

**From:** (b) (6)  
**Sent:** Fri, 28 Feb 2020 22:03:30 -0500  
**To:** AYLWARD, Raymond Bruce J.  
**Subject:** Re: Wall Street Journal

Thanks very much.

(b) (5)

Cliff

> On Feb 28, 2020, at 12:58 PM, AYLWARD, Raymond Bruce J. <(b) (6)> wrote:

>

> Hi Cliff

>

> Thanks for the alert - I will look out for it and provide feedback if/when he contacts.

>

> Really appreciate the head's up.

>

> On a related note, (b) (5)

(b) (5)

>

> B

>

> -----Original Message-----

> From: Lane, Cliff (NIH/NIAID) [E] <(b) (6)h.gov>

> Sent: Friday, February 28, 2020 17:09

> To: AYLWARD, Raymond Bruce J. <(b) (6)>

> Subject: Wall Street Journal

>

> Bruce,

>

> A WSJ reporter named Tom Burton is very interested in the report - lessons for the US /world, etc.

>

> I think he did very balanced coverage on Ebola. He wanted to speak with me. For a variety of reasons I am not able to speak to him.

>

> I think he has/will reach out to you.

>

> Hope all is well; congratulations on getting the report posted.

>

> Cliff

**From:** DRURY, Patrick Anthony  
**Sent:** Fri, 28 Feb 2020 12:47:23 +0000  
**To:** AYLWARD, Raymond Bruce J.; Alexander SEMENOV  
(b) (6) Chikwe IHEKWEAZU (b) (6) Lane, Cliff  
(NIH/NIAID) [E]; Zhou, Weigong (CDC/DDID/NCIRD/ID); Dale FISHER (b) (6) Dr Hitoshi  
TAKAHASHI (b) (6); LEE Jong-Koo (b) (6) Natalia PSHENICHNAYA (b) (6)  
(b) (6); Tim ECKMANNNS (b) (6) gmlung  
**Cc:** Dr VAN KERKHOVE, Maria; XING, Jun; MINHAS, Raman; POOLE, Marcia; STERN,  
Gabriella; SCHWARTLANDER, Bernhard F.; Petasch, Christiane; Eduard Salakhov; STOROZHENKO, Oleg  
Nikolayevich; Slava Smolenski; ARTHUR, Ray Richard; 'Jansen, Andreas'; 'Beermann, Sandra'; Boklage,  
Evgeniya; Wieler, Lothar; Aldighieri, Dr. Sylvain (WDC); HUO, Xiang; SURI, Sameera; YAO, N'da Konan  
Michel; BRENNAN, Richard John  
**Subject:** UPDATE - Release of the Final Report: WHO-China Joint Mission on COVID-19

Dear colleagues, and on behalf of Bruce -

Please be advised that WHO has posted the COVID-19 Joint Mission Report which can be accessed as follows:

- In the latest updates section of the Coronavirus page:  
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- Direct link to the report in English: <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>

WHO will also post the Chinese version as soon as it is received from our counterparts there.

---

**From:** AYLWARD, Raymond Bruce J.  
**Sent:** 27 February 2020 17:24  
**To:** Alexander SEMENOV (b) (6) <(b) (6)> (b) (6) Chikwe IHEKWEAZU  
(b) (6) <(b) (6)> (b) (6) Clifford LANE (b) (6)  
<(b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6) Dale FISHER  
(b) (6) <(b) (6) Dr Hitoshi TAKAHASHI (b) (6)  
<(b) (6) LEE Jong-Koo (b) (6) <(b) (6) Natalia  
PSHENICHNAYA (b) (6) <(b) (6) Tim  
ECKMANNNS (b) (6) <(b) (6) gmlung <(b) (6)  
**Cc:** Dr VAN KERKHOVE, Maria <(b) (6) XING, Jun <(b) (6) MINHAS, Raman  
<(b) (6) POOLE, Marcia <(b) (6) STERN, Gabriella <(b) (6) DRURY,  
Patrick Anthony <(b) (6) SCHWARTLANDER, Bernhard F. <(b) (6)  
**Subject:** NEXT STEPS- Release of the Final Report: WHO-China Joint Mission on COVID-19  
**Importance:** High

Dear Joint Mission colleagues,

I enjoyed all of the emails of the last days knowing you've each arrived home (and continue to be healthy!)

To update you on plans for the release of the Joint Mission Report:



Thanks for your patience and with warmest regards from a chilly Geneva,

Bruce

---

**From:** AYLWARD, Raymond Bruce J.

**Sent:** Thursday, February 27, 2020 00:04

**To:** GHEBREYESUS, Tedros Adhanom <(b) (6)>

**Cc:** KASAI, Takeshi <(b) (6)> <(b) (6)> <(b) (6)>

<(b) (6)> <(b) (6)> Alexander SEMENOV

<(b) (6)> <(b) (6)> Chikwe IHEKWEAZU

<(b) (6)> <(b) (6)> Clifford LANE <(b) (6)>

<(b) (6)> 'Zhou, Weigong (CDC/DDID/NCIRD/ID)' <(b) (6)> Dale FISHER

<(b) (6)> <(b) (6)> Dr Hitoshi TAKAHASHI <(b) (6)>

<(b) (6)> LEE Jong-Koo <(b) (6)> <(b) (6)> Natalia

PSHENICHNAYA <(b) (6)> <(b) (6)> Tim

ECKMANNS <(b) (6)> <(b) (6)> XING, Jun <(b) (6)> gmleung

<(b) (6)> Dr VAN KERKHOVE, Maria <(b) (6)> RYAN, Michael J.

<(b) (6)> SCHWARTLANDER, Bernhard F. <(b) (6)>

**Subject:** Final Report: WHO-China Joint Mission on COVID-19

**Importance:** High

Dear Dr Tedros,

On behalf of the entire team, it is my honor to share with you the attached **Report of the WHO-China Joint Mission on COVID-19**.

In submitting this final version of the report, I would like to extend my tremendous gratitude to my Co-Lead Dr LIANG Wannian (copied), whose deep experience and wisdom were crucial as we distilled our vast findings into the overall assessment and major recommendations.

You will be aware that Dr Liang and I have had the opportunity to present the findings and recommendations of this report to the Honorable Minister of Health, Dr MA Xiaowei, while in Wuhan on 23 February.

I must also thank our Deputy Team Leader Dr WANG Bin and our international team members, all of whom are also copied on this note. I would like to extend a further and very special thank you to our team members from China who gave so tirelessly and generously of their vast knowledge of the unfolding outbreak in China as well as their specific areas of technical expertise.

Dr Tedros, this was truly a Joint Mission, with national and international team members working closely together throughout, and particularly to consolidate their respective sections of this report in the final days of the Mission. Please know that the attached findings and recommendations reflect the collective opinion of the entire team, all of whom have been closely engaged in its writing and finalization.

We share a common hope that the findings contained herein can help inform the global work you are leading to stem the ongoing international spread of COVID-19.

Regards

Bruce

**From:** (b) (6)  
**Sent:** Wed, 26 Feb 2020 19:32:51 -0500  
**To:** AYLWARD, Raymond Bruce J.  
**Subject:** Re: Thank you and safe travels

Bruce,

Thanks for the note and your leadership of the joint mission. I am back in the US. I had a chance to listen to your press briefing from WHO and thought you did a great job.

Sec. Azar asked for a briefing and I gave him the high points from the document - he was very appreciative. The US did a high-level press conference today to indicate their commitment to readiness.

Cliff

> On Feb 26, 2020, at 6:43 PM, AYLWARD, Raymond Bruce J. <(b) (6)> wrote:  
>  
> Dear Cliff  
>  
> I trust you got back to the States safely? Or did you head back to Japan? I lost track at the end of this Mission due to the incredible sleep deprivation!  
>  
> I just wanted to let you know that in the final final minutes of trying to wrap up the report tonight, I saw your comment about (b) (5).  
>  
> Thanks so much for the great suggestion.  
>  
> Again, an even bigger thanks for having joined the Mission. Hugely appreciated.  
>  
> Warmly,  
>  
> Bruce  
>  
> -----Original Message-----  
> From: Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
> Sent: Wednesday, February 26, 2020 21:54  
> To: Dr VAN KERKHOVE, Maria <(b) (6)>  
> Cc: Alexander SEMENOV <(b) (6)> <(b) (6)> Chikwe IHEKWEAZU  
<(b) (6)> <(b) (6)> Clifford LANE <(b) (6)>  
<(b) (6) Dale FISHER <(b) (6)> <(b) (6) AYLWARD, Raymond Bruce  
<(b) (6) Dr Hitoshi TAKAHASHI <(b) (6)> <(b) (6) LEE Jong-Koo  
<(b) (6)> <(b) (6) Natalia PSHENICHNAYA <(b) (6)>  
<(b) (6) Tim ECKMANN <(b) (6)> <(b) (6) XING, Jun  
<(b) (6) <(b) (6) GALEA, Gauden <(b) (6)> <(b) (6) LEE, Chin-kei  
<(b) (6) SCANO, Fabio <(b) (6)> <(b) (6) gmleung <(b) (6)>  
> Subject: RE: Thank you and safe travels  
>  
> Dear Maria,  
> Please see my comments/suggestions and some minor edits in the attached version 5. I removed a few figures but kept their space (so you know I didn't mean to delete them) to make the size of the file manageable for transmitting through email.  
>  
> My comments/suggestions are on pages 11, 12, 13, 14, 34, 36, 37, 38

>  
> Minor edits are on  
> \* Page 7, last line  
> \* Page 8, line 4 from top, and line 5&6 from bottom  
> \* Page 38, line 3 from top

>  
> Dear all,  
> It was a privilege and pleasure to work with you all during the unforgettable mission in China. I look forward to seeing you again in the near future.

>  
> All the best,  
> Weigong

> -----Original Message-----

> From: Dr VAN KERKHOVE, Maria <(b) (6)>  
> Sent: Monday, February 24, 2020 3:23 AM  
> To: gmlung <(b) (6)>  
> Cc: Alexander SEMENOV (b) (6) <(b) (6)> Chikwe IHEKWEAZU  
(b) (6) <(b) (6)> Clifford LANE (b) (6) <(b) (6)>  
(b) (6) Dale FISHER (b) (6) <(b) (6)> AYLWARD, Raymond Bruce  
<(b) (6) Dr Hitoshi TAKAHASHI (b) (6) <(b) (6)> LEE Jong-Koo  
(b) (6) <(b) (6) Natalia PSHENICHNAYA (b) (6) <(b) (6)>  
<(b) (6) Tim ECKMANNNS (b) (6) <(b) (6) Zhou,  
Weigong (CDC/DDID/NCIRD/ID) <(b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)  
XING, Jun <(b) (6) <(b) (6) GALEA, Gauden <(b) (6) LEE, Chin-kei  
<(b) (6) SCANO, Fabio <(b) (6)  
> Subject: Re: Thank you and safe travels

>  
> Dear colleagues, please also do not share the report until it is (Final) and public.

>  
> Best,  
> Maria

>  
>> On 24 Feb 2020, at 15:55, Gabriel Leung <(b) (6)> wrote:

>>

Geneva time if all goes well with travel.

May I take this opportunity to again express my sincere appreciation to each and everyone of you for the tremendous and expert team work over the past 10 days.

Sincerely

Bruce

> On 24 Feb 2020, at 16:23, Dr VAN KERKHOVE, Maria <[REDACTED] (b) (6)> wrote:

>

> Dear colleagues, please also do not share the report until it is (Final) and public.

>

> Best,

> Maria

>

>> On 24 Feb 2020, at 15:55, Gabriel Leung <[REDACTED] (b) (6)> wrote:

>>

**From:** Wieler, Lothar  
**Sent:** Wed, 26 Feb 2020 17:34:25 +0000  
**To:** Schuchat, Anne MD (CDC/OD);STAG IH  
Secretariat; (b) (6) David Heymann;(SPmig) DELIA ENRIA;Delia Enria  
(b) (6) (b) (6) Dr Amadou Alpha SALL  
(b) (6) Gary Kobinger;Johan Giesecke;(SPmig) Juliet  
Bedford;(b) (6) Lane, Cliff (NIH/NIAID) [E]; (b) (6);President\_RKI;Ziad  
Memish  
**Cc:** STAG IH Secretariat;BRIAND, Sylvie;LEWIS, Rosamund F. (Felicity);DUNCAN,  
Benjamin Paul;GREIN, Thomas;PARK, Munjoo;DOLEA, Carmen Mihaela;MAHJOUR, Jaouad;Dr VAN  
KERKHOVE, Maria;PERKINS, Mark;VON EIJE, Karin;MOEN, Ann;SAMAAN, Gina;MORGAN, Oliver;Ryan,  
Michael (CDC who.int);FALL, Ibrahima Soce;RODIER, Guenael R.m.;BROWN, Caroline Sarah;DRURY,  
Patrick Anthony;DIAZ, Janet Victoria;BALLER, April;HUO, Xiang;MATHIS, Margaux Manoua;AYLWARD,  
Raymond Bruce J.;PEBODY, Richard;HUGONNET, Stéphane Alexandre Louis  
**Subject:** AW: !!STAG-IH!! TC minutes 25Feb2020

Indeed - thanks for a great job again :)

Mit freundlichen Grüßen

Prof. Dr. Lothar H. Wieler  
Robert Koch Institute  
13353 Berlin, Germany  
e-mail: (b) (6)  
phone: (b) (6)

-----Ursprüngliche Nachricht-----

Von: Schuchat, Anne MD (CDC/OD) [[\(b\) \(6\)](mailto:(b) (6))]  
Gesendet: Mittwoch, 26. Februar 2020 18:33  
An: STAG IH Secretariat; (b) (6) David Heymann; (SPmig) DELIA ENRIA; Delia Enria  
(b) (6) (b) (6) Dr Amadou Alpha SALL (b) (6)  
Gary Kobinger; Johan Giesecke; (SPmig) Juliet Bedford; (b) (6) Lane, Cliff (NIH/NIAID)  
[E]; (b) (6) President\_RKI; Wieler, Lothar; Ziad Memish  
Cc: STAG IH Secretariat; BRIAND, Sylvie; LEWIS, Rosamund F. (Felicity); DUNCAN, Benjamin Paul; GREIN,  
Thomas; PARK, Munjoo; DOLEA, Carmen Mihaela; MAHJOUR, Jaouad; Dr VAN KERKHOVE, Maria;  
PERKINS, Mark; VON EIJE, Karin; MOEN, Ann; SAMAAN, Gina; MORGAN, Oliver; Ryan, Michael (CDC  
who.int); FALL, Ibrahima Soce; RODIER, Guenael R.m.; BROWN, Caroline Sarah; DRURY, Patrick Anthony;  
DIAZ, Janet Victoria; BALLER, April; HUO, Xiang; MATHIS, Margaux Manoua; AYLWARD, Raymond Bruce  
J.; PEBODY, Richard; HUGONNET, Stéphane Alexandre Louis  
Betreff: Re: !!STAG-IH!! TC minutes 25Feb2020

Thanks so much. Very helpful for those of us who couldn't make the cal.

Get Outlook for iOS <<https://aka.ms/o0ukef>>

From: STAG IH Secretariat <(b) (6)>  
Sent: Wednesday, February 26, 2020 12:00:52 PM  
To: (b) (6) <(b) (6) David Heymann  
<(b) (6) (SPmig) DELIA ENRIA <(b) (6) Delia Enria  
(b) (6) (b) (6) Dr Amadou Alpha SALL  
(b) (6) <(b) (6) Gary Kobinger



< (b) (6) Johan Giesecke < (b) (6) (SPmig) Juliet Bedford  
< (b) (6) (b) (6) < (b) (6) Lane, Cliff  
(NIH/NIAID) [E] < (b) (6) (b) (6) < (b) (6) President\_RKI  
< (b) (6) < (b) (6) Schuchat, Anne MD (CDC/OD) < (b) (6) Wieler, Lothar  
< (b) (6) Ziad Memish < (b) (6)  
Cc: STAG IH Secretariat < (b) (6) BRIAND, Sylvie < (b) (6) LEWIS, Rosamund  
F. (Felicity) < (b) (6) DUNCAN, Benjamin Paul < (b) (6) GREIN, Thomas  
< (b) (6) PARK, Munjoo < (b) (6) DOLEA, Carmen Mihaela < (b) (6)  
MAHJOUR, Jaouad < (b) (6) Dr VAN KERKHOVE, Maria < (b) (6) PERKINS,  
Mark < (b) (6) VON EIJE, Karin < (b) (6) MOEN, Ann < (b) (6) SAMAAN,  
Gina < (b) (6) MORGAN, Oliver < (b) (6) Ryan, Michael (CDC who.int)  
< (b) (6) FALL, Ibrahima Soce < (b) (6) RODIER, Guenael R.m. < (b) (6)  
BROWN, Caroline Sarah < (b) (6) DRURY, Patrick Anthony < (b) (6) DIAZ, Janet Victoria  
< (b) (6) BALLER, April < (b) (6) HUO, Xiang < (b) (6) MATHIS, Margaux  
Manoua < (b) (6) RODIER, Guenael R.m. < (b) (6) BROWN, Caroline Sarah  
< (b) (6) AYLWARD, Raymond Bruce J. < (b) (6) PEBODY, Richard  
< (b) (6) HUGONNET, Stéphane Alexandre Louis < (b) (6)  
Subject: !!STAG-IH!! TC minutes 25Feb2020

Dear STAG-IH,

Please find attached, minutes from the STAG-IH call yesterday.

Best wishes,

Secretariat

**From:** Elvander, Erika (OS/OGA)  
**Sent:** Wed, 26 Feb 2020 15:23:38 +0000  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Lane, Cliff (NIH/NIAID) [E]  
**Cc:** Grigsby, Garrett (HHS/OS/OGA); Zebley, Kyle (HHS/OS/OGA); Kerr, Lawrence (HHS/OS/OGA); Fernandez, Jose (OS/OGA); (b) (6); Schaeffer, Alison (HHS/OS/OGA); Mciff, Colin (HHS/OS/OGA); Thomas, Gloria (HHS/OS/OGA); Smith, Kendra (HHS/OS/OGA) (CTR)  
**Subject:** RE: welcome back

Great –thanks Weigong. We will consult internally and let you know!

Cheers.

Erika

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Wednesday, February 26, 2020 10:18 AM  
**To:** Elvander, Erika (OS/OGA) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Grigsby, Garrett (HHS/OS/OGA) <(b) (6)> Zebley, Kyle (HHS/OS/OGA) <(b) (6)> Kerr, Lawrence (HHS/OS/OGA) <(b) (6)> Fernandez, Jose (OS/OGA) <(b) (6)> Schaeffer, Alison (HHS/OS/OGA) <(b) (6)> Mciff, Colin (HHS/OS/OGA) <(b) (6)> Thomas, Gloria (HHS/OS/OGA) <(b) (6)> Smith, Kendra (HHS/OS/OGA) (CTR) <(b) (6)>  
**Subject:** RE: welcome back

Hi Erika,

Got back late last night. Happy to debrief at your convenience.

Thanks,  
Weigong

---

**From:** Elvander, Erika (OS/OGA) <(b) (6)>  
**Sent:** Tuesday, February 25, 2020 11:46 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Grigsby, Garrett (HHS/OS/OGA) <(b) (6)> Zebley, Kyle (HHS/OS/OGA) <(b) (6)> Kerr, Lawrence (HHS/OS/OGA) <(b) (6)> Fernandez, Jose (OS/OGA) <(b) (6)> Schaeffer, Alison (HHS/OS/OGA) <(b) (6)> Mciff, Colin (HHS/OS/OGA) <(b) (6)> Thomas, Gloria (HHS/OS/OGA) <(b) (6)> Smith, Kendra (HHS/OS/OGA) (CTR)

< (b) (6)

**Subject:** Re: welcome back

Thanks Cliff and welcome back! Perhaps we can aim for Thursday or Friday. Will you and Weigong self isolate? We'd like to do this in a secure environment if possible.

Thanks again.

Erika  
Erika Elvander  
Director, Asia and the Pacific  
Office of Global Affairs, HHS  
Sent from my iPhone

On Feb 25, 2020, at 11:43 AM, Lane, Cliff (NIH/NIAID) [E] < (b) (6) > wrote:

I just landed. I think Weigong gets back tomorrow. Happy to debrief whenever convenient.

On Feb 25, 2020, at 8:40 AM, Elvander, Erika (OS/OGA) < (b) (6) > wrote:

Dear Weigong and Cliff –

Welcome home from China! OGA was hoping you might be able to do some sort of debrief to us and others on the sixth floor of HHS. Given that you're both probably in some sort of home isolation, we're happy to do this by telephone. Would some time this week work for both of you? I've cc'd Garrett's admin team to assist with this.

Thanks so much.

Cheers.

Erika

*Erika Elvander*  
*Director, Asia and the Pacific*  
*Office of Global Affairs/US Department of Health and Human Services*

Tel: (b) (6); cell (b) (6) (updated)

**From:** LEE, Chin-kei  
**Sent:** Mon, 24 Feb 2020 04:11:11 +0000  
**To:** Dr VAN KERKHOVE, Maria; ZENG, Lishan; WANG, Can; SCANO, Fabio; (b) (6); Lane, Cliff (NIH/NIAID) [E]; (b) (6) (b) (6); (b) (6); (b) (6); XING, Jun; (b) (6) (b) (6) (b) (6) (b) (6)  
**Cc:** (b) (6) FU, Xijuan; PANG, Xinxin  
**Subject:** RE: Travel plan on Feb 24 onward  
**Attachments:** mmexport1582517396173.jpg, mmexport1582517392429.jpg

Sent from my handheld device

在 2020年2月24日 上午8:15, "LEE, Chin-kei" <(b) (6) 孚道 >:

Dear all

I'm re-sending the flight schedule sent by Pang Xinxin in wechat earlier – given that many of you will return your mobiles (and wechat messenger) soon. Thanks.

Regards  
ck

---

**From:** LEE, Chin-kei  
**Sent:** 23 February, 2020 3:11 PM  
**To:** Dr VAN KERKHOVE, Maria <(b) (6)> ZENG, Lishan <(b) (6)> WANG, Can <(b) (6)> SCANO, Fabio <(b) (6)> (b) (6) (b) (6) (b) (6) (b) (6) XING, Jun <(b) (6)> (b) (6) (b) (6) (b) (6) (b) (6) chikwe.i (b) (6)ng  
**Cc:** (b) (6) FU, Xijuan <(b) (6)> PANG, Xinxin <(b) (6)>  
**Subject:** RE: Travel plan on Feb 24 onward

Dear all,

I'm copying Xinxin who may be collecting your itineraries and is making an arrangement with the local authorities. Xinxin has also asked for your itinerary by wechat.

Ps. Please also give your WHO mobiles to Lisa tomorrow. Please back up as necessary any critical information in your mobiles, as we will soon clear the memory.

Thanks and Regards  
ck

---

**From:** Dr VAN KERKHOVE, Maria  
**Sent:** 23 February, 2020 2:18 PM  
**To:** ZENG, Lishan <(b) (6)> WANG, Can <(b) (6)> LEE, Chin-kei <(b) (6)> SCANO, Fabio <(b) (6)> (b) (6) (b) (6) (b) (6) (b) (6)

(b) (6) (b) (6) (b) (6) XING, Jun  
(b) (6) (b) (6) (b) (6) (b) (6)  
(b) (6)  
**Cc:** (b) (6); FU, Xijuan (b) (6)  
**Subject:** Re: Travel plan on Feb 24 onward

Hi Lisa,

Thank you very much. If you have our travel plans, could you kindly ask that for the hotel to arrange travel to the airport for us – we can pay on our own, but arranging this would be really appreciated (at least from my side!).

Thanks in advance,  
Maria

---

**From:** "ZENG, Lishan" <(b) (6)>  
**Date:** Sunday, 23 February 2020 at 06:54  
**To:** "WANG, Can" <(b) (6)> "LEE, Chin-kei" <(b) (6)> "SCANO, Fabio" <(b) (6)> Dale Fisher <(b) (6)> (b) (6)  
(b) (6), (b) (6), (b) (6)  
(b) (6), (b) (6)  
<(b) (6)> (b) (6) " (b) (6) (b) (6) Maria Van Kerkhove  
<(b) (6)> (b) (6) "XING, Jun" <(b) (6)> (b) (6) " (b) (6)  
(b) (6) " (b) (6) " (b) (6)>, (b) (6)  
(b) (6) (b) (6)  
**Cc:** " (b) (6) (b) (6) "FU, Xijuan" <(b) (6)>  
**Subject:** Travel plan on Feb 24 onward

Dear all,  
Meeting on Feb 24 starts at 8am.

I'd like to provide information on your travel arrangement.

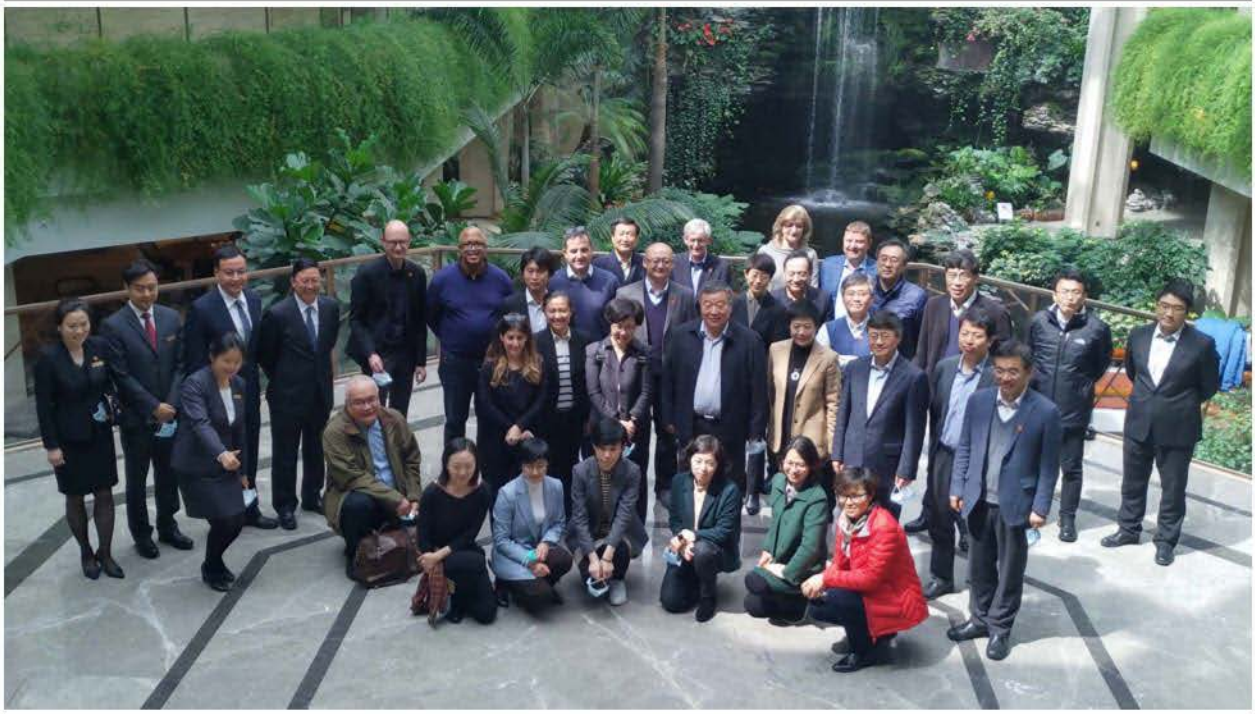
For those who will go to Beijing on Feb 24 (ie. Bruce, Fabio, CK, Can and Lisa):  
Bring your luggage to be checked and passport/ID card to the meeting room in the morning. I'll collect and hand them to the NHC staff to do check-ins in advance to save time.

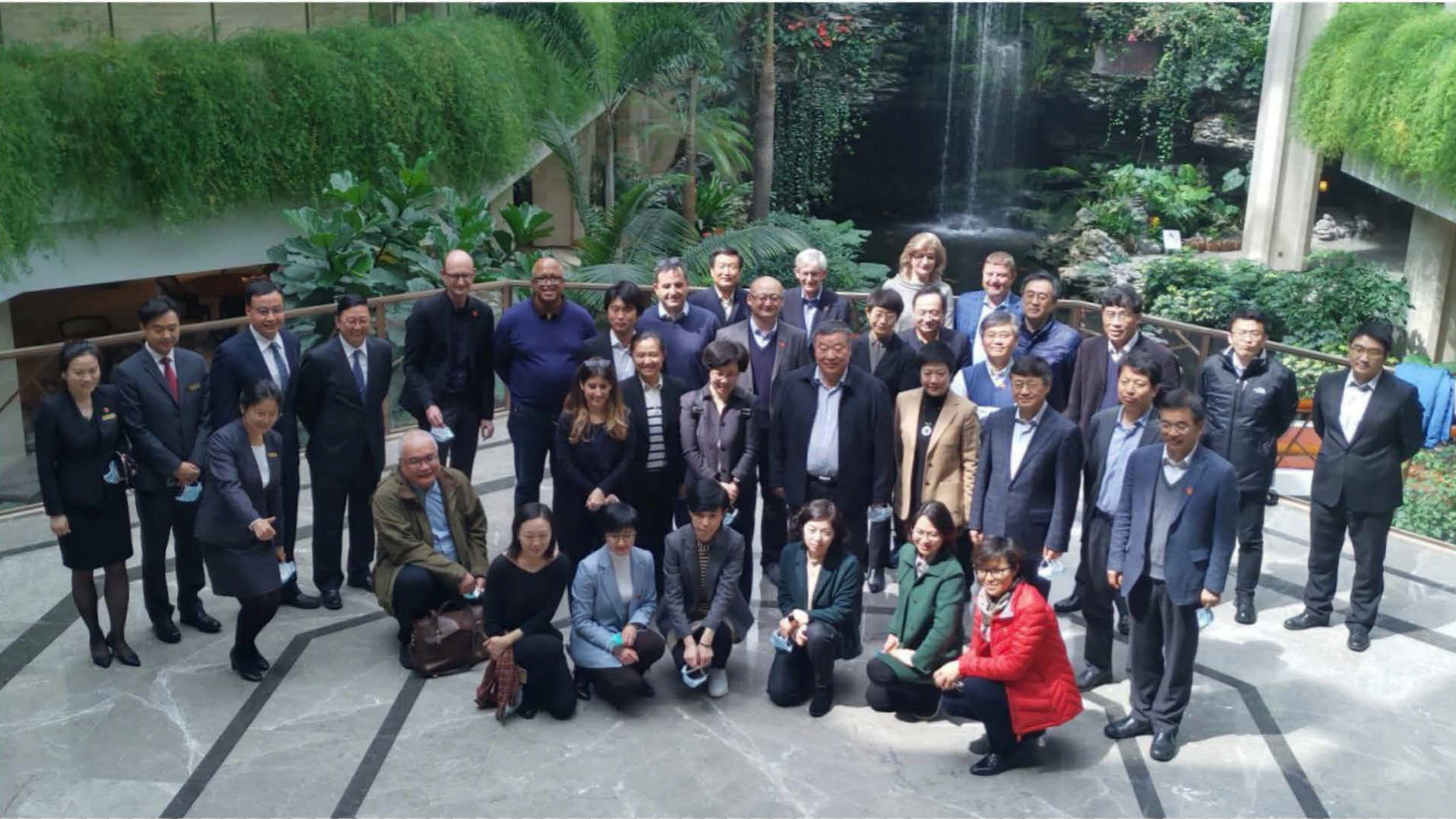
For those who will not go to Beijing and fly out from Guangzhou:

1. For the transport to airport: It was arranged for you to travel in Beijing to the airport, according to the initial plan. As the plan has changed and you'll fly out from Guangzhou instead, transport to the airport is thus not provided by the authority. Please make your own arrangement, for example, inquire the concierge/front desk.
2. For hotel check-out, credit card is fine. You don't need cash for that.

If you have other questions, please feel free to contact me. Many thanks.

Cheers,  
Lisa  
Translator of China Office









**From:** PANG, Xinxin  
**Sent:** Mon, 24 Feb 2020 03:34:30 +0000  
**To:** AYLWARD, Raymond Bruce J.;Alexander SEMENOV  
(b) (6) Chikwe IHEKWEAZU (b) (6) Lane, Cliff  
(NIH/NIAID) [E];Dale FISHER (b) (6) Dr Hitoshi TAKAHASHI  
(b) (6);gmleung;LEE Jong-Koo (b) (6) Dr VAN KERKHOVE, Maria;Natalia  
PSHENICHNAYA (b) (6) Tim ECKMANNS (b) (6) Zhou,  
Weigong (CDC/DDID/NCIRD/ID);Weigong ZHOU (b) (6);XING, Jun  
**Cc:** GALEA, Gauden;SCANO, Fabio;LEE, Chin-kei  
**Subject:** Thank you and pictures of the mission  
**Importance:** High

Dear All,

Some of you asked me to forward the below by email.

I would like to take this opportunity to wish you all safe travels back home.

We are collecting photos from the joint mission at (b) (5) (no need for registration or log in). It is just few clicks away:

- 1st click, upload photos (and in the message box, specify if you would like any photo credit).
- 2nd click, select email and move to next,
- 3rd click, add (b) (6) and your own email and click on transfer. Thank you so much to contributing build the WHO photo library.

Best regards,  
Fabio

**From:** LEE, Chin-kei  
**Sent:** Mon, 24 Feb 2020 00:15:56 +0000  
**To:** Dr VAN KERKHOVE, Maria; ZENG, Lishan; WANG, Can; SCANO, Fabio; (b) (6); Lane, Cliff (NIH/NIAID) [E]; (b) (6) (b) (6); (b) (6); (b) (6); XING, Jun; (b) (6) (b) (6) (b) (6) (b) (6)  
**Cc:** (b) (6) FU, Xijuan; PANG, Xinxin  
**Subject:** RE: Travel plan on Feb 24 onward  
**Attachments:** WHO Flight Schedule.docx

Dear all

I'm re-sending the flight schedule sent by Pang Xinxin in wechat earlier – given that many of you will return your mobiles (and wechat messenger) soon. Thanks.

Regards  
ck

---

**From:** LEE, Chin-kei  
**Sent:** 23 February, 2020 3:11 PM  
**To:** Dr VAN KERKHOVE, Maria <(b) (6)> ZENG, Lishan <(b) (6)> WANG, Can <(b) (6)> SCANO, Fabio <(b) (6)> (b) (6) (b) (6) (b) (6) (b) (6) (b) (6) (b) (6) XING, Jun <(b) (6)> (b) (6) (b) (6) (b) (6) (b) (6) (b) (6).ng  
**Cc:** (b) (6) FU, Xijuan <(b) (6)> PANG, Xinxin <(b) (6)>  
**Subject:** RE: Travel plan on Feb 24 onward

Dear all,

I'm copying Xinxin who may be collecting your itineraries and is making an arrangement with the local authorities. Xinxin has also asked for your itinerary by wechat.

Ps. Please also give your WHO mobiles to Lisa tomorrow. Please back up as necessary any critical information in your mobiles, as we will soon clear the memory.

Thanks and Regards  
ck

---

**From:** Dr VAN KERKHOVE, Maria  
**Sent:** 23 February, 2020 2:18 PM  
**To:** ZENG, Lishan <(b) (6)> WANG, Can <(b) (6)> LEE, Chin-kei <(b) (6)> SCANO, Fabio <(b) (6)> (b) (6) (b) (6) (b) (6) (b) (6) (b) (6) XING, Jun <(b) (6)> <(b) (6)>; (b) (6) (b) (6) (b) (6) (b) (6)

ch (b) (6)  
**Cc:** (b) (6) FU, Xijuan (b) (6)  
**Subject:** Re: Travel plan on Feb 24 onward

Hi Lisa,

Thank you very much. If you have our travel plans, could you kindly ask that for the hotel to arrange travel to the airport for us – we can pay on our own, but arranging this would be really appreciated (at least from my side!).

Thanks in advance,  
Maria

---

**From:** "ZENG, Lishan" <(b) (6)>  
**Date:** Sunday, 23 February 2020 at 06:54  
**To:** "WANG, Can" <(b) (6)> "LEE, Chin-kei" <(b) (6)> "SCANO, Fabio" <(b) (6)> Dale Fisher <(b) (6)> "(b) (6)" <(b) (6)>, "(b) (6)" <(b) (6)>, "(b) (6)" <(b) (6)>, "(b) (6)" <(b) (6)>, "(b) (6)" <(b) (6)> Maria Van Kerkhove <(b) (6)>, "XING, Jun" <(b) (6)> "(b) (6)" <(b) (6)>, "(b) (6)" <(b) (6)>, "(b) (6)" <(b) (6)>, "(b) (6)" <(b) (6)>  
**Cc:** "(b) (6)" <(b) (6)> "FU, Xijuan" <(b) (6)>  
**Subject:** Travel plan on Feb 24 onward

Dear all,  
Meeting on Feb 24 starts at 8am.

I'd like to provide information on your travel arrangement.

For those who will go to Beijing on Feb 24 (ie. Bruce, Fabio, CK, Can and Lisa):  
Bring your luggage to be checked and passport/ID card to the meeting room in the morning. I'll collect and hand them to the NHC staff to do check-ins in advance to save time.

For those who will not go to Beijing and fly out from Guangzhou:

1. For the transport to airport: It was arranged for you to travel in Beijing to the airport, according to the initial plan. As the plan has changed and you'll fly out from Guangzhou instead, transport to the airport is thus not provided by the authority. Please make your own arrangement, for example, inquire the concierge/front desk.
2. For hotel check-out, credit card is fine. You don't need cash for that.

If you have other questions, please feel free to contact me. Many thanks.

Cheers,

Lisa

Translator of China Office

## WHO Flight Schedule

Date	Departure from hotel	Flight Number	Flight Departure	Passenger(s)	Vehicle to Airport (car plate, driver contact)
24 Feb	12:00	CZ1322 Guangzhou-Beijing (VIP 4)	13:45	23 people including Bruce (1 goes to Shanghai on MU5306)	粤 A74081 (bus, 王文集, 13711180755) 粤 A78217 (bus, 罗本金, 18928899778) 粤 ACD213 (bus, 黄文雄, 13923160404) 粤 A1V5D2 (sedan, 郭艺诗, 13600483596)
	12:50	CZ363 Guangzhou-Bangkok (T2)	15:50	Dr. Clifford Lane	粤 ACE225 (bus, 梁健辉, 13802461966)
	16:45	CZ3105 Guangzhou-Beijing (T2)	19:00	Maria、邢军 2 人	粤 A74081 (bus, 王文集, 13711180755)
	21:00	ET607 Guangzhou- Addis Ababa (T1)	00:10+1	Dr. Chikwe Ihekwasu	粤 A9K35F (sedan, 郭维胜, 13711279120)
25 Feb	6:00	CZ385 Guangzhou-Tokyo (T2)	08:55	Dr. Hitoshi Takahashi	粤 A9K35F (sedan, 郭维胜, 13711279120)
	9:40	OZ370 Guangzhou-Inchon (T1)	12:40	Dr. Weigong Zhou	粤 A1V5D2 (sedan, 郭艺诗, 13600483596)

26 Feb	6:10	CA1310 Guangzhou-Beijing (T1)	08:10	Dr. Tim Eckmanns	粤 A9K35F (sedan, 郭维胜, 13711279120)
	8:50	SU221 Guangzhou-Moscow (T2)	11:50	Pr. Natalia Pshenichnaia, Dr. Aleksandr Semenov	粤 A6M99S (sedan, 曾建良, 13711279120)
TBC				Pr. Dale Fisher	TBC
TBC				Pr. Jong-koo Lee	TBC

**From:** (b) (6)  
**Sent:** Sun, 23 Feb 2020 19:04:20 +0800  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Simonds, R. J. (CDC/DDPHSIS/CGH/OD) (b) (6)  
**Subject:** Re: Saturday phone call

Looks like we got disconnected. Heading back to the meeting. Thanks again for all Your help.

Cliff

On Feb 23, 2020, at 6:30 PM, Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Hi weigong,

We can use the Skype invite for the call at 630.

Alex

Get [Outlook for iOS](#)

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Sunday, February 23, 2020 6:07:08 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> (b) (6)  
<(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Saturday phone call

just to let you know we are taking a dinner break right now and will restart at 7pm. I anticipate it's going to another long evening as we have to get the report done today. Therefore I would like to propose we get on the phone at 6:30pm. Otherwise I'll let you know when we finish for the day. It could be quite late.

Thanks,

Weigong

**From:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Sent:** Saturday, February 22, 2020 10:24 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (b) (6)  
<(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** RE: Saturday phone call

That would be great. Some of the things I'd be interested in hearing about:

- 1) Overall take on visit—how successful was it in meeting mission objectives
- 2) Anything sharable about key observations/conclusions
- 3) Plans for releasing findings and recommendations
- 4) Follow on activities anticipated



Thanks.

RJ

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Sunday, February 23, 2020 9:17 AM  
**To:** (b) (6) Lane, Cliff (NIH/NIAID) [E]  
<(b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Saturday phone call

although we are still not clear about the plan for today, we think it's probably safe to schedule our call at 8:00pm this evening. We'll let you know if we become available earlier.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Saturday, February 22, 2020 4:08 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]  
<(b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Saturday phone call

Sounds good Weigong and thanks very much.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Date:** 2/22/20 1:11 PM (GMT+08:00)  
**To:** (b) (6), "Lane, Cliff"  
<(b) (6)>  
**Cc:** "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Subject:** Re: Saturday phone call

Tomorrow works better for us. Will propose a time later when we have some ideas about tomorrow's plan.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Saturday, February 22, 2020 11:14:08 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]  
<(b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** RE: Saturday phone call

No problem. Since you are in country for a few more days also we can certainly catch up tomorrow or Monday as well. Whatever best for you both.

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Saturday, February 22, 2020 9:09 AM  
**To:** (b) (6); Lane, Cliff  
<[Clane@niaid.nih.gov](mailto:Clane@niaid.nih.gov)>  
**Cc:** (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC)  
<(b) (6)>  
**Subject:** Re: Saturday phone call

Will let you know once we are clear about today's plan.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Saturday, February 22, 2020 6:19:46 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]  
(b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Saturday phone call

Thanks Weigong.

What time works for you both for a chat today?

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>

Date: 2/21/20 8:41 PM (GMT+08:00)

To: (b) (6) "Lane, Cliff"

(b) (6)

Cc: "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)"

<(b) (6)>

Subject: Re: Saturday phone call

I just got the final word. I will not go to Wuhan. They picked the member from Nigeria. I should be able to join the call tomorrow.

Thanks,  
Weigong

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>

**Sent:** Friday, February 21, 2020 5:16 AM

**To:** (b) (6) Lane, Cliff (NIH/NIAID) [E]

<(b) (6)>

**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.

(CDC/DDID/NCIRD/ID) <(b) (6)>

**Subject:** Re: Saturday phone call

not yet. will let you know as soon as I know for sure.

thanks,  
Weigong

---

**From:** (b) (6)

**Sent:** Friday, February 21, 2020 3:36 AM

**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]

<(b) (6)>

**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.

(CDC/DDID/NCIRD/ID) <(b) (6)>

**Subject:** RE: Saturday phone call

Hi Weigong – Have you received final confirmation of your travel to Wuhan and any details about flight and hotel? As soon as you have these please do send along.

