m.=3,1
md.=3
s.=1
ab.=1

2.7) Interactivité (questions, utilisation pertinente des outils d'interaction directe tels que SpeakUp, Pingo, forum, etc…)



n=57
m.=3,3
md.=3
s.=0,7
ab.=7

Profil

Département: Bachelor 1
Référent évaluation: Prof Brochet Mathieu
Objet: (Nom de l'enquête) Microbiologie

Valeurs utilisées dans la ligne de profil: Moyenne

1. Evaluation globale

1.3)	Mon évaluation globale de ce bloc	Insuffisante	Excellente	n=65	m.=3,2	md.=3,0	s.=0,7

2. Dimensions

2.1)	Les objectifs d'apprentissage ont été clairement explicités	Pas d'accord	D'accord	n=64	m.=3,6	md.=4,0	s.=0,7
2.2)	Les objectifs ont été traités	Pas d'accord	D'accord	n=63	m.=3,7	md.=4,0	s.=0,4
2.3)	Les enseignements de ce bloc sont cohérents entre eux	Pas d'accord	D'accord	n=64	m.=3,7	md.=4,0	s.=0,5
2.4)	Le niveau prérequis des connaissances est adapté	Pas d'accord	D'accord	n=64	m.=3,5	md.=4,0	s.=0,7
2.5)	Clarté et structure des supports de cours	Insuffisante	Excellente	n=65	m.=3,3	md.=3,0	s.=0,7
2.6)	Clarté et structure de la présentation des cours	Insuffisante	Excellente	n=64	m.=3,1	md.=3,0	s.=1,0
2.7)	Interactivité (questions, utilisation pertinente des outils d'interaction directe tels que SpeakUp, Pingo, forum, etc…)	Insuffisante	Excellente	n=57	m.=3,3	md.=3,0	s.=0,7

Ligne de profil pour indicateurs

Département: Bachelor 1
Référent évaluation: Prof Brochet Mathieu
Objet: Microbiologie
(Nom de l'enquête)

1. Evaluation globale	- +	m.=3,2	s.=0,7
2. Dimensions	- +	m.=3,5	s.=0,7

Résultats des questions ouvertes

2. Dimensions

2.8) Points positifs

- - Cours bien structurés et complets
  - Bonne interactivité, surtout lors du répetitoire
- Bonne explication des notions importantes sans nous inonder d'informations inutiles
- Clarté du plan du cours (diapo nous situant exactement quel sujet nous allons aborder) + document pdf annexes avec les points exacts à connaître pour chacune des slides
- Des cours très intéressants et bien structurés
- L'inclusion des points d'exclamations sur les diapositives importantes et des notes de cours facilitent la révision.
- Le guide avec les slides est un bon super et complet.
- Le prof essaye de clarifier son propos
- Les documents sur Moodle sont très complets.
- Les questions Pingo et le répétitoire sont très utiles. Les diapositives sont claires et il est marqué en évidence les éléments importants du cours
- Professeur qui donne du sien et qui aime ce qu'il fait.
- Question en fin de cours, repetitoire, note en plus fournit—> bien surtout en début d'année quand on a pas trouvé sa méthode de travail
- Résumés par diapos des cours en microbiologie : aident à mettre en avant l'essentiel
- Supports du cours explicites et compréhensibles.
  Cours très intéressants surtout lorsqu'on débute la médecine.
- Très clair
  Cool,
  Interactif
  Passionné
- cours très intéressants et bien expliqués, les idées sont claires et faciles à organiser sur un support annexe.
- explications très claires !!
  les slides à savoir par cœur étaient marquées
- les notes séparées sont utiles

2.9) Améliorations suggérées

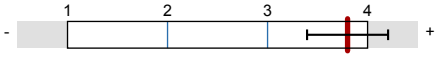
- - Un plan du cours serait appréciable
- Aurait pensé un approfondissement avec plus de matière de cours vu l'importance de cet enseignement mais peut-être le sera-t-il plus tard.
- Certains diapositives compliqué, comme celui du cycle du toxoplasme, n'avaient pas de texte ou de notes, et cela pourrait rendre plus difficile l'apprentissage après le cours.
- Continuer comme ça

Docteur BROCHET Mathieu

Infections - Bactériologie G107
Nombre de réponses = 8 (88.9 %)

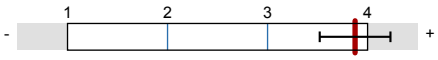
Indicateurs globaux

Index global



m.=3,8
s.=0,4

1. Evaluation globale



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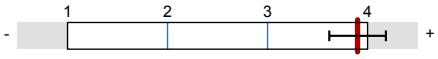
s.=0,4

2. Processus d'apprentissage



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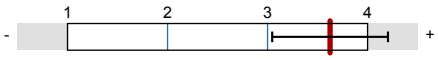
s.=0,3

4. Régularité du feedback



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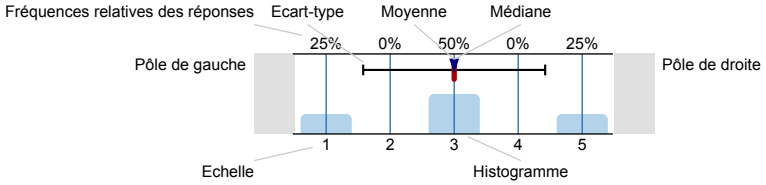
s.=0,6

Résultats des questions prédéfinies

Légende

Question



n.= nombre
m.= moyenne
md.=Médiane
s.=Ecart-type
ab.=abstention

Index de qualité

Description des symboles de qualité:

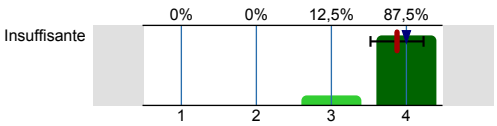
Moyenne au-dessous de la directive de qualité.

Moyenne dans la marge de conformité.

Moyenne conforme ou au-delà de la directive de qualité.

1. Evaluation globale

1.1) Votre appréciation globale du tuteur

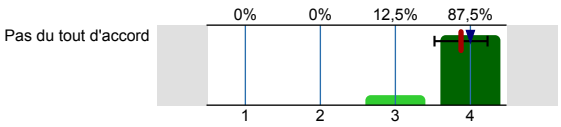


n=8
m.=3,9
md.=4
s.=0,4

2. Processus d'apprentissage

Mon tuteur:

2.1) montre qu'il connaît bien les étapes de l'APP



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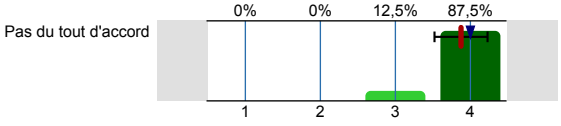
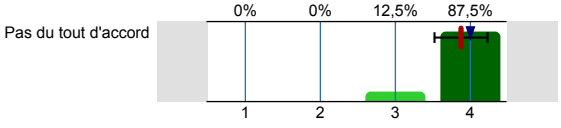
m.=3,9
md.=4
s.=0,4

2.2) m'aide à identifier et à analyser les points fondamentaux des problèmes



n=8
m.=3,9
md.=4
s.=0,4

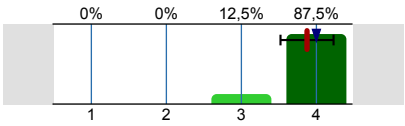
2.3) me guide dans l'élaboration des objectifs d'apprentissage



n=8
m.=3,9
md.=4
s.=0,4

2.4) s'intéresse à mes activités d'apprentissage au cours de l'Unité

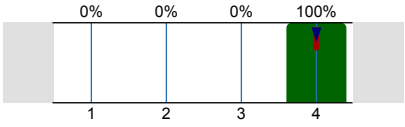
Pas du tout d'accord — Tout à fait d'accord



n=8
m.=3,9
md.=4
s.=0,4

2.5) est à l'aise avec les sujets des problèmes

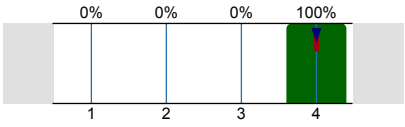
Pas du tout d'accord — Tout à fait d'accord



n=8
m.=4
md.=4
s.=0

2.6) intervient de manière pertinente

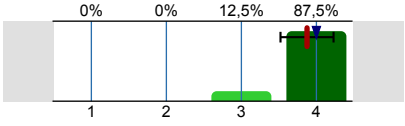
Pas du tout d'accord — Tout à fait d'accord



n=8
m.=4
md.=4
s.=0

2.7) amène le groupe à formuler sa propre solution au problème

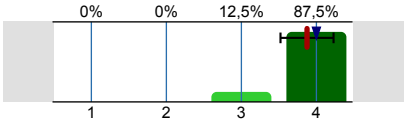
Pas du tout d'accord — Tout à fait d'accord



n=8
m.=3,9
md.=4
s.=0,4

2.8) génère de l'enthousiasme pour l'apprentissage

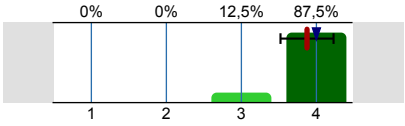
Pas du tout d'accord — Tout à fait d'accord



n=8
m.=3,9
md.=4
s.=0,4

2.9) est disponible pour répondre à mes questions

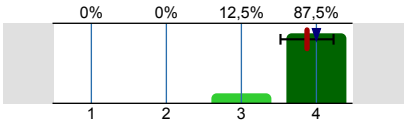
Pas du tout d'accord — Tout à fait d'accord



n=8
m.=3,9
md.=4
s.=0,4

2.10) m'aide à faire un bilan utile du problème

Pas du tout d'accord — Tout à fait d'accord

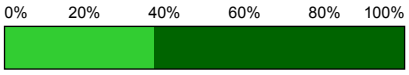


n=8
m.=3,9
md.=4
s.=0,4

3. Fonctionnement du groupe

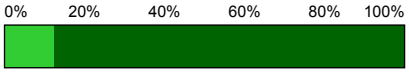
Dans mon groupe:

3.1) on suit bien les étapes de l'APP



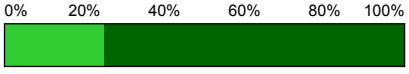
n=8
m.=3,6
md.=4
s.=0,5

3.2) le climat est agréable



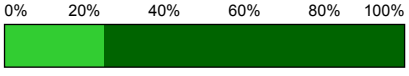
n=8
m.=3,9
md.=4
s.=0,4

3.3) chacun participe de manière active



n=8
m.=3,8
md.=4
s.=0,5

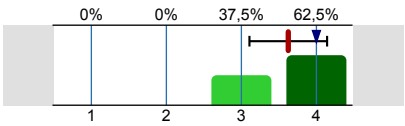
3.4) je fonctionne bien dans ce groupe



n=8
m.=3,8
md.=4
s.=0,5

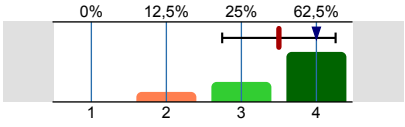
4. Régularité du feedback

4.1) Le bilan de fonctionnement du groupe se fait régulièrement



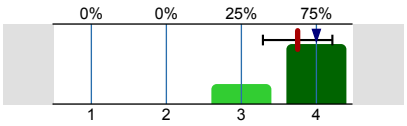
n=8
m.=3,6
md.=4
s.=0,5

4.2) Mon tuteur me donne régulièrement du feedback (i.e. observations, suggestions sur l'apprentissage, le fonctionnement...)



n=8
m.=3,5
md.=4
s.=0,8

4.3) Le tuteur donne régulièrement du feedback au groupe

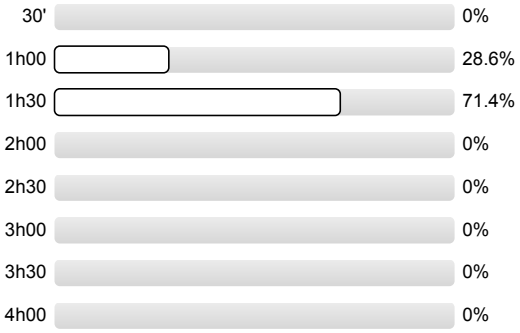


n=8
m.=3,8
md.=4
s.=0,5

5. Durée des tutoriaux et bilans

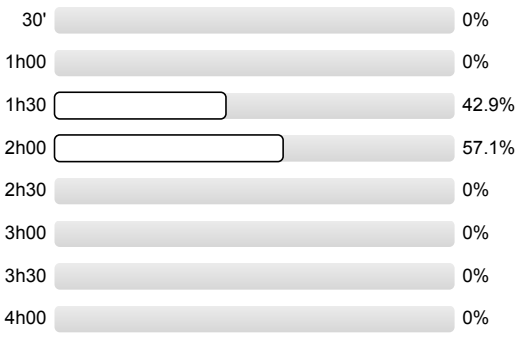
5.1) Durée moyenne des tutoriaux de votre groupe

n=7



5.2) Durée moyenne des bilans de votre groupe

n=7



Profil

Département: Infections
Référent évaluation: Docteur BROCHET Mathieu
Objet: (Nom de l'enquête) Infections - Bactériologie G107