Best,  
(b) (6)

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Friday, February 21, 2020 10:03 AM  
**To:** (b) (6) Lane, Cliff  
(b) (6)  
**Cc:** (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC)  
<(b) (6)>  
**Subject:** Re: Saturday phone call

I have just been asked to go to Wuhan with a 3 persons team including Bruce. It's pending China approval right now. If approved, we can leave anytime, so may not be available tomorrow.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Friday, February 21, 2020 9:50:21 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD)  
<(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** RE: Saturday phone call

Ok, got it. Will reach out later today and check in.

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)  
**Sent:** Friday, February 21, 2020 9:34 AM  
**To:** (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (U) Simonds, R J (Beijing | CDC)  
<(b) (6)> (U) Millman, Alexander (Beijing | CDC) <(b) (6)>  
**Subject:** Re: Saturday phone call

Thanks very much. This morning the status of the mission is evolving. At the moment tomorrow looks good for me. That could change in the next few hours.

Cliff

On Feb 21, 2020, at 9:31 AM, (b) (6) wrote:

Good morning! I hope you both are doing well. Is tomorrow looking possible for a phone call while you are in transit? I have a conference call in line we can hold and utilize once I have an idea of timing.

Thanks again,

(b) (6)

---

**From:** (b) (6)  
**Sent:** Thursday, February 20, 2020 11:35 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC) <(b) (6)>  
**Subject:** RE: Saturday phone call

Thanks to you both. Once you have your return flight info then I can send around a call-in line for us to use during your layover or another window of time also ok.

best,

(b) (6)

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Wednesday, February 19, 2020 11:15 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** (b) (6) (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC) <(b) (6)>  
**Subject:** Re: Saturday phone call

Same here. One flight option (to Atlanta) goes via Seoul. If we both end up on that flight the layover might be a good time to call.

Cliff

On Feb 19, 2020, at 7:15 PM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, (b) (6) Sure. I plan to fly out on Saturday, but don't have the itinerary yet. Will let you know my availability once I know the departure time.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Wednesday, February 19, 2020 6:43:49 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. <(b) (6)>

(CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Subject:** Saturday phone call

Good morning Weigong and Cliff,

I hope your travel to Chengdu and Shenzen went well yesterday. Wanted you to know that our US consulates in Chengdu and Guangzhou are aware of your plans in case you need anything locally.

Best of luck for your continued work today.

Could we hold some time this Saturday before your departure to the US to do a phone debrief?

Best,

[REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>

**Date:** 2/17/20 11:45 PM (GMT+08:00)

**To:** "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "[REDACTED] (b) (6)" <[REDACTED] (b) (6)> "[REDACTED] (b) (6)" "Lane, Cliff" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

Thanks, RJ!

Sorry for not being able to make it.

Best,

Weigong

---

**From:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)>

**Sent:** Monday, February 17, 2020 8:42:54 PM

**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> [REDACTED] (b) (6) <[REDACTED] (b) (6)> Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

Good luck. I hope you can get some rest!

RJ

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Sent:** Monday, February 17, 2020 6:43:37 PM

**To:** (b) (6); Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Just to let you know our meeting may last a lot longer. Sorry.

Weigong

---

**From:** (b) (6)  
**Sent:** Monday, February 17, 2020 5:28:30 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Cliff and Weigong we will pick you up directly from the WHO offices so we can head directly to the restaurant. Look for a red Subaru Forester (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <(b) (6)>  
**Date:** 2/17/20 5:15 PM (GMT+08:00)  
**To:** "Lane, Cliff" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Cc:** (b) (6), "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Thanks. We are all 3 together and will meet you at either WHO or hotel.

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Monday, February 17, 2020 5:13:43 PM  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** (b) (6); Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I just spoke to (b) (6). The team is going straight to WHO for a 1 hour meeting now. (b) (6) was going to see about moving dinner to 7; pickup at 6:40 from the hotel.

On Feb 17, 2020, at 4:48 PM, Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Do you know what time the WHO meeting will be tonight?

Alex

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 4:47 PM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Leaving CDC now.

On Feb 17, 2020, at 12:57 PM, [REDACTED] (b) (6) wrote:

Thanks Cliff. Given that, perhaps I should ask if the Ambassador can meet earlier, say 6pm or 5:30? In case you need to get back over to the WHO offices? What do you think?

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 12:45 PM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6) (U)> Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6) (U)> Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

At the moment it looks like we are scheduled to leave the China CDC, Changping Campus to return to the hotel at 4 PM. There is also a note that we will have a meeting tonight at WHO. The time for that meeting has not yet been determined.

Cliff

On Feb 17, 2020, at 7:36 AM, [REDACTED] (b) (6) wrote:

Thanks Cliff. Keep us posted. I have reached out to the Ambassador and DCM about a possible window this evening from 6pm onward.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone



----- Original message -----

From: "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)>  
Date: 2/17/20 12:37 AM (GMT+08:00)  
To: (b) (6)  
Cc: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)> "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

It looks like we will be at the CDC tomorrow afternoon with nothing after that. We will let you know as we get more detail.

Cliff

On Feb 16, 2020, at 4:47 PM, (b) (6) wrote:

Thanks for the update. Will see you when you are done.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
Date: 2/16/20 4:24 PM (GMT+08:00)  
To: (b) (6) "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "Lane, Cliff" <(b) (6)>  
Cc: "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

Just to let you know we are still in the meeting at WHO, so will be late. Will let you know when we are done.

Thanks,

Weigong

---

**From:** (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>

**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <[REDACTED]> (b) (6)  
**Date:** 2/16/20 8:33 AM (GMT+08:00)  
**To:** [REDACTED] (b) (6) "Lane, Cliff"  
<[REDACTED]> (b) (6) "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED]> (b) (6)  
**Cc:** "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

My number is [REDACTED] (b) (6)  
See you this afternoon.

RJ

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID)  
[REDACTED] (b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6) Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.

Best,  
[REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED]> (b) (6)  
**Date:** 2/16/20 6:58 AM (GMT+08:00)  
**To:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED]> (b) (6)

Cc: "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> <(b) (6)>  
(b) (6) "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

My mobile is (b) (6)

Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.

I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change. What is the best number to reach you? My EOC mobile is (b) (6)

See you tomorrow.

Best,  
Weigong

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)  
**Sent:** Saturday, February 15, 2020 11:42:51 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> <(b) (6)>  
(b) (6) Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> wrote:  
>  
>  
> Hi and welcome to China. I hope you both arrived safely.  
>  
> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.  
>  
> Thanks and have a good sleep.

>  
> RJ  
>

**From:** (b) (6)  
**Sent:** Sun, 23 Feb 2020 18:31:25 +0800  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Simonds, R. J. (CDC/DDPHSIS/CGH/OD); (b) (6)  
**Subject:** Re: Saturday phone call

Great - speak then.

Cliff

On Feb 23, 2020, at 6:30 PM, Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Hi weigong,

We can use the Skype invite for the call at 630.

Alex

Get [Outlook for iOS](#)

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Sunday, February 23, 2020 6:07:08 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> (b) (6)  
<(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Saturday phone call

just to let you know we are taking a dinner break right now and will restart at 7pm. I anticipate it's going to another long evening as we have to get the report done today. Therefore I would like to propose we get on the phone at 6:30pm. Otherwise I'll let you know when we finish for the day. It could be quite late.

Thanks,

Weigong

**From:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Sent:** Saturday, February 22, 2020 10:24 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (b) (6)  
<(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** RE: Saturday phone call

That would be great. Some of the things I'd be interested in hearing about:

- 1) Overall take on visit—how successful was it in meeting mission objectives
- 2) Anything sharable about key observations/conclusions
- 3) Plans for releasing findings and recommendations
- 4) Follow on activities anticipated

Thanks.

RJ

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Sunday, February 23, 2020 9:17 AM  
**To:** (b) (6) Lane, Cliff (NIH/NIAID) [E]  
<(b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Saturday phone call

although we are still not clear about the plan for today, we think it's probably safe to schedule our call at 8:00pm this evening. We'll let you know if we become available earlier.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Saturday, February 22, 2020 4:08 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]  
<(b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Saturday phone call

Sounds good Weigong and thanks very much.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Date:** 2/22/20 1:11 PM (GMT+08:00)  
**To:** (b) (6) "Lane, Cliff"  
<(b) (6)>  
**Cc:** "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Subject:** Re: Saturday phone call

Tomorrow works better for us. Will propose a time later when we have some ideas about tomorrow's plan.

Thanks,

Weigong

---

**From:** (b) (6)  
**Sent:** Saturday, February 22, 2020 11:14:08 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]  
<(b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** RE: Saturday phone call

No problem. Since you are in country for a few more days also we can certainly catch up tomorrow or Monday as well. Whatever best for you both.

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Saturday, February 22, 2020 9:09 AM  
**To:** (b) (6); Lane, Cliff  
(b) (6)  
**Cc:** (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC)  
<(b) (6)>  
**Subject:** Re: Saturday phone call

Will let you know once we are clear about today's plan.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Saturday, February 22, 2020 6:19:46 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]  
(b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Saturday phone call

Thanks Weigong.

What time works for you both for a chat today?

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>

Date: 2/21/20 8:41 PM (GMT+08:00)

To: (b) (6) "Lane, Cliff"

(b) (6)

Cc: "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)"

<(b) (6)>

Subject: Re: Saturday phone call

I just got the final word. I will not go to Wuhan. They picked the member from Nigeria. I should be able to join the call tomorrow.

Thanks,  
Weigong

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>

**Sent:** Friday, February 21, 2020 5:16 AM

**To:** (b) (6); Lane, Cliff (NIH/NIAID) [E]

<(b) (6)>

**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.

(CDC/DDID/NCIRD/ID) <(b) (6)>

**Subject:** Re: Saturday phone call

not yet. will let you know as soon as I know for sure.

thanks,  
Weigong

---

**From:** (b) (6)

**Sent:** Friday, February 21, 2020 3:36 AM

**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]

<(b) (6)>

**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J.

(CDC/DDID/NCIRD/ID) <(b) (6)>

**Subject:** RE: Saturday phone call

Hi Weigong – Have you received final confirmation of your travel to Wuhan and any details about flight and hotel? As soon as you have these please do send along.

Best,  
(b) (6)



---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Friday, February 21, 2020 10:03 AM  
**To:** (b) (6) Lane, Cliff  
(b) (6)  
**Cc:** (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC)  
<(b) (6)>  
**Subject:** Re: Saturday phone call

I have just been asked to go to Wuhan with a 3 persons team including Bruce. It's pending China approval right now. If approved, we can leave anytime, so may not be available tomorrow.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Friday, February 21, 2020 9:50:21 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD)  
<(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** RE: Saturday phone call

Ok, got it. Will reach out later today and check in.

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)  
**Sent:** Friday, February 21, 2020 9:34 AM  
**To:** (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (U) Simonds, R J (Beijing | CDC)  
<(b) (6)> (U) Millman, Alexander (Beijing | CDC) <(b) (6)>  
**Subject:** Re: Saturday phone call

Thanks very much. This morning the status of the mission is evolving. At the moment tomorrow looks good for me. That could change in the next few hours.

Cliff

On Feb 21, 2020, at 9:31 AM, (b) (6) wrote:

Good morning! I hope you both are doing well. Is tomorrow looking possible for a phone call while you are in transit? I have a conference call in line we can hold and utilize once I have an idea of timing.

Thanks again,

(b) (6)

---

**From:** (b) (6)  
**Sent:** Thursday, February 20, 2020 11:35 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC) <(b) (6)>  
**Subject:** RE: Saturday phone call

Thanks to you both. Once you have your return flight info then I can send around a call-in line for us to use during your layover or another window of time also ok.

best,

(b) (6)

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Wednesday, February 19, 2020 11:15 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** (b) (6) (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC) <(b) (6)>  
**Subject:** Re: Saturday phone call

Same here. One flight option (to Atlanta) goes via Seoul. If we both end up on that flight the layover might be a good time to call.

Cliff

On Feb 19, 2020, at 7:15 PM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, (b) (6) Sure. I plan to fly out on Saturday, but don't have the itinerary yet. Will let you know my availability once I know the departure time.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Wednesday, February 19, 2020 6:43:49 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. <(b) (6)>

(CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Subject:** Saturday phone call

Good morning Weigong and Cliff,

I hope your travel to Chengdu and Shenzen went well yesterday. Wanted you to know that our US consulates in Chengdu and Guangzhou are aware of your plans in case you need anything locally.

Best of luck for your continued work today.

Could we hold some time this Saturday before your departure to the US to do a phone debrief?

Best,

[REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>

**Date:** 2/17/20 11:45 PM (GMT+08:00)

**To:** "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "[REDACTED] (b) (6)" <[REDACTED] (b) (6)> "[REDACTED] (b) (6)" "Lane, Cliff" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

Thanks, RJ!

Sorry for not being able to make it.

Best,

Weigong

---

**From:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)>

**Sent:** Monday, February 17, 2020 8:42:54 PM

**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> [REDACTED] (b) (6) <[REDACTED] (b) (6)> Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

Good luck. I hope you can get some rest!

RJ

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Sent:** Monday, February 17, 2020 6:43:37 PM

**To:** (b) (6); Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Just to let you know our meeting may last a lot longer. Sorry.

Weigong

---

**From:** (b) (6)  
**Sent:** Monday, February 17, 2020 5:28:30 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Cliff and Weigong we will pick you up directly from the WHO offices so we can head directly to the restaurant. Look for a red Subaru Forester (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <(b) (6)>  
**Date:** 2/17/20 5:15 PM (GMT+08:00)  
**To:** "Lane, Cliff" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Cc:** (b) (6), "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Thanks. We are all 3 together and will meet you at either WHO or hotel.

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Monday, February 17, 2020 5:13:43 PM  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** (b) (6); Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I just spoke to (b) (6). The team is going straight to WHO for a 1 hour meeting now. (b) (6) was going to see about moving dinner to 7; pickup at 6:40 from the hotel.

On Feb 17, 2020, at 4:48 PM, Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Do you know what time the WHO meeting will be tonight?

Alex

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 4:47 PM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Leaving CDC now.

On Feb 17, 2020, at 12:57 PM, [REDACTED] (b) (6) wrote:

Thanks Cliff. Given that, perhaps I should ask if the Ambassador can meet earlier, say 6pm or 5:30? In case you need to get back over to the WHO offices? What do you think?

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 12:45 PM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6) (U)> Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6) (U)> Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

At the moment it looks like we are scheduled to leave the China CDC, Changping Campus to return to the hotel at 4 PM. There is also a note that we will have a meeting tonight at WHO. The time for that meeting has not yet been determined.

Cliff

On Feb 17, 2020, at 7:36 AM, [REDACTED] (b) (6) wrote:

Thanks Cliff. Keep us posted. I have reached out to the Ambassador and DCM about a possible window this evening from 6pm onward.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)>  
Date: 2/17/20 12:37 AM (GMT+08:00)  
To: (b) (6)  
Cc: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)> "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

It looks like we will be at the CDC tomorrow afternoon with nothing after that. We will let you know as we get more detail.

Cliff

On Feb 16, 2020, at 4:47 PM, (b) (6) wrote:

Thanks for the update. Will see you when you are done.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
Date: 2/16/20 4:24 PM (GMT+08:00)  
To: (b) (6) "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "Lane, Cliff" <(b) (6)>  
Cc: "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

Just to let you know we are still in the meeting at WHO, so will be late. Will let you know when we are done.

Thanks,

Weigong

---

**From:** (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>

**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <[REDACTED]> (b) (6)  
**Date:** 2/16/20 8:33 AM (GMT+08:00)  
**To:** [REDACTED] (b) (6) "Lane, Cliff"  
<[REDACTED]> (b) (6) "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED]> (b) (6)  
**Cc:** "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

My number is [REDACTED] (b) (6)  
See you this afternoon.

RJ

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID)  
[REDACTED] (b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6) Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.

Best,  
[REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED]> (b) (6)  
**Date:** 2/16/20 6:58 AM (GMT+08:00)  
**To:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED]> (b) (6)

Cc: "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> <(b) (6)>  
(b) (6) "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

My mobile is (b) (6)

Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.

I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change. What is the best number to reach you? My EOC mobile is (b) (6)

See you tomorrow.

Best,  
Weigong

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)  
**Sent:** Saturday, February 15, 2020 11:42:51 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> <(b) (6)>  
(b) (6) Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> wrote:  
>  
>  
> Hi and welcome to China. I hope you both arrived safely.  
>  
> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.  
>  
> Thanks and have a good sleep.



>  
> RJ  
>

**From:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD)  
**Sent:** Sun, 23 Feb 2020 04:54:33 +0000  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID); [REDACTED] (b) (6)  
[REDACTED]; Lane, Cliff (NIH/NIAID) [E]; Zhou, Weigong (CDC/DDID/NCIRD/ID)  
**Subject:** Readout

Let us know if this needs to be changed.

[Join online meeting](#)

Join by Phone

(404) 553-8912	[REDACTED] (b) (6)	(Atlanta Dial-in Conference Region)	English (United States)
(855) 348-8390	[REDACTED]	(Atlanta Dial-in Conference Region)	English (United States)
(513) 841-4293	[REDACTED]	(Cincinnati Dial-in Conference Region)	English (United States)
(404) 553-8912	[REDACTED]	(Cincinnati Dial-in Conference Region)	English (United States)
(855) 348-8390	[REDACTED]	(Cincinnati Dial-in Conference Region)	English (United States)
(301) 458-4013	[REDACTED]	(Hyattsville Dial-in Conference Region)	English (United States)
(855) 348-8390	[REDACTED]	(Hyattsville Dial-in Conference Region)	English (United States)
(404) 553-8912	[REDACTED]	(Hyattsville Dial-in Conference Region)	English (United States)
(509) 354-8107	[REDACTED]	(Spokane Dial-in Conference Region)	English (United States)
(855) 348-8390	[REDACTED]	(Spokane Dial-in Conference Region)	English (United States)
(404) 553-8912	[REDACTED]	(Spokane Dial-in Conference Region)	English (United States)
(970) 221-6403	[REDACTED]	(Ft. Collins Dial-in Conference Region)	English (United States)
(404) 553-8912	[REDACTED]	(Ft. Collins Dial-in Conference Region)	English (United States)
(855) 348-8390	[REDACTED]	(Ft. Collins Dial-in Conference Region)	English (United States)
(770) 488-3600	[REDACTED]	(Chamblee Dial-in Conference Region)	English (United States)
(855) 644-0229	[REDACTED]	(Chamblee Dial-in Conference Region)	English (United States)
(304) 285-6345	[REDACTED]	(Morgantown Dial-in Conference Region)	English (United States)
(855) 348-8390	[REDACTED]	(Morgantown Dial-in Conference Region)	English (United States)

(404) 553-8912	(b) (6)	(Morgantown Dial-in Conference Region)	English (United States)
(412) 386-6464	(b) (6)	(Pittsburgh Dial-in Conference Region)	English (United States)
(855) 348-8390	(b) (6)	(Pittsburgh Dial-in Conference Region)	English (United States)
(404) 553-8912	(b) (6)	(Pittsburgh Dial-in Conference Region)	English (United States)
(907) 348-3100	(b) (6)	(Anchorage Dial-in Conference Region)	English (United States)
(855) 348-8390	(b) (6)	(Anchorage Dial-in Conference Region)	English (United States)
(404) 553-8912	(b) (6)	(Anchorage Dial-in Conference Region)	English (United States)
(787) 706-4312	(b) (6)	(San Juan Dial-in Conference Region)	English (United States)
(855) 348-8390	(b) (6)	(San Juan Dial-in Conference Region)	English (United States)
(404) 553-8912	(b) (6)	(San Juan Dial-in Conference Region)	English (United States)
(919) 541-2471	(b) (6)	(RTP Dial-in Conference Region)	English (United States)
(855) 348-8390	(b) (6)	(RTP Dial-in Conference Region)	English (United States)
(404) 553-8912	(b) (6)	(RTP Dial-in Conference Region)	English (United States)

[Find a local number](#)

Conference ID: (b) (6)

[Forgot your dial-in PIN?](#)

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID)  
**Sent:** Sun, 23 Feb 2020 03:42:21 +0000  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD); [REDACTED] (b) (6); [REDACTED]; Lane, Cliff (NIH/NIAID) [E]  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Subject:** Re: Saturday phone call

well noted. talk to you this evening.

Thanks,  
Weigong

**From:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)>  
**Sent:** Saturday, February 22, 2020 10:24 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> [REDACTED] (b) (6) <[REDACTED] (b) (6)> Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** RE: Saturday phone call

That would be great. Some of the things I'd be interested in hearing about:

- 1) Overall take on visit—how successful was it in meeting mission objectives
- 2) Anything sharable about key observations/conclusions
- 3) Plans for releasing findings and recommendations
- 4) Follow on activities anticipated

Thanks.

RJ

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Sent:** Sunday, February 23, 2020 9:17 AM  
**To:** [REDACTED] (b) (6); Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Saturday phone call

although we are still not clear about the plan for today, we think it's probably safe to schedule our call at 8:00pm this evening. We'll let you know if we become available earlier.

Thanks,  
Weigong

---

**From:** [REDACTED] (b) (6)  
**Sent:** Saturday, February 22, 2020 4:08 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Lane, Cliff (NIH/NIAID) [E]

< (b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < (b) (6) Millman, Alexander J. (CDC/DDID/NCIRD/ID) < (b) (6)  
**Subject:** Re: Saturday phone call

Sounds good Weigong and thanks very much.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" < (b) (6)  
**Date:** 2/22/20 1:11 PM (GMT+08:00)  
**To:** (b) (6), "Lane, Cliff" < (b) (6)  
**Cc:** "(U) Simonds, R J (Beijing | CDC)" < (b) (6) "(U) Millman, Alexander (Beijing | CDC)" < (b) (6)  
**Subject:** Re: Saturday phone call

Tomorrow works better for us. Will propose a time later when we have some ideas about tomorrow's plan.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Saturday, February 22, 2020 11:14:08 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) < (b) (6) Lane, Cliff (NIH/NIAID) [E] < (b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < (b) (6) Millman, Alexander J. (CDC/DDID/NCIRD/ID) < (b) (6)  
**Subject:** RE: Saturday phone call

No problem. Since you are in country for a few more days also we can certainly catch up tomorrow or Monday as well. Whatever best for you both.

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) < (b) (6)  
**Sent:** Saturday, February 22, 2020 9:09 AM  
**To:** (b) (6) Lane, Cliff < (b) (6)  
**Cc:** (U) Simonds, R J (Beijing | CDC) < (b) (6) (U) Millman, Alexander (Beijing | CDC)

< (b) (6)

**Subject:** Re: Saturday phone call

Will let you know once we are clear about today's plan.

Thanks,  
Weigong

---

**From:** (b) (6)

**Sent:** Saturday, February 22, 2020 6:19:46 AM

**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) < (b) (6) > Lane, Cliff (NIH/NIAID) [E]

< (b) (6) >

**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < (b) (6) > Millman, Alexander J. (CDC/DDID/NCIRD/ID) < (b) (6) >

**Subject:** Re: Saturday phone call

Thanks Weigong.

What time works for you both for a chat today?

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" < (b) (6) >

**Date:** 2/21/20 8:41 PM (GMT+08:00)

**To:** (b) (6) "Lane, Cliff"

(b) (6)

**Cc:** "(U) Simonds, R J (Beijing | CDC)" < (b) (6) > "(U) Millman, Alexander (Beijing | CDC)"

< (b) (6) >

**Subject:** Re: Saturday phone call

I just got the final word. I will not go to Wuhan. They picked the member from Nigeria. I should be able to join the call tomorrow.

Thanks,  
Weigong

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) < (b) (6) >

**Sent:** Friday, February 21, 2020 5:16 AM

**To:** (b) (6) Lane, Cliff (NIH/NIAID) [E]

< (b) (6) >

**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < (b) (6) > Millman, Alexander J.

(CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Subject:** Re: Saturday phone call

not yet. will let you know as soon as I know for sure.

thanks,  
Weigong

---

**From:** [REDACTED] (b) (6)  
**Sent:** Friday, February 21, 2020 3:36 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** RE: Saturday phone call

Hi Weigong – Have you received final confirmation of your travel to Wuhan and any details about flight and hotel? As soon as you have these please do send along.

Best,  
[REDACTED] (b) (6)

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Sent:** Friday, February 21, 2020 10:03 AM  
**To:** [REDACTED] (b) (6); Lane, Cliff [REDACTED] (b) (6)  
**Cc:** (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Saturday phone call

I have just been asked to go to Wuhan with a 3 persons team including Bruce. It's pending China approval right now. If approved, we can leave anytime, so may not be available tomorrow.

Thanks,  
Weigong

---

**From:** [REDACTED] (b) (6)  
**Sent:** Friday, February 21, 2020 9:50:21 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** RE: Saturday phone call

Ok, got it. Will reach out later today and check in.

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Friday, February 21, 2020 9:34 AM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Saturday phone call

Thanks very much. This morning the status of the mission is evolving. At the moment tomorrow looks good for me. That could change in the next few hours.

Cliff

On Feb 21, 2020, at 9:31 AM, [REDACTED] (b) (6) wrote:

Good morning! I hope you both are doing well. Is tomorrow looking possible for a phone call while you are in transit? I have a conference call in line we can hold and utilize once I have an idea of timing.

Thanks again,  
[REDACTED] (b) (6)

---

**From:** [REDACTED] (b) (6)  
**Sent:** Thursday, February 20, 2020 11:35 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Cc:** (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** RE: Saturday phone call

Thanks to you both. Once you have your return flight info then I can send around a call-in line for us to use during your layover or another window of time also ok.

best,  
[REDACTED] (b) (6)

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Wednesday, February 19, 2020 11:15 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Cc:** [REDACTED] (b) (6) (U) Simonds, R J (Beijing | CDC)



< (b) (6) (U) Millman, Alexander (Beijing | CDC) < (b) (6)

**Subject:** Re: Saturday phone call

Same here. One flight option (to Atlanta) goes via Seoul. If we both end up on that flight the layover might be a good time to call.

Cliff

On Feb 19, 2020, at 7:15 PM, Zhou, Weigong (CDC/DDID/NCIRD/ID) < (b) (6) wrote:

Thanks, (b) (6) Sure. I plan to fly out on Saturday, but don't have the itinerary yet. Will let you know my availability once I know the departure time.

Thanks,  
Weigong

---

**From:** (b) (6)

**Sent:** Wednesday, February 19, 2020 6:43:49 AM

**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) < (b) (6) Simonds, R. J. (CDC/DDPHSIS/CGH/OD)

< (b) (6) Lane, Cliff (NIH/NIAID) [E] < (b) (6) Millman, Alexander J.

(CDC/DDID/NCIRD/ID) < (b) (6)

**Subject:** Saturday phone call

Good morning Weigong and Cliff,

I hope your travel to Chengdu and Shenzhen went well yesterday. Wanted you to know that our US consulates in Chengdu and Guangzhou are aware of your plans in case you need anything locally.

Best of luck for your continued work today.

Could we hold some time this Saturday before your departure to the US to do a phone debrief?

Best,

(b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" < (b) (6)

Date: 2/17/20 11:45 PM (GMT+08:00)

To: "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> <(b) (6)>  
(b) (6) "Lane, Cliff" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

Thanks, RJ!  
Sorry for not being able to make it.  
Best,  
Weigong

---

**From:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Sent:** Monday, February 17, 2020 8:42:54 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> <(b) (6)>  
(b) (6); Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Good luck. I hope you can get some rest!  
RJ

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Monday, February 17, 2020 6:43:37 PM  
**To:** (b) (6); Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Just to let you know our meeting may last a lot longer. Sorry.

Weigong

---

**From:** (b) (6)  
**Sent:** Monday, February 17, 2020 5:28:30 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Cliff and Weigong we will pick you up directly from the WHO offices so we can head directly to the restaurant. Look for a red Subaru Forester (b) (6)

----- Original message -----

From: "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <(b) (6)>  
Date: 2/17/20 5:15 PM (GMT+08:00)  
To: "Lane, Cliff" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Cc: <(b) (6)> "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

Thanks. We are all 3 together and will meet you at either WHO or hotel.

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Monday, February 17, 2020 5:13:43 PM  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I just spoke to <(b) (6)> The team is going straight to WHO for a 1 hour meeting now. <(b) (6)> was going to see about moving dinner to 7; pickup at 6:40 from the hotel.

On Feb 17, 2020, at 4:48 PM, Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Do you know what time the WHO meeting will be tonight?  
Alex

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Monday, February 17, 2020 4:47 PM  
**To:** <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Leaving CDC now.

On Feb 17, 2020, at 12:57 PM, <(b) (6)> wrote:

Thanks Cliff. Given that, perhaps I should ask if the Ambassador can meet earlier, say 6pm or 5:30? In case you need to get back over to the WHO offices? What do you think?

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 12:45 PM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

At the moment it looks like we are scheduled to leave the China CDC, Changping Campus to return to the hotel at 4 PM. There is also a note that we will have a meeting tonight at WHO. The time for that meeting has not yet been determined.

Cliff

On Feb 17, 2020, at 7:36 AM, [REDACTED] (b) (6) wrote:

Thanks Cliff. Keep us posted. I have reached out to the Ambassador and DCM about a possible window this evening from 6pm onward.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** 2/17/20 12:37 AM (GMT+08:00)  
**To:** "[REDACTED] (b) (6)"  
**Cc:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)> "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

It looks like we will be at the CDC tomorrow afternoon with nothing after that. We will let you know as we get more detail.

Cliff

On Feb 16, 2020, at 4:47 PM, [REDACTED] (b) (6) wrote:

Thanks for the update. Will see you when you are done.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
Date: 2/16/20 4:24 PM (GMT+08:00)  
To: "(b) (6), "(U) Simonds, R J (Beijing | CDC)" <(b) (6) "Lane, Cliff" <(b) (6)>  
Cc: "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

Just to let you know we are still in the meeting at WHO, so will be late. Will let you know when we are done.

Thanks,

Weigong

---

**From:** (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6) Lane, Cliff (NIH/NIAID) [E] <(b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <(b) (6)>  
Date: 2/16/20 8:33 AM (GMT+08:00)  
To: (b) (6) "Lane, Cliff" <(b) (6) "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
Cc: "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

My number is (b) (6)  
See you this afternoon.

RJ

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] [REDACTED] (b) (6); Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.

Best,  
[REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** 2/16/20 6:58 AM (GMT+08:00)  
**To:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>  
**Cc:** "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "[REDACTED] (b) (6)" <[REDACTED] (b) (6)> "[REDACTED] (b) (6)" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

My mobile is [REDACTED] (b) (6)

Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.  
I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change. What is the best number to reach you? My EOC mobile is [REDACTED] (b) (6)

See you tomorrow.

Best,  
Weigong

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Saturday, February 15, 2020 11:42:51 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> [REDACTED] (b) (6)  
<[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> wrote:  
>  
>  
> Hi and welcome to China. I hope you both arrived safely.  
>  
> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.  
>  
> Thanks and have a good sleep.  
>  
> RJ  
>

**From:** ZENG, Lishan  
**Sent:** Sat, 22 Feb 2020 12:32:51 +0000  
**To:** WANG, Can;LEE, Chin-kei;SCANO, Fabio; (b) (6) Lane, Cliff  
(NIH/NIAID) [E]; (b) (6) (b) (6)  
(b) (6); (b) (6) (b) (6) Dr VAN KERKHOVE, Maria;XING,  
Jun; (b) (6)  
**Subject:** 9 am tomorrow

Dear all,  
This is Lisa, one of the translators with the China Office. I'd like to inform you that we'll start at 9 am tomorrow.

Good night~

Lisa



**From:** Dr VAN KERKHOVE, Maria  
**Sent:** Sat, 22 Feb 2020 08:56:57 +0000  
**To:** Alexander SEMENOV ( (b) (6) Chikwe IHEKWEAZU  
( (b) (6) Lane, Cliff (NIH/NIAID) [E]; Dale FISHER ( (b) (6) Dr  
Hitoshi TAKAHASHI ( (b) (6); gmlung; LEE Jong-Koo ( (b) (6) Natalia  
PSHENICHNAYA ( (b) (6) Tim ECKMANNS ( (b) (6) Zhou,  
Weigong (CDC/DDID/NCIRD/ID); Weigong ZHOU ( (b) (6) XING, Jun  
**Cc:** AYLWARD, Raymond Bruce J.  
**Subject:** Draft report 22 Feb 1654 version  
**Attachments:** WHO-China Joint Mission - DRAFT REPORT V1.1.docx

Dear colleagues,

Thank you for the tremendous work in drafting this together with our colleagues from China. It was a fascinating and productive day. Jun, can you please share this word document with Chinese colleagues?

As discussed, please use this version to update your technical sections (the narrative) adding in the discussed recommended text/tables/stats/figures. Please also revise your technical recommendations.

**I look forward to receiving your updated versions by 2200 tonight.**

Thank you!

Maria

















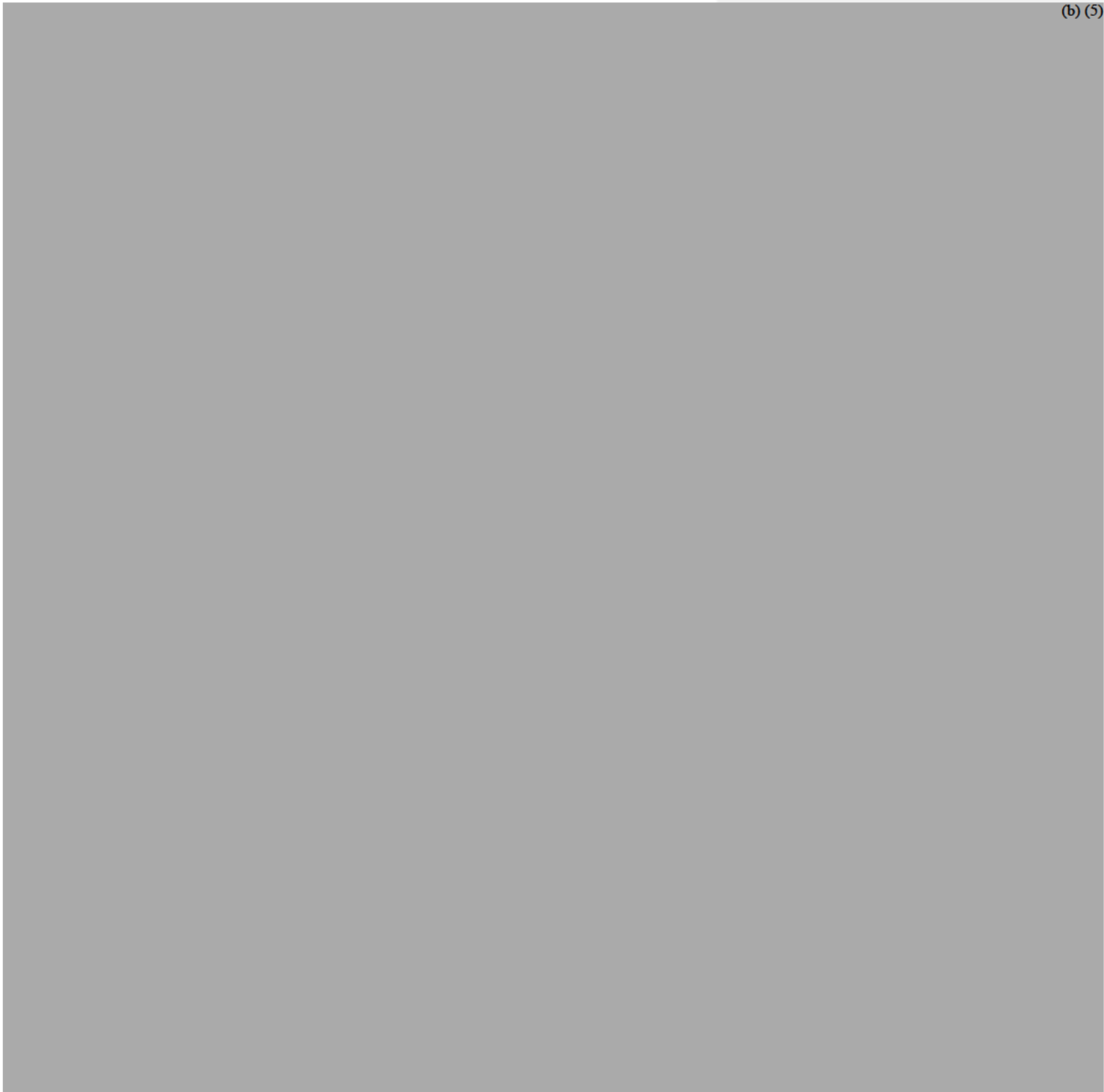


















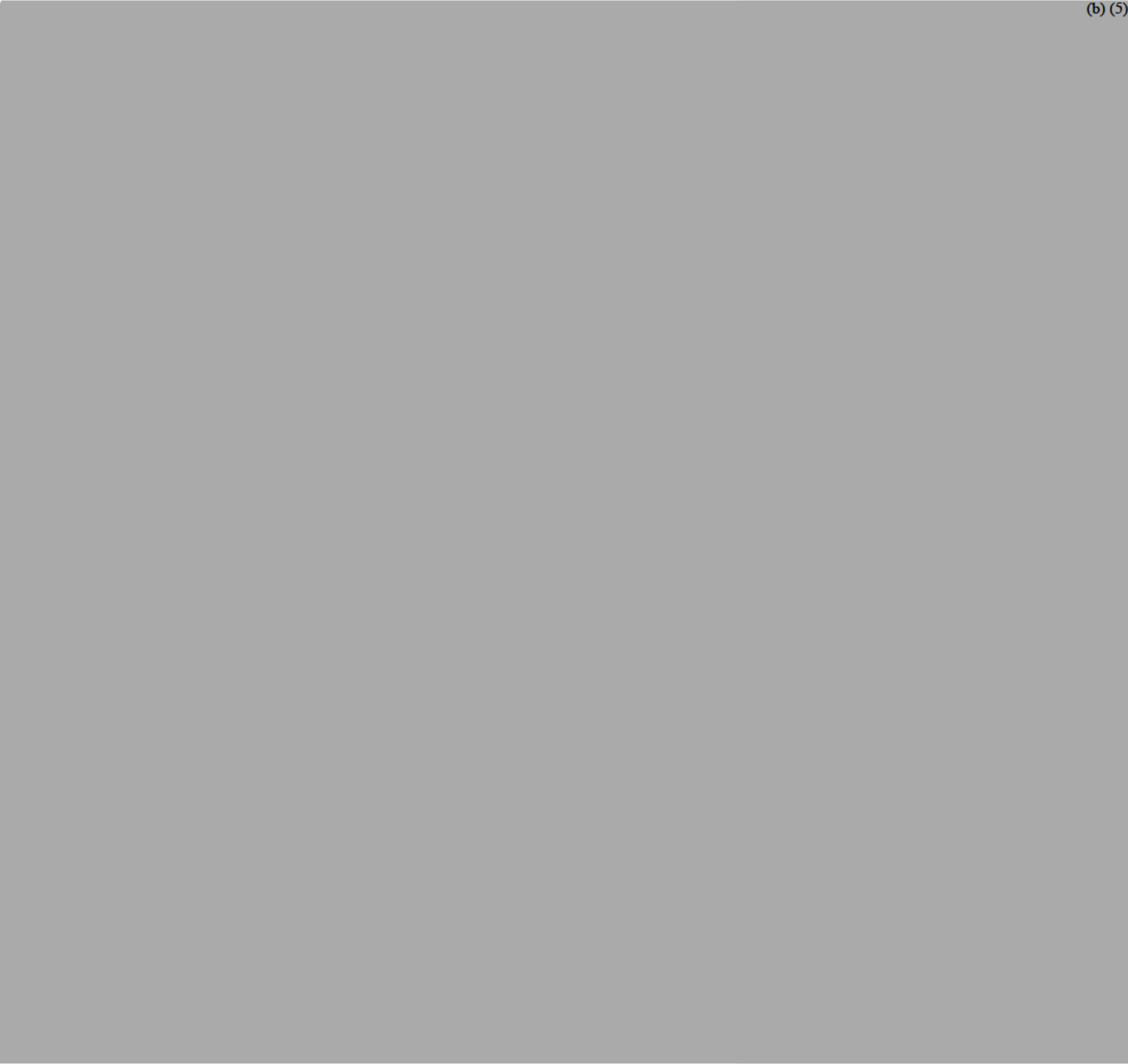














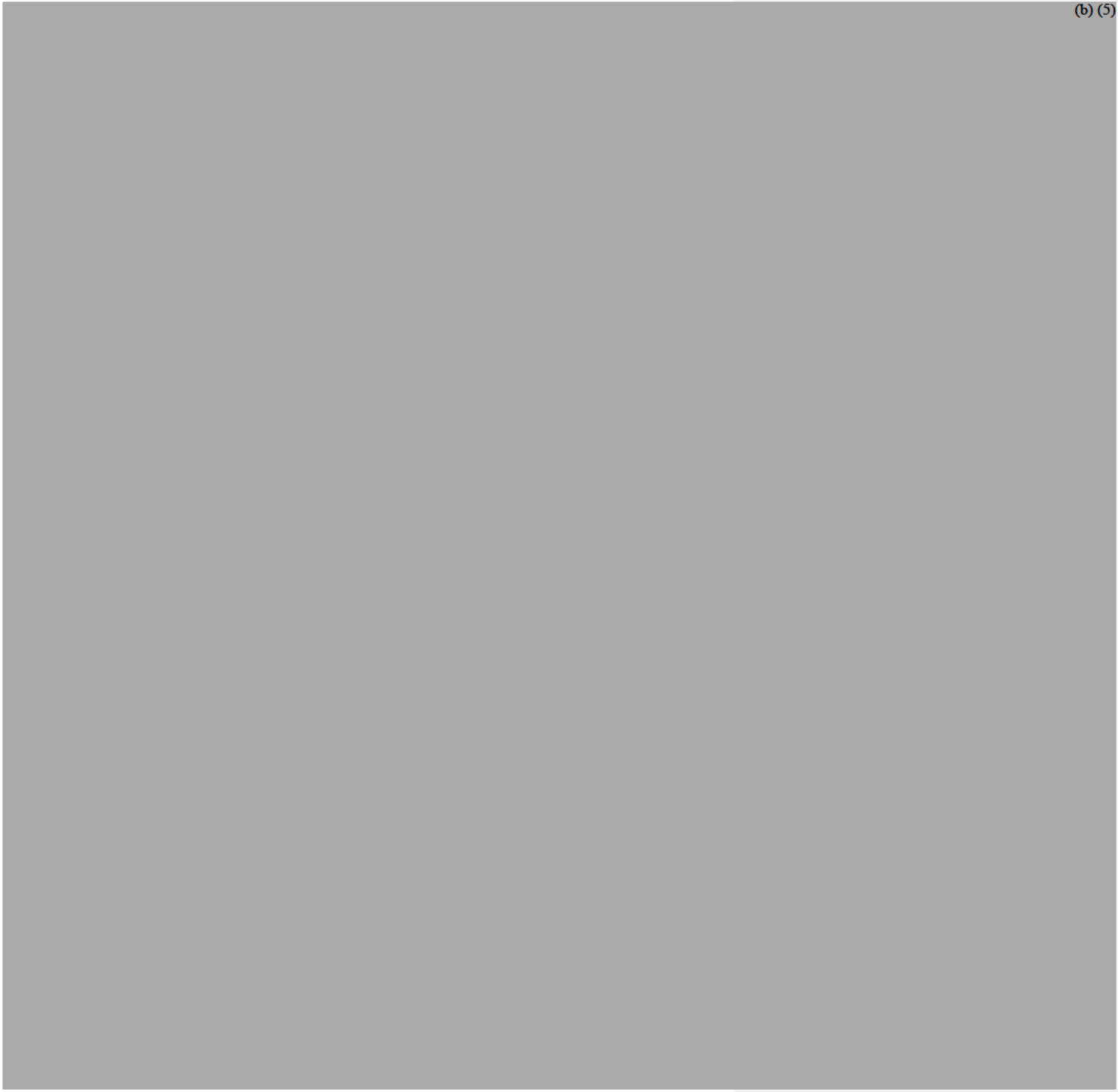


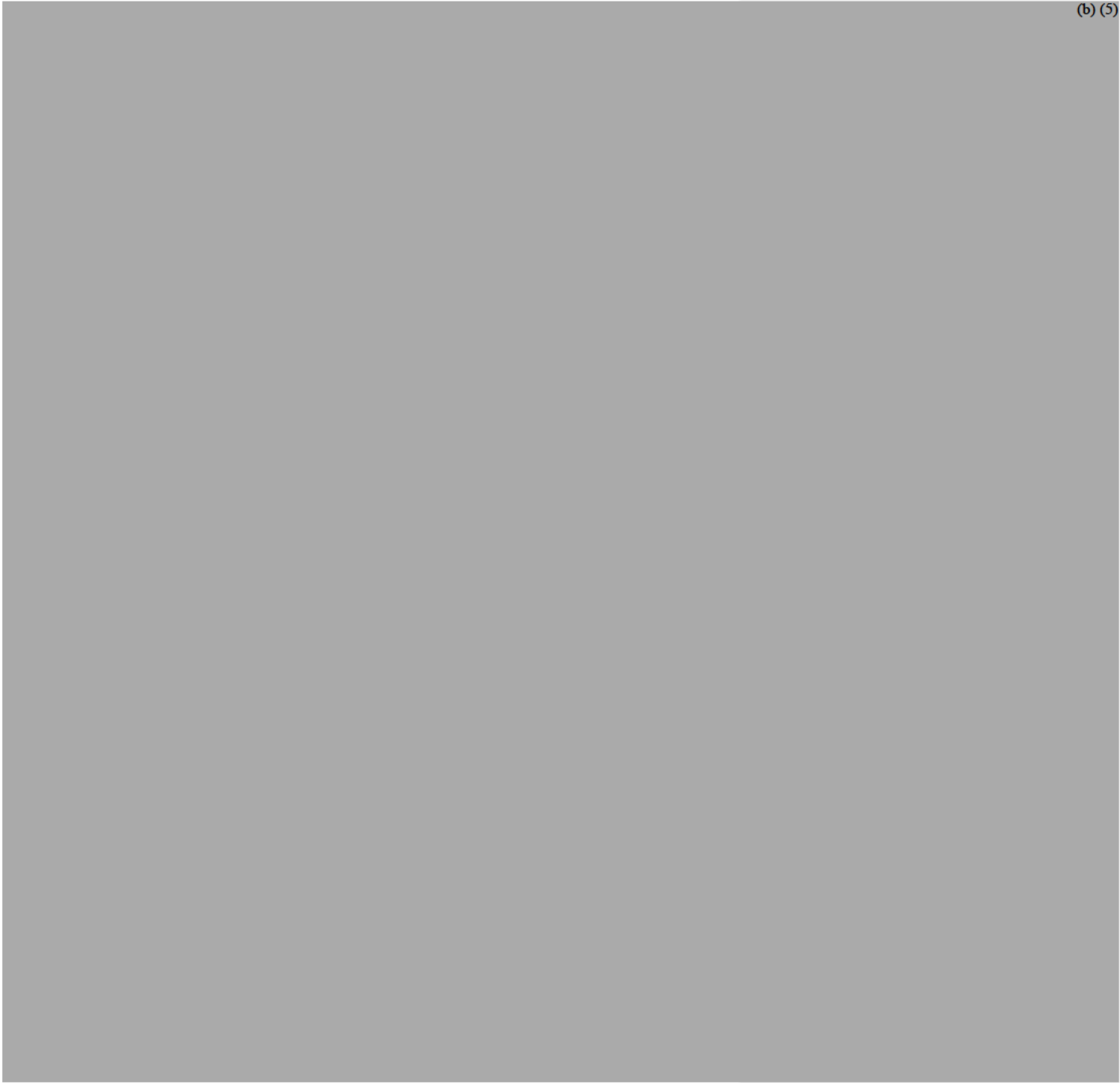














**From:** Lane, Cliff (NIH/NIAID) [E]  
**Sent:** Sat, 22 Feb 2020 14:30:33 +0800  
**To:** Dale Fisher  
**Subject:** Re: Singapore trial site

Thanks

On 2/22/20, 2:27 PM, "Dale Fisher" <(b) (6)> wrote:

Thanks a lot Paul;

Cliff; Paul knows everyone and here is his response:

-----Original Message-----

From: Paul Anantharajah Tambyah <(b) (6)>  
Sent: Saturday, 22 February 2020 2:17 PM  
To: Dale Fisher <(b) (6).sg>  
Subject: RE: Singapore trial site

I think I may have met him some time back at one of the military medical conferences. He does list Burkholderia among the organisms he studies but I think he mainly works with Gopal from Anatomy on snake bite (DAAV = antivenom).