Valeurs utilisées dans la ligne de profil: Moyenne

1. Evaluation globale

1.1)	Votre appréciation globale du tuteur	Insuffisante	Excellente	n=8	m.=3,9	md.=4,0	s.=0,4

2. Processus d'apprentissage

2.1)	montre qu'il connaît bien les étapes de l'APP	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=3,9	md.=4,0	s.=0,4
2.2)	m'aide à identifier et à analyser les points fondamentaux des problèmes	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=3,9	md.=4,0	s.=0,4
2.3)	me guide dans l'élaboration des objectifs d'apprentissage	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=3,9	md.=4,0	s.=0,4
2.4)	s'intéresse à mes activités d'apprentissage au cours de l'Unité	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=3,9	md.=4,0	s.=0,4
2.5)	est à l'aise avec les sujets des problèmes	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=4,0	md.=4,0	s.=0,0
2.6)	intervient de manière pertinente	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=4,0	md.=4,0	s.=0,0
2.7)	amène le groupe à formuler sa propre solution au problème	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=3,9	md.=4,0	s.=0,4
2.8)	génère de l'enthousiasme pour l'apprentissage	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=3,9	md.=4,0	s.=0,4
2.9)	est disponible pour répondre à mes questions	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=3,9	md.=4,0	s.=0,4
2.10)	m'aide à faire un bilan utile du problème	Pas du tout d'accord	Tout à fait d'accord	n=8	m.=3,9	md.=4,0	s.=0,4

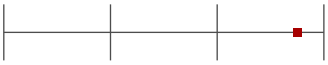
3. Fonctionnement du groupe

3.1)	on suit bien les étapes de l'APP	n=8	m.=3,6	md.=4,0	s.=0,5
3.2)	le climat est agréable	n=8	m.=3,9	md.=4,0	s.=0,4
3.3)	chacun participe de manière active	n=8	m.=3,8	md.=4,0	s.=0,5
3.4)	je fonctionne bien dans ce groupe	n=8	m.=3,8	md.=4,0	s.=0,5

4. Régularité du feedback

4.1)	Le bilan de fonctionnement du groupe se fait régulièrement	n=8	m.=3,6	md.=4,0	s.=0,5
4.2)	Mon tuteur me donne régulièrement du feedback (i.e. observations, suggestions sur l'apprentissage, le fonctionnement...)	n=8	m.=3,5	md.=4,0	s.=0,8

4.3) Le tuteur donne régulièrement du feedback au groupe



n=8 m.=3,8 md.=4,0 s.=0,5

Ligne de profil pour indicateurs

Département: Infections
Référent évaluation: Docteur BROCHET Mathieu
Objet: Infections - Bactériologie G107
(Nom de l'enquête)

1. Evaluation globale	- +	m.=3,9	s.=0,4
2. Processus d'apprentissage	- +	m.=3,9	s.=0,3
4. Régularité du feedback	- +	m.=3,6	s.=0,6

Résultats des questions ouvertes

1. Evaluation globale

[1.2)] Indiquez les qualités que vous appréciez chez votre tuteur

- Enthousiasme, intérêt pour le sujet, investissement dans les APP et dans l'unité, nous demande souvent notre avis sur le fonctionnement des cours/APP/sessions intéractives.
- Génère beaucoup d'enthousiasme pour l'apprentissage et très à l'écoute des avis des étudiants.
- Très motivé et connais bien les thèmes des app

[1.3)] Suggestions à votre tuteur pour ses prochains tutoriaux

L'évaluation ne sera pas affichée, pour cause de taux de réponse insuffisant.

2. Processus d'apprentissage

[2.11)] Commentaires sur le processus d'apprentissage

L'évaluation ne sera pas affichée, pour cause de taux de réponse insuffisant.

3. Fonctionnement du groupe

[3.5)] Commentaires sur le groupe

L'évaluation ne sera pas affichée, pour cause de taux de réponse insuffisant.

4. Régularité du feedback

[4.4)] Le tuteur nous a donné du feedback sur les points suivants

L'évaluation ne sera pas affichée, pour cause de taux de réponse insuffisant.

[4.5)] J'aurais souhaité recevoir du feedback sur les points suivants

L'évaluation ne sera pas affichée, pour cause de taux de réponse insuffisant.

UNIVERSITÉ DE GENÈVE
FACULTÉ DES SCIENCES

Pôle SEA, Université de Genève
24, rue du Général Dufour
CH-1211 Genève 4

Rapport d'évaluation des enseignements "Mathieu BROCHET (P23)

Bonjour,

Ce rapport contient les résultats de l'évaluation de votre enseignement intitulé "Mathieu BROCHET (P23)13C008PP2305".

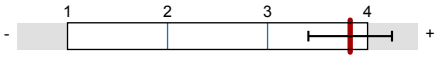
UNIVERSITÉ DE GENÈVE
FACULTÉ DES SCIENCES

Bordignon | BARABAS | BOLAND | et al.

Mathieu BROCHET (P23)
13C008PP2305
Taux de réponse (%) = 31.58
Nb réponses = 6

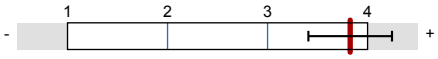
Indicateurs globaux

Index global



m.=3,83
s.=0,42

1. Questions concernant l'enseignant-e

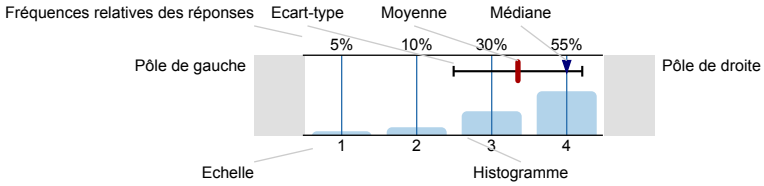


m.=3,83
s.=0,42

Résultats des questions prédéfinies

Légende

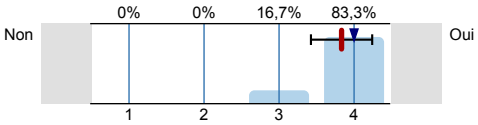
Question



n.= nombre
m.= moyenne
md.=Médiane
s.=Ecart-type
ab.=abstention

1. Questions concernant l'enseignant-e

1.1) L'enseignant-e suscite l'intérêt pour la matière.



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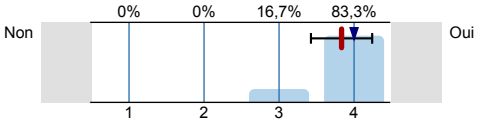
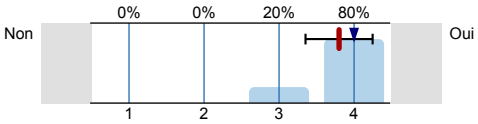
m.=3,83
md.=4
s.=0,41

1.2) L'enseignant-e stimule la réflexion.



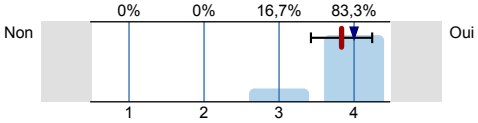
n=6
m.=3,83
md.=4
s.=0,41

1.3) L'enseignant-e encourage les étudiant-e-s à s'engager activement dans l'assimilation de la matière durant le cours.



n=5
m.=3,8
md.=4
s.=0,45

1.4) La disponibilité de l'enseignant-e est satisfaisante.



n=6
m.=3,83
md.=4
s.=0,41

Profil

Département: CHIMIE-BIOCHIMIE 2022-2023
Responsable du module: Bordignon | BARABAS | BOLAND | et al.,
Objet: Mathieu BROCHET (P23)
(Nom de l'enquête)

Valeurs utilisées dans la ligne de profil: Moyenne

1. Questions concernant l'enseignant-e

1.1)	L'enseignant-e suscite l'intérêt pour la matière.	Non	Oui	n=6	m.=3,83
1.2)	L'enseignant-e stimule la réflexion.	Non	Oui	n=6	m.=3,83
1.3)	L'enseignant-e encourage les étudiant-e-s à s'engager activement dans l'assimilation de la matière durant le cours.	Non	Oui	n=5	m.=3,80
1.4)	La disponibilité de l'enseignant-e est satisfaisante.	Non	Oui	n=6	m.=3,83

Résultats des questions ouvertes

2. Remarques concernant l'enseignant-e

2.1) Remarques, précisions et suggestions à destination de cet enseignant-e.

- Cours absolument fascinant!!

  Il est juste dommage qu'en Bachelor de Biochimie, nous n'ayons pas assez de background pour absolument tout comprendre, mais autrement dit, c'était super intéressant!

  Par contre, les notions importantes ne sont pas précisés (détails..)

- Je trouve que c'était vraiment bien de faire des questions sur pingo. Cela rend le cours plus interactif.

Curriculum vitae
General information

■ Personal data

- Brochet, Mathieu
- Date of birth: 22 May 1981
- Place of birth: Rueil-Malmaison, France
- Address: Chemin de Roches, 1208, Geneva, Switzerland
- ORCID: 0000-0003-3911-5537
- Mathieu.Brochet@unige.ch
- Centre Médical Universitaire, Rue Michel Servet 1, 1211 Geneva 4, Switzerland

■ Education from the most recent to the oldest

Degrees

11/2007 **PhD in Molecular Microbiology,** "Population genomics and genetic flux in *Streptococcus agalactiae*"
Pasteur Institute
Paris, France

09/2004 **Msc in biochemistry and genetics and Msc in Agronomy, zootechnical engineering**
National Higher Agronomic School of Rennes (France) and McGill University (Canada)

Additional relevant training

01/2018 **Qualifications to perform and supervise animal experiments**
Réseau des animaleries lémaniques

■ Past and present positions from the most recent to the oldest

08/2020 **Associate professor**, 100%
University of Geneva, Faculty of Medicine
Geneva, Switzerland

10/2015 **Assistant professor**, 100%
University of Geneva, Faculty of Medicine
Geneva, Switzerland

08/2014 **INSERM investigator** (*"*chargé de recherche 1ère classe*"*, French Institute for Health and Medical Research)**,** 100%
CNRS UMR-523, Montpellier, France – In secondment

02/2009 **Postdoctoral fellow,** 100%
Wellcome Trust Sanger Institute, Cambridge, UK

12/2007 **Postdoctoral fellow,** 100%
Pasteur Institute, Paris, France

■ Academic age

Number of years since the first scientific publication: 18
Number of years since PhD: 16

■ Honors and awards

- Elected EMBO young investigator - European Molecular Biology Organisation 2018
- Swiss National Fund, Starting Grant (BSSGI0-155852, 2015-2020), backup scheme for ERC starting grants when Switzerland was not associated to ERC in 2014
- INSERM investigator position (French Institute for Health and Medical Research, 2014) -

tenured
- CNRS investigator position (French National Centre for Scientific Research, 2014) - declined
- Marie Curie Intra-European Fellowship for career development (PIEF-GA-2009-253899, 2011)
- EMBO long term fellowship (ALTF 45-2009, 2009)

Language skills

French, mother tongue; English, professional proficiency

■ Self-evaluation

I am cellular and molecular microbiologist fascinated by infectious diseases. During my PhD I showed that pathogenic isolates of *Streptococcus agalactiae*, the leading cause of neonatal infections, recently emerged by exchanging large chromosomal fragments through conjugation. This challenged the paradigm assuming that "sex" in natural bacterial populations mainly involved the transfer of small regions by transformation or transduction.

I then turned my attention to the biology of *Plasmodium* parasites that cause malaria. I am particularly interested in understanding how *Plasmodium* proliferates and times its development across multiple intra or extra cellular environments.

Our work led to the most detailed analysis of a signalling pathway in *Plasmodium*. We showed how external stimuli are translated into intracellular signals mediated by cGMP and Ca^{2+} to initiate parasite replication in the mosquito. Most importantly, we found that the same signalling module regulates other crucial stages of the parasite lifecycle including exit and invasion of erythrocytes, colonisation of the mosquito midgut and infection of liver cells. These findings define this signalling pathway as a key *Plasmodium* vulnerability and allow to understand the functional requirements of important drug targets.

Our work also highlighted the peculiarities of microtubule cytoskeletons that are important for the proliferation, reproduction and dissemination of *Plasmodium* parasites. This includes structures conserved across eukaryotes such as the mitotic spindle and associated kinetochores for cell division or the basal body nucleating axonemes for sexual reproduction. We have also recently discovered a tubulin ring unique to *Plasmodium* at the apex of motile cells that is likely key to sustain motility and host cell invasion. These results are important as they bring new evolutionary insights into structures conserved across all eukaryotes but also defines *Plasmodium* specificities that could be targeted by new therapeutic interventions.