See <https://expedmed.org/blog/dr-michael-v-callahan-coming-to-little-rock>

Paul Ananth

-----Original Message-----

From: Dale Fisher <(b) (6)>  
Sent: Saturday, 22 February 2020 1:14 PM  
To: Paul Anantharajah Tambyah <(b) (6)>  
Subject: FW: Singapore trial site

Do you know Michael Callahan?

-----Original Message-----

From: Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
Sent: Saturday, 22 February 2020 1:13 PM  
To: Dale Fisher <(b) (6)>  
Subject: Re: Singapore trial site

- External Email -

Thanks- (b) (5)

> On Feb 22, 2020, at 1:08 PM, Dale Fisher <(b) (6)> wrote:

>  
> No I don't think so  
>

> Do you want me to ask his likely collaborators about this?

>  
>  
>

> -----Original Message-----

> From: Lane, Cliff (NIH/NIAID) [E] <(b) (6).gov>

> Sent: Saturday, 22 February 2020 12:49 PM

> To: Dale Fisher <(b) (6)>

> Subject: Fwd: Singapore trial site

>

> - External Email -

>

>

>

> Dale,

>

> Do you know this person? It seems I should but I don't.

>

> Thanks,

>

> Cliff

>

>>>> On Feb 22, 2020, at 12:06 AM, Callahan, Michael V.,M.D. <(b) (6)> wrote:

>>>>

(b) (5)

>>>> Let me know if you want to proceed.

>>>>

>>>> Michael Callahan MD MSPH DTM&H, DMCC (UK) Director, Mass-Casualty

>>>> Infection Operations Vaccine & Immunotherapy Center Massachusetts

>>>> General Hospital Boston, MA

>>>>

>>>> Special Advisor to the Assistant Secretary of Public Health

>>>> Preparedness and Response U.S Dept of Health and Human Services

>>>> O'Neil Building 6th Floor Washington, DC

>>>>

>

>

>

> Important: This email is confidential and may be privileged. If you are not the intended recipient, please delete it and notify us immediately; you should not copy or use it for any purpose, nor disclose its contents to any other person. Thank you.

---

Important: This email is confidential and may be privileged. If you are not the intended recipient, please delete it and notify us immediately; you should not copy or use it for any purpose, nor disclose its contents to any other person. Thank you.

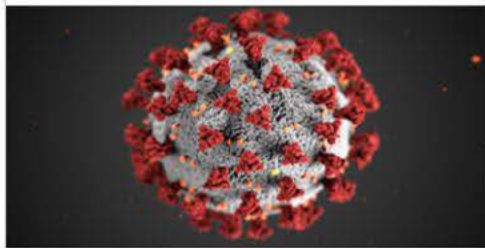


**From:** (b) (6)  
**Sent:** Sat, 22 Feb 2020 12:53:11 +0800  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID)  
**Subject:** Re: quarantine regulation

Thanks

On Feb 22, 2020, at 12:50 PM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

<https://www.cdc.gov/coronavirus/2019-ncov/travelers/from-china.html>



## Travelers from China to the United States, 2019-nCoV | CDC

To slow the spread of 2019 novel coronavirus into the United States, CDC is working with public health partners to implement new travel procedures announced in a Presidential Proclamation on Novel Coronavirus [external icon](#). In summary: Foreign nationals who have visited China in the past 14 days may ...

[www.cdc.gov](http://www.cdc.gov)

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Friday, February 21, 2020 7:32 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Flights

Asiana flight 370 12:40 PM - 4:50 PM  
Delta flight 26 8:05 PM - 7:34 PM

**From:** Office of the Director-General  
**Sent:** Fri, 21 Feb 2020 17:20:39 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Cc:** SCHWARTLANDER, Bernhard F.;etiennec;DRURY, Patrick  
Anthony; (b) (6); (b) (6)  
**Subject:** Letter from the Director-General of the World Health Organization  
**Attachments:** USA Cliff Lane.pdf

Dear Dr Lane,

Please find attached a letter from the Director-General of the World Health Organization for your kind attention.

Best regards,

Office of the Director-General  
World Health Organization



Tel. direct: +41 22 791  
Fax direct: +41 22 791  
E-mail :

In reply please  
refer to:

Your reference:

Dr Cliff Lane  
Clinical Director  
National Institute of Allergy and  
Infectious Diseases  
US National Institute of Health  
Etats-Unis d'Amérique

21 February 2020

Dear Dr Lane,

I would like to thank you for your willingness to participate as an expert in the World Health Organization (WHO)-led, joint international technical mission to the People's Republic of China to support response operations for the COVID-19 outbreak. Your involvement in this mission to date, conducted under the framework of the Global Outbreak Alert and Response Network (GOARN), has been invaluable.

The efforts of the expert team thus far, and the analyses and information being examined, will be critical in informing response efforts nationally, regionally and globally. As the work of the expert team continues, I am requesting the extension of your participation in this joint mission until Tuesday, 25 February 2020, in order for the final report, analyses and recommendations of the expert team to be concluded.

Thank you for contributing your extensive skills and experience to this mission, to date, and WHO looks forward to your confirmation of the extension of the mission. WHO also conveys its appreciation to your host institution for supporting your participation in this mission until its conclusion.

In conjunction with relevant authorities from the People's Republic of China, the GOARN Secretariat is on standby to support and facilitate your arrangements, and will follow-up with you directly in short course with additional details.

I would like to thank you very much for your engagement in this important work, and for your time and consideration.

Yours sincerely,

Dr Tedros Adhanom Ghebreyesus  
Director-General

cc: The Director, Office of Global Health Affairs, Department of Health and Human Services, Washington, D.C.  
Permanent Mission of the United States of America to the United Nations Office and other International Organizations at Geneva

**From:** (b) (6)  
**Sent:** Sat, 22 Feb 2020 00:20:02 +0800  
**To:** David Lye Chien Boon (NCID)  
**Cc:** Dale Fisher  
**Subject:** Re: clinical trial registered

How might you like the eligibility criteria changed?

On Feb 22, 2020, at 12:10 AM, David Lye Chien Boon (NCID) <(b) (6)> wrote:

Hi Dale  
Thanks for the introduction.

(b) (5)

Hi Cliff  
Pleased to be introduced.

(b) (5)

With warm regards,  
David Lye FRACP FAMS FRCP  
Director, ID Research and Training Office (IDRTO), National Centre for Infectious Diseases (NCID)  
Head, Training and Education Office, NCID  
Head, Singapore ID Clinical Research Network (SCRN), NCID  
Senior consultant, Department of Infectious Diseases (ID), TTSH  
Associate professor, Yong Loo Lin School of Medicine, NUS  
Associate professor, Lee Kong Chian School of Medicine, NTU

On 21 Feb 2020, at 11:40 PM, Dale Fisher <(b) (6)> wrote:

Hi David;

Cliff has some ideas

---

**From:** David Lye Chien Boon (NCID) <(b) (6)>  
**Sent:** Friday, 21 February 2020 10:42 PM  
**To:** Shawn Vasoo (NCID) <(b) (6)>  
**Cc:** Dale Fisher <(b) (6)> (b) (6) Louis Chai  
<(b) (6) Marimuthu Kalisvar (NCID) <(b) (6) Hsu Li Yang  
<(b) (6) Catherine WM ONG (NUHS) <(b) (6)>  
**Subject:** Re: clinical trial registered

- External Email -

(b) (5)

With warm regards,

David Lye FRACP FAMS FRCP  
Director, ID Research and Training Office (IDRTO), National Centre for Infectious Diseases (NCID)  
Head, Training and Education Office, NCID  
Head, Singapore ID Clinical Research Network (SCRN), NCID  
Senior consultant, Department of Infectious Diseases (ID), TTSH  
Associate professor, Yong Loo Lin School of Medicine, NUS  
Associate professor, Lee Kong Chian School of Medicine, NTU

On 21 Feb 2020, at 10:37 PM, Shawn Vasoo (NCID) <[REDACTED]> (b) (6) wrote:

(b) (5)

Sent from my iPhone

On 21 Feb 2020, at 8:35 PM, Dale Fisher <[REDACTED]> (b) (6) wrote:

(b) (5)

(b) (5)

**From:** David Lye Chien Boon (NCID) (b) (6)

**Sent:** Friday, 21 February 2020 8:27 PM

**To:** Shawn Vasoo (NCID) (b) (6)

**Cc:** Dale Fisher <(b) (6)> (b) (6); Louis Chai  
<(b) (6)> Marimuthu Kalisvar (NCID) (b) (6); Hsu Li Yang  
<(b) (6)> Catherine WM ONG (NUHS) (b) (6)

**Subject:** Re: clinical trial registered

- External Email -

Hi Shawn

(b) (5)

With warm regards,

David Lye FRACP FAMS FRCP  
Director, ID Research and Training Office (IDRTO), National Centre for Infectious Diseases (NCID)  
Head, Training and Education Office, NCID  
Head, Singapore ID Clinical Research Network (SCRN), NCID  
Senior consultant, Department of Infectious Diseases (ID), TTSH  
Associate professor, Yong Loo Lin School of Medicine, NUS  
Associate professor, Lee Kong Chian School of Medicine, NTU

On 21 Feb 2020, at 8:14 PM, Shawn Vasoo (NCID) (b) (6) wrote:

(b) (5)

Shawn

Sent from my iPhone

On 21 Feb 2020, at 7:58 PM, Dale Fisher <(b) (6)> wrote:

<image75a4f4.GIF>

Thought you might like to see this list... (b) (5) ....a few seem interesting

---

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<新型冠状病毒肺炎临床研究索引（更新至北京时间2020年2月21日下午13时44分）.xlsx>

---

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Important: This email is confidential and may be privileged. If you are not the intended recipient, please delete it and notify us immediately; you should not copy or use it for any purpose, nor disclose its contents to any other person. Thank you.

**From:** Eckmanns, Tim  
**Sent:** Fri, 21 Feb 2020 13:56:42 +0000  
**To:** GALEA, Gauden; DRURY, Patrick  
Anthony (b) (6) (b) (6) (b) (6) (b) (6)  
; (b) (6) (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID); Lane, Cliff (NIH/NIAID)  
[E]; (b) (6)  
**Cc:** AYLWARD, Raymond Bruce J.; XING, Jun; Dr VAN KERKHOVE, Maria; PANG,  
Xinxin; AL-SHORBAJI, Farah; UMALI DALANGIN, Khristeen; HAN, Mansuk Daniel; GREIN,  
Thomas; MAHAMUD, Abdi Rahman  
**Subject:** AW: WHO/GOARN: China mission - changes to return flights

Thank you all of you.  
Like allways I feel very sippoted  
Tim

Gesendet von meinem BlackBerry 10-Smartphone.  
Von: GALEA, Gauden  
Gesendet: Freitag, 21. Februar 2020 20:14  
An: DRURY, Patrick Anthony; (b) (6) (b) (6) (b) (6)  
(b) (6) (b) (6) (b) (6) (b) (6) (b) (6) (b) (6)  
; Eckmanns, Tim  
Cc: AYLWARD, Raymond Bruce J.; XING, Jun; Dr VAN KERKHOVE, Maria; PANG, Xinxin; AL-SHORBAJI,  
Farah; UMALI DALANGIN, Khristeen; HAN, Mansuk Daniel; GREIN, Thomas; MAHAMUD, Abdi Rahman  
Betreff: Re: WHO/GOARN: China mission - changes to return flights

Thanks to all from the China side too. Having you dealing with this really frees up the space to focus on the Wuhan component.