Research outputs

Five most significant publications
I selected publications that reflect the diversity of research projects we cover in the lab or that I covered during my career.

A Plasmodium *membrane receptor platform integrates cues for egress and invasion in blood forms and activation of transmission stages*
Kuehnel RM[+], Ganga E[+], Balestra AC[+], Suarez C, Wyss M, Klages N, Brusini L, Maco B, Brancucci N, Voss T, Soldati-Favre D, and **Brochet M[#]**
Science Advances, 2023, *9(24):eadf2161*
While we previously showed that cGMP signalling is critical to multiple developmental stages, little was known about how cGMP biosynthesis iss regulated in response to environmental signals in the absence of canonical families of receptors in *Plasmodium*. Here we showed that a new type a receptor integrates multiple signals of various nature to time egress from the red blood cell and parasite activation upon their ingestion by a mosquito.

Expansion Microscopy provides new insights into the cytoskeleton of malaria parasites including the conservation of a conoid.
Bertiaux E[+], Balestra[+] AC, Bournonville L, Louvel E, Maco B, Soldati-Favre D, **Brochet M[#]**, Guichard P[#], Hamel V[#].
PloS Biology, 2021, 19(3):e3001020
In collaboration with the Centriole Lab (P. Guichard and V. Hamel, University of Geneva), we have implemented for the first time in *Plasmodium* expansion microscopy. This approach is revolutionising

how we look at these parasites and, in this case, we identified in *Plasmodium* an atypical tubulin ring required for motility that was not identified previously despite intense scrutiny.

Calcium signals critical for egress and gametogenesis in malaria parasites depend on a multipass membrane protein that interacts with PKG.
Balestra AC[+], Koussis K[+], Klages N, Howell SA, Flynn HR, Bantscheff M, Pasquarello C, Perrin AJ, Brusini L, Arboit P, Sanz O, Peces-Barba Castaño L, Withers-Martinez C, Hainard A, Ghidelli-Disse S, Snijders AP, Baker DA, Blackman MJ[#], **Brochet M**[#].
Science Advances, 2021, 7(13):eabe5396
Despite the central role of calcium signaling in the pathogenesis and transmission of malaria parasites it was unknown how this intracellular messenger is mobilized from intracellular stores in the absence of canonical calcium channels. Here we have identified a putative divergent calcium channel that is essential for calcium mobilization opening a new line of research in calcium signaling.

Phosphoinositide metabolism links cGMP-dependent protein kinase to essential Ca^{2+} signals at key decision points in the life cycle of malaria parasites.
Brochet M[#], Collins MO, Smith TK, Thompson E, Sebastian S, Volkmann K, Schwach F, Chappell L, Berriman M, Rayner JC, Baker DA, Choudhary J, Billker [#]O.
PloS biology, 2014, 12(3):e1001806
The cGMP-dependent protein kinase G (PKG) is considered as a major drug target as it is essential at multiple stages of the *Plasmodium* lifecycle. However, its molecular role was unknown. In this study, we have shown that PKG main function is to regulate intracellular calcium signals that are required to exit the red blood cells, to activate the parasite development in the mosquito and to colonise the mosquito midgut.

Shaping a bacterial genome by large chromosomal replacements, the evolutionary history of Streptococcus agalactiae.
Brochet M, Rusniok C, Couvé E, Dramsi S, Poyart C, Trieu-Cuot P, Kunst F, and Glaser P.
Proc Natl Acad Sci USA., 2008, 105(41):15961-66
In this study, we showed that pathogenic isolates of *Streptococcus agalactiae*, the leading cause of neonatal infections, recently emerged by exchanging large chromosomal fragments through conjugation. This challenged the paradigm assuming that “sex” in natural bacterial populations mainly involved the transfer of small regions by transformation or transduction

5 most significant methods, tools, infrastructures, data, etc. developed as part of research.

Plasmodium parasites are experimentally difficult cells that are divergent from usually well studied systems such as *Homo sapiens*, *Drosophila* or yeast. Therefore, our work requires significant efforts to implement new methods to study these parasites. In the last years my lab has implemented and adapted to *Plasmodium* multiple approaches that significantly improved our analytic or experimental tools to better understand the biology of these fascinating cells.

How unique is unique? The absence of metazoan orthologues in *Plasmodium* or the “unicity” of *Plasmodium* proteins is often based on the absence of hit by reciprocal BlastP. However, such approach might not be sensitive enough and it is possible that proteins considered as unique to or absent in *Plasmodium* have diverged beyond our detectability. To address this issue, we have implemented deep homology searches using an iterative Hidden Markov Model (HMM) profiling strategy. We have constructed an in-house protein database of apicomplexan and related organisms and added iteratively significant sequences to generate pan-apicomplexan HMMs. This allows profile-profile comparisons against a growing list of manually curated pan-eukaryotic HMMs. Using this powerful approach, we and others identified metazoan kinetochore proteins that were thought to be absent in *Plasmodium* and confirmed that a subcomplex of the *Plasmodium* kinetochore is to be genuinely present in apicomplexans only.

Proteomic approaches. Little is known about protein complexes in *Plasmodium*. To identify protein-protein interaction (PPI) networks, we have established a range of immuno-precipitation

(IP) and proximity labelling protocols followed by mass spectrometry (MS). Our growing PPI repertoire currently comprises data from 63 interaction studies that allow to confidently discriminate bona fide interactors from background contaminants. This approach identified the components of various signalling complexes or cytoskeletal structures. We are also at the forefront of proteomic approaches in the field and have been among the first groups to implement pipelines using Tandem Mass Tag (TMT) labelling for phosphoproteomics or Data-Independent Acquisition to characterise proteomes or ubiquitomes.

Getting to the nanoscale architecture of protein complexes with light microscopy. Owing to the small size of the parasites, subcellular imaging by fluorescent light microscopy poses a major challenge in *Plasmodium*. Because of the limit of resolution of fluorescence microscopy or the technical limitations of super resolution microscopy in *Plasmodium*, imaging *Plasmodium* with high resolution remained difficult. To overcome this roadblock, we have implemented ultrastructure expansion microscopy (U-ExM) for the first time in *Plasmodium* and showed it provides an accessible bridge between traditional fluorescence microscopy and electron microscopy (EM).