Warmly

~ Gauden

~~~~~  
Gauden Galea ??, WHO Representative for China  
Office: (b) (6) Mobile: (b) (6)

From: "DRURY, Patrick Anthony" <(b) (6)>  
Date: Friday, 21 February 2020 at 19:20  
To: "(b) (6) <(b) (6)>" (b) (6)  
<(b) (6)> (b) (6) " (b) (6) <(b) (6)> (b) (6)  
" (b) (6) <(b) (6)> (b) (6) <(b) (6)> (b) (6) " (b) (6)  
<(b) (6)> (b) (6) <(b) (6)> (b) (6) <(b) (6)> (b) (6) (b) (6)  
<(b) (6)> (b) (6) <(b) (6)> (b) (6) <(b) (6)> (b) (6)  
Cc: "Raymond Bruce Aylward," <(b) (6)> XING <(b) (6)> "Maria Van Kerkhove,"  
<(b) (6)> Xinxin Pang <(b) (6)> "Gauden (??) Galea" <(b) (6)> "AL-SHORBAJI, Farah" <(b) (6)> "UMALI DALANGIN, Khristeen" <(b) (6)> "HAN,



Mansuk Daniel" <[REDACTED] (b) (6) "GREIN, Thomas" <[REDACTED] (b) (6) "MAHAMUD, Abdi Rahman"  
<[REDACTED] (b) (6).

Subject: WHO/GOARN: China mission - changes to return flights

Dear colleagues,

We have received news from Bruce and WHO country team on the latest changes, the Wuhan deployment, and current planning on the final wrap up.

Khris and the HR/Travel team at HQ and WPRO are working on the changes, and rescheduling travel/flights.

Thanks for your continuing commitment and support.

best wishes,

Pat

Pat Drury

Deputy Incident Manager - COVID-19

Global Outbreak Alert and Response Network (GOARN)

WHO Health Emergency Preparedness and Response

[REDACTED] (b) (6)

**From:** Dale Fisher  
**Sent:** Fri, 21 Feb 2020 12:59:23 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Subject:** RE: Possible remdesivir study in Singapore

Yes David has his finger in all these pies 😊

cheers

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Friday, 21 February 2020 8:57 PM  
**To:** Dale Fisher <[REDACTED]> (b) (6)  
**Subject:** Possible remdesivir study in Singapore

- External Email -

FYI

Begin forwarded message:

**From:** "Beigel, John (NIH) [E]" <[REDACTED]> (b) (6)  
**Date:** February 21, 2020 at 8:54:44 PM GMT+8  
**To:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Dodd, Lori (NIH/NIAID) [E]" <[REDACTED]> (b) (6)  
**Subject: Re: Contact in Singapore**

David Lye . He is at the National Centre for Infectious Diseases and Tan Tock Seng Hospital. Per his note overnight (attached), he has already sent this to project manager (Singapore Clinical Research Institute), regulator (Health Science Authority, our FDA), ethics (Domain Specific Review Board) and funding agency (National Medical Research Council).

--

John Beigel, M.D.  
Associate Director for Clinical Research  
Division of Microbiology and Infectious Diseases  
National Institute of Allergy and Infectious Diseases (NIAID)  
Phone: [REDACTED] (b) (6)  
email: [REDACTED] (b) (6) <applewebdata://3656E43B-6CD6-45A9-8824-487FF017EE53/[REDACTED]> (b) (6)

-----Original Message-----

From: Cliff Lane <[REDACTED]> (b) (6)

Date: Friday, February 21, 2020 at 7:45 AM

To: John Beigel (b) (6), Lori Dodd <(b) (6)>

Subject: Contact in Singapore

What is the name of your contact in Singapore? (Colleague here from Singapore asking.)

Thanks

---

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**From:** Dale Fisher  
**Sent:** Fri, 21 Feb 2020 11:46:48 +0000  
**To:** DRURY, Patrick  
Anthony, (b) (6) (b) (6) (b) (6) (b) (6)  
(b) (6); Zhou, Weigong (CDC/DDID/NCIRD/ID); Lane, Cliff (NIH/NIAID) [E]; (b) (6)  
(b) (6)  
**Cc:** AYLWARD, Raymond Bruce J.; XING, Jun; Dr VAN KERKHOVE, Maria; PANG, Xinxin; GALEA, Gauden; AL-SHORBAJI, Farah; UMALI DALANGIN, Khristeen; HAN, Mansuk Daniel; GREIN, Thomas; MAHAMUD, Abdi Rahman  
**Subject:** RE: WHO/GOARN: China mission - changes to return flights

Thanks Pat, Khris, WPRO, CO and all!

We can feel the support.....logistics are very smooth allowing us to get on with the work. Its been great

Regards

Dale

---

**From:** DRURY, Patrick Anthony <(b) (6)>  
**Sent:** Friday, 21 February 2020 7:20 PM  
**To:** Dale Fisher <(b) (6)> (b) (6) (b) (6) (b) (6) (b) (6) (b) (6) (b) (6) (b) (6) (b) (6)  
(b) (6); (b) (6)  
**Cc:** AYLWARD, Raymond Bruce J. <(b) (6)> XING, Jun <(b) (6)> Dr VAN KERKHOVE, Maria <(b) (6)> PANG, Xinxin <(b) (6)> GALEA, Gauden <(b) (6)> AL-SHORBAJI, Farah <(b) (6)> UMALI DALANGIN, Khristeen <(b) (6)> HAN, Mansuk Daniel <(b) (6)> GREIN, Thomas <(b) (6)> MAHAMUD, Abdi Rahman <(b) (6)>  
**Subject:** WHO/GOARN: China mission - changes to return flights

- External Email -

Dear colleagues,

We have received news from Bruce and WHO country team on the latest changes, the Wuhan deployment, and current planning on the final wrap up.

Khris and the HR/Travel team at HQ and WPRO are working on the changes, and rescheduling travel/flights.

Thanks for your continuing commitment and support.

best wishes,

Pat

Pat Drury

Deputy Incident Manager – COVID-19

Global Outbreak Alert and Response Network (GOARN)

WHO Health Emergency Preparedness and Response

(b) (6)

---

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**From:** [REDACTED] (b) (6)  
**Sent:** Fri, 21 Feb 2020 09:58:39 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Simonds, R. J. (CDC/DDPHSIS/CGH/OD); Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Subject:** Re: Saturday phone call

Ok thanks Cliff for the update.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** 2/21/20 5:30 PM (GMT+08:00)  
**To:** [REDACTED] (b) (6)  
**Cc:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)> "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
**Subject:** Re: Saturday phone call

.....and I have been asked to extend in Guangdong until at least Monday night.  
Cliff

On Feb 21, 2020, at 4:36 PM, [REDACTED] (b) (6)  
[REDACTED] wrote:

Hi Weigong – Have you received final confirmation of your travel to Wuhan and any details about flight and hotel? As soon as you have these please do send along.

Best,  
[REDACTED] (b) (6)

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Sent:** Friday, February 21, 2020 10:03 AM  
**To:** [REDACTED] (b) (6) Lane, Cliff  
[REDACTED] (b) (6)  
**Cc:** (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Saturday phone call

I have just been asked to go to Wuhan with a 3 persons team including Bruce. It's pending China approval right now. If approved, we can leave anytime, so may not be available tomorrow.

Thanks,  
Weigong

---

**From:** [REDACTED] (b) (6)  
**Sent:** Friday, February 21, 2020 9:50:21 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** RE: Saturday phone call

Ok, got it. Will reach out later today and check in.

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Friday, February 21, 2020 9:34 AM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Saturday phone call

Thanks very much. This morning the status of the mission is evolving. At the moment tomorrow looks good for me. That could change in the next few hours.

Cliff

On Feb 21, 2020, at 9:31 AM, [REDACTED] (b) (6) wrote:

Good morning! I hope you both are doing well. Is tomorrow looking possible for a phone call while you are in transit? I have a conference call in line we can hold and utilize once I have an idea of timing.

Thanks again,  
[REDACTED] (b) (6)

---

**From:** [REDACTED] (b) (6)  
**Sent:** Thursday, February 20, 2020 11:35 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Cc:** (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** RE: Saturday phone call

Thanks to you both. Once you have your return flight info then I can send around a call-in line for us to use during your layover or another window of time also ok.

best,

(b) (6)

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)  
**Sent:** Wednesday, February 19, 2020 11:15 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** (b) (6); (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC) <(b) (6)>  
**Subject:** Re: Saturday phone call

Same here. One flight option (to Atlanta) goes via Seoul. If we both end up on that flight the layover might be a good time to call.

Cliff

On Feb 19, 2020, at 7:15 PM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, (b) (6) Sure. I plan to fly out on Saturday, but don't have the itinerary yet. Will let you know my availability once I know the departure time.

Thanks,  
Weigong

---

**From:** (b) (6)  
**Sent:** Wednesday, February 19, 2020 6:43:49 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] (b) (6) Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Saturday phone call

Good morning Weigong and Cliff,

I hope your travel to Chengdu and Shenzen went well yesterday. Wanted you to know that our US consulates in Chengdu and Guangzhou are aware of your plans in case you need anything locally.

Best of luck for your continued work today.

Could we hold some time this Saturday before your departure to the US to do a phone debrief?

Best,  
(b) (6)



Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Date:** 2/17/20 11:45 PM (GMT+08:00)  
**To:** "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(b) (6)" <(b) (6)>  
<(b) (6)> "Lane, Cliff" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Thanks, RJ!  
Sorry for not being able to make it.  
Best,  
Weigong

---

**From:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Sent:** Monday, February 17, 2020 8:42:54 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (b) (6)  
<(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Good luck. I hope you can get some rest!  
RJ

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Monday, February 17, 2020 6:43:37 PM  
**To:** (b) (6) Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Just to let you know our meeting may last a lot longer. Sorry.

Weigong

---

**From:** (b) (6)  
**Sent:** Monday, February 17, 2020 5:28:30 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Cliff and Weigong we will pick you up directly from the WHO offices so we can head directly to the restaurant. Look for a red Subaru Forester (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <(b) (6)>  
**Date:** 2/17/20 5:15 PM (GMT+08:00)  
**To:** "Lane, Cliff" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Cc:** "Parrish Fuentes, (b) (6)" "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Thanks. We are all 3 together and will meet you at either WHO or hotel.

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)  
**Sent:** Monday, February 17, 2020 5:13:43 PM  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I just spoke to (b) (6) The team is going straight to WHO for a 1 hour meeting now. (b) (6) was going to see about moving dinner to 7; pickup at 6:40 from the hotel.

On Feb 17, 2020, at 4:48 PM, Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Do you know what time the WHO meeting will be tonight?  
Alex

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)  
**Sent:** Monday, February 17, 2020 4:47 PM  
**To:** (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Leaving CDC now.

On Feb 17, 2020, at 12:57 PM, (b) (6) wrote:

Thanks Cliff. Given that, perhaps I should ask if the Ambassador can meet earlier, say 6pm or 5:30? In case you need to get back over to the WHO offices? What do you think?

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 12:45 PM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

At the moment it looks like we are scheduled to leave the China CDC, Changping Campus to return to the hotel at 4 PM. There is also a note that we will have a meeting tonight at WHO. The time for that meeting has not yet been determined.

Cliff

On Feb 17, 2020, at 7:36 AM, [REDACTED] (b) (6) wrote:

Thanks Cliff. Keep us posted. I have reached out to the Ambassador and DCM about a possible window this evening from 6pm onward.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** 2/17/20 12:37 AM (GMT+08:00)  
**To:** "Parrish Fuentes, [REDACTED] (b) (6)"  
**Cc:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)> "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

It looks like we will be at the CDC tomorrow afternoon with nothing after that. We will let you know as we get more detail.

Cliff

On Feb 16, 2020, at 4:47 PM, [REDACTED] (b) (6) wrote:

Thanks for the update. Will see you when you are done.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>  
Date: 2/16/20 4:24 PM (GMT+08:00)  
To: "[REDACTED] (b) (6)", "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)>, "Lane, Cliff" <[REDACTED] (b) (6)>  
Cc: "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
Subject: Re: Meet Sunday afternoon?

Just to let you know we are still in the meeting at WHO, so will be late. Will let you know when we are done.

Thanks,

Weigong

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)>, Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>, Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <[REDACTED] (b) (6)>  
Date: 2/16/20 8:33 AM (GMT+08:00)  
To: [REDACTED] (b) (6), "Lane, Cliff" <[REDACTED] (b) (6)>, "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>  
Cc: "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
Subject: Re: Meet Sunday afternoon?

My number is (b) (6).  
See you this afternoon.

RJ

---

**From:** (b) (6)  
**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6).gov>; Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.

Best,  
(b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)>  
**Date:** 2/16/20 6:58 AM (GMT+08:00)  
**To:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Cc:** "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(b) (6)" <(b) (6)>  
<(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

My mobile is (b) (6)

Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.  
I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change. What is the best number to reach you? My EOC mobile is (b) (6)

See you tomorrow.

Best,  
Weigong

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)  
**Sent:** Saturday, February 15, 2020 11:42:51 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (b) (6)  
<(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> wrote:  
>  
>  
> Hi and welcome to China. I hope you both arrived safely.  
>  
> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.  
>  
> Thanks and have a good sleep.  
>  
> RJ  
>

**From:** Dr VAN KERKHOVE, Maria  
**Sent:** Thu, 20 Feb 2020 23:59:49 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Cc:** AYLWARD, Raymond Bruce J.  
**Subject:** Re: Comments on research

Thank you Cliff, well received.

On 21 Feb 2020, at 02:26, Lane, Cliff (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Maria,

Attached (and pasted below) are some thoughts regarding research. I do not know how much, if any, of this is helpful for the report.

Comments for consideration on research activities

(b) (5)





<WHO-China joint mission research.docx>



**From:** SWAMINATHAN, Soumya  
**Sent:** Wed, 19 Feb 2020 18:26:37 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]; HENAO RESTREPO, Ana Maria; AYLWARD, Raymond Bruce J.; RYAN, Michael J.; Higgs, Elizabeth (NIH/NIAID) [E]  
**Subject:** RE: Master protocol therapeutics

Thanks Cliff, and Libby and colleagues at NIH for the incredible effort.  
Best  
Soumya

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Wednesday, February 19, 2020 4:39 PM  
**To:** HENAO RESTREPO, Ana Maria <(b) (6)> AYLWARD, Raymond Bruce J.  
<(b) (6)> SWAMINATHAN, Soumya <(b) (6)> RYAN, Michael J.  
<(b) (6)>  
**Subject:** Re: Master protocol therapeutics

Colleagues,

This is the most recent draft. An improved version will be ready in 1-2 days. (b) (5)

(b) (6)

Cliff

---

**From:** "HENAO RESTREPO, Ana Maria" <(b) (6)>  
**Date:** Wednesday, February 19, 2020 at 10:32 PM  
**To:** "AYLWARD, Raymond Bruce J." <(b) (6)> "Lane, Cliff (NIH/NIAID) [E]"  
<(b) (6)> "SWAMINATHAN, Soumya" <(b) (6)> Mike Ryan  
<(b) (6)>  
**Subject:** Master protocol therapeutics

Dear Bruce,

Thanks to the colleagues in NIH that based on the deliberations of the international group of experts have developed the full master protocol for therapeutics attached here.

We will have a teleconference with the clinical trials expert group this Friday to seek final suggestions on the protocol.

(b) (5)

A revised version will be shared on Monday.

Kind regards

Ana Maria on behalf of the team

Sent from my iPhone

Begin forwarded message:

**From:** "Higgs, Elizabeth (NIH/NIAID) [E]" <(b) (6)>  
**Date:** 19 February 2020 at 15:12:30 CET  
**To:** "HENA RESTREPO, Ana Maria" <(b) (6)> "GSELL, Pierre" <(b) (6)>  
Peter Smith <(b) (6)> "GSELL, Pierre" <(b) (6)> 曹彬  
<(b) (6)>, "Thomas R. Fleming" <(b) (6)> ilongini <(b) (6)> "Rob.  
Fowler@sunnybrook.ca" <(b) (6)>, Yaseen Arabi <(b) (6)>  
Steve Webb <(b) (6)>, Tansy Edwards <(b) (6)> "RIVEROS  
BALTA, Alina Ximena" <(b) (6)> "PREZIOSI, Marie-pierre" <(b) (6)>  
"SATHIYAMOORTHY, Vaseeharan" <(b) (6)> "COSTA, Alejandro Javier" <(b) (6)>  
"SALAMI, Kolawole" <(b) (6)> "DIAZ, Janet Victoria" <(b) (6)> "David Lye Chien Boon  
(NCID)" <(b) (6)>  
**Cc:** "Kerr, Lawrence (HHS/OS/OGA)" <(b) (6)> "Walker, Robert (OS/ASPR/BARDA)"  
<(b) (6)> "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)> "Beigel, John (NIH) [E]"  
<(b) (6)>  
**Subject: Re: 2019 nCoV Master Protocol drafting group - CALL tomorrow Wednesday at 12:00  
Geneva time**

Dear Colleagues,

Apologies in the delay from the NIAID end regarding a draft master protocol. We are hopeful that the attached protocol and consent reflects the collective input of this group. (b) (5)

I defer to Peter and the R&D BP team on next steps for discussion, forward implementation, etc. I'm sure there will be questions and suggestions.

Kind regards,  
Libby

Elizabeth S. Higgs, MD, DTMH, MIA  
Global Health Science Advisor  
Division of Clinical Research  
National Institute of Allergy and Infectious Diseases  
NIH, HHS, USG  
(b) (6)  
Skype: libbyhiggs2  
Cell: (b) (6)

---

**From:** Ana Maria Henaoretrepoa <(b) (6)>  
**Date:** Saturday, February 15, 2020 at 4:01 AM

**To:** "David Lye Chien Boon (NCID)" (b) (6), "GSELL, Pierre" <(b) (6)>  
**Cc:** "GSELL, Pierre" <(b) (6) 曹彬 (b) (6) Peter Smith  
<(b) (6) "Thomas R. Fleming" (b) (6) ilongini  
<(b) (6) John Beigel <(b) (6) " (b) (6)  
<(b) (6) "Rob. (b) (6) <(b) (6)>, Yaseen  
Arabi <(b) (6) Steve Webb <(b) (6) Tansy Edwards  
<(b) (6) "RIVEROS BALTA, Alina Ximena" <(b) (6) "PREZIOSI,  
Marie-pierre" <(b) (6) Vaseeharan SATHIYAMOORTHY <(b) (6)  
"COSTA, Alejandro Javier" <(b) (6) "SALAMI, Kolawole" (b) (6), "DIAZ,  
Janet Victoria" <(b) (6)  
**Subject:** Re: 2019 nCoV Master Protocol drafting group - CALL tomorrow Wednesday at 12:00  
Geneva time

Dear All,



Kind regards

Ana Maria

**From:** HENAO RESTREPO, Ana Maria  
**Sent:** Wed, 19 Feb 2020 14:29:27 +0000  
**To:** AYLWARD, Raymond Bruce J.; Lane, Cliff (NIH/NIAID) [E]; SWAMINATHAN, Soumya; RYAN, Michael J.  
**Subject:** Master protocol therapeutics  
**Attachments:** PIND 147771 SN0002 5.3.5.1 20-0006 International Informed Consent Form - v1.0, 18Feb2020.eCTD.docx, ATT00001.htm, PIND 147771 SN0002 5.3.5.1 Protocol No. 20-0006 - v1.0 18Feb2020.eCTD.docx, ATT00002.htm

Dear Bruce,

Thanks to the colleagues in NIH that based on the deliberations of the international group of experts have developed the full master protocol for therapeutics attached here.

(b) (5)

A revised version will be shared on Monday.

Kind regards

Ana Maria on behalf of the team

Sent from my iPhone

Begin forwarded message:

**From:** "Higgs, Elizabeth (NIH/NIAID) [E]" <(b) (6)>  
**Date:** 19 February 2020 at 15:12:30 CET  
**To:** "HENAO RESTREPO, Ana Maria" <(b) (6)> "GSELL, Pierre"  
<(b) (6) Peter Smith <(b) (6) "GSELL, Pierre"  
<(b) (6) 曹彬 <(b) (6) "Thomas R. Fleming" <(b) (6)  
ilongini <(b) (6) "Rob." <(b) (6) <(b) (6)  
Yaseen Arabi <(b) (6) Steve Webb <(b) (6) Tansy  
Edwards <(b) (6) "RIVEROS BALTA, Alina Ximena"  
<(b) (6) "PREZIOSI, Marie-pierre" <(b) (6) "SATHIYAMOORTHY,  
Vaseeharan" <(b) (6) "COSTA, Alejandro Javier" <(b) (6) "SALAMI,  
Kolawole" <(b) (6) "DIAZ, Janet Victoria" <(b) (6) "David Lye Chien  
Boon (NCID)" <(b) (6)  
**Cc:** "Kerr, Lawrence (HHS/OS/OGA)" <(b) (6) "Walker, Robert  
(OS/ASPR/BARDA)" <(b) (6) "Lane, Cliff (NIH/NIAID) [E]"  
<(b) (6) "Beigel, John (NIH) [E]" <(b) (6)  
**Subject:** Re: 2019 nCoV Master Protocol drafting group - CALL tomorrow Wednesday  
at 12:00 Geneva time

Dear Colleagues,

Apologies in the delay from the NIAID end regarding a draft master protocol. We are hopeful that the attached protocol and consent reflects the collective input of this group. (b) (5)

I defer to Peter and the R&D BP team on next steps for discussion, forward implementation, etc. I'm sure there will be questions and suggestions.  
Kind regards,  
Libby

Elizabeth S. Higgs, MD, DTMH, MIA  
Global Health Science Advisor  
Division of Clinical Research  
National Institute of Allergy and Infectious Diseases  
NIH, HHS, USG  
(b) (6)  
Skype: libbyhiggs2  
Cell: (b) (6)

---

**From:** Ana Maria Henaoretrepoa <(b) (6)>  
**Date:** Saturday, February 15, 2020 at 4:01 AM  
**To:** "David Lye Chien Boon (NCID)" <David\_Lye@ncid.sg>, "GSELL, Pierre" <(b) (6)>  
**Cc:** "GSELL, Pierre" <(b) (6)> 曹彬 <(b) (6)> Peter Smith <(b) (6)> "Thomas R. Fleming" <(b) (6)> ilongini <(b) (6)> John Beigel <(b) (6)> "Rob. Fowler@sunnybrook. ca" <(b) (6)> Yaseen Arabi <(b) (6)> Steve Webb <(b) (6)> Tansy Edwards <(b) (6)> "RIVEROS BALTA, Alina Ximena" <(b) (6)> "PREZIOSI, Marie-pierre" <(b) (6)> Vaseeharan SATHIYAMOORTHY <(b) (6)> "COSTA, Alejandro Javier" <(b) (6)> "SALAMI, Kolawole" <(b) (6)> "DIAZ, Janet Victoria" <(b) (6)>  
**Subject:** Re: 2019 nCoV Master Protocol drafting group - CALL tomorrow Wednesday at 12:00 Geneva time

Dear All,

FYI – please find attached the latest study synopsis for Phase 2b/Phase 3 treatment trial, on the basis of the WHO Blueprint WG of Clinical Trials and with support from experts in this group as well.

(b) (5)

(b) (5)

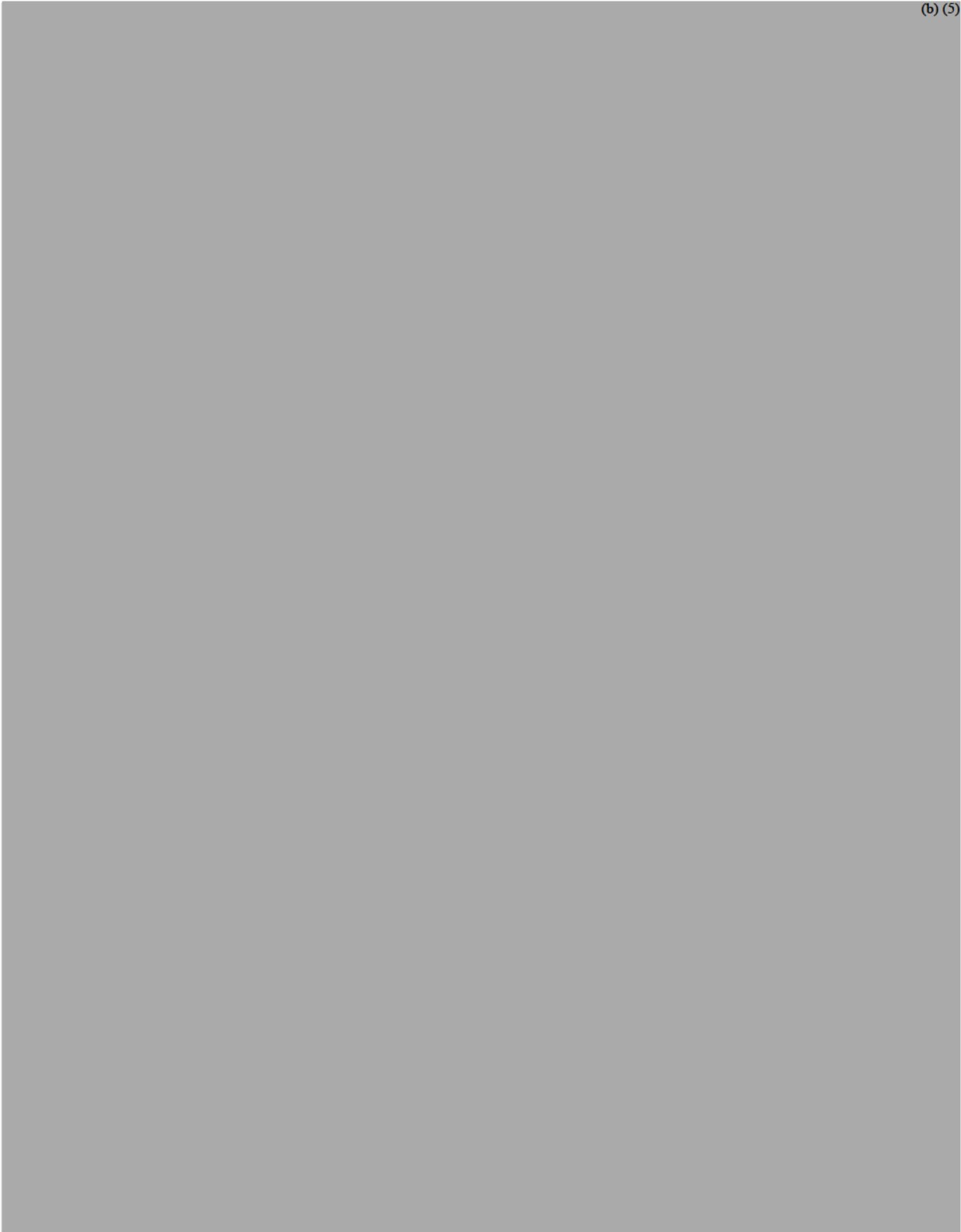
Kind regards

Ana Maria

This is a template for an informed consent form that should be modified for local requirements

Version 1.0  
18 February 2020

(b) (5)



This is a template for an informed consent form that should be modified for local requirements

Version 1.0  
18 February 2020

(b) (5)



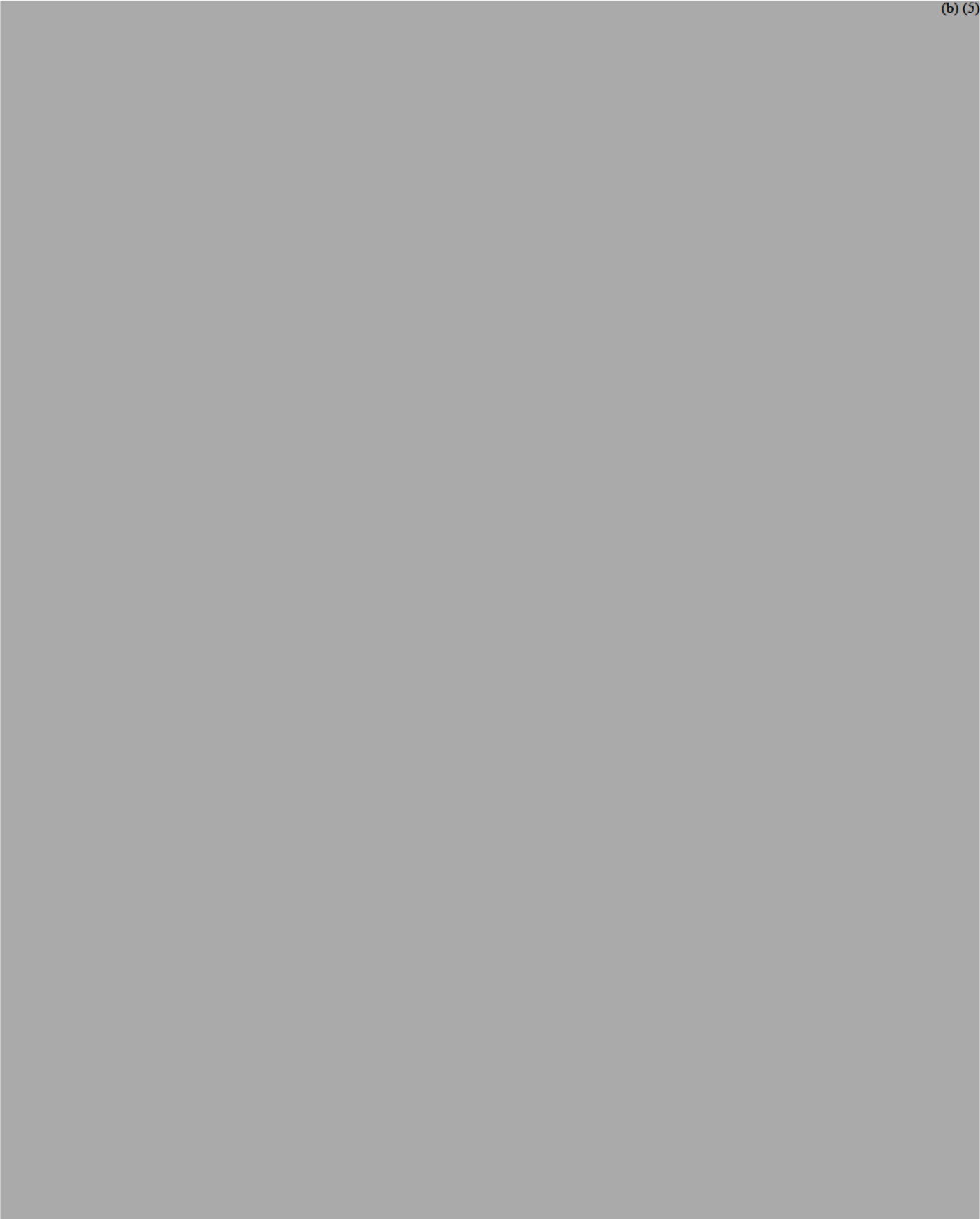


This is a template for an informed consent form that should be modified for local requirements

Version 1.0  
18 February 2020

(b) (5)







(b) (5)

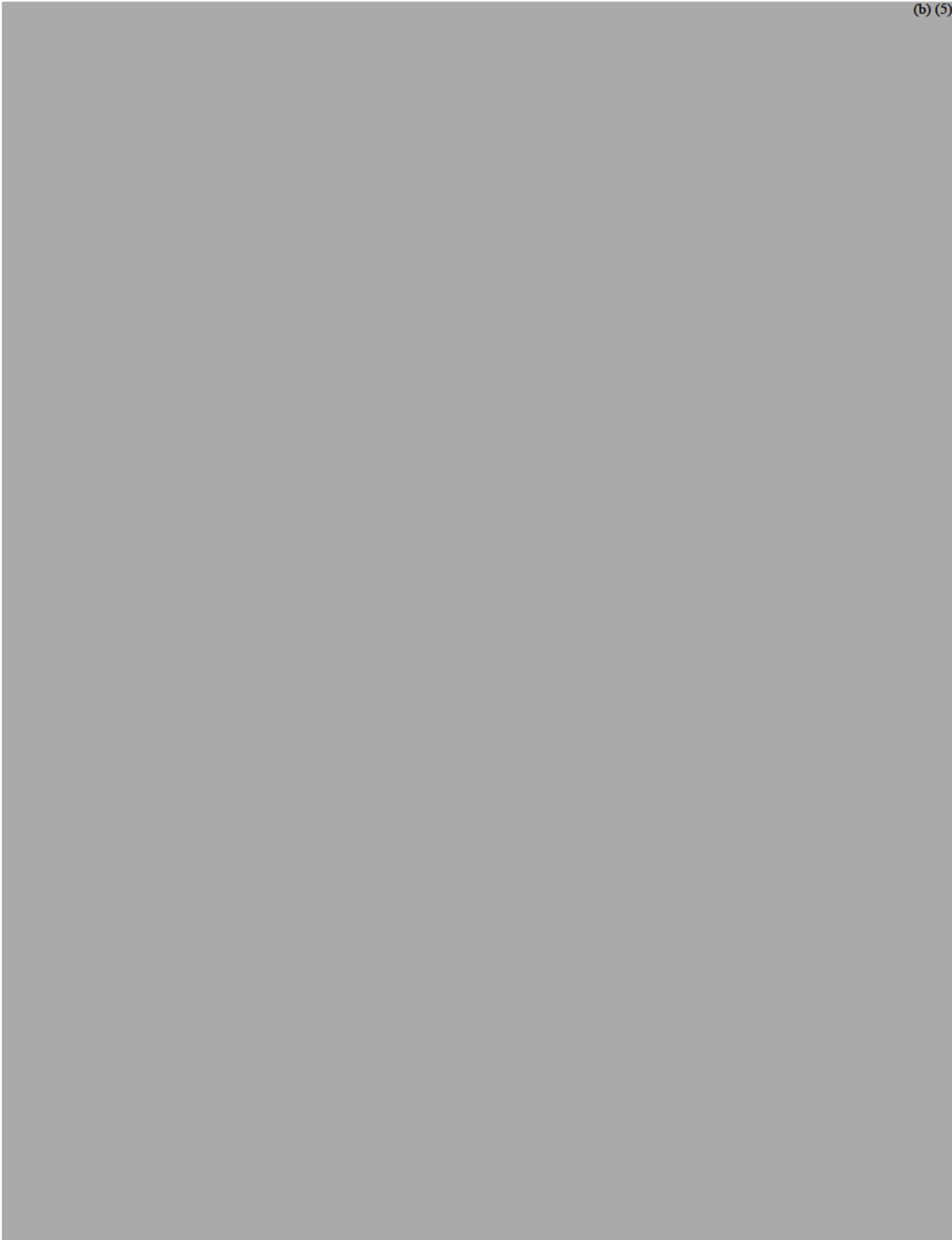


This is a template for an informed consent form that should be modified for local requirements

Version 1.0  
18 February 2020

(b) (5)



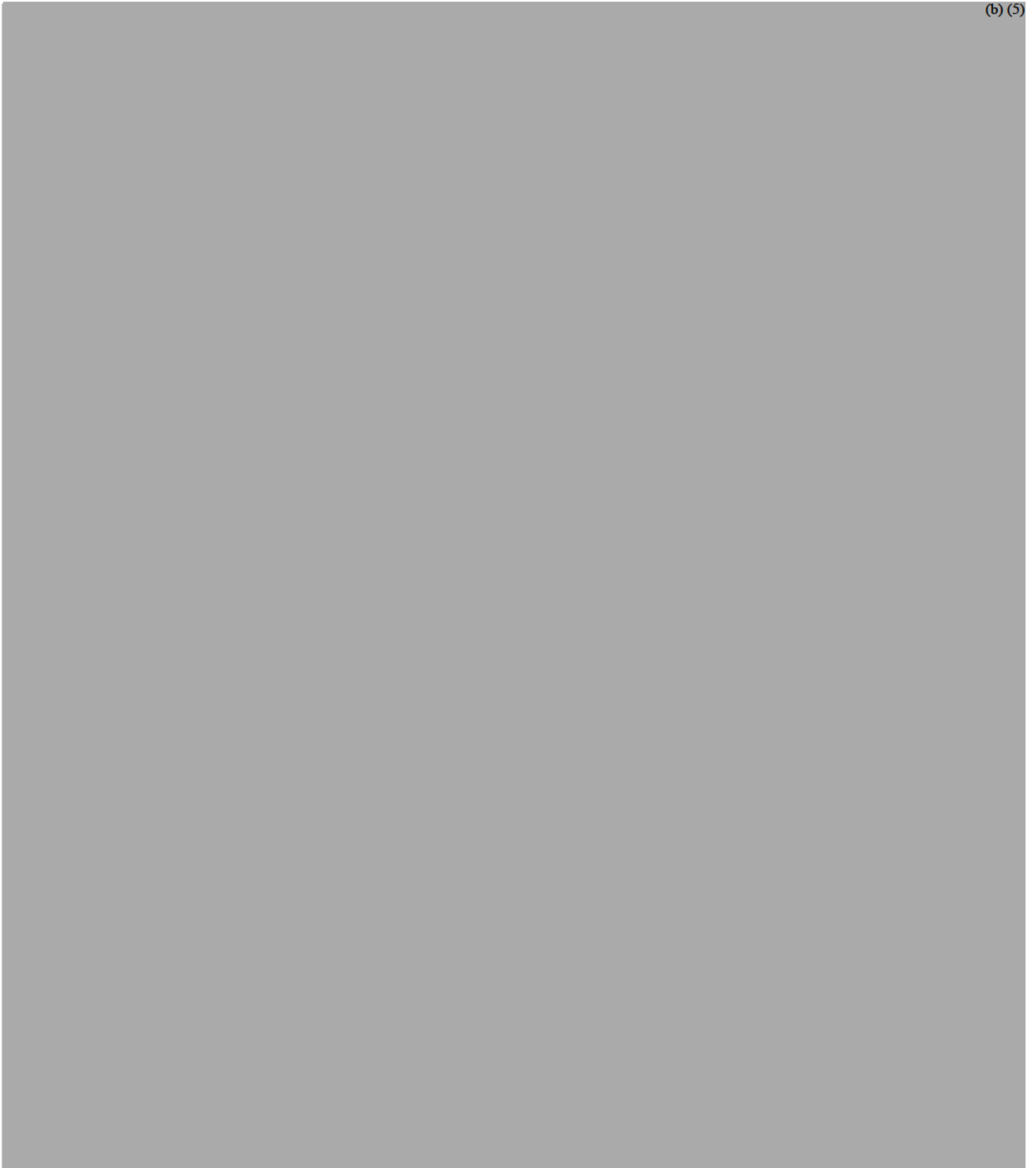


This is a template for an informed consent form that should be modified for local requirements

Version 1.0  
18 February 2020

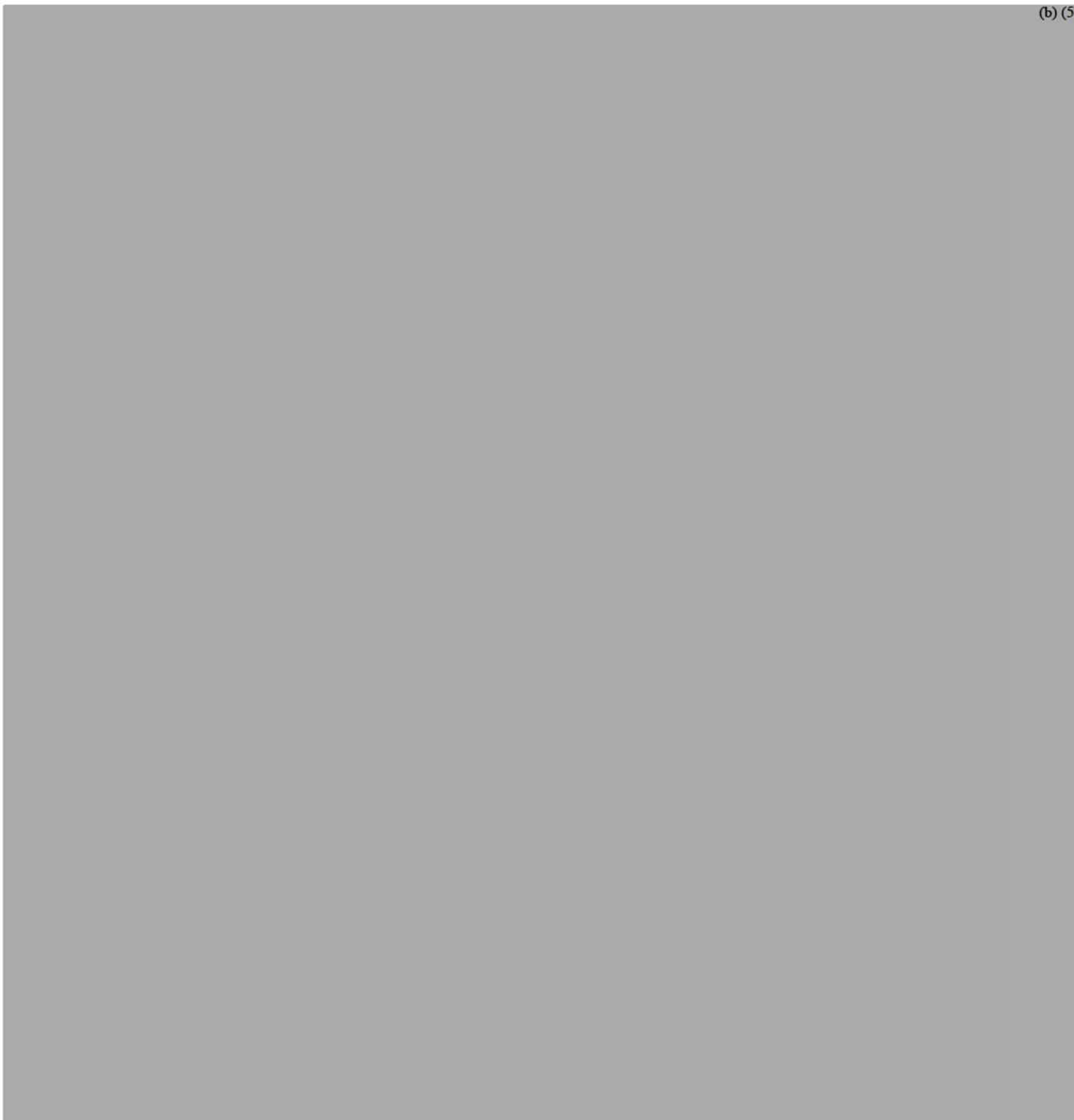
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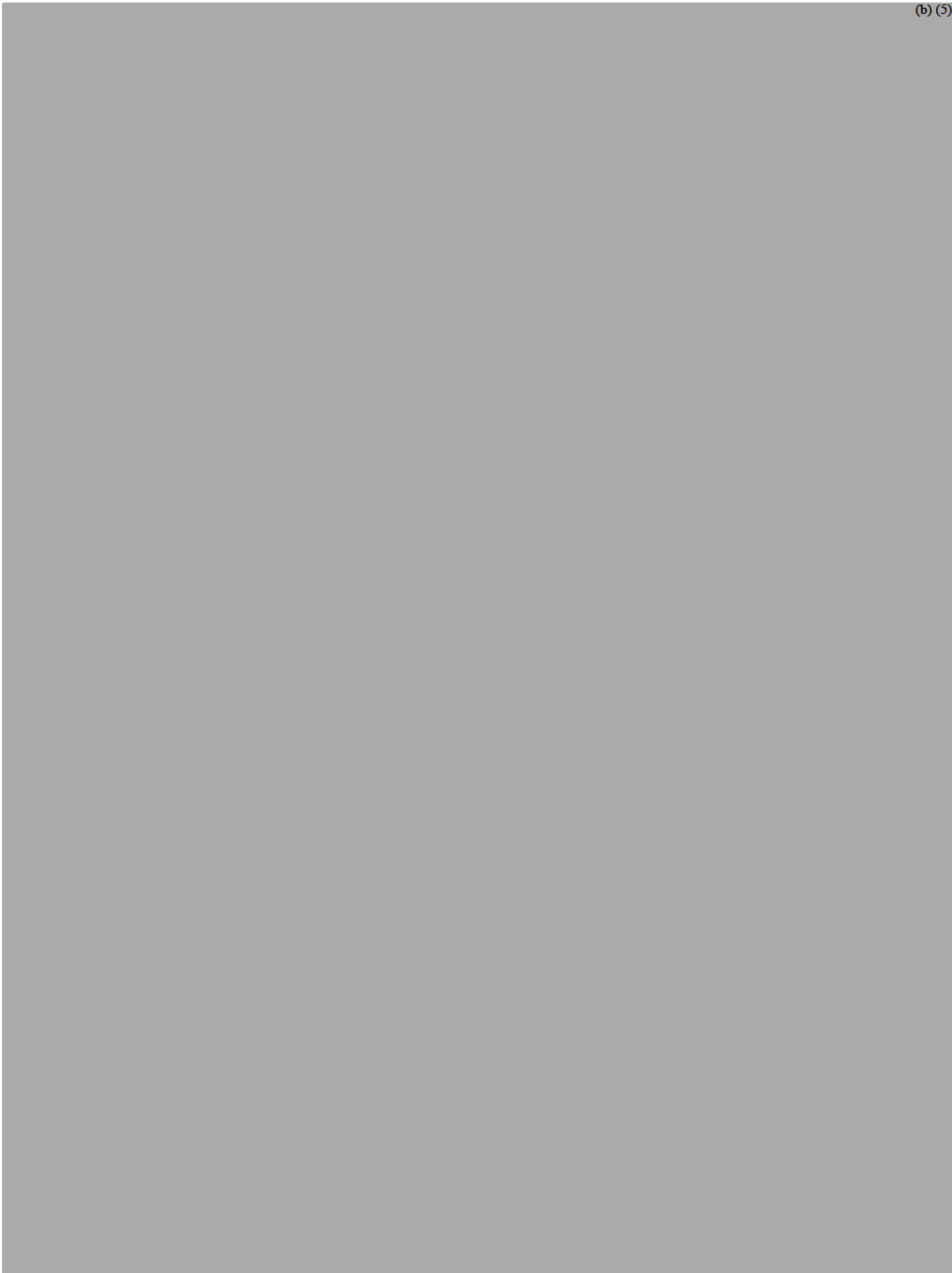


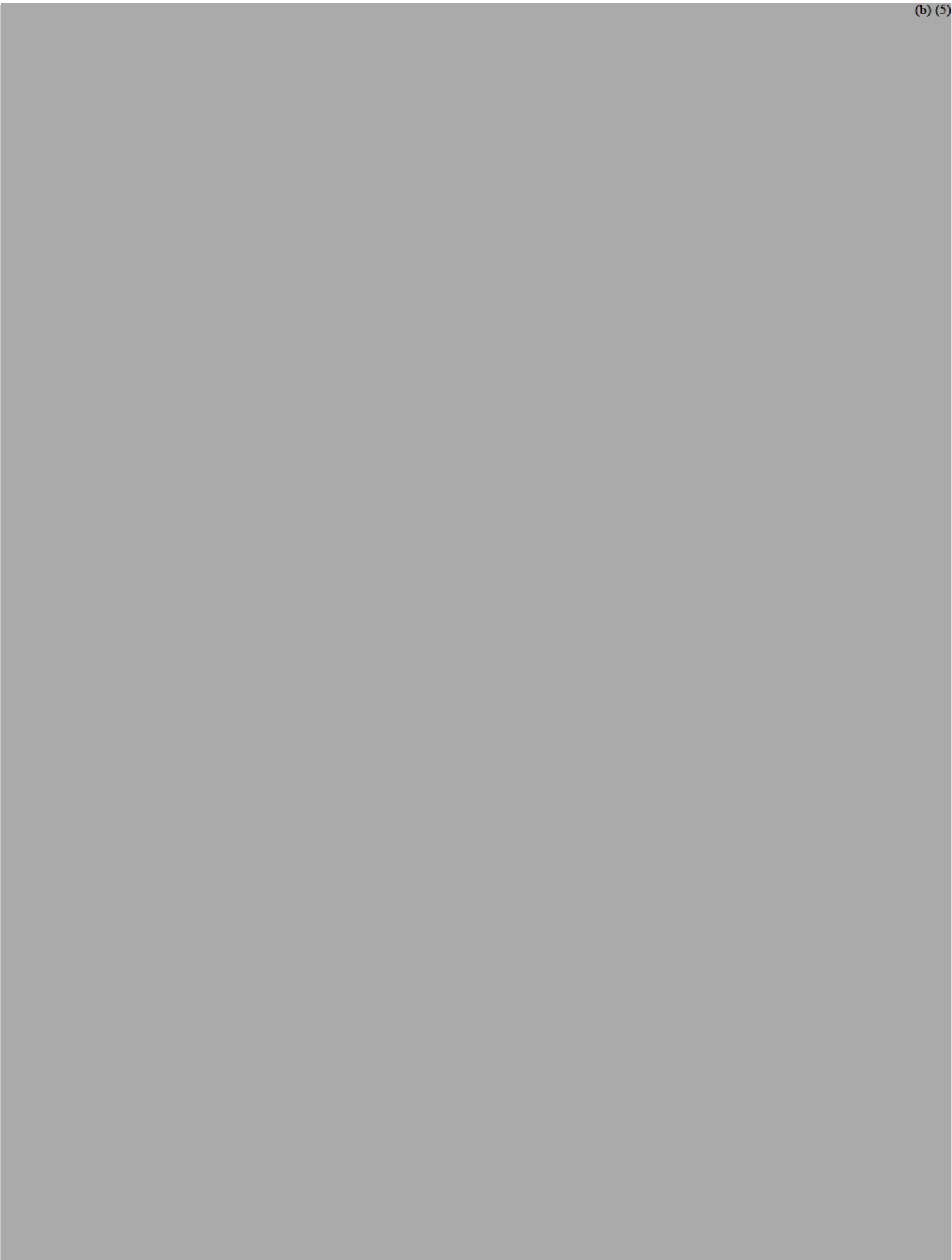




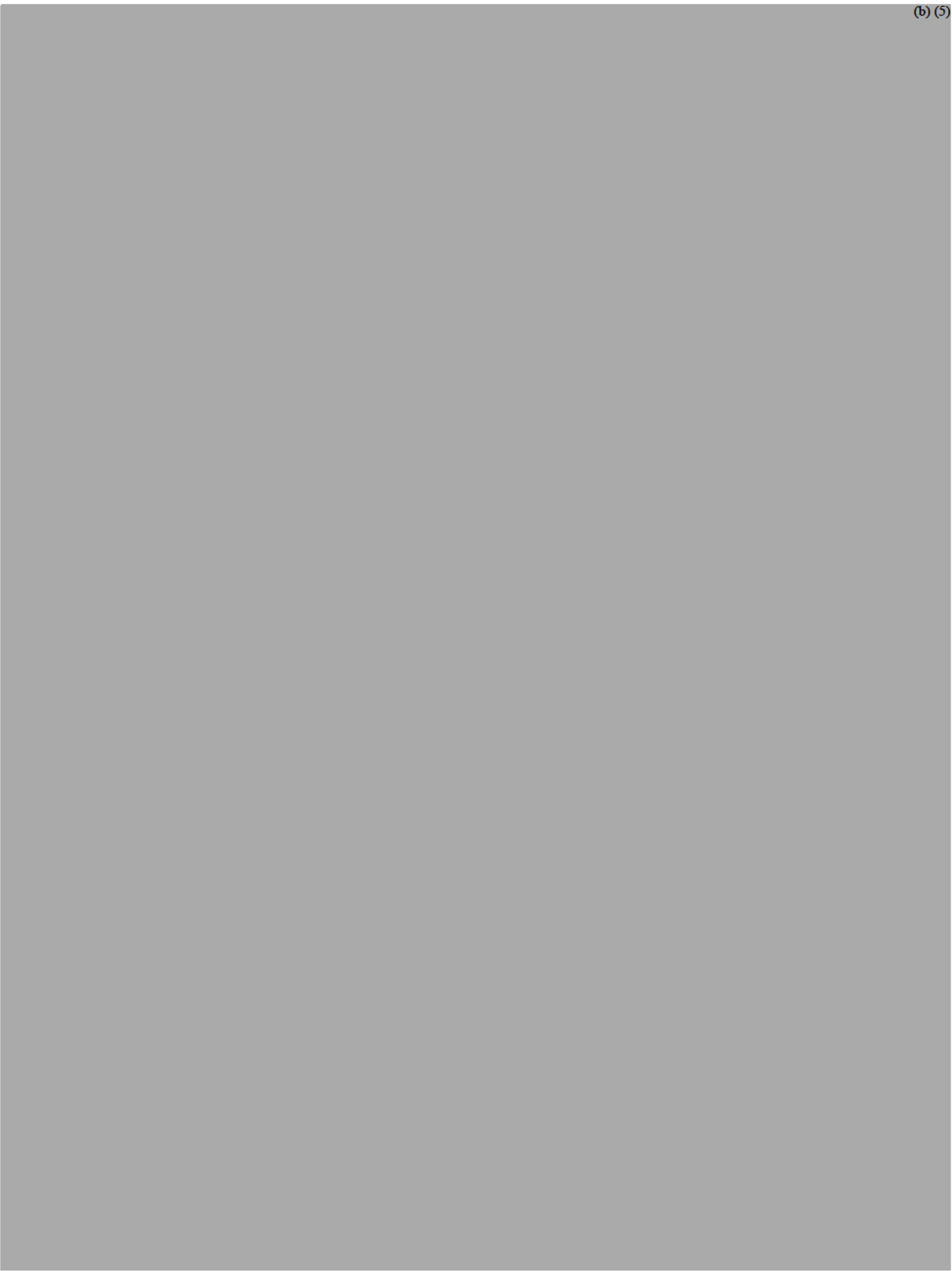


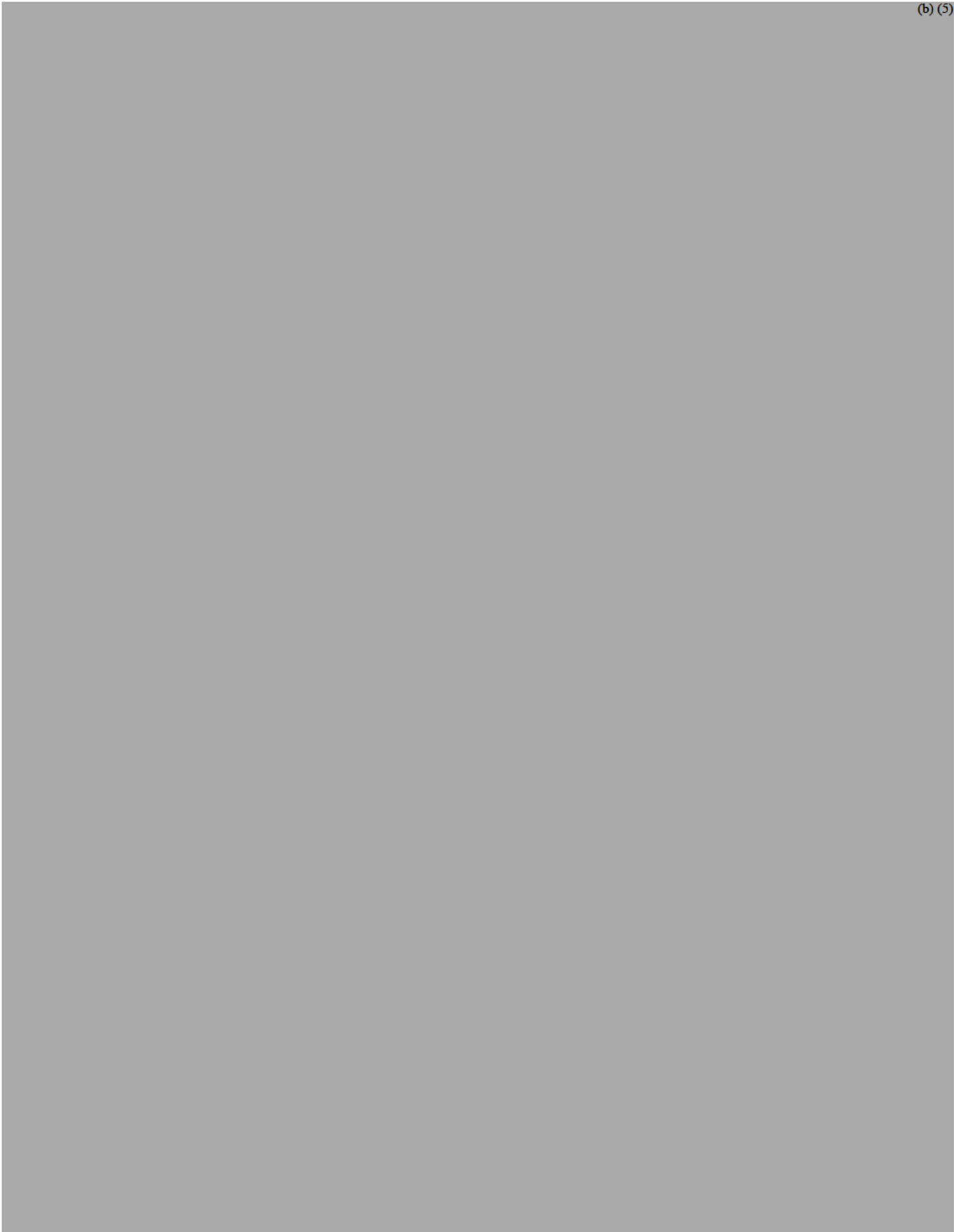




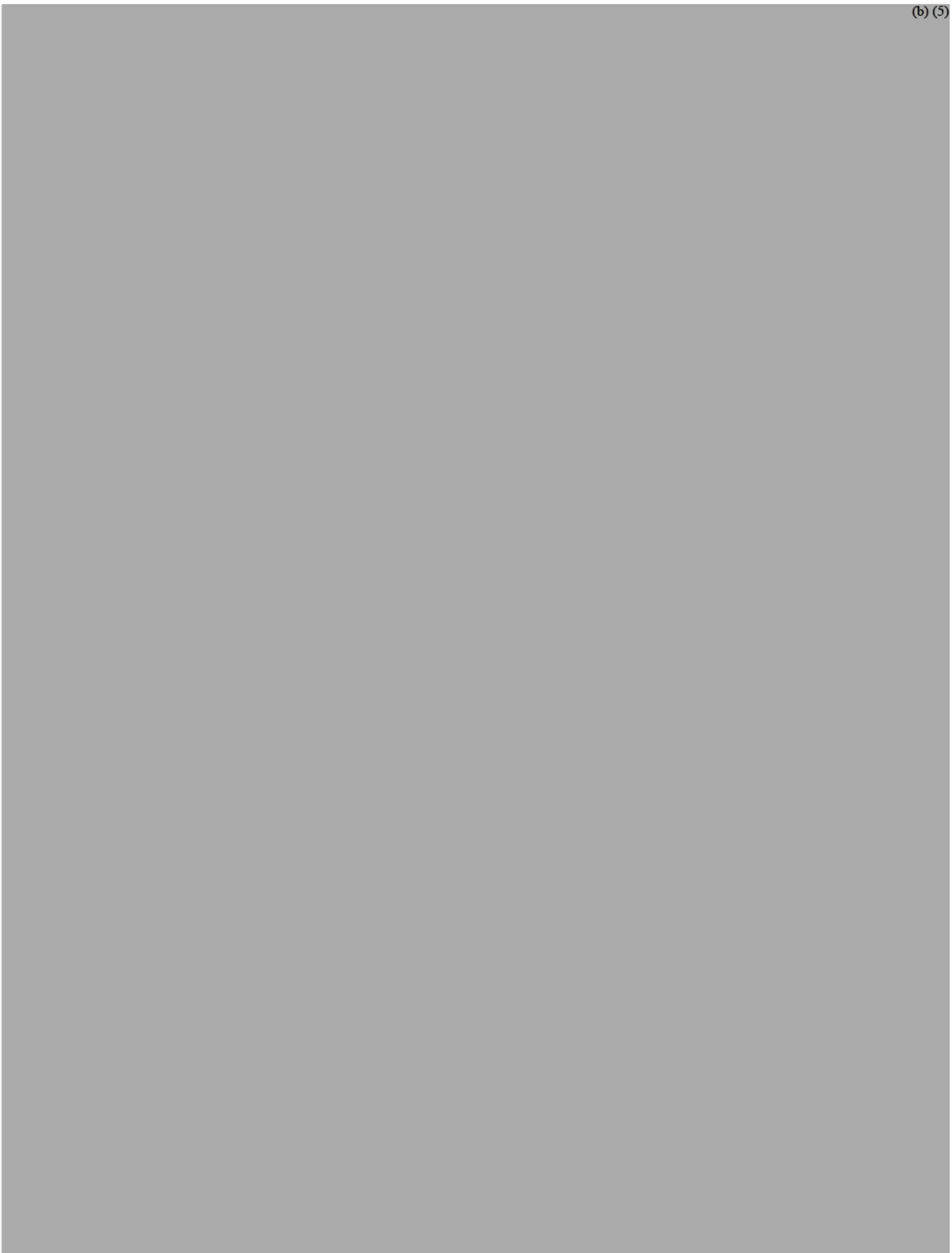






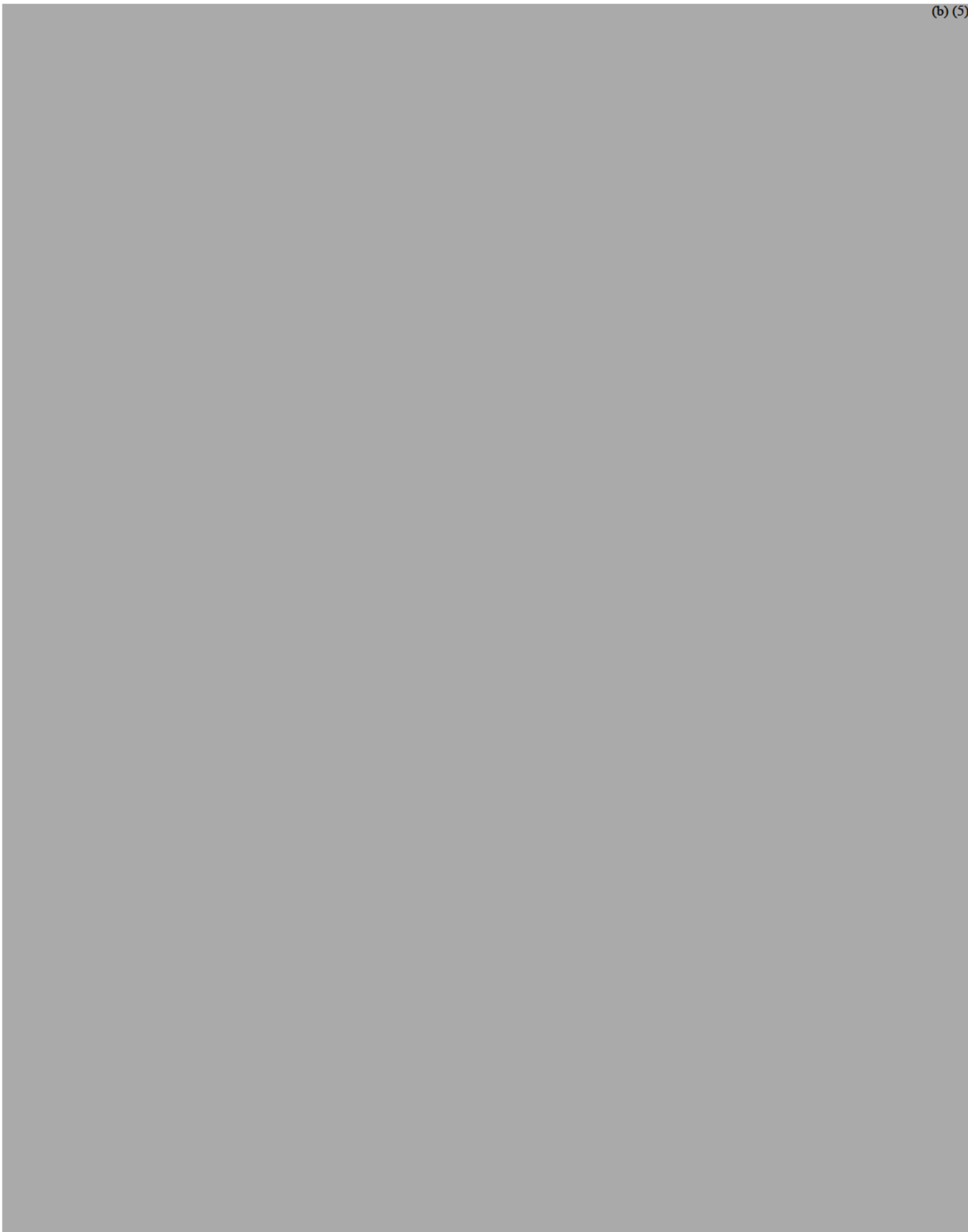




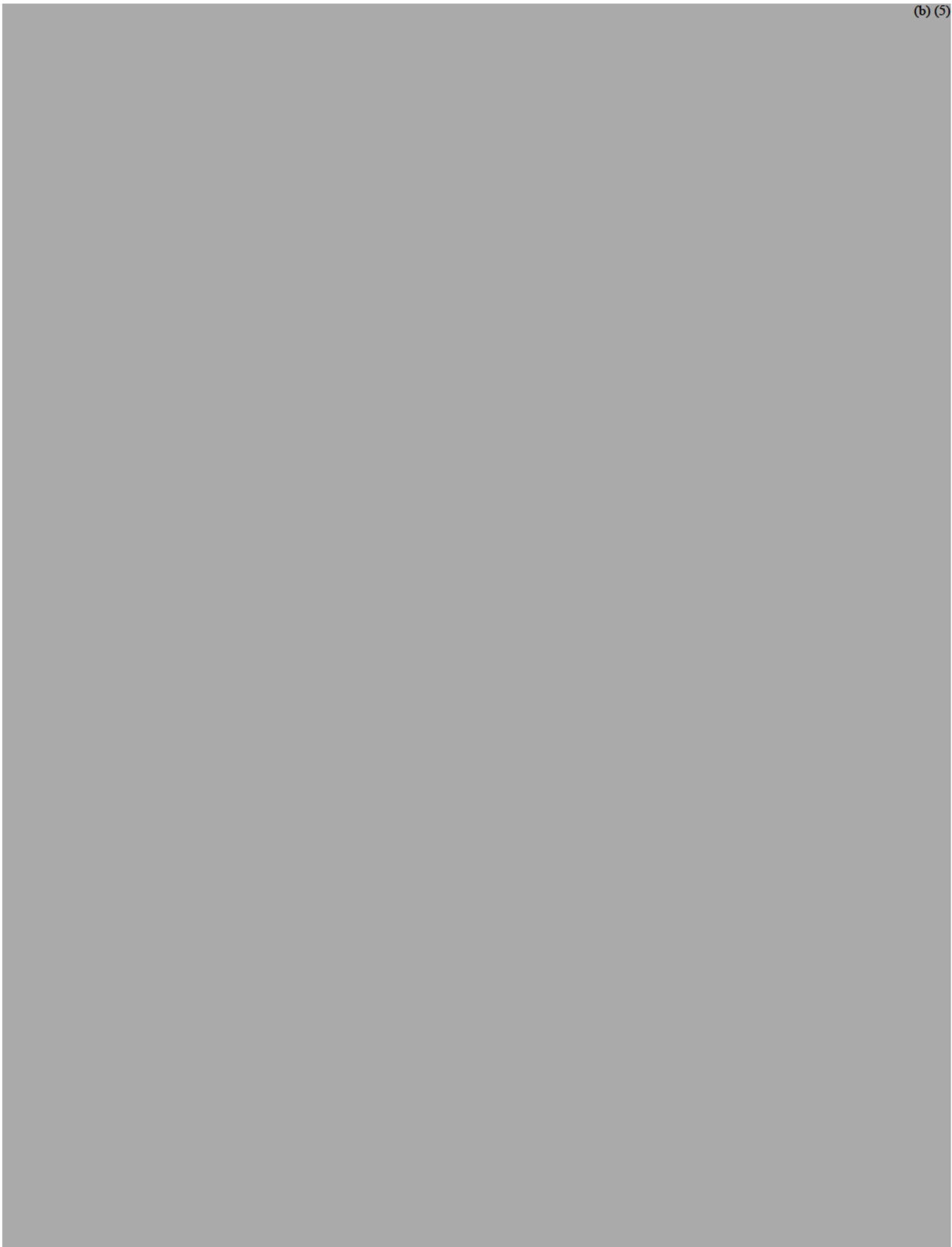








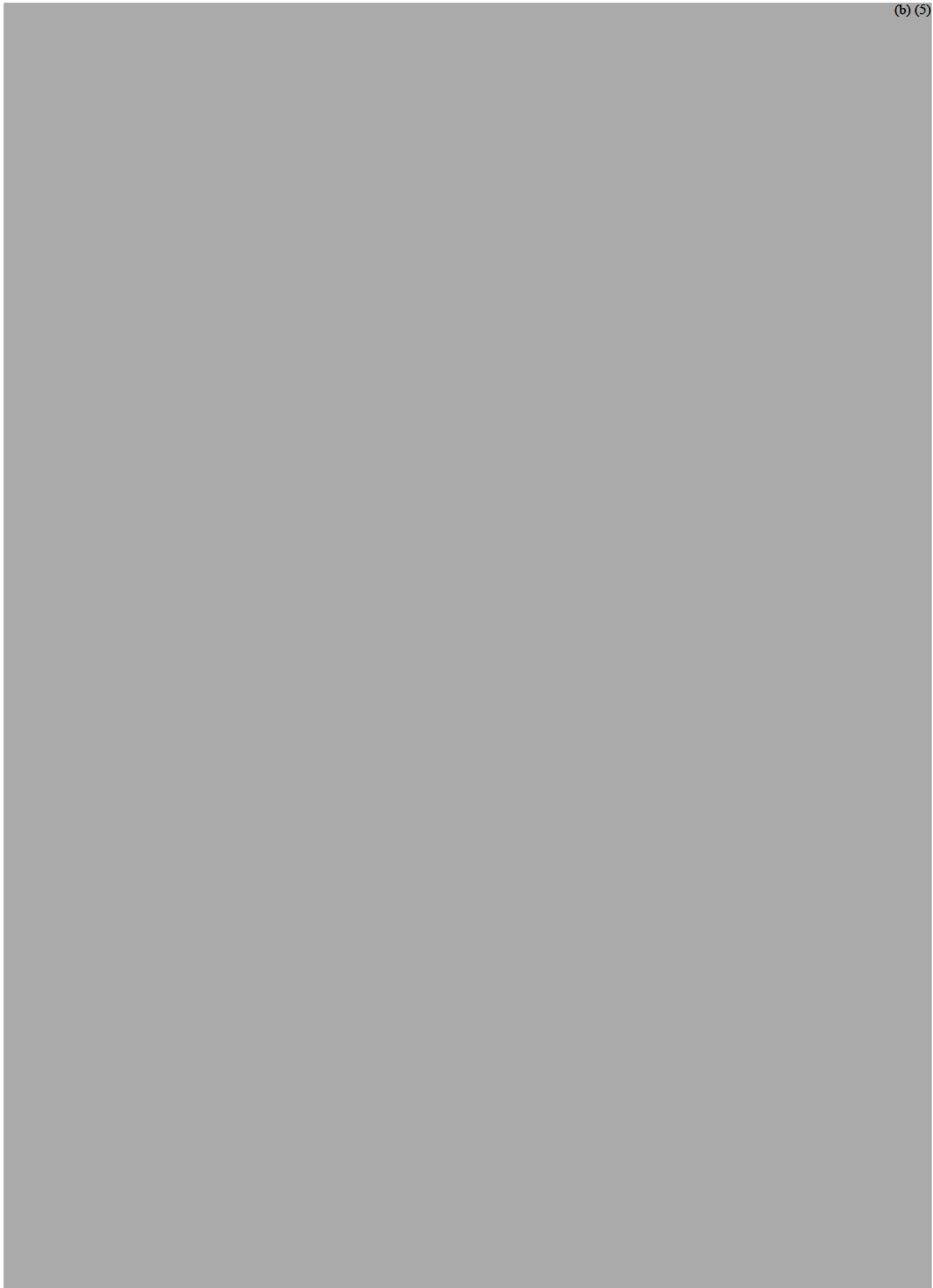




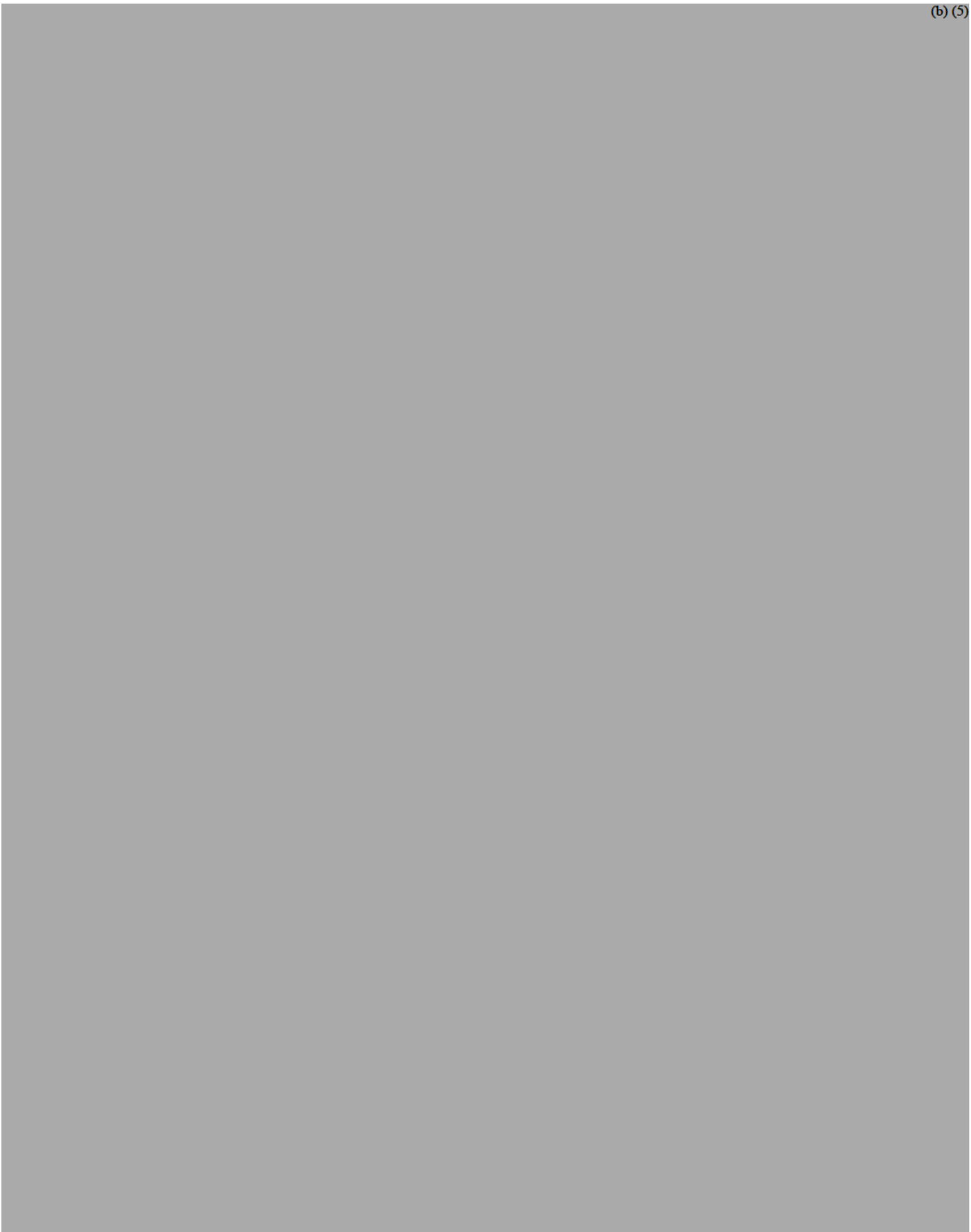


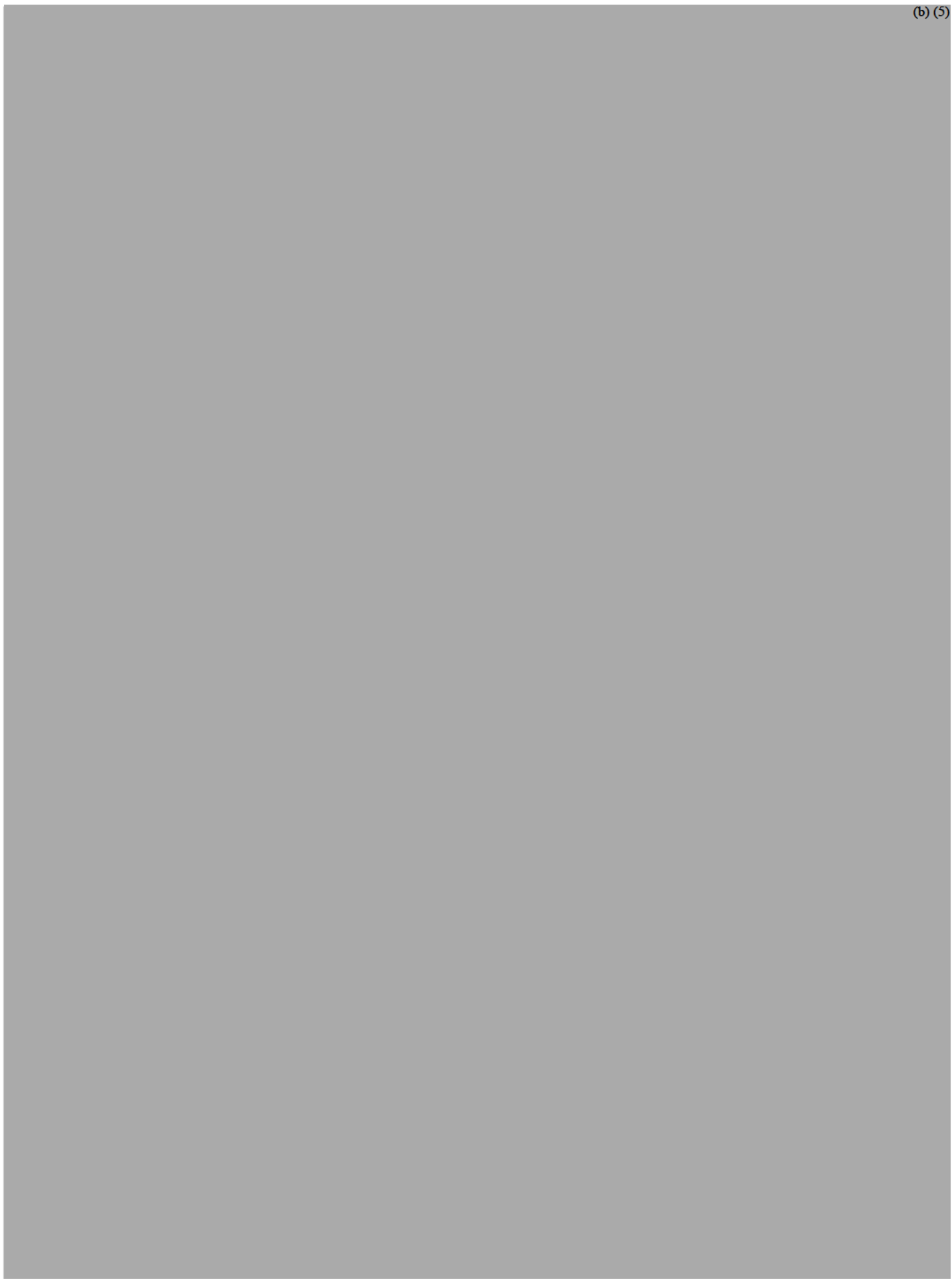




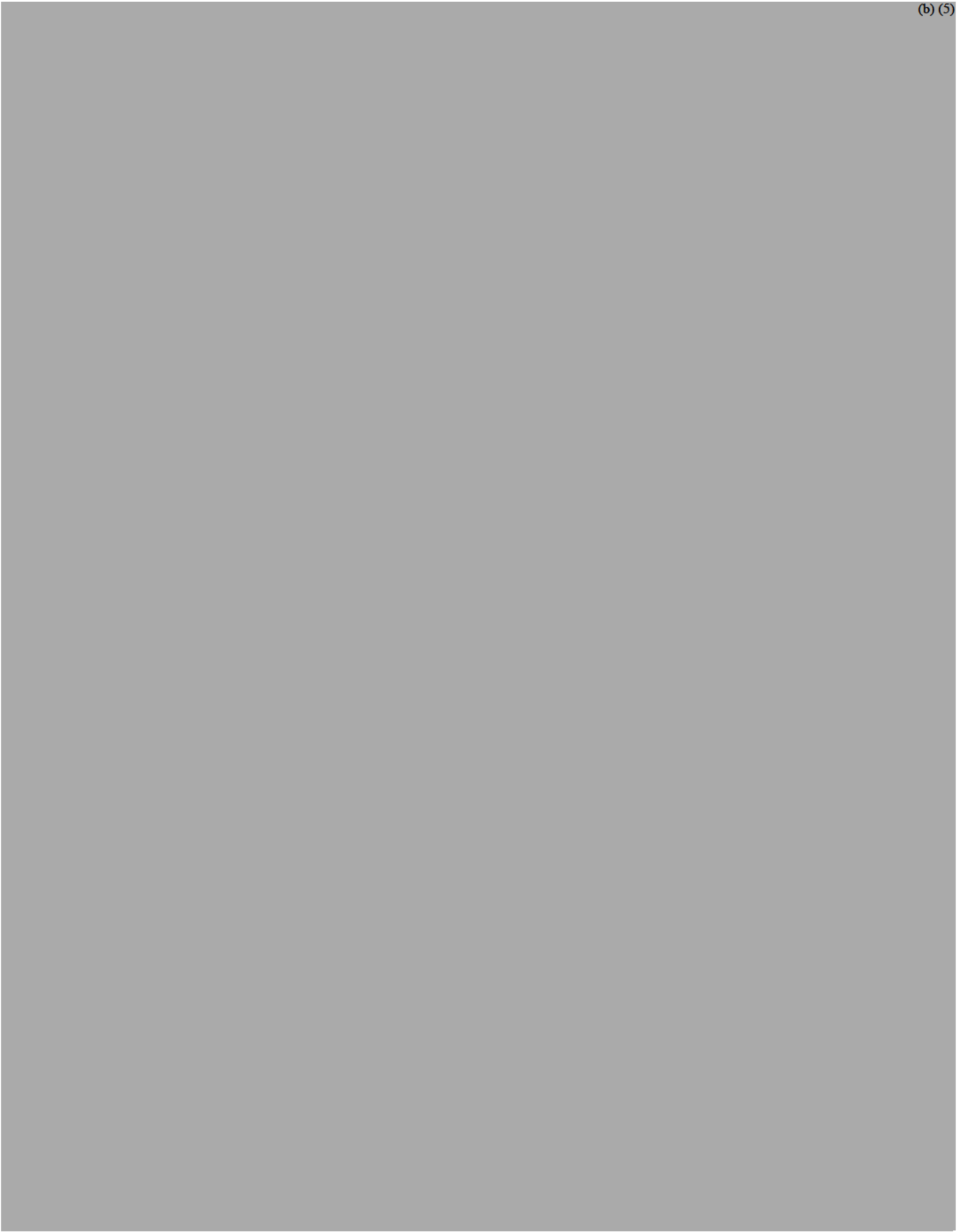


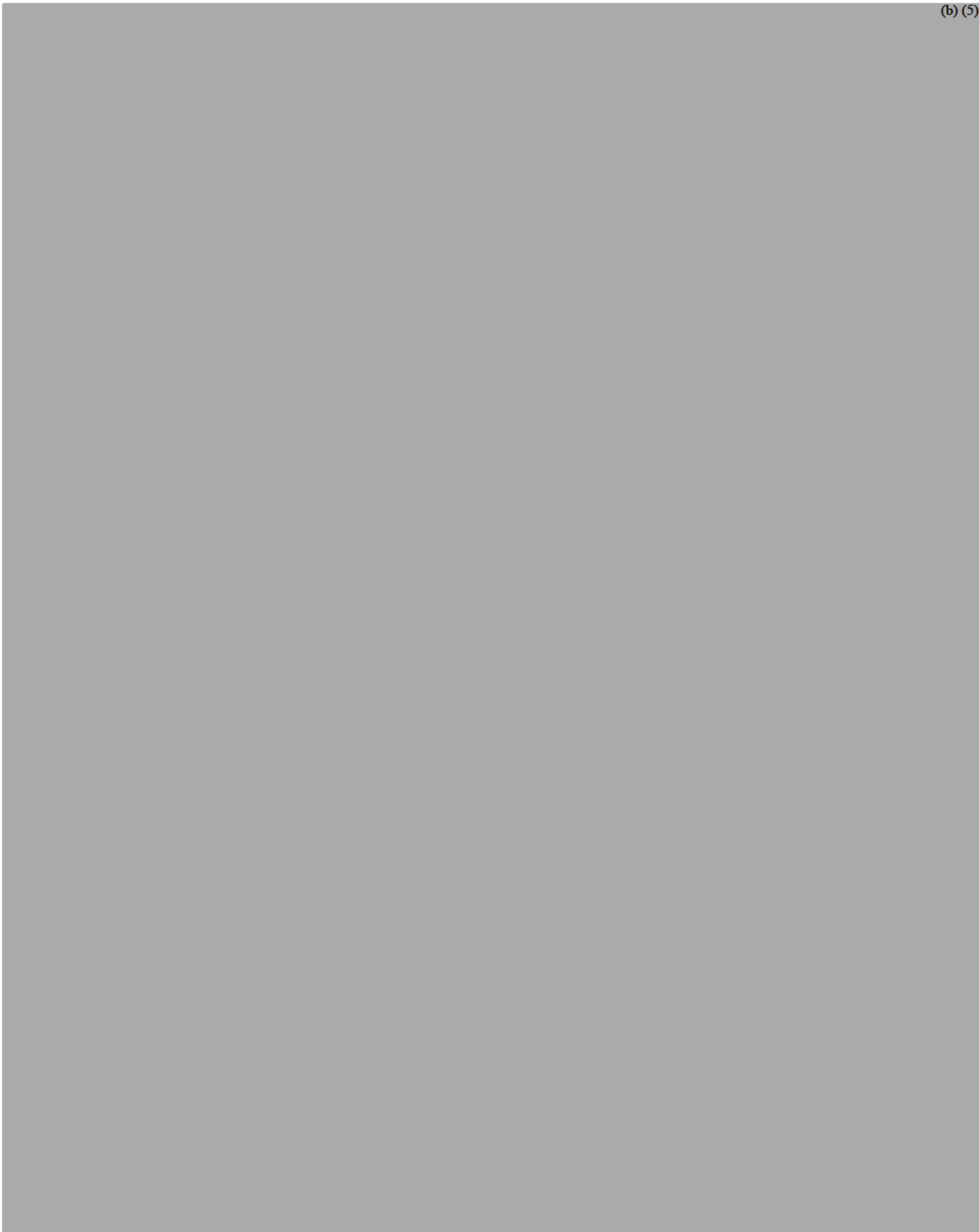






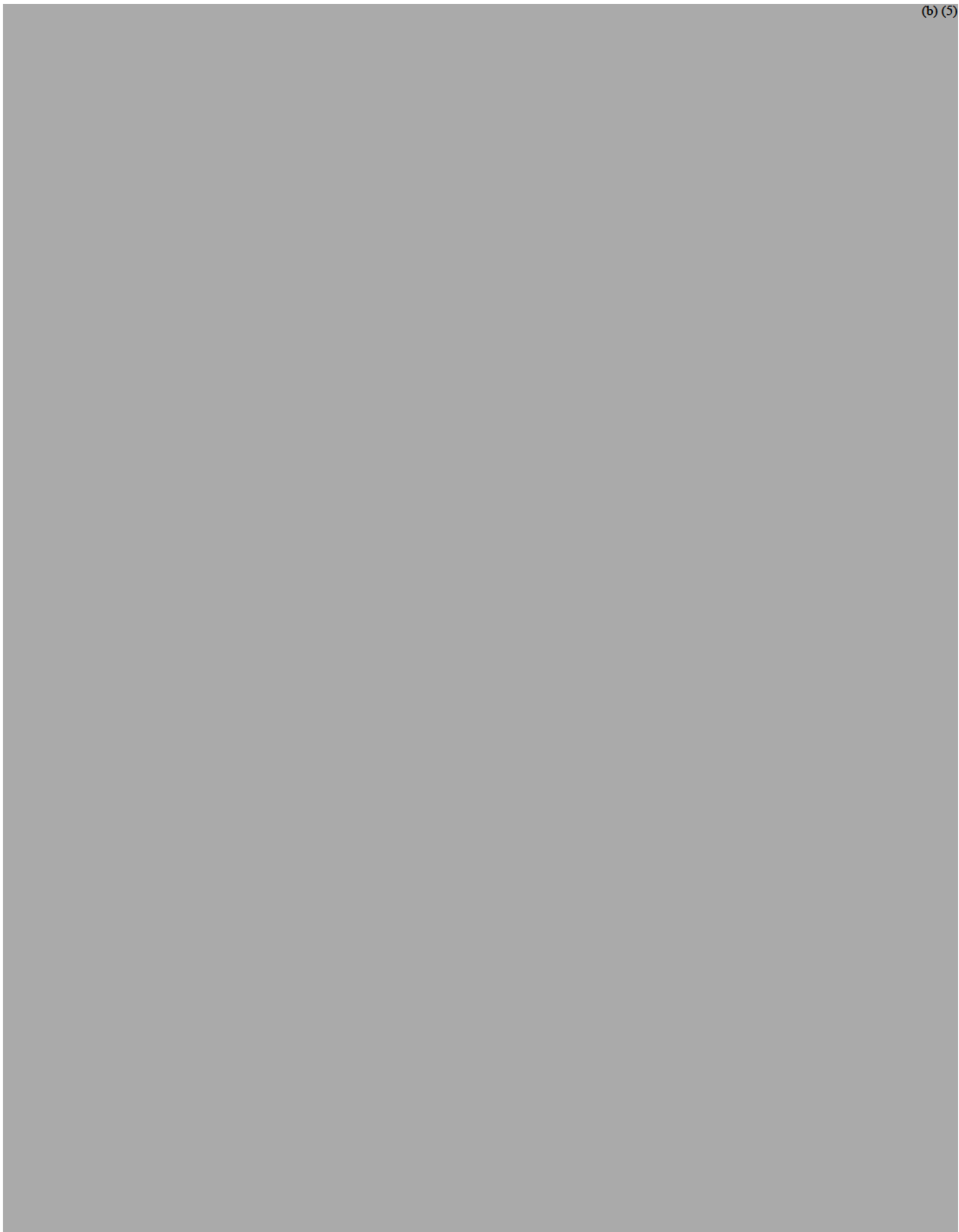


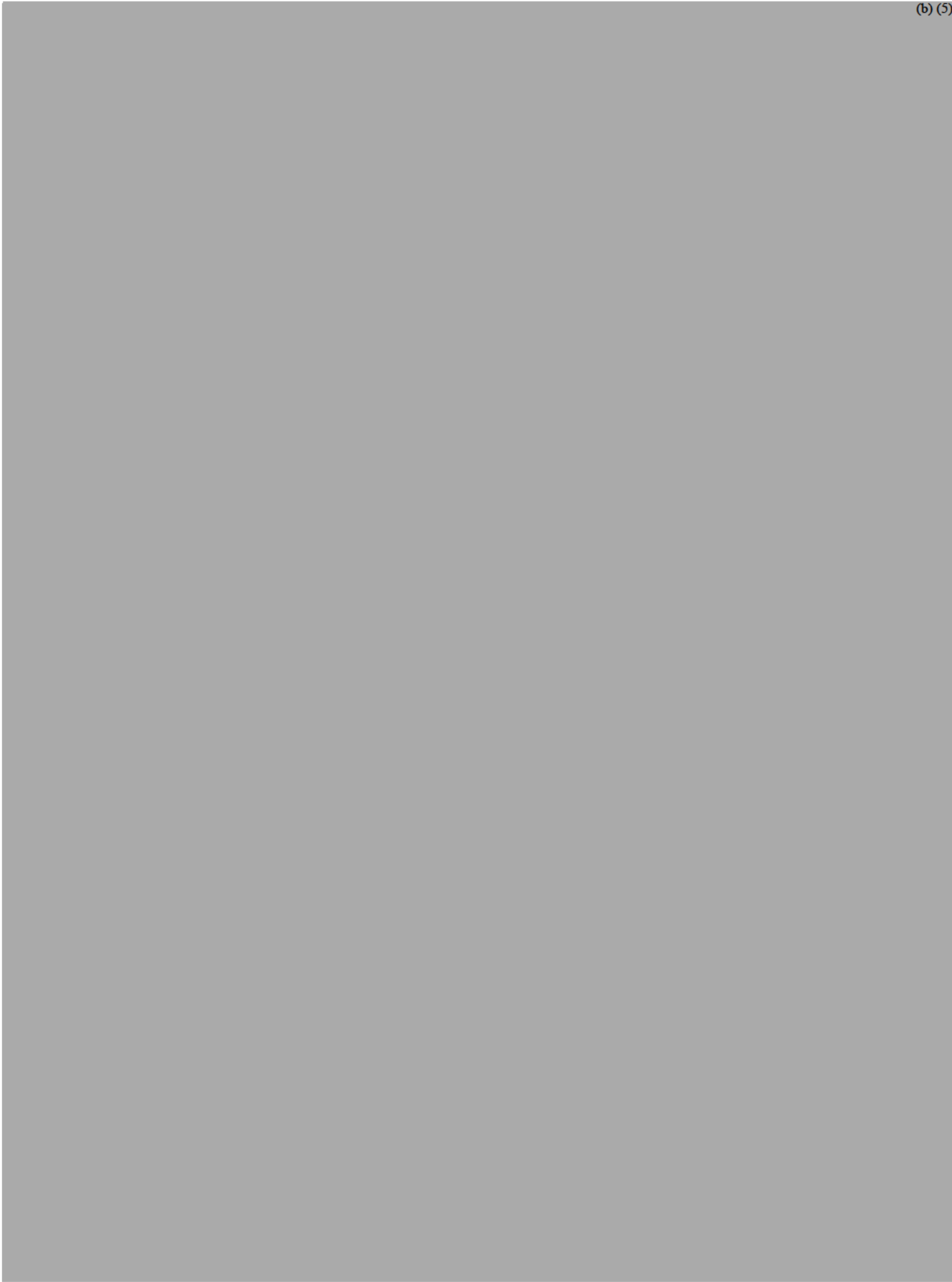


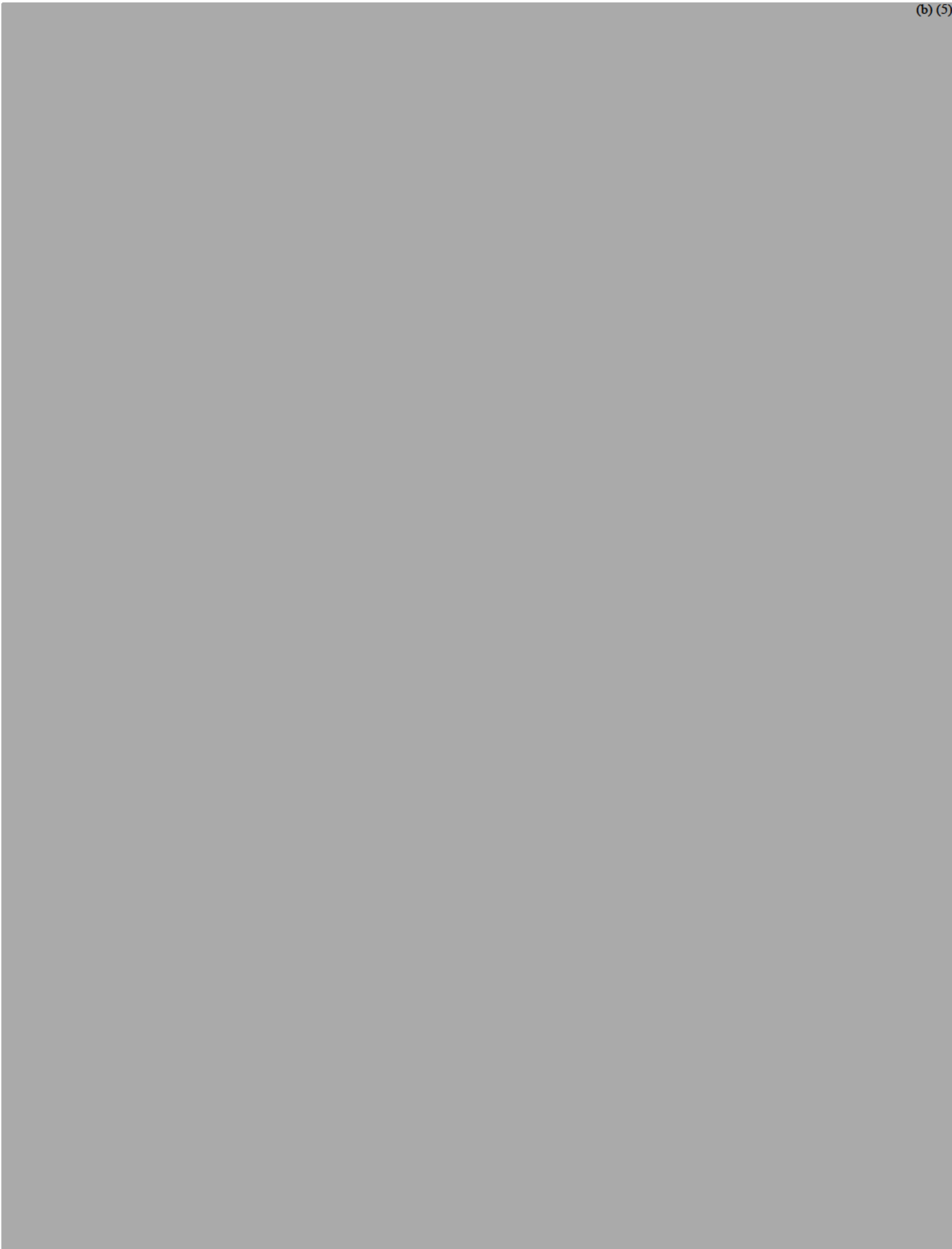


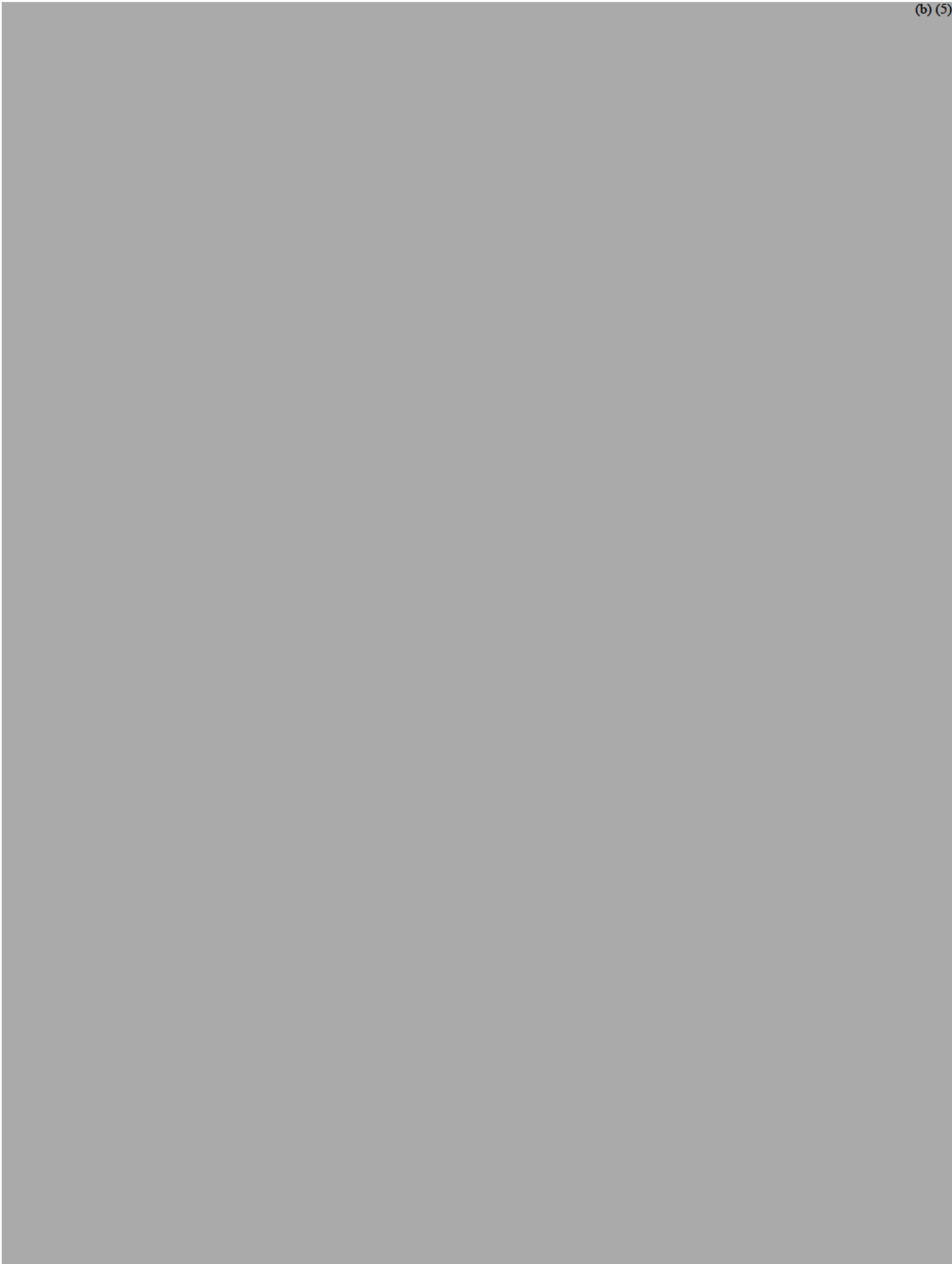




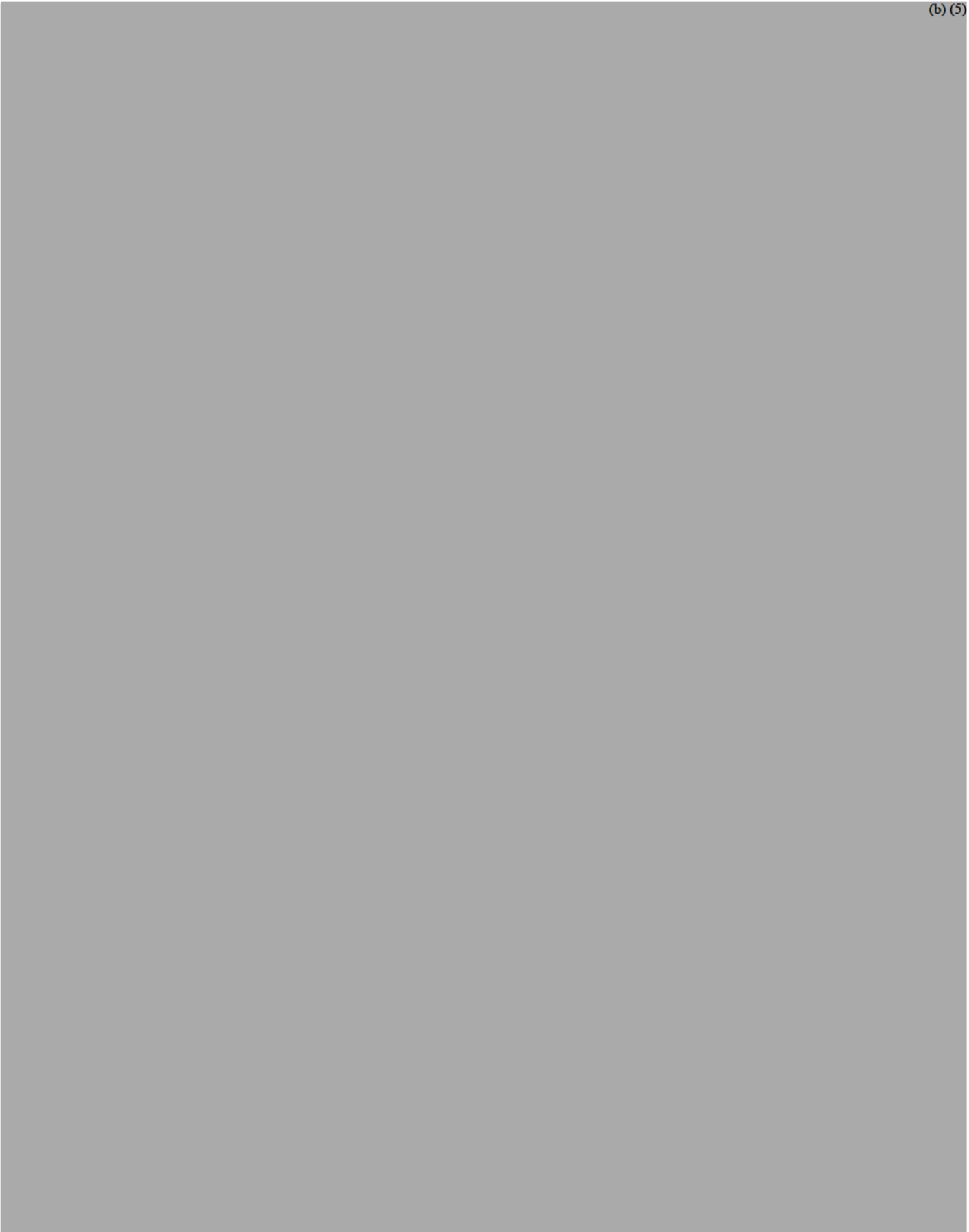




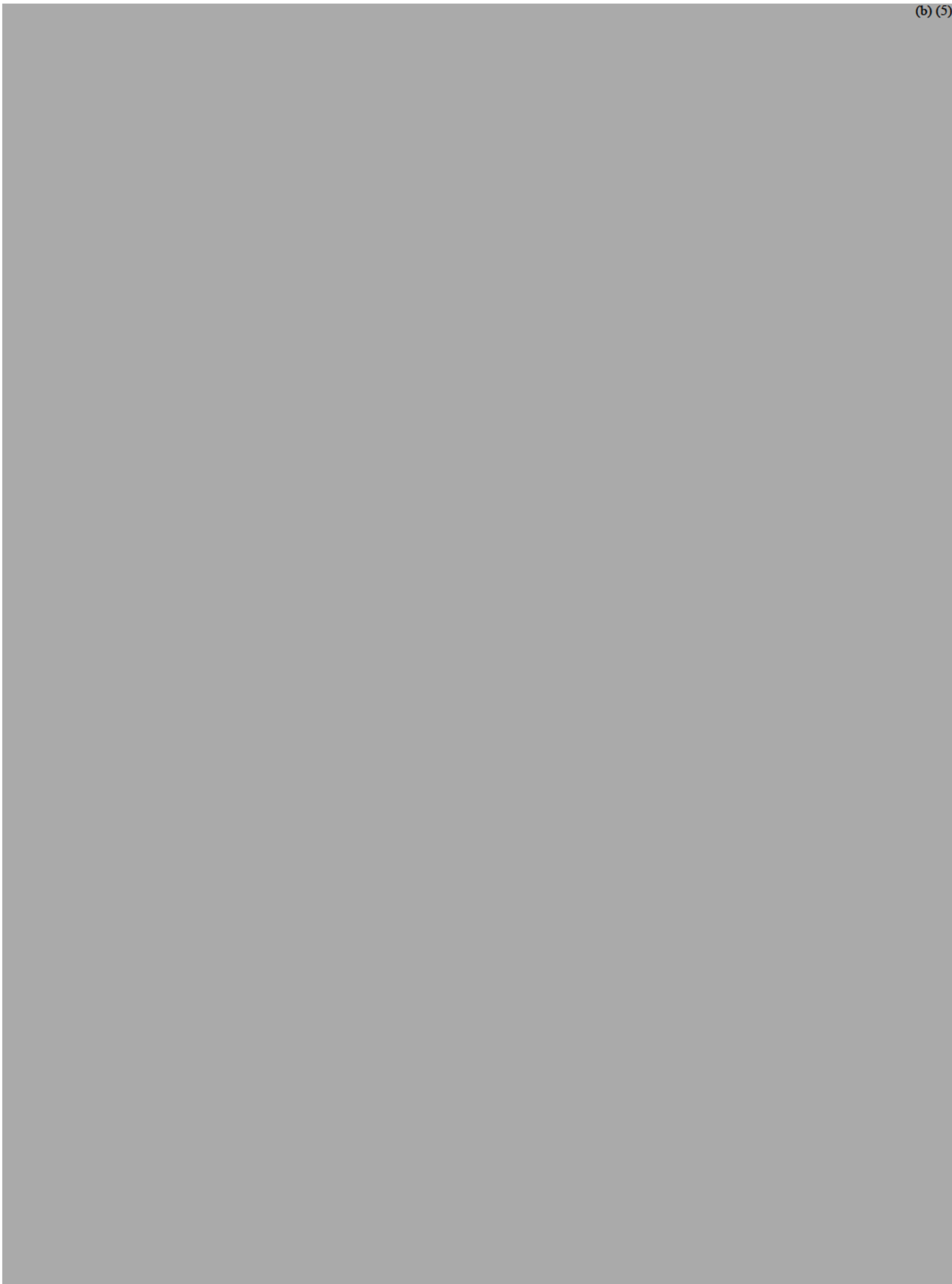






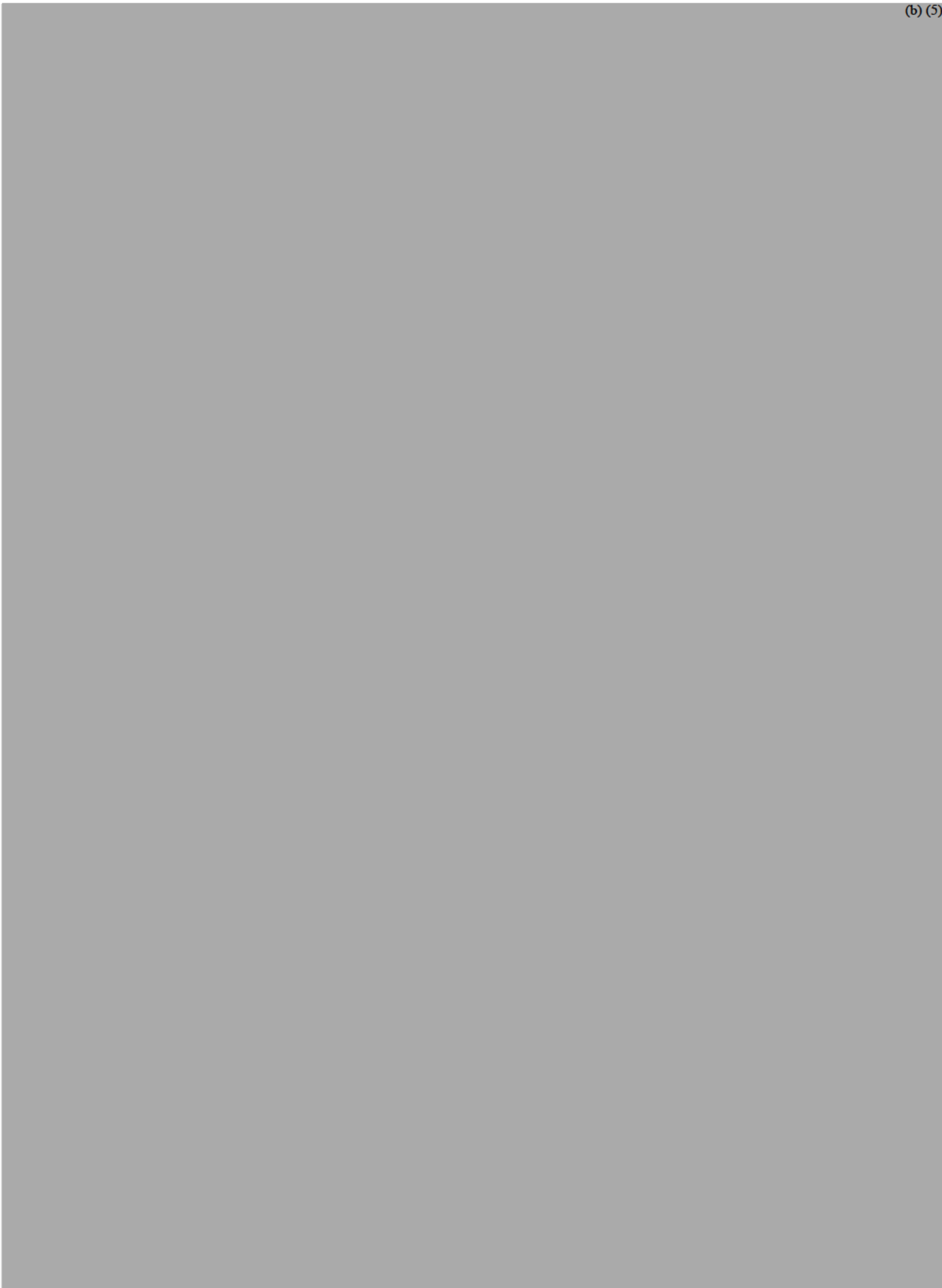


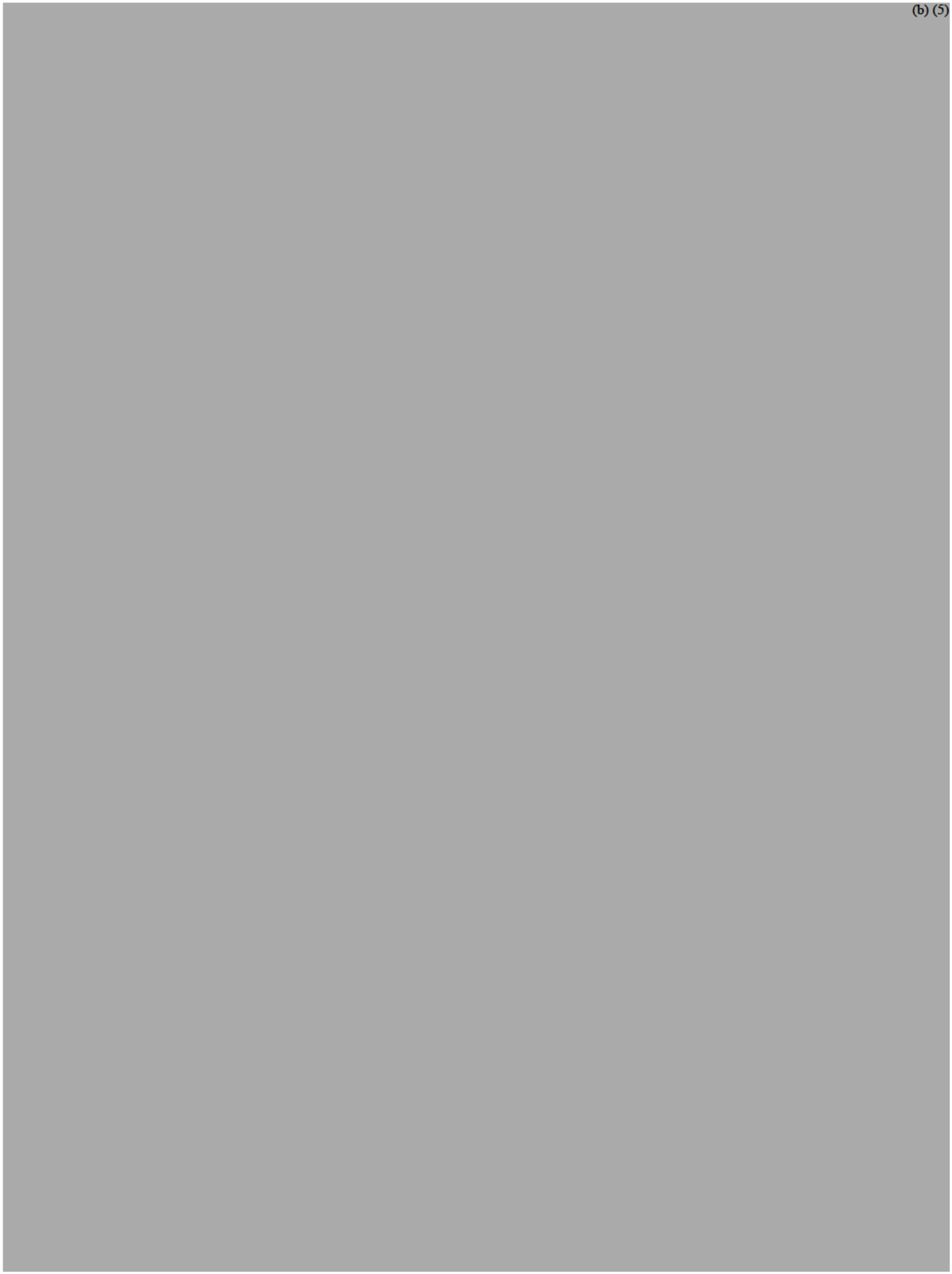


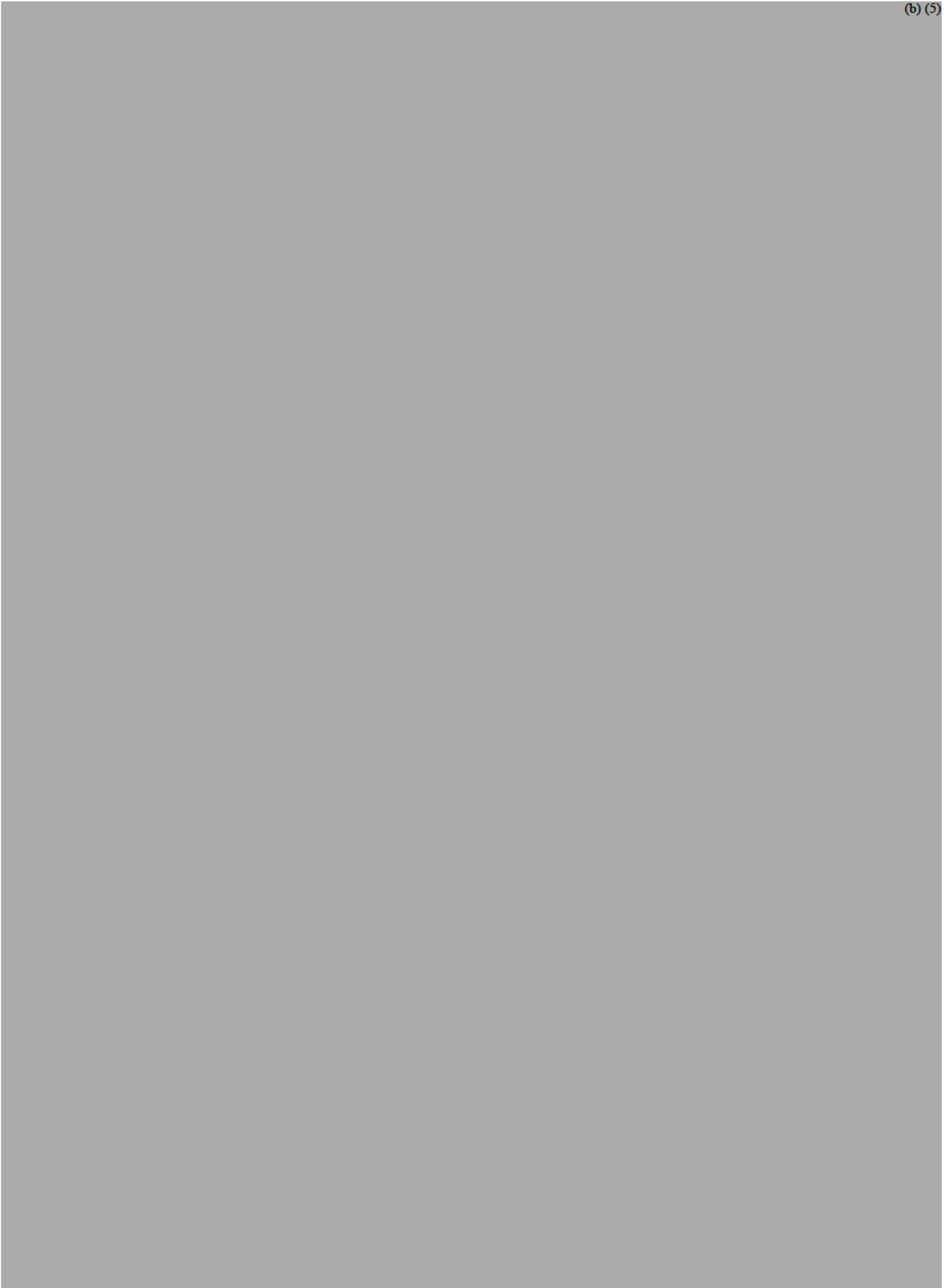


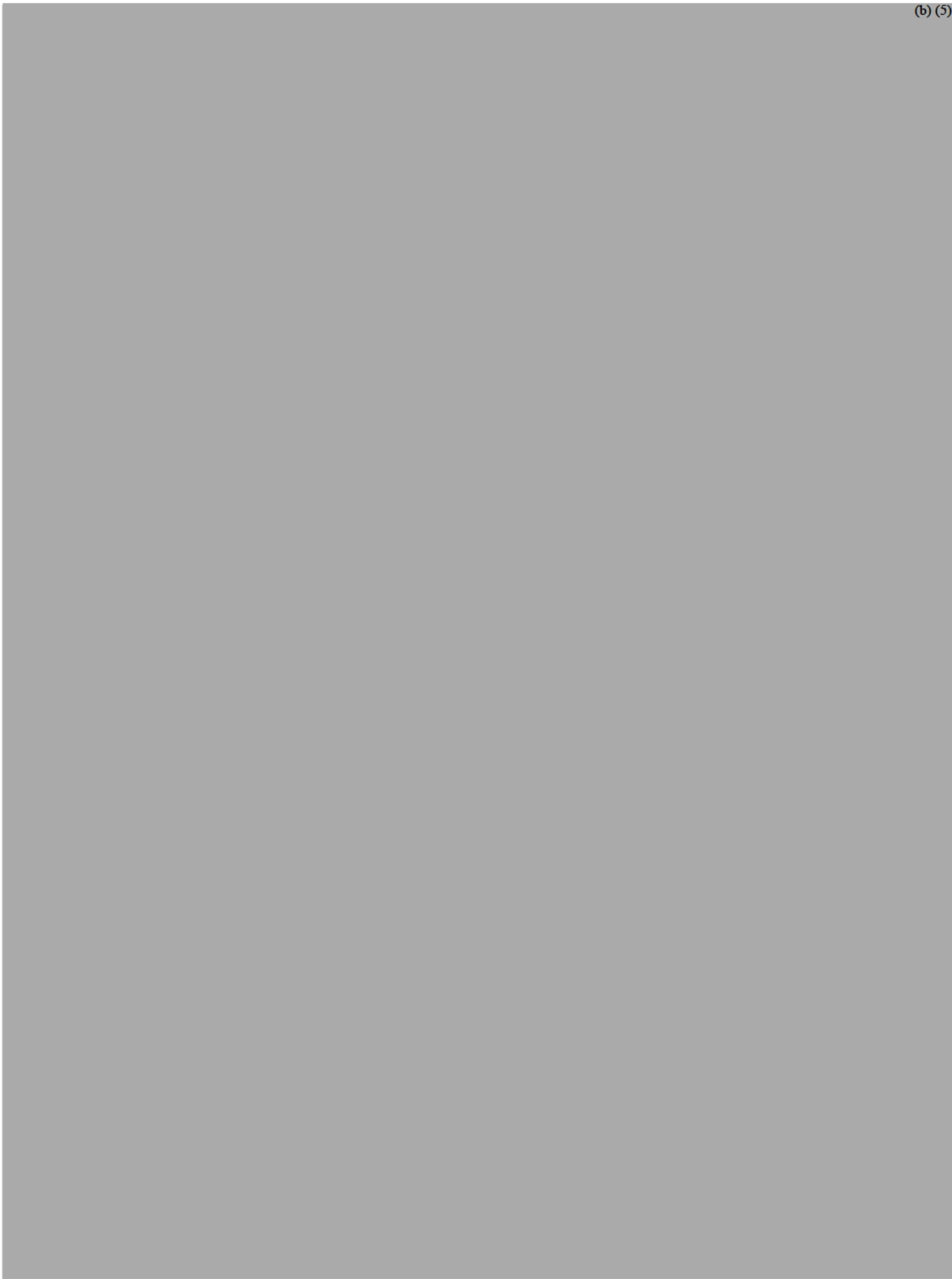


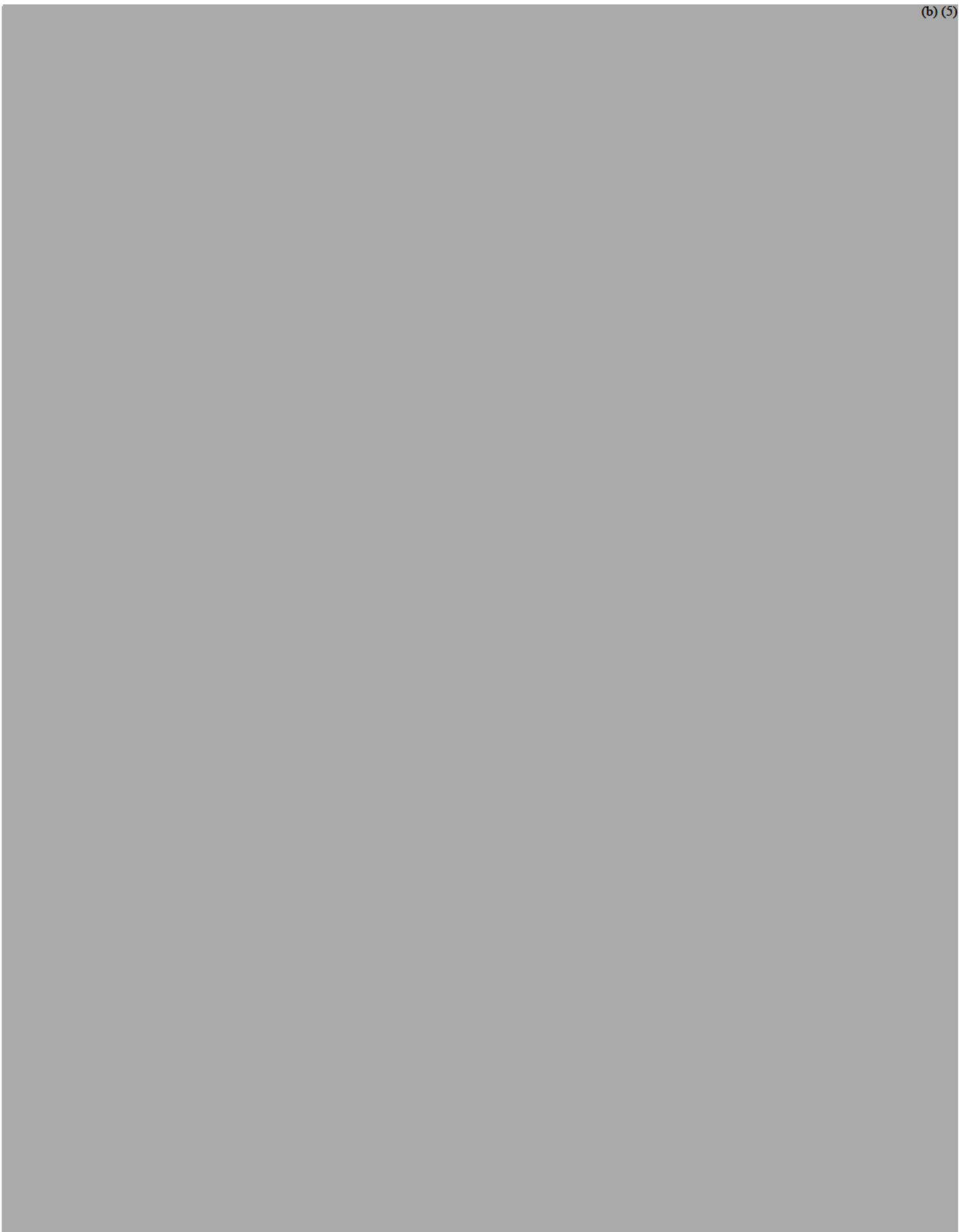


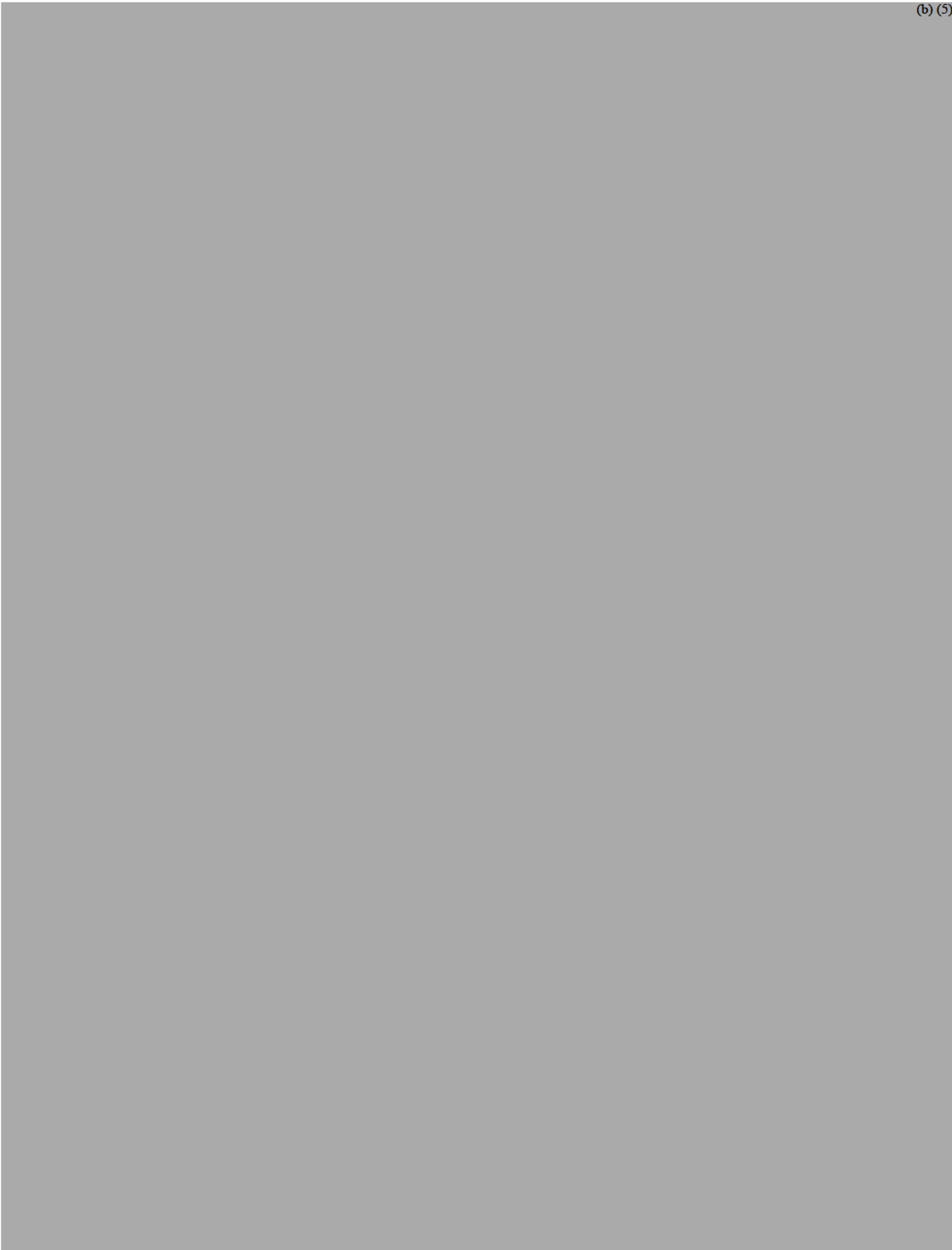


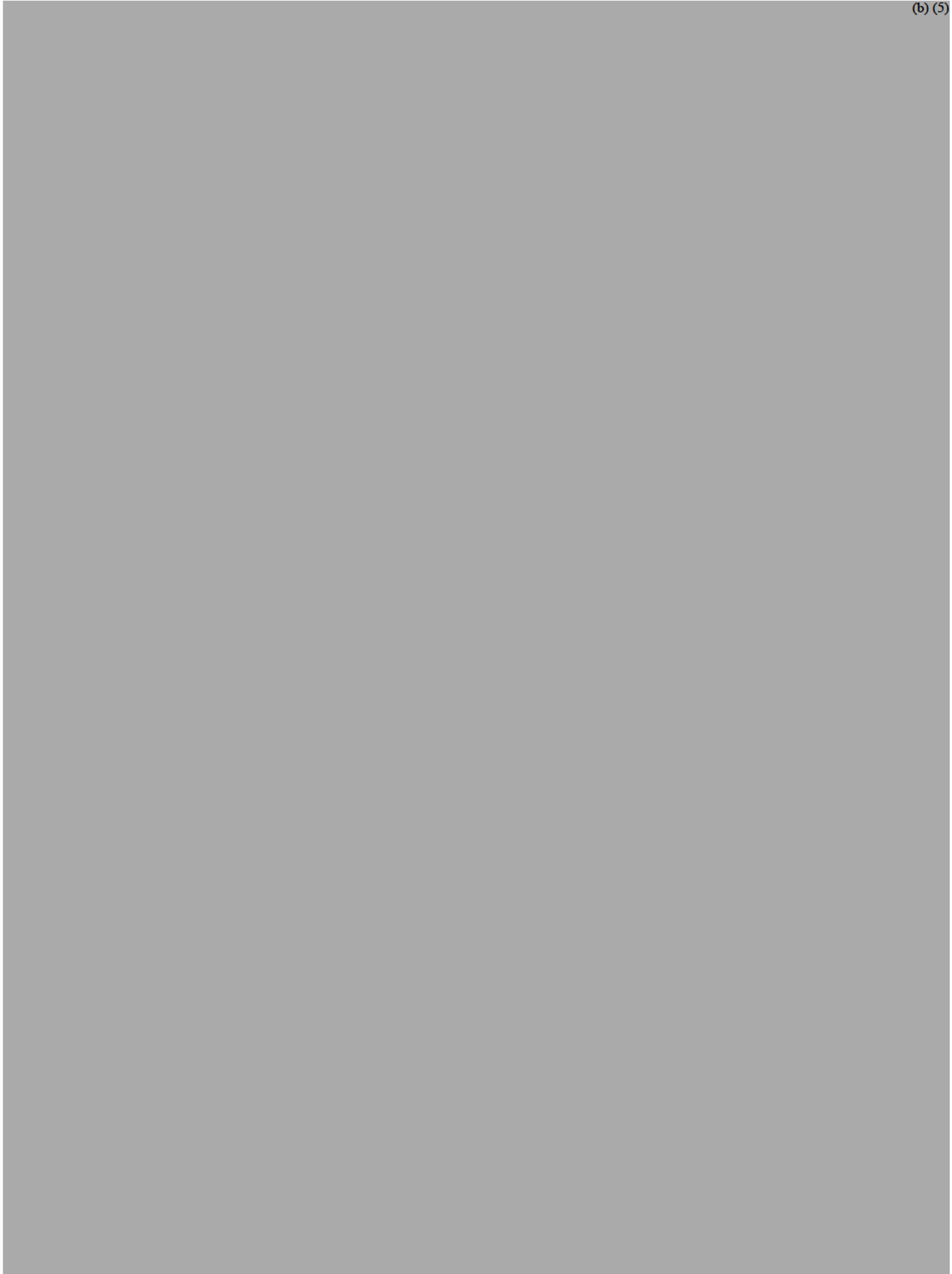




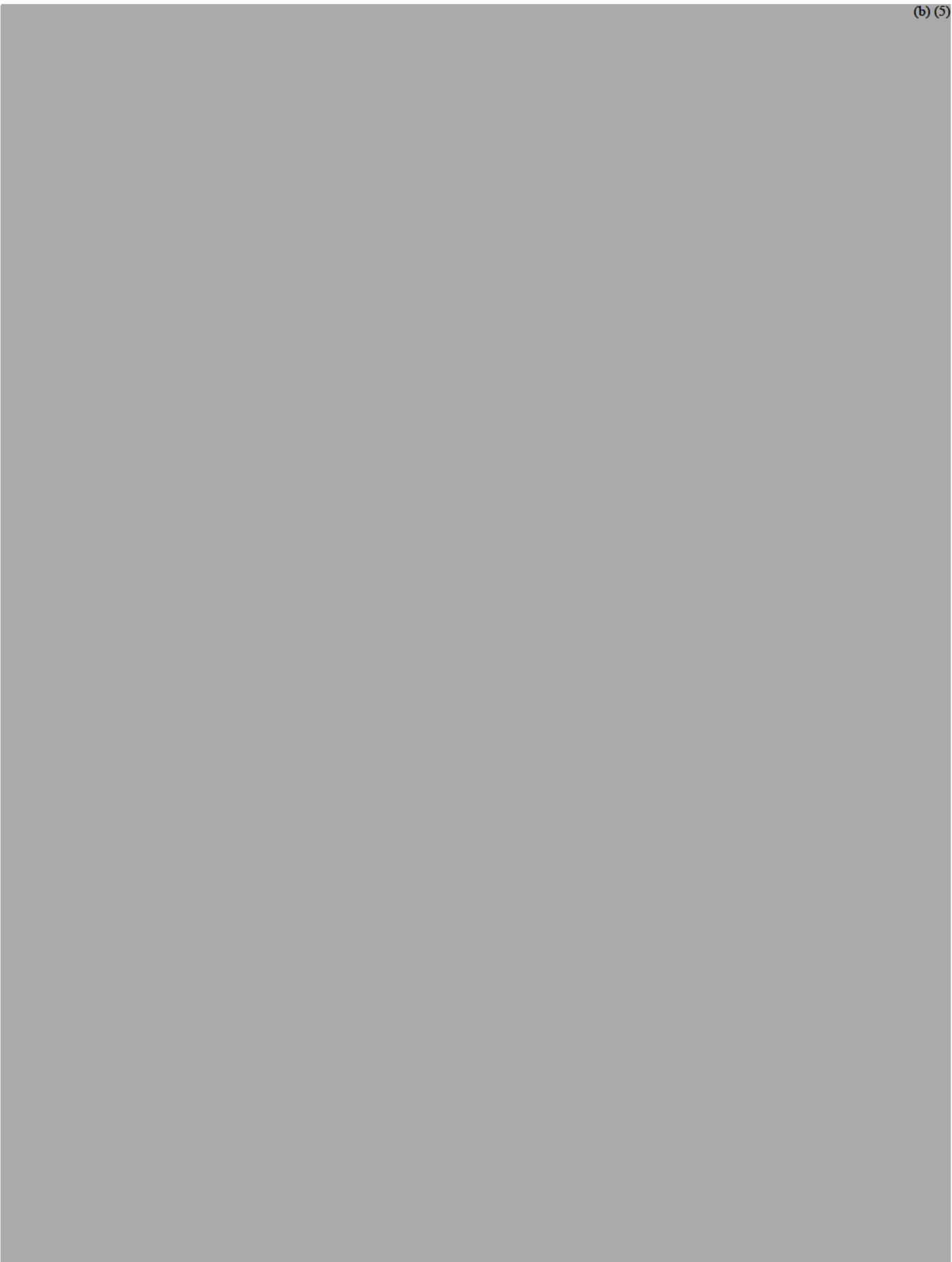


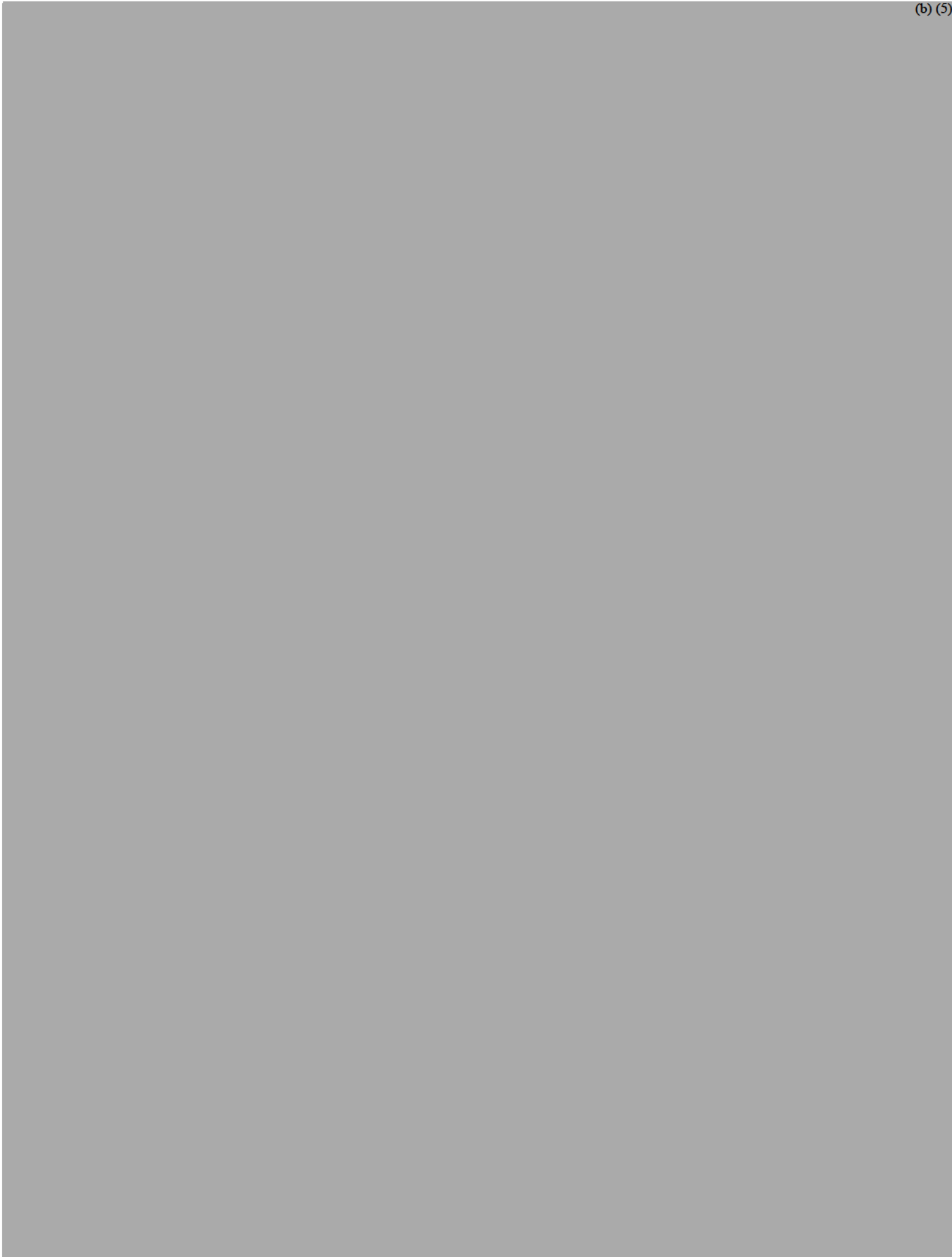


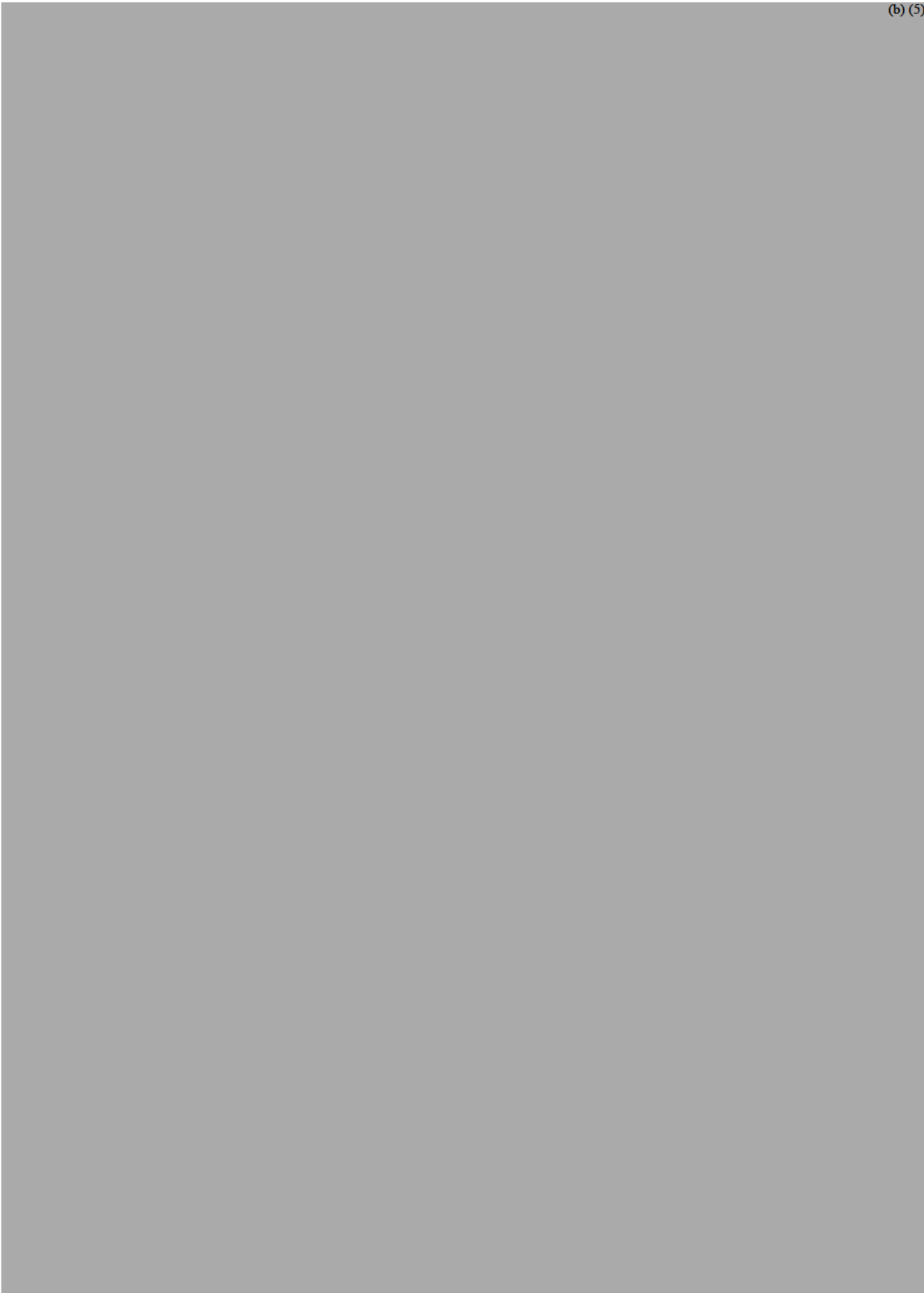




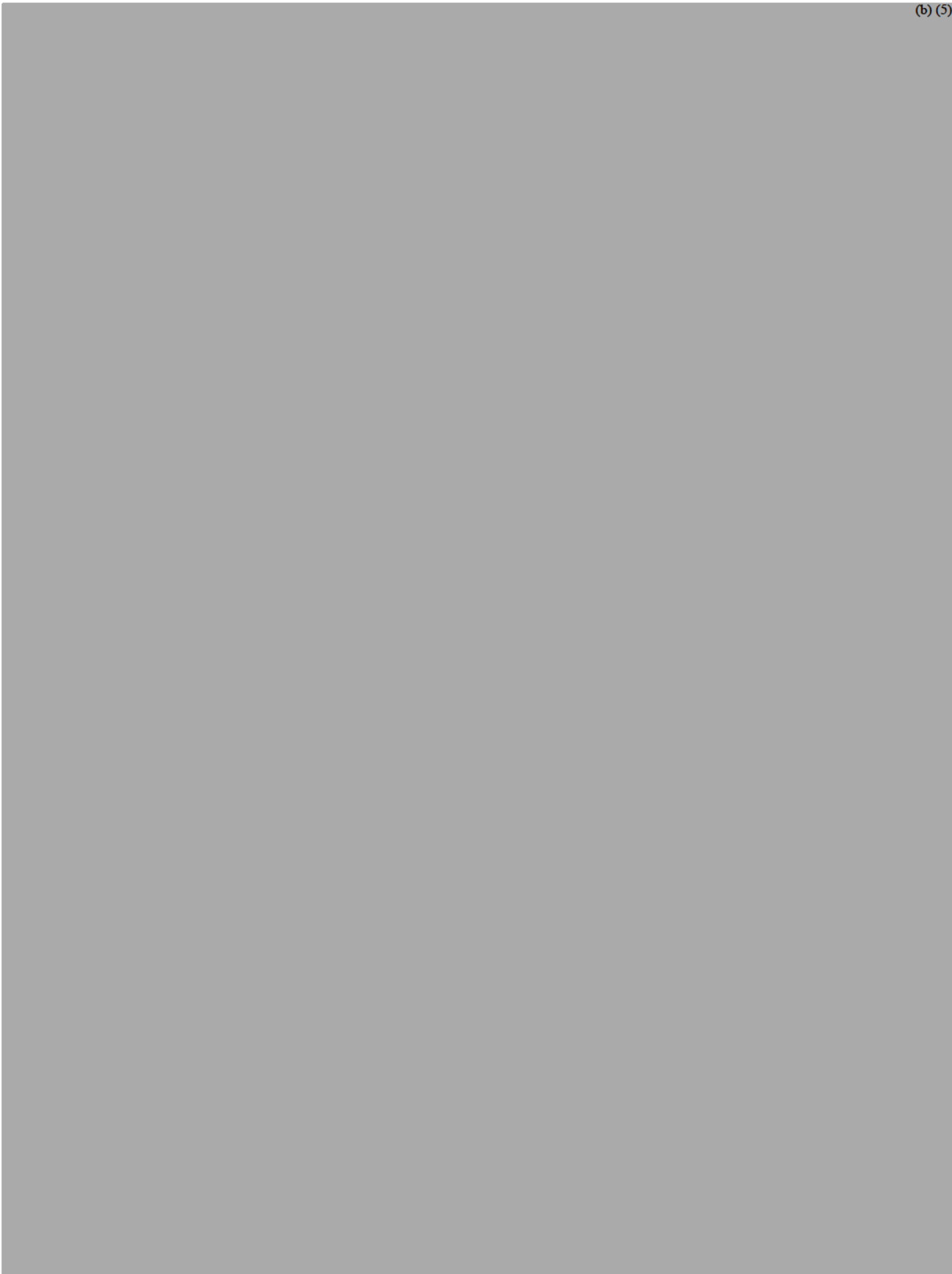


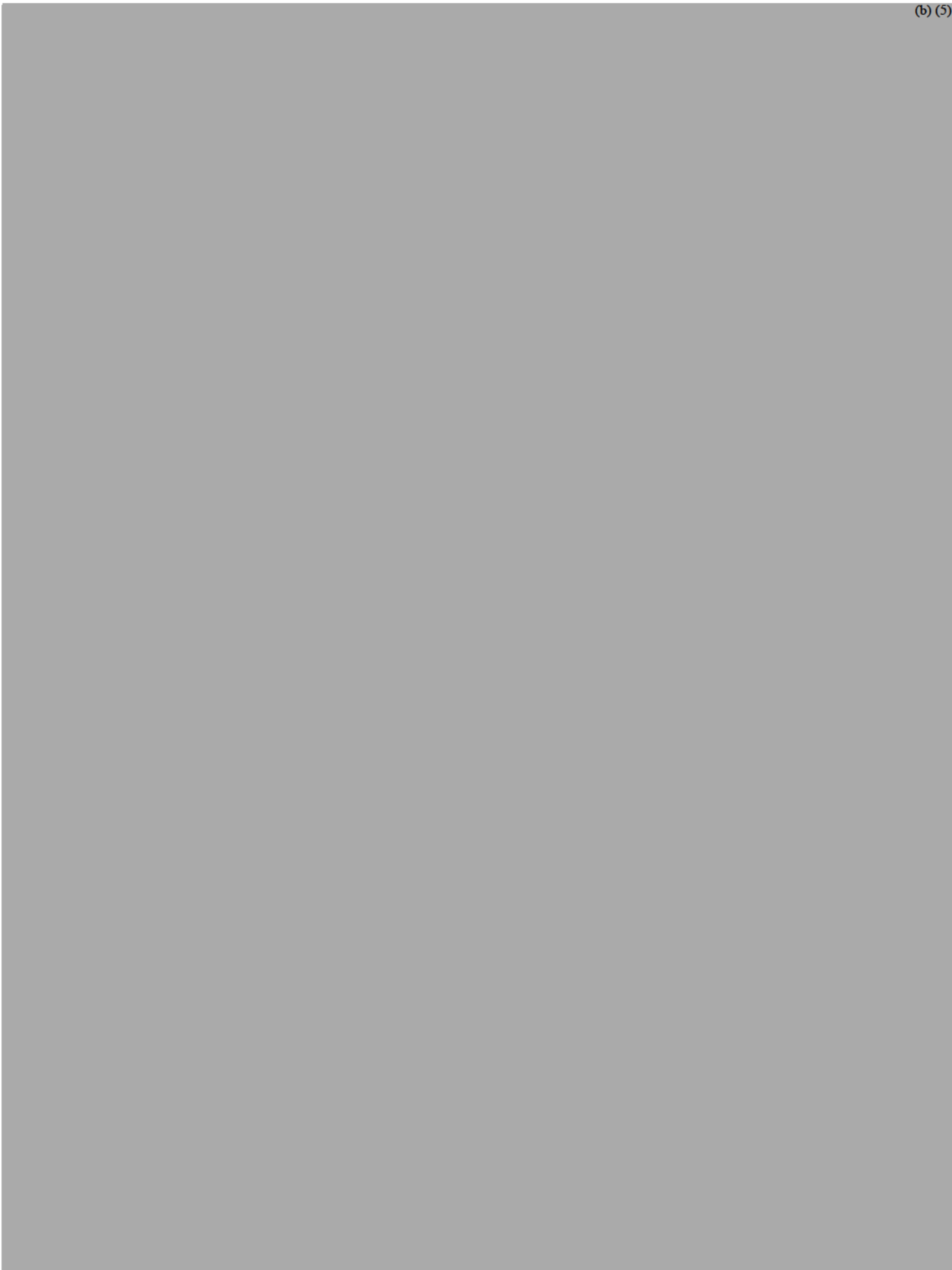


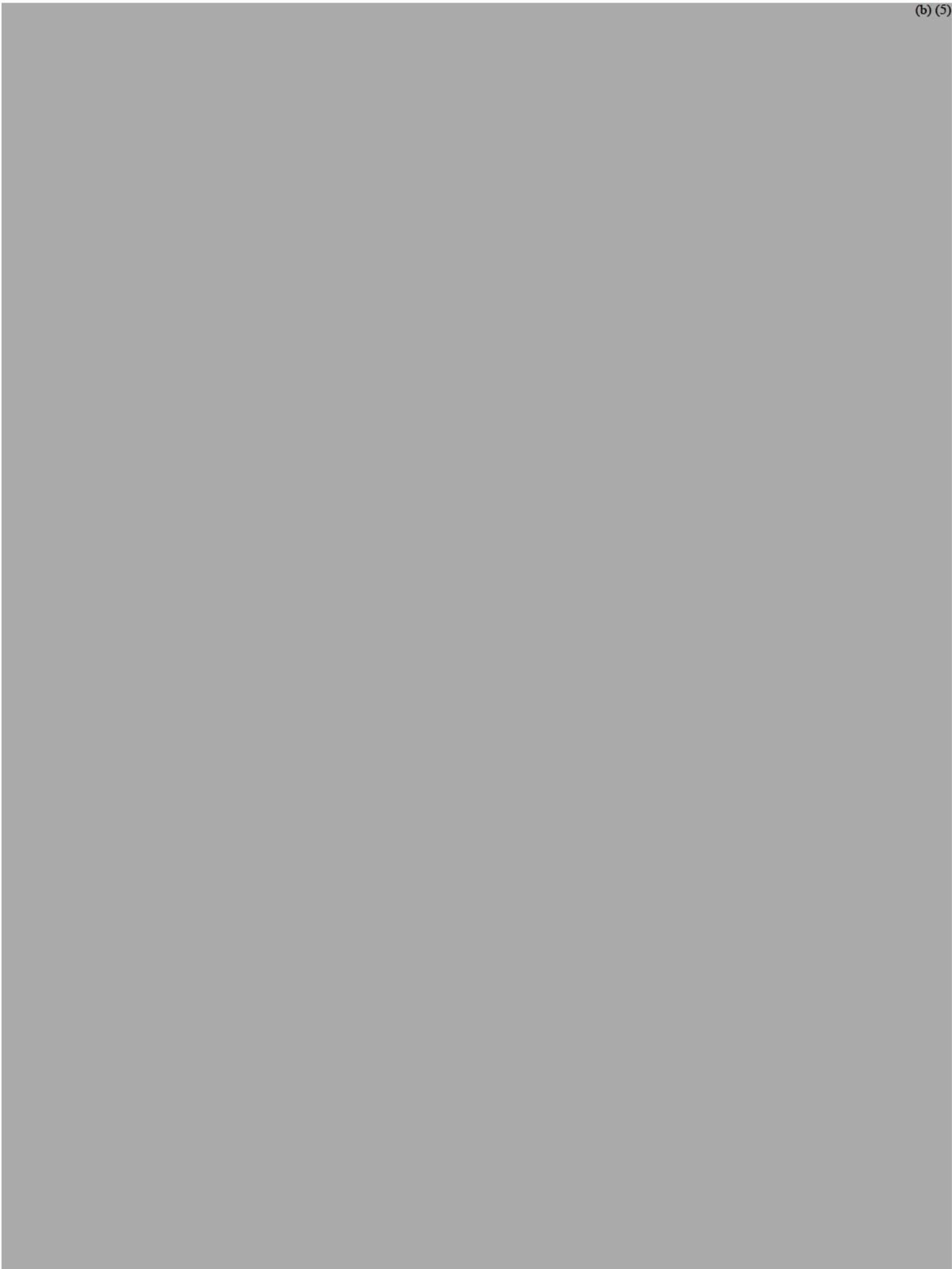


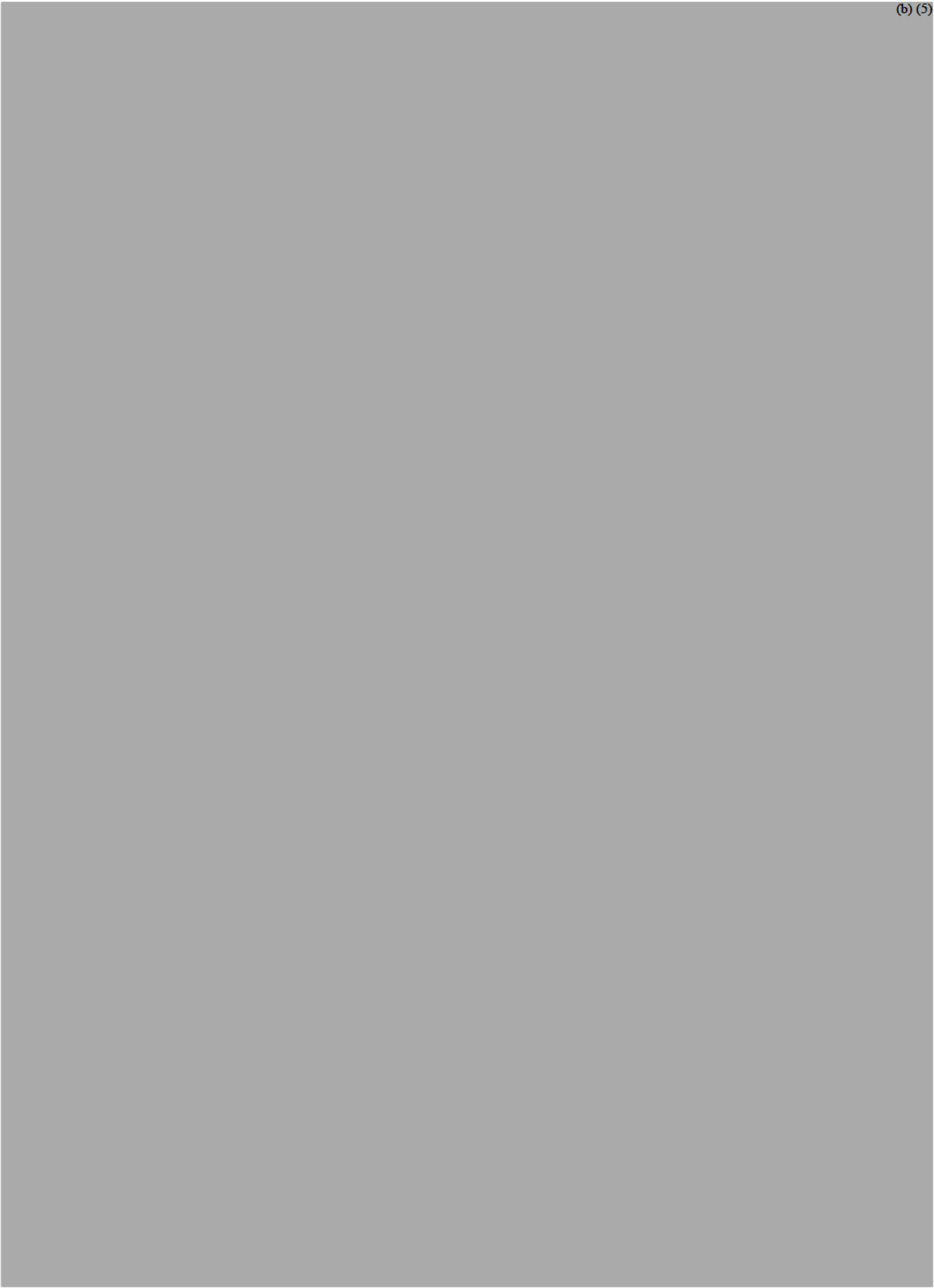




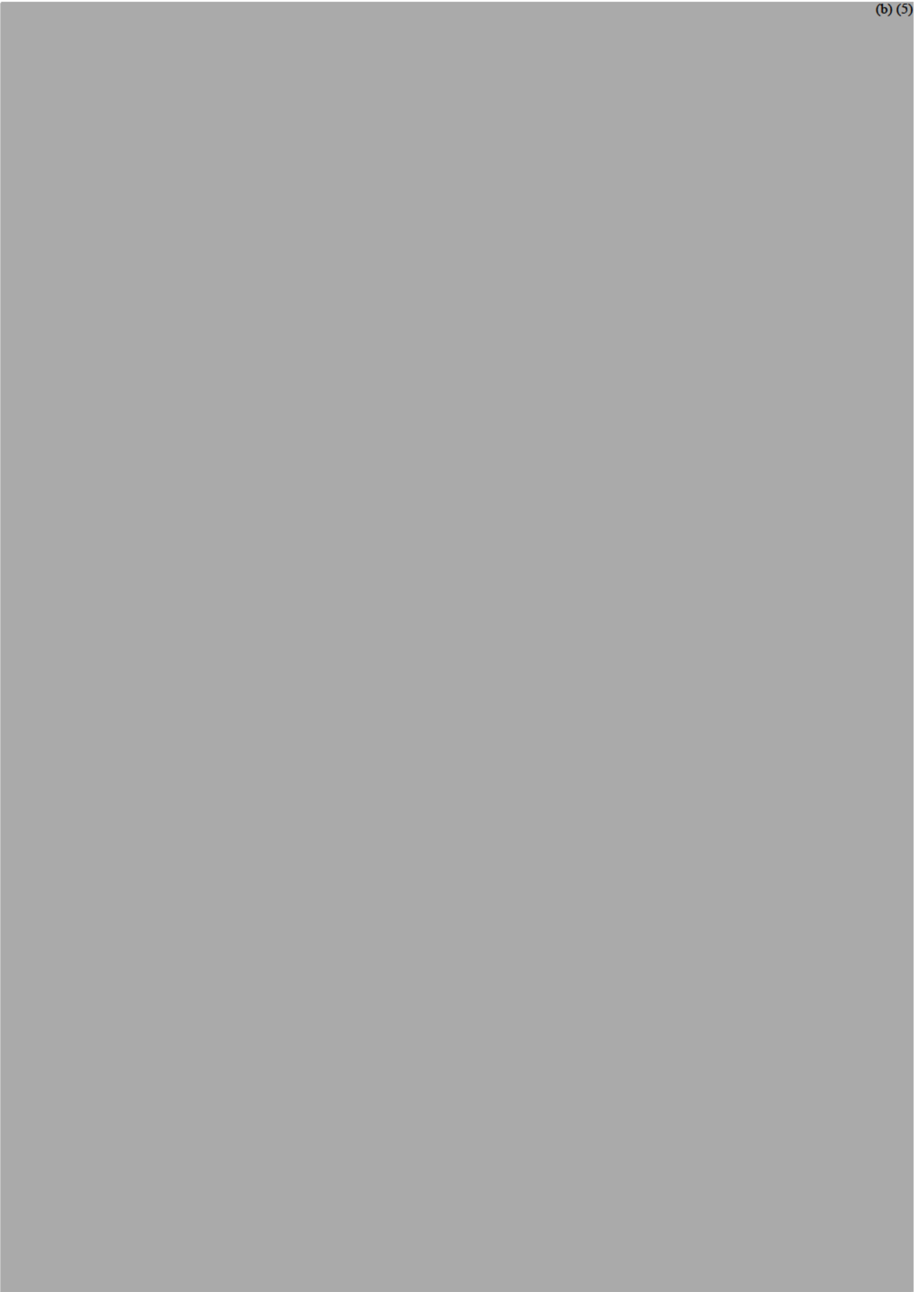


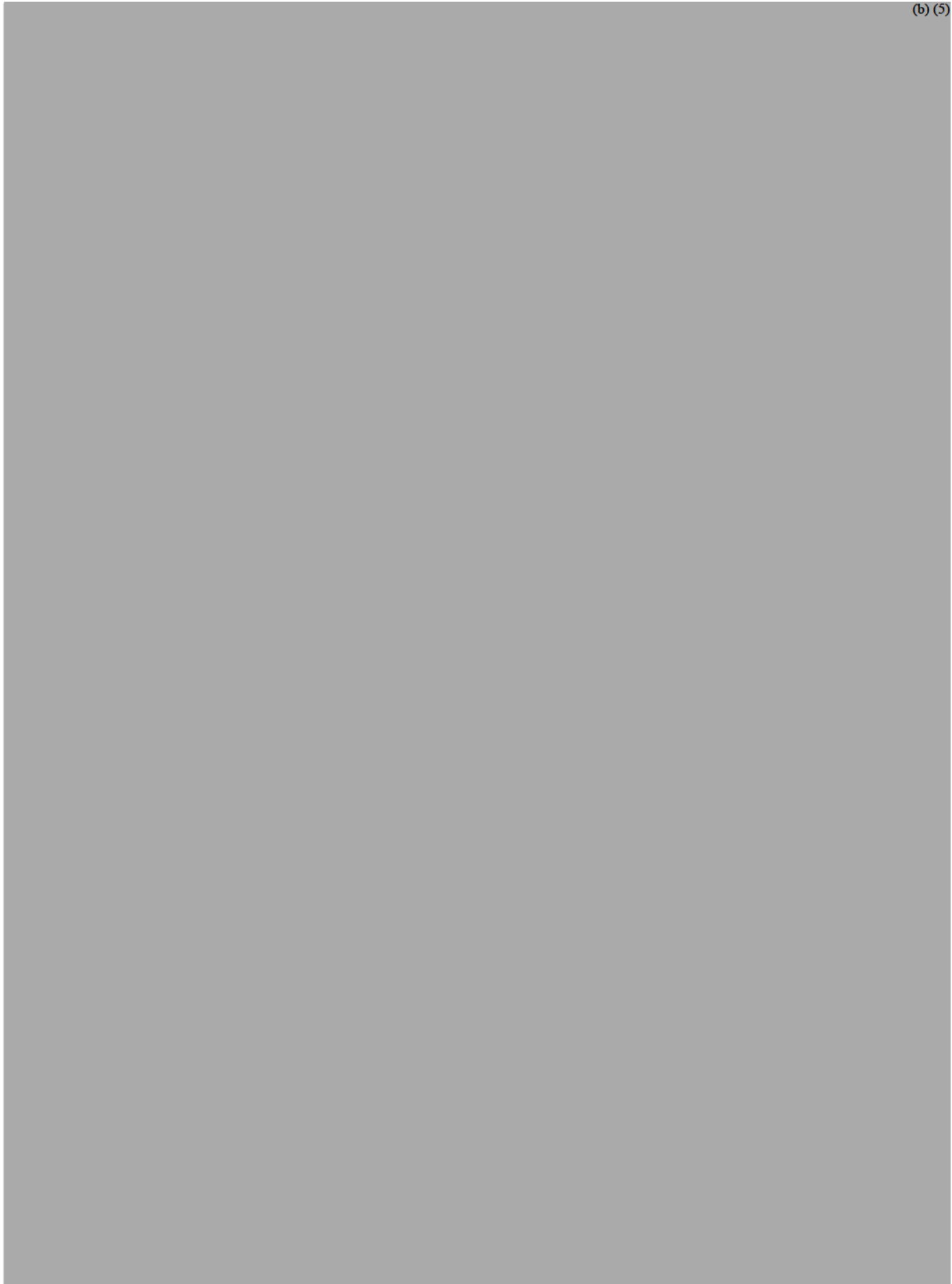




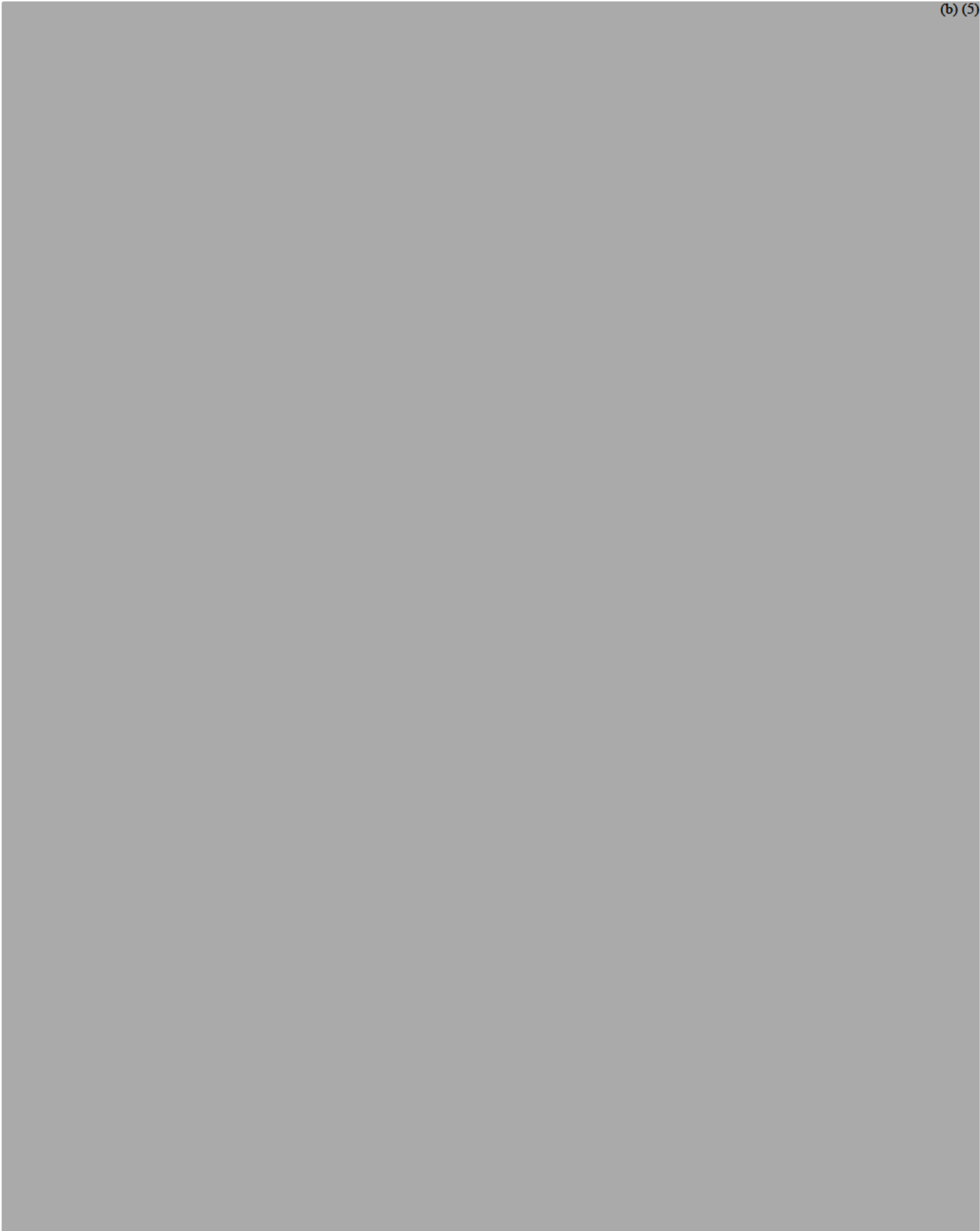












**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID)  
**Sent:** Mon, 17 Feb 2020 11:49:41 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Subject:** Re: Meet Sunday afternoon?

Got it.

Thanks,

Weigong

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 7:27:52 PM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I let them know we were not able to make it.  
Cliff

On Feb 17, 2020, at 5:38 PM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> wrote:

Got it. Thanks!

Weigong

**From:** [REDACTED] (b) (6)  
**Sent:** Monday, February 17, 2020 5:28:30 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Cliff and Weigong we will pick you up directly from the WHO offices so we can head directly to the restaurant. Look for a red Subaru Forester [REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <[REDACTED] (b) (6)>  
**Date:** 2/17/20 5:15 PM (GMT+08:00)  
**To:** "Lane, Cliff" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
**Cc:** [REDACTED] (b) (6); "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Thanks. We are all 3 together and will meet you at either WHO or hotel.

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 5:13:43 PM  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Cc:** [REDACTED] (b) (6); Zhou, Weigong

(CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

I just spoke to [REDACTED] (b) (6). The team is going straight to WHO for a 1 hour meeting now. She was going to see about moving dinner to 7; pickup at 6:40 from the hotel.

On Feb 17, 2020, at 4:48 PM, Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> wrote:

Do you know what time the WHO meeting will be tonight?

Alex

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Sent:** Monday, February 17, 2020 4:47 PM

**To:** [REDACTED] (b) (6)

**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

Leaving CDC now.

On Feb 17, 2020, at 12:57 PM, [REDACTED] (b) (6) wrote:

Thanks Cliff. Given that, perhaps I should ask if the Ambassador can meet earlier, say 6pm or 5:30? In case you need to get back over to the WHO offices? What do you think?

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Sent:** Monday, February 17, 2020 12:45 PM

**To:** [REDACTED] (b) (6)

**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> (U) Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6)> (U) Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

At the moment it looks like we are scheduled to leave the China CDC, Changping Campus to return to the hotel at 4 PM. There is also a note that we will have a meeting tonight at WHO. The time for that meeting has not yet been determined.

Cliff

On Feb 17, 2020, at 7:36 AM, [REDACTED] (b) (6)

Thanks Cliff. Keep us posted. I have reached out to the Ambassador and DCM about a possible window this evening from 6pm onward.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
Date: 2/17/20 12:37 AM (GMT+08:00)  
To: [REDACTED] (b) (6)  
Cc: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)> "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
Subject: Re: Meet Sunday afternoon?

It looks like we will be at the CDC tomorrow afternoon with nothing after that. We will let you know as we get more detail.

Cliff

On Feb 16, 2020, at 4:47 PM, [REDACTED] (b) (6) wrote:

Thanks for the update. Will see you when you are done.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>  
Date: 2/16/20 4:24 PM (GMT+08:00)  
To: [REDACTED] (b) (6) "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "Lane, Cliff" <[REDACTED] (b) (6)>  
Cc: "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
Subject: Re: Meet Sunday afternoon?

Just to let you know we are still in the meeting at WHO, so will be late. Will let you know when we are done.

Thanks,

Weigong

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6) Lane, Cliff (NIH/NIAID) [E]  
[REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED]> (b) (6)  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <[REDACTED]> (b) (6)  
**Date:** 2/16/20 8:33 AM (GMT+08:00)  
**To:** [REDACTED] (b) (6), "Lane, Cliff"  
<[REDACTED]> (b) (6) "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED]> (b) (6)  
**Cc:** "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

My number is [REDACTED] (b) (6)

See you this afternoon.

RJ

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID)  
[REDACTED] (b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6) Millman, Alexander J.  
(CDC/DDID/NCIRD/ID) <[REDACTED]> (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.

Best,

[REDACTED] (b) (6)



(b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)>  
Date: 2/16/20 6:58 AM (GMT+08:00)  
To: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
Cc: "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> <(b) (6)>  
<(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
Subject: Re: Meet Sunday afternoon?

My mobile is (b) (6)

Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.  
I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change. What is the best number to reach you? My EOC mobile is (b) (6).

See you tomorrow.

Best,  
Weigong

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Saturday, February 15, 2020 11:42:51 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> <(b) (6)>  
<(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6) wrote:

>

>

> Hi and welcome to China. I hope you both arrived safely.

>

> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.

>

> Thanks and have a good sleep.

>

> RJ

>

**From:** (b) (6)  
**Sent:** Mon, 17 Feb 2020 16:50:02 +0800  
**To:** Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Cc:** (b) (6); Zhou, Weigong (CDC/DDID/NCIRD/ID); Simonds, R. J. (CDC/DDPHSIS/CGH/OD)  
**Subject:** Re: Meet Sunday afternoon?

Just notified they we are going to the WHO office for a 1 hour meeting!

On Feb 17, 2020, at 4:48 PM, Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Do you know what time the WHO meeting will be tonight?  
Alex

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Monday, February 17, 2020 4:47 PM  
**To:** (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Leaving CDC now.

On Feb 17, 2020, at 12:57 PM, (b) (6) wrote:

Thanks Cliff. Given that, perhaps I should ask if the Ambassador can meet earlier, say 6pm or 5:30? In case you need to get back over to the WHO offices? What do you think?

---

**From:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Monday, February 17, 2020 12:45 PM  
**To:** (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (U) Simonds, R J (Beijing | CDC) <(b) (6)> (U) Millman, Alexander (Beijing | CDC) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

At the moment it looks like we are scheduled to leave the China CDC, Changping Campus to return to the hotel at 4 PM. There is also a note that we will have a meeting tonight at WHO. The time for that meeting has not yet been determined.

Cliff

On Feb 17, 2020, at 7:36 AM, [REDACTED] (b) (6)  
wrote:

Thanks Cliff. Keep us posted. I have reached out to the Ambassador and DCM about a possible window this evening from 6pm onward.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
Date: 2/17/20 12:37 AM (GMT+08:00)  
To: [REDACTED] (b) (6)  
Cc: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)> "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
Subject: Re: Meet Sunday afternoon?

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Cliff

On Feb 16, 2020, at 4:47 PM, [REDACTED] (b) (6)  
wrote:

Thanks for the update. Will see you when you are done.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>

Date: 2/16/20 4:24 PM (GMT+08:00)

To: [REDACTED] (b) (6), "(U) Simonds, R J (Beijing | CDC)" < [REDACTED] (b) (6) "Lane, Cliff" < [REDACTED] (b) (6)  
Cc: "(U) Millman, Alexander (Beijing | CDC)" < [REDACTED] (b) (6)  
Subject: Re: Meet Sunday afternoon?

Just to let you know we are still in the meeting at WHO, so will be late. Will let you know when we are done.

Thanks,

Weigong

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < [REDACTED] (b) (6) Lane, Cliff (NIH/NIAID) [E] < [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6)  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6)  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" [REDACTED] (b) (6)  
Date: 2/16/20 8:33 AM (GMT+08:00)  
To: [REDACTED] (b) (6), "Lane, Cliff" < [REDACTED] (b) (6) "Zhou, Weigong (CDC/DDID/NCIRD/ID)" < [REDACTED] (b) (6)  
Cc: "(U) Millman, Alexander (Beijing | CDC)" < [REDACTED] (b) (6)  
Subject: Re: Meet Sunday afternoon?

My number is [REDACTED] (b) (6)  
See you this afternoon.

RJ

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] < [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < [REDACTED] (b) (6) Millman, Alexander J.

(CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.

Best,

[REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>

**Date:** 2/16/20 6:58 AM (GMT+08:00)

**To:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>

**Cc:** "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> [REDACTED] (b) (6)

<[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>

**Subject:** Re: Meet Sunday afternoon?

My mobile is [REDACTED] (b) (6)

Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.

I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change. What is the best number to reach you? My EOC mobile is [REDACTED] (b) (6)

See you tomorrow.

Best,

Weigong

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Sent:** Saturday, February 15, 2020 11:42:51 PM

**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)>

**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> [REDACTED] (b) (6)

< (b) (6) Millman, Alexander J. (CDC/DDID/NCIRD/ID) < (b) (6)

**Subject:** Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < (b) (6) wrote:

>

>

> Hi and welcome to China. I hope you both arrived safely.

>

> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.

>

> Thanks and have a good sleep.

>

> RJ

>

**From:** [REDACTED] (b) (6)  
**Sent:** Mon, 17 Feb 2020 07:00:43 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Simonds, R. J. (CDC/DDPHSIS/CGH/OD); Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Subject:** RE: Meet Sunday afternoon?

OK that would be great.

As of now, we have a dinner reservation at 6pm. We will pick you up at the hotel by 5:30 and after dinner I can either drop you back at the hotel or the WHO offices.

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 1:52 PM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6) (U)> Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6) (U)> Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

That might make the most sense. I will let you know when we are leaving.

On Feb 17, 2020, at 12:57 PM, [REDACTED] (b) (6) wrote:

Thanks Cliff. Given that, perhaps I should ask if the Ambassador can meet earlier, say 6pm or 5:30? In case you need to get back over to the WHO offices? What do you think?

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Monday, February 17, 2020 12:45 PM  
**To:** [REDACTED] (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6) (U)> Simonds, R J (Beijing | CDC) <[REDACTED] (b) (6) (U)> Millman, Alexander (Beijing | CDC) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

At the moment it looks like we are scheduled to leave the China CDC, Changping Campus to return to the hotel at 4 PM. There is also a note that we will have a meeting tonight at WHO. The time for that meeting has not yet been determined.

Cliff



On Feb 17, 2020, at 7:36 AM, [REDACTED] (b) (6)  
wrote:

Thanks Cliff. Keep us posted. I have reached out to the Ambassador and DCM about a possible window this evening from 6pm onward.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
Date: 2/17/20 12:37 AM (GMT+08:00)  
To: [REDACTED] (b) (6)  
Cc: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)> "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
Subject: Re: Meet Sunday afternoon?

It looks like we will be at the CDC tomorrow afternoon with nothing after that. We will let you know as we get more detail.

Cliff

On Feb 16, 2020, at 4:47 PM, [REDACTED] (b) (6)  
wrote:

Thanks for the update. Will see you when you are done.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>  
Date: 2/16/20 4:24 PM (GMT+08:00)

To: [REDACTED] (b) (6), "(U) Simonds, R J (Beijing | CDC)" < [REDACTED] (b) (6) "Lane, Cliff" [REDACTED] (b) (6) >  
Cc: "(U) Millman, Alexander (Beijing | CDC)" < [REDACTED] (b) (6) >  
Subject: Re: Meet Sunday afternoon?

Just to let you know we are still in the meeting at WHO, so will be late. Will let you know when we are done.

Thanks,

Weigong

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < [REDACTED] (b) (6) Lane, Cliff (NIH/NIAID) [E] < [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6) >  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6) >  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" < [REDACTED] (b) (6) >  