Interrogating and characterising the functions of genes and proteins. To interrogate the function of newly identified genes or proteins, we have developed or implemented an array of conditional or stage-specific systems, including the Auxin-inducible degron (AID), promoter swap approaches, a tet-off system, or the rapamycin-inducible diCre system. We have also implemented Cas9-based editing approaches in *P. falciparum* and have recently done so in *P. berghei*. In *P. berghei* we can additionally combine Cas9-editing with the highly efficient linear PlasmoGEM targeting vectors, I have previously contributed to develop.

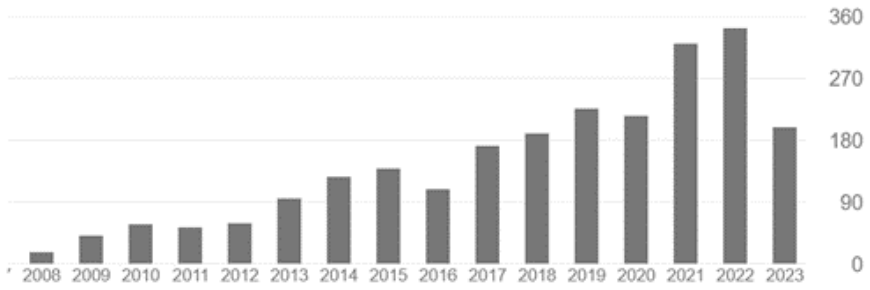
Publication indicators specific to the discipline

Number of publications:

- 34 original research articles (15 as corresponding author and 8 as first author), 2 reviews, 3 book chapters, 1 news and views, 1 preprint under review, 1 review under review, 1 editorial
- Complete list: google scholar, ORCID, Pubmed

Total number of citations: 2444. As an indicator, a search for the general Mesh terms "*Plasmodium* or malaria" on pubmed recovers 5,288 citations for 2022.

h-index: 27.



■ Scientific planning

My team is internationally recognised for our expertise intracellular signaling pathways in *Plasmodium*. We are in a leading position to further refine the molecular and structural characterisation of these pathways. We are now exploiting this knowledge to infer how *Plasmodium* signaling pathways can be targeted by small molecules with multistage activity.

We are also expanding our expertise in cellular parasitology by studying multiple cytoskeletal structures important for the division, reproduction and motility of these parasites. We anticipate that the array of methods we have recently developed to tackle these structures places our lab

in a in a leading position to better understand the fundamental aspect of specific cytoskeletal structures underpinning the pathogenicity of malaria parasites in the coming years.

■ Research collaborations

Collaboration is at the heart of my team philosophy and most of our projects involve collaborative efforts.

We have longstanding collaborative projects with the team of Pre Dominique Soldati (University of Geneva) who is an expert in various aspect of the biology of *Toxoplasma gondii*, an apicomplexan parasite related to *Plasmodium*. Comparing these two related but yet distinct parasites is an extremely powerful approach to better understand their pathogenicity, biology and evolution.

We have initially collaborated with Pr Paul Guichard and Dre Virginie Hamel (University of Geneva) to implement expansion microscopy in *Plasmodium* parasites. Both are experts in studying the structure and function of the centriole, a microtubule-based structure crucial for many cellular processes such as cell division and we are now teaming up to better understand microtubule structures in *Plasmodium*.

We are collaborating with the team of Pr Till Voss (Swiss TPH) to combine our expertise in cell signaling with their expertise in epigenetic regulation of gene expression in *Plasmodium*.

We also have longstanding collaborations with Pr Mike Blackman (The Crick Institute) and Pr David Baker (London School of Hygiene and Tropical Medicine) on cGMP signaling as well as Pr Rita Tewari (Nottingham University) to study cell division.

■ Research funding and grants

During the last five years I secured CHF 3,136,031 for my lab.
2023 **Confirm grant**, HUG foundation, main co-PI (50%), CHF 600,000
2022 Swiss National Fund, **Project Grant** (310030_208151, 2022-2026), PI 100%, CHF 908,000
2021 Swiss National Fund, **Sinergia grant**, (CRSII5_198545), Co-PI 25%, CHF 3,198,008
2020 **Novartis foundation** grant, PI 100%, CHF 59,529
2019 **EMBO young investigator** grant, PI 100%, CHF 20,000
2019 **Confirm grant**, HUG foundation, main co-PI (50%), CHF 600,000
2018 Swiss National Fund, **Project Grant** (31003A_179321, 2019-2022), PI 100%, CHF 429,000
2018 NCCR Chemical Biology **High-impact chemical biology screening** (2018), PI 100%, CHF 20,000

I was also co-applicant on two R'Equip calls
2022 **R'Equip**, co-applicant (316030_213531), CHF 1,000,000
2021 **R'Equip**, co-applicant (316030_205686), CHF 537,244

Members of my team have also been awarded grants to support their projects in my lab
2023 Swiss National Fund, **Swiss Postdoctoral fellowship**, CHF 260,285 - Dre Boulet
2022 **Novartis foundation**, CHF 80,000 - Dr Brusini

■ Research supervision and mentoring

Research supervision
During the last five years, I directly supervised 2 postdoctoral fellows, 4 PhD students, 3 visiting scientists, 1 PREM student, 1 master, 1 apprentice and 1 senior lab technician.

2024-now Postdoc supervision of C. Boulet **(SNSF post-doctoral fellowship)**
2023-now PhD supervision of A. Hackmann

2023-2024	Master supervision of C. Bourguignon
2021-now	PhD supervision of E. Ganga
2022	Supervision D. Hemsteg - 2nd year medical student
2021	Visit of S. Hernandez, **EMBO STF** (lab of Ellen Bushell)
2021	Visit of L. Akkerman, **Beyond the Frontiers Program** (lab of T Kooij)
2020	Master supervision of V. Saez Morganella
2020-now	PhD supervision of R. Kühnel
2019-now	Postdoc supervision of R. Rashpa
2019-now	Postdoc supervision of L. Brusini
2019	Visit of C. Simon, **EMBO STF** (lab of J. Guizetti)
2018	Visit of PhD student E. Hitz (lab of T. Voss)
2017-21	PhD supervision of A. Balestra – **Best PhD award from the doctoral school**
2016-17	Supervision of research assistant B Baechler
2015-20	PhD supervision of H. Fang
2015- now	Supervision of N. Klages, senior lab technician

Mentoring
I actively discuss with my students and postdocs about academic and non-academic issues. So far, all members leaving the lab have been able to find a position in their field or area of interest. Dr Fang joined a pharmaceutical company and Dre Balestra secured the **best PhD award from our doctoral school** and an **EMBO long-term fellowship** for a post-doc in the only and single laboratory she wanted to join. Current PhD students in my lab also benefit from the support of the EMBO YIP to develop their network of excellence across Europe. I also promote active scientific exchange with my collaborators in Switzerland and Europe. All PhD students and post docs are presenting at major international conferences to develop their own professional network.