Date: 2/16/20 8:33 AM (GMT+08:00)  
To: "[REDACTED] (b) (6) "Lane, Cliff" [REDACTED] (b) (6) "Zhou, Weigong (CDC/DDID/NCIRD/ID)" < [REDACTED] (b) (6) >  
Cc: "(U) Millman, Alexander (Beijing | CDC)" < [REDACTED] (b) (6) >  
Subject: Re: Meet Sunday afternoon?

My number is [REDACTED] (b) (6)  
See you this afternoon.

RJ

---

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6) >  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < [REDACTED] (b) (6) Millman, Alexander J. (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6) >  
**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.

Best,

(b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)>

Date: 2/16/20 6:58 AM (GMT+08:00)

To: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>

Cc: "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> (b) (6)

<(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>

Subject: Re: Meet Sunday afternoon?

My mobile is (b) (6)

Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.

I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change. What is the best number to reach you? My EOC mobile is (b) (6)

See you tomorrow.

Best,

Weigong

---

**From:** Lane, Cliff (NIH/NIAID) [E] (b) (6)

**Sent:** Saturday, February 15, 2020 11:42:51 PM

**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>

**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (b) (6)

<(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>

**Subject:** Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> wrote:

>

>

> Hi and welcome to China. I hope you both arrived safely.

>

> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.

>

> Thanks and have a good sleep.

>

> RJ

>

**From:** (b) (6)  
**Sent:** Mon, 17 Feb 2020 11:17:53 +0800  
**To:** (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Simonds, R. J. (CDC/DDPHSIS/CGH/OD); Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Subject:** Re: Meet Sunday afternoon?

Thanks very much.

Cliff

On Feb 17, 2020, at 10:16 AM, (b) (6)  
<(b) (6)> wrote:

Cliff and Weigong,

The Ambassador would like to have dinner together this evening if you are amenable. His staff is making a reservation for us at 6:30pm in the hope this will give you time to get back into town. I let them know this might change due to your schedule but just letting you know what we are aiming for.

Touch base again later.

Best,

(b) (6)  
Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)>  
**Date:** 2/17/20 12:37 AM (GMT+08:00)  
**To:** (b) (6)  
**Cc:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)> "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

It looks like we will be at the CDC tomorrow afternoon with nothing after that. We will let you know as we get more detail.

Cliff

On Feb 16, 2020, at 4:47 PM, (b) (6)  
<(b) (6)> wrote:

Thanks for the update. Will see you when you are done.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Date:** 2/16/20 4:24 PM (GMT+08:00)

To: [REDACTED] (b) (6), "(U) Simonds, R J (Beijing | CDC)" < [REDACTED] (b) (6) "Lane, Cliff" < [REDACTED] (b) (6) > >  
Cc: "(U) Millman, Alexander (Beijing | CDC)" < [REDACTED] (b) (6) >  
Subject: Re: Meet Sunday afternoon?

Just to let you know we are still in the meeting at WHO, so will be late. Will let you know when we are done.

Thanks,  
Weigong

**From:** [REDACTED] (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < [REDACTED] (b) (6) Lane, Cliff (NIH/NIAID) [E] < [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6) > >  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6) >  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.  
Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" < [REDACTED] (b) (6) >  
**Date:** 2/16/20 8:33 AM (GMT+08:00)  
**To:** [REDACTED] (b) (6), "Lane, Cliff" < [REDACTED] (b) (6) >  
< [REDACTED] (b) (6) "Zhou, Weigong (CDC/DDID/NCIRD/ID)" < [REDACTED] (b) (6) > >  
**Cc:** "(U) Millman, Alexander (Beijing | CDC)" < [REDACTED] (b) (6) >  
**Subject:** Re: Meet Sunday afternoon?

My number is [REDACTED] (b) (6)  
See you this afternoon.

RJ

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**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] < [REDACTED] (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6) > >  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) < [REDACTED] (b) (6) Millman, Alexander J. (CDC/DDID/NCIRD/ID) < [REDACTED] (b) (6) > >  
**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.  
Best,

[REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Lane, Cliff (NIH/NIAID) [E]" < [REDACTED] (b) (6) >  
**Date:** 2/16/20 6:58 AM (GMT+08:00)  
**To:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" < [REDACTED] (b) (6) >  
**Cc:** "(U) Simonds, R J (Beijing | CDC)" < [REDACTED] (b) (6) > [REDACTED] (b) (6)  
(Beijing)" < [REDACTED] (b) (6) > "(U) Millman, Alexander (Beijing | CDC)" < [REDACTED] (b) (6) >

Subject: Re: Meet Sunday afternoon?  
My mobile is (b) (6)  
Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.  
I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change.  
What is the best number to reach you? My EOC mobile is (b) (6)  
See you tomorrow.  
Best,  
Weigong

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**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (b) (6)  
<(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
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>  
>  
> Hi and welcome to China. I hope you both arrived safely.  
>  
> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.  
>  
> Thanks and have a good sleep.  
>  
> RJ  
>

**From:** (b) (6)  
**Sent:** Mon, 17 Feb 2020 00:33:49 +0800  
**To:** (b) (6)  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Simonds, R. J. (CDC/DDPHSIS/CGH/OD); Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Subject:** Re: Meet Sunday afternoon?

It looks like we will be done around

On Feb 16, 2020, at 4:47 PM, (b) (6)  
<(b) (6)> wrote:

Thanks for the update. Will see you when you are done.

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**Date:** 2/16/20 4:24 PM (GMT+08:00)  
**To:** (b) (6), "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> "Lane, Cliff" <(b) (6)>  
**Cc:** "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

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**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

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**Date:** 2/16/20 8:33 AM (GMT+08:00)  
**To:** (b) (6) "Lane, Cliff" <(b) (6)> (b) (6) "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Cc:** "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?  
My number is (b) (6)  
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RJ



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**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

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[REDACTED] (b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

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**Date:** 2/16/20 6:58 AM (GMT+08:00)  
**To:** "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>  
**Cc:** "(U) Simonds, R J (Beijing | CDC)" <[REDACTED] (b) (6)> [REDACTED] (b) (6) (Beijing)" <[REDACTED] (b) (6)> "(U) Millman, Alexander (Beijing | CDC)" <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?  
My mobile is [REDACTED] (b) (6)  
Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> wrote:

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See you tomorrow.

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Weigong

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Saturday, February 15, 2020 11:42:51 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> [REDACTED] (b) (6) <[REDACTED] (b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> wrote:

>

>

> Hi and welcome to China. I hope you both arrived safely.

>

> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.

>

> Thanks and have a good sleep.

>

> RJ

>

**From:** PANG, Xinxin  
**Sent:** Sun, 16 Feb 2020 13:51:24 +0000  
**To:** GALEA, Gauden;AYLWARD, Raymond Bruce J.;Alexander SEMENOV  
(b) (6) Chikwe IHEKWEAZU (b) (6) Lane, Cliff  
(NIH/NIAID) [E];Dale FISHER (b) (6) Dr Hitoshi TAKAHASHI  
(b) (6) gmleung;LEE Jong-Koo (b) (6) Dr VAN KERKHOVE, Maria;Natalia  
PSHENICHNAYA (b) (6) Tim ECKMANNS (b) (6) Zhou,  
Weigong (CDC/DDID/NCIRD/ID);Weigong ZHOU (b) (6) XING, Jun  
**Cc:** DRURY, Patrick Anthony  
**Subject:** Recall: Welcome to the WHO-CHN Joint Mission

PANG, Xinxin would like to recall the message. "Welcome to the WHO-CHN Joint Mission".

**From:** PANG, Xinxin  
**Sent:** Sun, 16 Feb 2020 13:44:47 +0000  
**To:** GALEA, Gauden;AYLWARD, Raymond Bruce J.;Alexander SEMENOV  
(b) (6) Chikwe IHEKWEAZU (b) (6) Lane, Cliff  
(NIH/NIAID) [E];Dale FISHER (b) (6) Dr Hitoshi TAKAHASHI  
(b) (6);gmleung;LEE Jong-Koo (b) (6) Dr VAN KERKHOVE, Maria;Natalia  
PSHENICHNAYA (b) (6) Tim ECKMANNS (b) (6) Zhou,  
Weigong (CDC/DDID/NCIRD/ID);Weigong ZHOU (b) (6) XING, Jun  
**Cc:** DRURY, Patrick Anthony  
**Subject:** RE: Welcome to the WHO-CHN Joint Mission

Dear Joint Mission members,

We just received the tentative agenda for tomorrow Feb 17:

8:20, travel from hotel to Ditan Hospital  
9:00, to visit Ditan Hospital  
Time TBC, to visit a Community Health Center  
12:30, travel to China CDC  
Time TBC, lunch at China CDC  
Time TBC, discussion at China CDC

NHC will provide more info later tonight or tomorrow morning.

With regards,  
Xinxin

---

**From:** PANG, Xinxin **On Behalf Of** GALEA, Gauden  
**Sent:** Saturday, February 15, 2020 4:47 PM  
**To:** AYLWARD, Raymond Bruce J. <(b) (6)> Alexander SEMENOV  
(b) (6) <(b) (6)> Chikwe IHEKWEAZU  
(b) (6) <(b) (6)> Clifford LANE (b) (6)  
<(b) (6)> Dale FISHER (b) (6) <(b) (6)> Dr Hitoshi TAKAHASHI  
(b) (6) <(b) (6)> gmleung <(b) (6)> LEE Jong-Koo  
(b) (6) <(b) (6)> Dr VAN KERKHOVE, Maria <(b) (6)>  
Natalia PSHENICHNAYA (b) (6) <(b) (6)> Tim  
ECKMANNS (b) (6) <(b) (6)> Weigong ZHOU (b) (6)  
<(b) (6)> Weigong ZHOU (b) (6) <(b) (6)> XING, Jun <(b) (6)  
**Cc:** GALEA, Gauden <(b) (6)> DRURY, Patrick Anthony <(b) (6)> PANG, Xinxin  
<(b) (6)>  
**Subject:** RE: Welcome to the WHO-CHN Joint Mission

Dear Joint Mission members,

Further to Bruce's message of last evening, I am very pleased to welcome you to Beijing.

As Bruce informed you, we will have a meeting of the international team members from 11:00 hr - 15:00 hr at our WHO China Office tomorrow, Sunday 16 February. Our colleagues Maria and Jun will meet you in the lobby of the Holiday Inn Express at 10:45 so that you can walk over to our office together.

During the meeting we will provide you with a briefing folder that includes relevant administrative, epidemiologic and technical information, as well as a thumb drive with electronic versions of the same materials.

As we will serve a light lunch around 12:30hr, please let Xinxin know if you have any food allergies or strong preferences in that regard.

Finally, please be aware that our hosts, the National Health Commission (NHC), will be arranging all of our subsequent group transportation while you are in Beijing and during field visits.

I look forward to meeting you tomorrow.

With best regards,

Gauden GALEA  
WHO Representative to China  
Beijing

---

**From:** AYLWARD, Raymond Bruce J.

**Sent:** Saturday, February 15, 2020 2:26 AM

**To:** Alexander SEMENOV ( (b) (6) < (b) (6) > (b) (6) Chikwe IHEKWEAZU ( (b) (6) < (b) (6) > (b) (6) Clifford LANE ( (b) (6) < (b) (6) Dale FISHER ( (b) (6) < (b) (6) > (b) (6) Dr Hitoshi TAKAHASHI ( (b) (6) < (b) (6) > (b) (6) gmleung < (b) (6) > (b) (6) LEE Jong-Koo ( (b) (6) < (b) (6) > (b) (6) Dr VAN KERKHOVE, Maria < (b) (6) > (b) (6) Natalia PSHENICHNAYA ( (b) (6) < (b) (6) > (b) (6) Tim ECKMANN ( (b) (6) < (b) (6) > (b) (6) Weigong ZHOU ( (b) (6) < (b) (6) > (b) (6) Weigong ZHOU ( (b) (6) < (b) (6) > (b) (6) XING, Jun < (b) (6) > (b) (6)

**Cc:** GALEA, Gauden < (b) (6) > (b) (6) DRURY, Patrick Anthony < (b) (6) > (b) (6)

**Subject:** Welcome to the WHO-CHN Joint Mission

**Importance:** High

Dear Members of the Joint Mission,

Thank you all so much for your enthusiasm to participate in the forthcoming WHO-CHN Joint Mission on COVID-19.

I am also very grateful for your understanding and patience as key details of this Mission were worked out.

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You are in very good hands with our logistics teams, however please do not hesitate to contact me directly if I can be of assistance in advance of your arrival.

With very best regards,

Bruce

Bruce AYLWARD (WHO/Geneva)

Team Leader, WHO-China Joint Mission on COVID-19

Email: (b) (6)

Mobile: (b) (6) (international)

**From:** Hall, Bill (HHS/ASPA)  
**Sent:** Sun, 16 Feb 2020 11:33:39 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Cc:** Billet, Courtney (NIH/NIAID) [E];Fauci, Anthony (NIH/NIAID) [E];Grigsby, Garrett (HHS/OS/OGA);Redfield, Robert R. (CDC/OD);Zhou, Weigong (CDC/DDID/NCIRD/ID)  
**Subject:** Re: WHO mission to China

Hi Cliff,

Thanks for your note. [REDACTED] (b) (5)

Best regards,  
Bill

Sent from my iPad

> On Feb 16, 2020, at 5:21 AM, Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

>

> Colleagues,

>

[REDACTED] (b) (5)

>

> Cliff

**From:** (b) (6)  
**Sent:** Sun, 16 Feb 2020 17:04:39 +0800  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID)  
**Cc:** (b) (6); Simonds, R. J. (CDC/DDPHSIS/CGH/OD); Millman, Alexander J. (CDC/DDID/NCIRD/ID)  
**Subject:** Re: Meet Sunday afternoon?

We are still at WHO. Leaving in a few minutes.

Cliff

On Feb 16, 2020, at 4:48 PM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Just done. Should be back around 5:00.

**From:** (b) (6)  
**Sent:** Sunday, February 16, 2020 4:15:39 PM  
**To:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

See you all in a bit in the hotel lobby.

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <(b) (6)>  
**Date:** 2/16/20 8:33 AM (GMT+08:00)  
**To:** (b) (6), "Lane, Cliff" <(b) (6)> "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>  
**Cc:** "(U) Millman, Alexander (Beijing | CDC)" <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?  
My number is (b) (6)  
See you this afternoon.

RJ

**From:** (b) (6)  
**Sent:** Sunday, February 16, 2020 7:24:20 AM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Subject:** Re: Meet Sunday afternoon?

Thanks everyone. Let's stay in touch today if timing adjusts. Best of luck for a good start.

Best,

(b) (6)



(b) (6)

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone

----- Original message -----

From: "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)>

Date: 2/16/20 6:58 AM (GMT+08:00)

To: "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <(b) (6)>

Cc: "(U) Simonds, R J (Beijing | CDC)" <(b) (6)> (b) (6)  
(Beijing)" <(b) (6)> "(U) Millman, Alexander (Beijing | CDC)"  
<(b) (6)>

Subject: Re: Meet Sunday afternoon?

My mobile is (b) (6)

Cliff

On Feb 16, 2020, at 12:48 AM, Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> wrote:

Thanks, RJ! Same here. Let's plan as you proposed.

I think the agenda for tomorrow is still evolving. I'll call you in case there's last minute change.

What is the best number to reach you? My EOC mobile is (b) (6)

See you tomorrow.

Best,

Weigong

From: Lane, Cliff (NIH/NIAID) [E] <(b) (6)>

Sent: Saturday, February 15, 2020 11:42:51 PM

To: Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)>

Cc: Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> (b) (6)  
<(b) (6)> Millman, Alexander J. (CDC/DDID/NCIRD/ID) <(b) (6)>

Subject: Re: Meet Sunday afternoon?

I am fine with anything that does not conflict with the WHO schedule.

Thanks for reaching out to us.

Cliff

> On Feb 15, 2020, at 9:33 PM, Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> wrote:

>

>

>

> Hi and welcome to China. I hope you both arrived safely.

>

> We would like to schedule some time for the HHS team in China to meet with you tomorrow. We understand from WHO that you will have a pre-meeting from 11-2 or so, and that you will then need to be ready by 6:30pm to start your evening meeting. Would you be willing to meet with us at 5pm? We could come to your hotel and maybe find a place to have dinner nearby. Let us know please.

>

> Thanks and have a good sleep.

>  
> RJ  
>

**From:** Eckmanns, Tim  
**Sent:** Sat, 15 Feb 2020 13:43:20 +0000  
**To:** GALEA, Gauden;AYLWARD, Raymond Bruce J.;Alexander SEMENOV  
(b) (6) Chikwe IHEKWEAZU (b) (6) Lane, Cliff  
(NIH/NIAID) [E];Dale FISHER (b) (6) Dr Hitoshi TAKAHASHI  
(b) (6) gmlung;LEE Jong-Koo (b) (6) Dr VAN KERKHOVE, Maria;Natalia  
PSHENICHNAYA (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID);Weigong  
ZHOU (b) (6);XING, Jun  
**Cc:** GALEA, Gauden;DRURY, Patrick Anthony;PANG, Xinxin  
**Subject:** AW: Welcome to the WHO-CHN Joint Mission

Dear Gauden  
Thank you.  
I am on my way. I will reach Beijing at 11:45. So I will be late for the meeting.  
Looking forward to meeting you tomorrow.  
Tim

Gesendet von meinem BlackBerry 10-Smartphone.

Von: GALEA, Gauden

Gesendet: Samstag, 15. Februar 2020 09:47

An: AYLWARD, Raymond Bruce J.; Alexander SEMENOV (b) (6) Chikwe IHEKWEAZU  
(b) (6) Clifford LANE (b) (6) Dale FISHER (b) (6) Dr  
Hitoshi TAKAHASHI (b) (6) gmlung; LEE Jong-Koo (b) (6) Dr VAN  
KERKHOVE, Maria; Natalia PSHENICHNAYA (b) (6) Eckmanns, Tim; Weigong  
ZHOU (b) (6) Weigong ZHOU (b) (6) XING, Jun

Cc: GALEA, Gauden; DRURY, Patrick Anthony; PANG, Xinxin

Betreff: RE: Welcome to the WHO-CHN Joint Mission

Dear Joint Mission members,

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As Bruce informed you, we will have a meeting of the international team members from 11:00 hr - 15:00 hr at our WHO China Office tomorrow, Sunday 16 February. Our colleagues Maria and Jun will meet you in the lobby of the Holiday Inn Express at 10:45 so that you can walk over to our office together.

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I look forward to meeting you tomorrow.

With best regards,

Gauden GALEA  
WHO Representative to China  
Beijing

From: AYLWARD, Raymond Bruce J.

Sent: Saturday, February 15, 2020 2:26 AM

To: Alexander SEMENOV (b) (6) <(b) (6)> (b) (6) Chikwe IHEKWEAZU  
(b) (6) <(b) (6)> (b) (6) Clifford LANE (b) (6)  
(b) (6) Dale FISHER (b) (6) <(b) (6)> (b) (6) Dr Hitoshi TAKAHASHI  
(b) (6) <(b) (6)> (b) (6) gmlung <(b) (6)> (b) (6) LEE Jong-Koo (b) (6)  
(b) (6) Dr VAN KERKHOVE, Maria <(b) (6)> (b) (6) Natalia PSHENICHNAYA  
(b) (6) <(b) (6)> (b) (6) Tim ECKMANNNS (b) (6)  
(b) (6) Weigong ZHOU (b) (6) <(b) (6)> (b) (6) Weigong ZHOU (b) (6)  
(b) (6) XING, Jun <(b) (6)> (b) (6)

Cc: GALEA, Gauden <(b) (6)> DRURY, Patrick Anthony <(b) (6)>

Subject: Welcome to the WHO-CHN Joint Mission

Importance: High

Dear Members of the Joint Mission,

Thank you all so much for your enthusiasm to participate in the forthcoming WHO-CHN Joint Mission on COVID-19.

I am also very grateful for your understanding and patience as key details of this Mission were worked out.

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You are in very good hands with our logistics teams, however please do not hesitate to contact me directly if I can be of assistance in advance of your arrival.

With very best regards,

Bruce

Bruce AYLWARD (WHO/Geneva)

Team Leader, WHO-China Joint Mission on COVID-19

Email: (b) (6) mailto:(b) (6)

Mobile: (b) (6) (international)

**From:** Dale Fisher  
**Sent:** Sat, 15 Feb 2020 12:09:48 +0000  
**To:** GALEA, Gauden;AYLWARD, Raymond Bruce J.;Alexander SEMENOV  
(b) (6) Chikwe IHEKWEAZU (b) (6) Lane, Cliff  
(NIH/NIAID) [E];Dr Hitoshi TAKAHASHI (b) (6);gmlung;LEE Jong-Koo  
(b) (6) Dr VAN KERKHOVE, Maria;Natalia PSHENICHNAYA (b) (6)  
(b) (6);Tim ECKMANNS (b) (6) Zhou, Weigong  
(CDC/DDID/NCIRD/ID);Weigong ZHOU (b) (6);XING, Jun  
**Cc:** DRURY, Patrick Anthony;PANG, Xinxin  
**Subject:** RE: Welcome to the WHO-CHN Joint Mission

Thanks Gauden;

Very pleased to be here and looking forward to meeting you tomorrow.

Dale

---

**From:** PANG, Xinxin <(b) (6)> **On Behalf Of** GALEA, Gauden  
**Sent:** Saturday, 15 February 2020 4:47 PM  
**To:** AYLWARD, Raymond Bruce J. <(b) (6)> Alexander SEMENOV  
(b) (6) <(b) (6)> Chikwe IHEKWEAZU  
(b) (6) <(b) (6)> Clifford LANE (b) (6)  
<(b) (6) Dale Fisher <(b) (6) Dr Hitoshi TAKAHASHI (b) (6)  
<(b) (6) gmlung <(b) (6) LEE Jong-Koo (b) (6)  
<(b) (6) Dr VAN KERKHOVE, Maria <(b) (6) Natalia PSHENICHNAYA  
(b) (6) <(b) (6) Tim ECKMANNS  
(b) (6) <(b) (6) Weigong ZHOU (b) (6) <(b) (6) Weigong  
ZHOU (b) (6) <(b) (6) XING, Jun <(b) (6)  
**Cc:** GALEA, Gauden <(b) (6) DRURY, Patrick Anthony <(b) (6) PANG, Xinxin  
<(b) (6)  
**Subject:** RE: Welcome to the WHO-CHN Joint Mission

- External Email -

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WHO Representative to China  
Beijing

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**Sent:** Saturday, February 15, 2020 2:26 AM  
**To:** Alexander SEMENOV ( (b) (6) < (b) (6) > Chikwe IHEKWEAZU ( (b) (6) < (b) (6) > Clifford LANE ( (b) (6) < (b) (6) > Dale FISHER ( (b) (6) < (b) (6) > Dr Hitoshi TAKAHASHI ( (b) (6) < (b) (6) > gmlung < (b) (6) > LEE Jong-Koo ( (b) (6) < (b) (6) > Dr VAN KERKHOVE, Maria < (b) (6) > Natalia PSHENICHNAYA ( (b) (6) < (b) (6) > Tim ECKMANN ( (b) (6) < (b) (6) > Weigong ZHOU ( (b) (6) < (b) (6) > Weigong ZHOU ( (b) (6) < (b) (6) > XING, Jun < (b) (6) >  
**Cc:** GALEA, Gauden < (b) (6) > DRURY, Patrick Anthony < (b) (6) >  
**Subject:** Welcome to the WHO-CHN Joint Mission  
**Importance:** High

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With very best regards,

Bruce

Bruce AYLWARD (WHO/Geneva)  
Team Leader, WHO-China Joint Mission on COVID-19  
Email: (b) (6)  
Mobile: (b) (6) (international)

---

Important: This email is confidential and may be privileged. If you are not the intended recipient, please delete it and notify us immediately; you should not copy or use it for any purpose, nor disclose its contents to any other person. Thank you.

**From:** Handley, Gray (NIH/NIAID) [E]  
**Sent:** Fri, 14 Feb 2020 22:35:15 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Carver, Trea (NIH) [C]; Arthur, Ray (CDC/DDPHSIS/CGH/DGHP); (b) (6); PANG, Xinxin  
**Subject:** RE: China Team

Cliff,

So my assumption is that when you come out of customs look for a sign with your name on it – either with “WHO” or “Holiday Inn” on it. This is how it usually works at that airport.

I have copied Ms. Pang so she can correct if this is wrong.

Bon Voyage.

Gray

---

**From:** (b) (6)  
**Sent:** Friday, February 14, 2020 5:19 PM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Handley, Gray (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)> Carver, Trea (NIH) [C] <(b) (6)> Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <(b) (6)>  
**Subject:** Re: China Team

Hi Gray and all,

The WHO office here has arranged the rooms at the Holiday Inn Express near their offices. They will provide transport from the airport.

Please contact ms Pang Xinxin (b) (6) for any and all details related to these aspects. You can also reach her by phone at (b) (6).

Best,  
(b) (6).

Sent via the Samsung Galaxy S8, an AT&T 4G LTE smartphone



**From:** (b) (6)  
**Sent:** Sat, 15 Feb 2020 05:23:06 +0900  
**To:** Handley, Gray (NIH/NIAID) [E]  
**Cc:** Zhou, Weigong (CDC/DDID/NCIRD/ID); Carver, Trea (NIH) [C]; (b) (6)  
(b) (6); Arthur, Ray (CDC/DDPHSIS/CGH/DGHP)  
**Subject:** Re: China Team

I have received WHO points of contact in China and a 24-hour number. I think I am okay.

On Feb 15, 2020, at 4:19 AM, Handley, Gray (NIH/NIAID) [E] <(b) (6)> wrote:

I heard that travelers will be met at airport and transported to the hotel but I asked for more specific details. Nothing in yet. Will share what we hear.

Gray

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Friday, February 14, 2020 11:56 AM  
**To:** Handley, Gray (NIH/NIAID) [E] <handleygr@niaid.nih.gov>  
**Cc:** Carver, Trea (NIH) [C] <(b) (6)> (b) (6)  
(Pa (b) (6) <(b) (6)> Lane, Cliff (NIH/NIAID) [E]  
<(b) (6)> Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <(b) (6)>  
**Subject:** Re: China Team

No, I haven't received information on hotel and transportation.

Thanks,  
Weigong

Get [Outlook for iOS](#)

---

**From:** Handley, Gray (NIH/NIAID) [E] (b) (6)  
**Sent:** Friday, February 14, 2020 8:41:04 AM  
**To:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Carver, Trea (NIH) [C] (b) (6) (b) (6)  
(b) (6) (b) (6) Lane, Cliff (NIH/NIAID) [E]  
(b) (6) Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <(b) (6)>  
**Subject:** RE: China Team

Thanks so much. I think we are all set. Cliff should be able to get his visa in Tokyo and join you on Saturday in Beijing.

One last question, have you received any information about how you will be met at airport and transported to the hotel?

Thanks. Gray

---

**From:** Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Sent:** Friday, February 14, 2020 12:01 AM  
**To:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <(b) (6)> Handley, Gray (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Carver, Trea (NIH) [C] <(b) (6)>  
**Subject:** RE: China Team

Hi Gray,

Since the mission has specific dates, I think you can just use those dates in the application, i.e., arrival on Feb 15 and departure on Feb 23. I put Hilton Beijing on my application, but it sounded like WHO wants everyone to stay in a holiday inn express near WHO office. I put CDC's country office director, RJ Simonds as the in country contact person. Hope these are helpful.

Best,  
Weigong

---

**From:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <(b) (6)>  
**Sent:** Thursday, February 13, 2020 4:52 PM  
**To:** Handley, Gray (NIH/NIAID) [E] <(b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <(b) (6)>  
**Cc:** Carver, Trea (NIH) [C] <(b) (6)>  
**Subject:** RE: China Team

Gray, I'm copying Weigong who has gone through the process of obtaining his visa. The process may differ somewhat since he obtained his visa in DC and not on entry. Ray

---

**From:** Handley, Gray (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Thursday, February 13, 2020 4:33 PM  
**To:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <(b) (6)>  
**Cc:** Carver, Trea (NIH) [C] <(b) (6)>  
**Subject:** RE: China Team

Ray, what did you all fill out in the visa form when it asks for dates, locations and address? Also who is the contact you used for the form? Sorry for the trouble. Gray

---

**From:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <(b) (6)>  
**Sent:** Thursday, February 13, 2020 4:12 PM  
**To:** Lane, Cliff (NIH/NIAID) [E] <(b) (6)> Carver, Trea (NIH) [C] <(b) (6)>  
**Cc:** Handley, Gray (NIH/NIAID) [E] <(b) (6)>  
**Subject:** RE: China Team

Kick off on Sunday 16th

- Day 1 (16/2): Workshop – Beijing

- Day 2: (17/2)Field Visits Beijing
- Day 3-6: (18 – 20/2) - Field visits – Guangdong, Wuhan (TBD), 3<sup>rd</sup> province (TBD)
- Day 7: T(21/2) Team regroup - Beijing
- Day 8: (22/2) Final briefing – Beijing

Would look like departure on late 22 or 23 February... as a guide.

WHO prefers that the team use the Holiday Inn Express near the WHO office. I assume the hotel details will be forthcoming. Our CDC Country Director indicates there are no USG security concerns with this hotel.

Best,  
Ray

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 13, 2020 3:17 PM  
**To:** Carver, Trea (NIH) [C] <[REDACTED] (b) (6)>  
**Cc:** Handley, Gray (NIH/NIAID) [E] <[REDACTED] (b) (6)> Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)>  
**Subject:** Re: China Team

I think it would be returning the following Sunday.

Gray or Ray should be able to confirm.

Cliff

On Feb 13, 2020, at 3:11 PM, Carver, Trea (NIH) [C] <[REDACTED] (b) (6)> wrote:

Dr. Lane I booked a 1 way flight from Tokyo to Beijing for Saturday, 2/15 departing @ 6pm. Do you have a return date?

*Thank You,*  
*Trea*

Trea Carver [C]  
Staff Assistant to the Director  
Division of Clinical Research (DCR)  
National Institute of Allergy and Infectious Diseases/NIH  
Building 10CRC/Room 4-1479  
Phone: [REDACTED] (b) (6)

Cell: (b) (6)

Fax: 301-480-5560

Email: (b) (6)

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---

**From:** "Lane, Cliff (NIH/NIAID) [E]" <(b) (6)>

**Date:** Thursday, February 13, 2020 at 2:39 PM

**To:** "Carver, Trea (NIH) [C]" (b) (6)

**Cc:** "Handley, Gray (NIH/NIAID) [E]" <(b) (6)>

**Subject:** Re: China Team

It would be Saturday or Sunday. Still very tentative.

Please keep Gray Handley (copied) in the loop on anything related.

Thanks

On Feb 13, 2020, at 2:36 PM, Carver, Trea (NIH) [C] (b) (6) wrote:

Dr. Lane, what day would you like to leave?

*Thank You,  
Trea*

Trea Carver [C]  
Staff Assistant to the Director  
Division of Clinical Research (DCR)  
National Institute of Allergy and Infectious Diseases/NIH  
Building 10CRC/Room 4-1479  
Phone: (b) (6)  
Cell: (b) (6)  
Fax: 301-480-5560  
Email: (b) (6)

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---

**From:** "Lane, Cliff (NIH/NIAID) [E]" (b) (6)

**Date:** Thursday, February 13, 2020 at 2:25 PM

**To:** "Carver, Trea (NIH) [C]" <[REDACTED] (b) (6)>  
**Subject:** Re: China Team

Please explore flights from Tokyo to Beijing. Thanks

On Feb 13, 2020, at 2:03 PM, Carver, Trea (NIH) [C] [REDACTED] (b) (6) wrote:

Received.

*Thank You,  
Trea*

Trea Carver [C]  
Staff Assistant to the Director  
Division of Clinical Research (DCR)  
National Institute of Allergy and Infectious Diseases/NIH  
Building 10CRC/Room 4-1479  
Phone: [REDACTED] (b) (6)  
Cell: [REDACTED] (b) (6)  
Fax: 301-480-5560  
*Email:* [REDACTED] (b) (6)

Notice: This email and any attachments to it are intended only for the identified recipient. It may contain proprietary or otherwise legally protected information for Leidos Biomedical Research, Inc. Any unauthorized use or disclosure of this communication is strictly prohibited. If you have received this communication in error, please notify the sender and delete or otherwise destroy the e-mail and all attachments immediately.

---

**From:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** Thursday, February 13, 2020 at 1:51 PM  
**To:** "Carver, Trea (NIH) [C]" <[REDACTED] (b) (6)>  
**Subject:** Fwd: China Team

Keeping you in the loop.

Begin forwarded message:

**From:** "Arthur, Ray (CDC/DDPHSIS/CGH/DGHP)" <[REDACTED] (b) (6)>  
**Date:** February 13, 2020 at 1:16:30 PM EST  
**To:** "Lane, Cliff (NIH/NIAID) [E]" <[REDACTED] (b) (6)> "Elvander, Erika (OS/OGA)" <[REDACTED] (b) (6)>  
**Cc:** "Simonds, R. J. (CDC/DDPHSIS/CGH/OD)" <[REDACTED] (b) (6)> "Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM)" <[REDACTED] (b) (6)> "Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP)" <[REDACTED] (b) (6)> "Bresee, Joseph (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)> "Zhou, Weigong (CDC/DDID/NCIRD/ID)" <[REDACTED] (b) (6)>  
**Subject:** RE: China Team

Thanks. Will await further info. I have alerted WHO.

Safe travels,  
Ray

---

**From:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 13, 2020 1:06 PM  
**To:** Elvander, Erika (OS/OGA) <[REDACTED] (b) (6)>  
**Cc:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM) <[REDACTED] (b) (6)> Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)> Bresee, Joseph (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** Re: China Team

Team,

As some of you may be aware, I am en route to Japan (communicating via onboard WiFi) to explore the possibility of rapidly implementing a remdesivir study.

I have sent a message to Dr. Fauci that I could probably change plans from Tokyo depending upon where I am felt to be of most value.

Thanks for all the help thus far.

Cliff

On Feb 13, 2020, at 12:53 PM, Elvander, Erika (OS/OGA) <[REDACTED] (b) (6)> wrote:

Got it. That's very very helpful.

Cheers.

Erika

---

**From:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 13, 2020 12:41 PM  
**To:** Elvander, Erika (OS/OGA) <[REDACTED] (b) (6)>  
**Cc:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM) <[REDACTED] (b) (6)> Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)> Bresee, Joseph (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Zhou, Weigong (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)>  
**Subject:** RE: China Team

Erika, There is a tacit understanding in WHO that this will occur. Team members don't publicize that it is happening. Ray

---

**From:** Elvander, Erika (OS/OGA) <[REDACTED]> (b) (6)  
**Sent:** Thursday, February 13, 2020 11:27 AM  
**To:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED]> (b) (6)  
**Cc:** Lane, Cliff (NIH/NIAID) [E] <[REDACTED]> (b) (6); Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6); Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM) <[REDACTED]> (b) (6); Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP) <[REDACTED]> (b) (6); Bresee, Joseph (CDC/DDID/NCIRD/ID) <[REDACTED]> (b) (6)  
**Subject:** Re: China Team

Thanks Ray. That's fine not talking to the press but I have a feeling member states will want to be able to talk to the team members. Does that make sense?

Erika Elvander  
Director, Asia and the Pacific  
Office of Global Affairs, HHS  
Sent from my iPhone

On Feb 13, 2020, at 11:23 AM, Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED]> (b) (6) wrote:

The DG's office is drafting something for each mission member. It is expected to be about confidentiality and not speaking to the press.

Ray

---

**From:** Elvander, Erika (OS/OGA) <[REDACTED]> (b) (6)  
**Sent:** Thursday, February 13, 2020 11:10 AM  
**To:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED]> (b) (6); Lane, Cliff (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6); Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM) <[REDACTED]> (b) (6); Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP) <[REDACTED]> (b) (6)  
**Subject:** RE: China Team

Thanks Ray! Do you know if Cliff and Weigong will need to sign NDAs?

Cheers.

Erika

---

**From:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED]> (b) (6)  
**Sent:** Thursday, February 13, 2020 11:02 AM

**To:** Elvander, Erika (OS/OGA) <[REDACTED]> (b) (6) Lane, Cliff (NIH/NIAID) [E]

<[REDACTED]> (b) (6)

**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6) Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM) <[REDACTED]> (b) (6) Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP)

<[REDACTED]> (b) (6)

**Subject:** RE: China Team

**Importance:** High

Erica, I just received word from Geneva that Weigong Zhou and Cliff Lane have been selected for the team. This is expected to be formalized by the Chinese within 24hrs. WHO has instructed the deployers to make arrangements to arrive in Beijing by Saturday for work starting Sunday. The mission will probably be approximately eight days in length with two in Beijing, three in the provinces, and two again in Beijing. There might be a period of quarantine after but it's too early to tell. WHO country office will arrange hotel reservations for Weigong and Cliff. Others from the mission include representatives from Japan, Singapore, Korea, Nigeria, and Russia.

Cliff, WHO urgently needs a copy of the face page of your official passport and your CV. Do you have your visa and can NIH arrange you travel or should I request WHO to do so? The DG has also asked who at NIH the DG should formally thank for your participation. You will have to get medical clearance to get a "GOARN (WHO) contract" for \$1 that affords you the rights and privileges of a WHO staff member. WHO will provide the medical form. I expect that you may have questions so please feel free to call me.

Thanks all.

Ray

Ray R. Arthur, PhD

Lead, Global Disease Detection Operations Center

Emergency Response and Recovery Branch

[Division of Global Health Protection](#)

Center for Global Health

Centers for Disease Control and Prevention

1600 Clifton Road, NE

MS: H21-9

Atlanta, GA 30329

Phone: [REDACTED] (b) (6)

Mobile [REDACTED] (b) (6)

[REDACTED] (b) (6)

---

**From:** Elvander, Erika (OS/OGA) [REDACTED] (b) (6)

**Sent:** Thursday, February 13, 2020 10:39 AM

**To:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED]> (b) (6)

**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED]> (b) (6) Marston, Barbara J.

(CDC/DDPHSIS/CGH/DPDM) <[REDACTED]> (b) (6) Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP)

<[REDACTED]> (b) (6)

**Subject:** RE: China Team



Thanks Ray!

I can say that all NIH members have been cleared by Embassy to travel to China, and that NIH has the visa letters to get visas. Let me check in with NIH and get back to you on the rest.

Cheers.

Erika

---

**From:** Arthur, Ray (CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 13, 2020 10:37 AM  
**To:** Elvander, Erika (OS/OGA) <[REDACTED] (b) (6)>  
**Cc:** Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM) <[REDACTED] (b) (6)> Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)>  
**Subject:** China Team  
**Importance:** High

Dear Erika,