■ Other scientific activities

Editorial responsibilities
Associate editor at *PLOS pathogens*
Section editor at *microlife*

Reviewing activities
Selected journals: *ACS Infectious Diseases*, *Cellular Microbiology*, *Cell Discovery*, *Cell Reports*, *Cellular Signalling*, *Current Biology*, *EMBO journal, EMBO reports*, *International Journal of Parasitology*, *Journal of Biochemical Chemistry, Journal of Cellular and Molecular Medicine, Nature communications, mBio*, *Microbiology Open*, *Molecular Microbiology*, *Molecular & Biochemical Parasitology*, *Open biology*, *Plos Biology*, *Plos Neglected Tropical Diseases*, *Plos One*, *Plos Pathogens, Scientific Reports, Trends in Parasitology*.
Early career reviewer at *elife*
Funding agencies: Swiss National Fund (CH), Boehringer Ingelheim Foundation (Ge), Wellcome Trust (UK), BBSRC (UK), Medical Research Council (UK), Institut Pasteur (Fr), Agence Nationale pour la Recherche (Fr), European Science Foundation, ZonMw (the Netherlands).

Membership
Member of Life Sciences Switzerland (LS^2)

Thesis examinations
Thesis examiner: N. Katris (2017, University of Melbourne), H. Bisio (2020, University of Geneva), M.L. Wilde (2021, The Walter and Eliza Hall Institute), J. Li (2023, University of Melbourne), S.S. Sahraoui (2023, University of Geneva), S. Yu (2023, University of Geneva), C.M. Castellano (2023, University of Montpellier)
Member of **15 thesis advisory committees** since 2017 (University of Geneva x12, University of Montpellier x2, Paul Scherrer Institute x1)

Conference organisation
Workshop organiser on Expansion microscopy 19th BioMalPar conference (2023
Departmental retreat (with M. Schmolke, 2023)
EMBO YIP sectorial meeting: Cell polarity and Cytoskeleton (2021)

Selected conferences and seminars
Invited speaker Future of parasitology 2022 (Institut Pasteur, Paris, France)
Invited speaker EMBO Workshop (France)
EMBO young investigator speaker, Calcium and cell function (FASEB meeting), 2021
Keynote speaker, 17th BioMalPar conference (EMBL, Virtual), 2021
Seminar, Swiss Tropical & Public Health Institute, Basel, Switzerland, 2020
Seminar, The Laboratory for Molecular Infection Medicine, Umea, Sweden, 2020
Invited speaker, 16th BioMalPar conference (EMBL, Virtual), 2020
Seminar, University of Bern, Institute for Cell Biology, Bern, Switzerland, 2019
Seminar, Heidelberg University Hospital, Centre for Infectious Diseases, Germany, 2019
Invited speaker, 14th BioMalPar conference (EMBL, Heidelberg, Germany), 2018
Seminar, University of Nottingham, Faculty of Medicine & Health Sciences, Nottingham, UK
Invited speaker, Annual Swiss proteomic meeting (Montreux, Switzerland), 2018
Seminar, ETH Zürich, Institute of Molecular Systems Biology, Zürich, Switzerland
Keynote speaker, 1st Swiss cytometry meeting (EPFL, Lausanne, Switzerland), 2018
Invited speaker, 12th BioMalPar conference (EMBL, Heidelberg, Germany), 2016
Invited speaker, EMBO Workshop (Les Embiez, France), 2016
Invited speaker, Forum of the Graduate School Infection, University of Geneva and Lausanne, 2016

■ Contributions to Open Science

All articles from my lab are published in open access journals and data submitted to open access repositories when relevant. I am associate and section editor for PLOS pathogens and microlife, respectively, two journals founded to promote open access in microbiology. The implementation of expansion microscopy (ExM) to the parasitology community has been instrumental for multiple groups around the world. In less than two years we have already trained 10 parasitology groups to implement ExM and openly shared our protocols. At the last BioMalPar conference (2023) I have organised an ExM workshop for parasitologists to keep sharing our most recent ExM protocols with the community and increase the visibility of our University to this community.

■ Scientific outreach

Press releases

We communicate some of our scientific findings to the general public through press releases from the University. For example, two of our recent publications had unusual media coverage for studies on a parasitic disease. Our press release on a new type of sensor in *Plasmodium* attracted attention of the French national radio France culture and the Swiss RTS radio. Our press release on expansion microscopy led to an outlook in the journal of our University, a prelight by the Company of Biologists, an article in “Pour la science”, a French popular science magazine, an interview at the Swiss RTS radio and a comment in Plos biology.

Social media

We maintain a twitter account to communicate our publications: https://twitter.com/BrochetLab

Engagement with high schools

2016-now Supervision of high school students during the “Biology and Medicine” week, ~1 per year
2016-now Supervision of high school student projects, ~1 per year
Together with the Guichard/Hamel group we also would like to take advantage of the Bioscope, the public life science laboratory of the University of Geneva, to organise public evening events to locally stimulate the curiosity of the public about the microbial world, infectious diseases and microscopy that is performed in our University.

■ Teaching experience

Teaching responsibilities

2023- **Co-director of the first year of the bachelor of human medicine**, Faculty of Medicine, University of Geneva (~600 students)

2022- **Co-director of the first teaching unit of the bachelor of human medicine**, first year medical students, Faculty of Medicine, University of Geneva (~600 students)

2021- **Co-director of the Infection unit**, third year medical students, Faculty of Medicine, University of Geneva (~180 students)

2020- **Steering committee of the Master of Advanced Studies in microbiology** - University of Geneva, Faculty of Sciences

Teaching

2020- **Introduction to microbiology**, first year medical students, Faculty of Medicine, University of Geneva (8h/year, ~600 students)

2020- **General Microbiology**, third year students, Faculty of Science, University of Geneva (4h/year, ~70 students)

2017- **Problem-based learning in bacteriology - tutor**, third year medical students, Faculty of Medicine, University of Geneva (20h/year, ~10 students)

2017- **Chapitres choisis"**, tutor and speaker (~4h/year, ~8 students)

2017- **Signal transduction and parasitism**, third year students, Faculty of Science, University of Geneva (4h/year, ~50 students)

2017-20 **Experimental pathology**, third year medical students, Faculty of Medicine, University of Geneva (16h/year, ~6 students)

2012-14 Teaching assistant - **Biology of Parasitism**, Marine Biological Laboratory, Woods Hole, US. One-week module for PhD students and postdocs. Project design, organisation and supervision of the "Vector Module".

2011-14 Teaching assistant - **Wellcome Trust advanced course in Malaria genetics**, Cambridge, UK. One-week course for PhD students and postdocs. Project design and course supervision for *Plasmodium berghei* transfection, recombineering, genotyping and phenotyping modules.

2005-06 Teaching assistant - **General Microbiology course of the Pasteur Institute**, Paris, Fr. Four-week practical course for MSc students. Project design and course supervision of a practical aiming at identifying new genes involved in the virulence of *S. agalactiae*.

■ Development of teaching tools and activities

In the last three years, I have taken significant responsibilities in teaching. This made me appreciate how important interactive supports are to motivate and passionate students. I believe that we can considerably improve the quality of teaching by combining various types of supports to stimulate the interest and motivation of our students. This has been particularly exacerbated in the last two years with the significant use of zoom or recording of lectures on mediaserver. For the bachelor 3 infection unit, we have implemented inverted classes, forums, e-learning, in addition to the classical ex-cathedra and problem-based learning approaches. For bachelor 1 *ex catedra* classes, I implemented online questionnaires during the lectures to stimulate reflexion and ensure that the main concepts are well understood. I also actively moderate the online forum to engage with more specific questions. For more targeted lectures like the one I give at the Faculty of science for the bachelor 3 biochemistry unit, I developed a lecture named "the project of which you are the hero", giving the students the opportunity to drive collectively their research project to understand intracellular signalling. This was well appreciated earning a "fascinating lecture" comment.

■ Teaching perspective

In 2023, I took over the responsibility of the first year of the medical bachelor together with Christel Borel, a responsibility that comes with multiple challenges. We will first have to manage an important turnover of lecturers or professors due to numerous planned retirements. We will also have to improve the coherence of the curriculum in relation to the 2nd and 3rd year of the bachelor. Another important reflexion is about the knowledge and skills that we want to evaluate at the end of the 1st year of the bachelor of human medicine. Another work package that I find particularly relevant is the “democratisation” of teaching to avoid unfair selection due inequalities for teaching support. Finally, I would like to actively contribute to valorise teaching, which is a corner stone of our Faculty.

■ Management skills

I strive to create a well-balanced, multinational team in my lab (~6-8 people) whose goal it is to create synergy and cooperate on research projects. Each PhD student or postdoc has its own project, which they drive themselves with continuous input and support from myself and the lab. Besides weekly lab meetings, where all collaborators regularly present their work, I also conduct weekly or fortnight one-on-one meetings with all lab members to provide specific feedback and guidance. I also implemented yearly appraisals to take time to reflect on the past and future challenges for each member of the team. This also helps to discuss and establish career plans. I followed the EMBO leadership training to improve my management skills. Constructive discussions and feed back together with external support have so far enabled the team to go through, so far minor, conflicts positively.

■ Institutional involvement

2021-now	**Director of the proteomic core facility** (1 coordinator, 2 senior scientists, 2 research assistants, ~40 user groups/year), Faculty of Medicine
2020-now	Member of the **steering committee of the bioimaging centre**, (4 staff scientists, ~110 user groups/year), Faculty of Medicine
2021-	1 commission de nomination

▪ Publication list - Mathieu Brochet

- 35 original research articles (15 as corresponding author and 8 as first author), 2 reviews, 3 book chapters, 1 news and views, 1 preprint under review, 1 review under review, 1 editorial
- 2444 citations, h-index = 27 (25/10/2023)
- Complete list: google scholar, ORCID, Pubmed
- # = corresponding author, + = Contributed equally

Available at bioarxiv or under review

2023 **A multistage *Plasmodium* CRL4^{WIG1} ubiquitin ligase is critical for the formation of functional microtubule organisation centres in microgametocytes**
Rashpa R, Smith C, Artavanis-Tsakonas K, and **Brochet M**[#]. Under review at ***Plos pathogens***
Available at https://www.biorxiv.org/content/10.1101/2023.07.19.549332v2

Apicomplexan phosphodiesterases in cyclic nucleotide turnover: conservation, function, and therapeutic potential
Moss WJ, Brusini L, Kuehnel RM, **Brochet M**[#], KM Brown[#]. In revision at ***mBio***

Original research

2023 **A *Plasmodium* membrane receptor platform integrates cues for egress and invasion in blood forms and activation of transmission stages**
Kuehnel RM[+], Ganga E[+], Balestra AC[+], Suarez C, Wyss M, Klages N, Brusini L, Maco B, Brancucci N, Voss T, Soldati-Favre D, and **Brochet M**[#]. ***Science Advances*** 9(24):eadf2161

Highlighted by: - The Swiss radio RTS
- The French radio France culture

The Skp1-Cullin1-FBXO1 complex is a pleiotropic regulator required for the formation of gametes and zoites in *Plasmodium berghei*
Rashpa R[#], Klages N, Schvartz D, Pasquarello C, **Brochet M**[#]. ***Nature communications*** 4(1):1312

***Plasmodium* ARK2-EB1 axis drives the unconventional spindle dynamics, scaffold formation and chromosome segregation of sexual transmission stages**
Zeeshan M, Rea E, Abel S, Vukušić K, Markus R, Brady D, Eze A, Rashpa R, Balestra AC, Bottrill AR, **Brochet M**, Guttery DS, Tolić IM, Holder AA, Le Roch KG, Tromer EC, and Tewari R. Accepted at ***Nature communications***
Available at https://www.biorxiv.org/content/10.1101/2023.01.29.526106v1

An Sfi1-like centrin-interacting centriolar plaque protein affects nuclear microtubule homeostasis
Wenz C, Simon CS, Romão TP, Stürmer V, Machado M, Klages N, Klemmer A, Voß Y, Ganter M, **Brochet M**, Guizetti M[#]. ***Plos pathogens*** 19(5):e1011325

2022 **Composition and organization of kinetochores show plasticity in apicomplexan chromosome segregation**
Brusini L[#], Dos Santos Pacheco N, Tromer EC, Soldati-Favre D, **Brochet M**[#]. ***Journal of Cell Biology*** 221(9):e202111084

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