I hope you are well. I've seen messages where you have an overview of HHS staff that have been proposed to join the multilateral technical team in China. As you may have seen, all four CDC have visas and are ready to deploy as soon as CDC receives official notice that one or more staff have been invited to join the team. I am writing to inquire about travel preparation for NIH staff if invited. We are getting strong indications that a CDC and a NIH expert will be deployed. Could they be in Beijing within 48 hrs. of notification?

The China team is being managed via the GOARN Operational Platform. I represent CDC on the GOARN Steering Committee and work closely with the GOARN Operational Support Team in Geneva and am aware of requirements for GOARN deployment and resources available. For example, WHO can arrange travel if NIH cannot do so quickly.

Please let me know. Thanks.

Ray

Ray R. Arthur, PhD  
Lead, Global Disease Detection Operations Center  
Emergency Response and Recovery Branch

[Division of Global Health Protection](#)  
Center for Global Health

Centers for Disease Control and Prevention

1600 Clifton Road, NE

MS: H21-9

Atlanta, GA 30329

Phone: [REDACTED] (b) (6)

Mobile: [REDACTED] (b) (6)

[REDACTED] (b) (6)

**From:** AYLWARD, Raymond Bruce J.  
**Sent:** Fri, 14 Feb 2020 18:26:04 +0000  
**To:** Alexander SEMENOV ( (b) (6) Chikwe IHEKWEAZU ( (b) (6) Lane, Cliff (NIH/NIAID) [E]; Dale FISHER ( (b) (6) Dr Hitoshi TAKAHASHI ( (b) (6) gmlung; LEE Jong-Koo ( (b) (6) Dr VAN KERKHOVE, Maria; Natalia PSHENICHNAYA ( (b) (6) Tim ECKMANN ( (b) (6) Zhou, Weigong (CDC/DDID/NCIRD/ID); Weigong ZHOU ( (b) (6) XING, Jun  
**Cc:** GALEA, Gauden; DRURY, Patrick Anthony  
**Subject:** Welcome to the WHO-CHN Joint Mission  
**Attachments:** WHO-China Joint Mission on COVID-19\_ToRs\_13Feb2020.pdf  
**Importance:** High

Dear Members of the Joint Mission,

Thank you all so much for your enthusiasm to participate in the forthcoming WHO-CHN Joint Mission on COVID-19.

I am also very grateful for your understanding and patience as key details of this Mission were worked out.

I am delighted that most of you are already scheduled to arrive either tomorrow (Saturday) or by mid-day Sunday. This should give us time for an initial 'pre-meeting' on Sunday afternoon at the WHO China office, which is a short walk from our hotel.

Over the past 3 days, myself and the other members of the Advance Team (Dr Maria van Kerkhove & Dr Jun Xing of WHO) have been working with national authorities here in Beijing to finalize the Mission objectives, workstreams, method of work and baseline information/data requests (please see attached 1-page summary of our draft ToRs).

Although the programme is still being finalized, we expect the formal Mission to start on Sunday evening with an in-depth workshop from 7-11 pm with our national Team counterparts and senior government officials from key Ministries involved in this COVID-19 response. Following a day of site visits here in Beijing there is a tentative plan for 3 days of field visits prior to our regrouping to consolidate findings.

A number of these details are still evolving, however, and will be finalized over the next 24 hours.

I understand that our very capable WHO teams in Geneva and here in Beijing have been communicating with each of you regarding your flights, airport pick-up and hotel accommodations. To facilitate our joint work and communications, we will also circulate a consolidated list of our names, affiliations, emails and cellphones by mid-day tomorrow (Saturday, 15 Feb).

You are in very good hands with our logistics teams, however please do not hesitate to contact me directly if I can be of assistance in advance of your arrival.

With very best regards,

Bruce

Bruce AYLWARD (WHO/Geneva)

Team Leader, WHO-China Joint Mission on COVID-19

Email: [REDACTED] (b) (6)

Mobile: [REDACTED] (b) (6) (international)

**Terms of Reference**  
**WHO-China Joint Mission on COVID-19**  
**as of 13 February 2020**

The WHO-China Joint Mission on COVID-19 (hereafter referred to as the 'Joint Mission') will be implemented over a **period** of 7-10 days during the 2<sup>nd</sup> half of February 2020.

The overall **goal** of the Joint Mission is to rapidly inform national (China) and international planning on next steps in the response to the ongoing outbreak of novel coronavirus disease (COVID-19) and on next steps in preparedness for areas not yet affected.

To achieve its goal, the Joint Mission will give particular focus to addressing **key questions** related to the transmission dynamics of the novel coronavirus, the natural history and severity of COVID-19, and the impact of ongoing response measures in areas of high, moderate and low transmission.

The Joint Mission **Team** will consist of approximately 12 international and WHO experts and a similar number of national expert counterparts from the People's Republic of China. The WHO Team Leader will represent the team in any public communications and/or comment related to the Joint Mission during the period of its implementation.

The **Terms of Reference** of the Joint Mission are summarized as follows:

- To enhance understanding of the epidemiology of the evolving COVID-19 outbreak in China and the nature and impact of ongoing elimination, control and case management measures;
- To share knowledge on COVID-19 response and preparedness measures being implemented in countries affected by or at risk of importations of the novel coronavirus;
- To undertake extensive discussions, deliberations, data reviews, field visits and expert consultations to inform conclusions and suggestions regarding the current outbreak and containment and control measures in China and internationally; and
- To establish priorities for a collaborative programme of work and research and development to address critical gaps in knowledge and/or response and preparedness tools and activities.

The **Method of Work** for the Joint Mission will include a workshop with representatives of the principal ministries that are leading and/or contributing to the response in China; meetings with national level institutions responsible for the management, implementation and evaluation of response and R&D activities; field visits to 2-3 provinces for in-depth reviews of the application and impact of response activities within areas of high, moderate and lower-intensity transmission, including urban and rural settings; videoconference and other interactions with other areas of interest/importance; meetings and discussions with specialized institutions contributing to key aspects of the response (e.g. academic institutions); and Joint Mission working sessions to consolidate findings, generate conclusions and propose suggested actions.

The Joint Mission will draft a **report** upon conclusion of the abovementioned consultations and field work. All Team Members will contribute to and comment on the draft report while in China and prior to its finalization by the Team Leader.

---

**From:** HAN, Mansuk Daniel  
**Sent:** Fri, 14 Feb 2020 14:39:07 +0000  
**To:** (b) (6) (b) (6) (b) (6) (b) (6)chikwe.ihekwea  
(b) (6) (b) (6)Zhou, Weigong (CDC/DDID/NCIRD/ID);Lane, Cliff (NIH/NIAID)  
[E]; (b) (6) (b) (6)gmleung;BEN EMBAREK, Peter  
Karim;ALEXANDER, Nyka  
**Cc:** DRURY, Patrick Anthony;UMALI DALANGIN, Khristeen  
**Subject:** WHO China Office: After-Hours Phone Number during your travel

Dear all,

Ms Xinxin PANG at China CO has kindly agreed to be available 24/7 on her mobile: (b) (6)

Please note that all non-Chinese online messaging services (WhatsApp, Google Call, etc.) may not work once you enter China.

Best, Dan

---

**From:** HAN, Mansuk Daniel  
**Sent:** Friday, February 14, 2020 3:22 PM  
**To:** (b) (6) (b) (6) (b) (6) (b) (6)  
(b) (6) (b) (6) (b) (6) (b) (6) (b) (6)  
(b) (6); (b) (6) (b) (6) BEN EMBAREK, Peter Karim  
<(b) (6) ALEXANDER, Nyka <(b) (6)  
**Cc:** DRURY, Patrick Anthony <(b) (6) UMALI DALANGIN, Khristeen <(b) (6)  
**Subject:** WHO China office contact persons during your travel

Dear partners,

Please call the numbers below if you need to contact the WHO China office during your travels:

- WHO China office, Ms Icy: (b) (6)
- WHO China office, Ms Xinxin PANG: (b) (6)

Best, Dan

**Mansuk Daniel HAN**  
Technical Officer  
WHO HQ, Geneva, Switzerland  
Office: (b) (6)  
Mobile: (b) (6)  
Email: (b) (6)  
Skype: dan.han3



**From:** Handley, Gray (NIH/NIAID) [E]  
**Sent:** Fri, 14 Feb 2020 13:45:16 +0000  
**To:** Lane, Cliff (NIH/NIAID) [E]  
**Cc:** Elvander, Erika (OS/OGA); Arthur, Ray  
(CDC/DDPHSIS/CGH/ (b) (6)); Stewart  
Simonson ( (b) (6); Zhou, Weigong (CDC/DDID/NCIRD/ID)  
**Subject:** RE: GOARN Pre-deployment package | Drs Weigong ZHOU & Cliff LANE |  
Mission to China | COVID-2019

(b) (5)

Gray

---

**From:** UMALI DALANGIN, Khristeen < (b) (6) >  
**Sent:** Friday, February 14, 2020 8:41 AM  
**To:** Handley, Gray (NIH/NIAID) [E] < (b) (6) > Lane, Cliff (NIH/NIAID) [E]  
< (b) (6) >  
**Cc:** Elvander, Erika (OS/OGA) < (b) (6) > Arthur, Ray (CDC/DDPHSIS/CGH/DGHP)  
< (b) (6) > DRURY, Patrick Anthony < (b) (6) > CAYABYAB, Ramoncito  
< (b) (6) > (b) (6) < (b) (6) >  
< (b) (6) > SCHWARTLANDER, Bernhard F. < (b) (6) > GALEA,  
Gauden < (b) (6) > Stewart Simonson ( (b) (6) < (b) (6) >  
< (b) (6) > NICHOLS, Phyllis Jane < (b) (6) > Zhou, Weigong  
(CDC/DDID/NCIRD/ID) < (b) (6) >  
**Subject:** RE: GOARN Pre-deployment package | Drs Weigong ZHOU & Cliff LANE | Mission to China |  
COVID-2019

Dear Gray,

Thanks for your message and very appreciate the efforts.

Please find attached a copy of the medical questionnaire and medical certificate which are mandatory for this deployment. Would it help if you contact the US Embassy in Tokyo to assist Cliff?

Best,

Khristeen

---

**From:** Handley, Gray (NIH/NIAID) [E] < (b) (6) >  
**Sent:** Friday, February 14, 2020 2:28 PM

**To:** NICHOLS, Phyllis Jane <(b) (6)> UMALI DALANGIN, Khristeen <(b) (6)>  
**Cc:** Lane, Cliff (NIH/NIAID) [E] <[clane@niaid.nih.gov](mailto:clane@niaid.nih.gov)>; Elvander, Erika (OS/OGA)  
<(b) (6)> (b) (6) DRURY, Patrick Anthony <(b) (6)> CAYABYAB,  
Ramoncito <(b) (6)> (b) (6)  
<(b) (6)> SCHWARTLANDER, Bernhard F. <(b) (6)> GALEA,  
Gauden <(b) (6)> Stewart Simonson <(b) (6)>  
<(b) (6)>  
**Subject:** FW: GOARN Pre-deployment package ; Drs Weigong ZHOU & Cliff LANE ; Mission to China ; COVID-2019

Dear GOARN Colleagues,

Over the last 24 hours we have been in active communication with WHO and Chinese officials to assure that Dr. Lane is able to participate in the WHO/GOARN Mission in China. This has been complicated by the fact that Dr. Lane was in transit to Japan when he received the invitation to participate in this mission. Upon arrival in Tokyo, he has made special efforts to obtain a visa, which was facilitated by the Chinese Embassy in Washington, WHO and the U.S. Embassy in Beijing.

I apologize that we were unaware of the list you have provided of necessary actions. I have attached the requested itinerary, passport face page and CV. Also attached is the completed visa application form. Dr. Lane will complete the security training upon arrival in Beijing. As for his medical clearance, Dr. Lane is a full-time U.S. Federal employee who maintains full medical clearance to practice as a research clinician in U.S. Facilities including the NIH Clinical Research Center.

Please let us know if anything more is needed.

One urgent need we have is an assurance that Dr. Lane will be met at the airport upon arrival and transported to the hotel. We also need confirmation of the hotel arrangements WHO/GOARN has made for members of the mission. If you can help with these matters, we would much appreciate it.

Thank you.

F. Gray Handley  
Associate Director for International Research Affairs  
National Institute of Allergy and Infectious Diseases  
National Institute of Health  
U.S. Department of Health and Human Services

Tel: (b) (6) 5601 Fishers Lane, Room 1E50  
Fax: 301 480 2954 Bethesda, MD 20892-9802  
(b) (6)

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---

**From:** Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM) <[REDACTED] (b) (6)>  
**Sent:** Friday, February 14, 2020 3:08 AM  
**To:** NICHOLS, Phyllis Jane <[REDACTED] (b) (6)> Lane, Cliff (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
Handley, Gray (NIH/NIAID) [E] <[REDACTED] (b) (6)> Lane, Cliff (NIH/NIAID) [E]  
<[REDACTED] (b) (6)> Elvander, Erika (OS/OGA) <[REDACTED] (b) (6)> Arthur, Ray  
(CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)>  
**Cc:** AZZIZ-BAUMGARTNER, Eduardo <[REDACTED] (b) (6)> UMALI DALANGIN, Khristeen  
<[REDACTED] (b) (6)> Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Roberts, Nathalie A.  
(CDC/DDPHSIS/CGH/DGHP) <[REDACTED] (b) (6)> DRURY, Patrick Anthony <[REDACTED] (b) (6)> CAYABYAB,  
Ramoncito <[REDACTED] (b) (6)>  
**Subject:** RE: GOARN Pre-deployment package | Drs Weigong ZHOU & Cliff LANE | Mission to China |  
COVID-2019

Hi Phyllis—including others from NIH in case they can help.  
Hello WHO friends.  
Barb

---

**From:** NICHOLS, Phyllis Jane <[REDACTED] (b) (6)>  
**Sent:** Friday, February 14, 2020 2:48 AM  
**To:** [REDACTED] (b) (6); ARTHUR, Ray Richard <[REDACTED] (b) (6)>  
**Cc:** AZZIZ-BAUMGARTNER, Eduardo <[REDACTED] (b) (6)> UMALI DALANGIN, Khristeen  
<[REDACTED] (b) (6)> Bresee, Joseph (CDC/DDID/NCIRD/ID) <[REDACTED] (b) (6)> Simonds, R. J.  
(CDC/DDPHSIS/CGH/OD) <[REDACTED] (b) (6)> Roberts, Nathalie A. (CDC/DDPHSIS/CGH/DGHP)  
<[REDACTED] (b) (6)> Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM) <[REDACTED] (b) (6)> DRURY, Patrick  
Anthony <[REDACTED] (b) (6)> CAYABYAB, Ramoncito <[REDACTED] (b) (6)>  
**Subject:** GOARN Pre-deployment package | Drs Weigong ZHOU & Cliff LANE | Mission to China | COVID-  
2019  
**Importance:** High

In the interest of time and having not been copied on any communication we may have received from  
Cliff, I'm forwarding this to him. Cliff, if you are able to participate, we need your CV, passport photo  
page, medical clearance, and flight itinerary as soon as possible.

Many thanks,  
Phyllis



**Phyllis Nichols**

Operations Coordinator, **Global Outbreak Alert and Response Network (GOARN)**  
World Health Organization (WHO)  
20 Avenue Appia, Geneva 1211, Switzerland  
Email: [REDACTED] (b) (6)  
<https://extranet.who.int/goarn/>

---

**From:** UMALI DALANGIN, Khristeen

**Sent:** Thursday, February 13, 2020 5:37 PM

**To:** AZZIZ-BAUMGARTNER, Eduardo <(b) (6)> Zhou, Weigong  
(CDC/DDID/NCIRD/ID) <(b) (6)>

**Cc:** NICHOLS, Phyllis Jane <(b) (6)> Bresee, Joseph (CDC/DDID/NCIRD/ID) <(b) (6)>

Simonds, R. J. (CDC/DDPHSIS/CGH/OD) <(b) (6)> Roberts, Nathalie A.

(CDC/DDPHSIS/CGH/DGHP) <(b) (6)> Marston, Barbara J. (CDC/DDPHSIS/CGH/DPDM)

<(b) (6)> DRURY, Patrick Anthony <(b) (6)> CAYABYAB, Ramoncito

<(b) (6)>

**Subject:** GOARN Pre-deployment package | Drs Weigong ZHOU & Cliff LANE | Mission to China | COVID-2019

**Importance:** High

Dear all,

Please find attached a copy of the pre-deployment package/information for Drs Weigong Zhou and Cliff Lane.

As GOARN Experts, you will be issued with a nil-remuneration consultant contract; **please note:** the contract issued is for insurance purposes only with no remuneration as you will continue receiving your salary and benefits with your current institution. As this is an emergency deployment and in order to avoid any delays in issuing a contract, we need the following mandatory administrative steps which are a pre-requisite for finalizing the deployment formalities:

1. Medical certificate of fitness and a pre-travel questionnaire forms – mandatory for all the members (non-WHO Staff) that are not passing through Geneva. The completed and signed forms must be sent directly WHO Staff Health and Wellbeing Services <(b) (6)> to expedite approval process.
2. Passport - please send this to us as soon as possible if not done yet.
3. UN Security training or BSAFE security training - the BSAFE is a mandatory requirement. However, in consideration of the exceptional and urgent nature of the mission, WHO Department of Safety and Security (DSS) in China had agreed a security briefing and assistance on the BSAFE be provided to the experts when they arrive in Beijing. In the event that you have already taken the BSAFE training course, may we kindly ask that you send us a copy at <(b) (6)>

### **UN SECURITY AWARENESS TRAINING COURSE- FOR INFO ONLY.**

For any person travelling on behalf of WHO it is mandatory to complete the UN security awareness training course 'BSAFE' through the UNDSS website (<https://training.dss.un.org>). The main goal of BSAFE is to teach UN personnel how to take better care of themselves and how to engage with security. The course contains vital security information for WHO personnel and is delivered in the shape of a story and through the eyes of staff members.

**IMPORTANT:**

Please treat this as sensitive and not for public communications until we have agreed communications with China. To follow are the special declaration of interest and confidentiality forms which are being developed for this mission.

Thanks to acknowledge receipt of this message.

Best,

Khristeen



Khristeen Umali

Assistant

**Global Outbreak Alert and Response Network**

Division of Emergency Response (WRE)

WHO Health Emergencies Programme (WHE)

World Health Organization

Avenue Appia 20

1211 Geneva 27, Switzerland

Work: [REDACTED] (b) (6)

Mobile/WhatsApp: [REDACTED] (b) (6)

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 8 Jun 2021 16:53:59 +0000  
**To:** Plowright, Raina; Emily Gurley  
**Cc:** (b) (6) Dr. Mohammed Ziaur Rahman; Rebeca Sultana;  
(b) (6) Laing, Eric; Henrik Salje; clifton.mckee  
**Subject:** RE: RO1 submitted

Great job!

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Plowright, Raina <(b) (6)>  
**Sent:** Tuesday, June 8, 2021 10:52 AM  
**To:** Emily Gurley <(b) (6)>  
**Cc:** (b) (6) Dr. Mohammed Ziaur Rahman <(b) (6)> Rebeca Sultana  
<(b) (6)> (b) (6) Munster, Vincent (NIH/NIAID) [E]  
<(b) (6) Laing, Eric <(b) (6) Henrik Salje <(b) (6)  
clifton.mckee <(b) (6)>  
**Subject:** Re: RO1 submitted

Congratulations! What a great effort. Crossing fingers and toes.

On Jun 8, 2021, at 10:36 AM, Emily Gurley <(b) (6)> wrote:

Colleagues,

I'm writing to share that our RO1 application has been submitted. The specific aims and research strategy we submitted is attached here, for your records.

Special thanks to Clif for his tireless efforts to get things together, and the really lovely figures.

All the best,

Emily

<specific\_aims.pdf><research\_strategy.pdf><references.pdf>

**From:** Plowright, Raina  
**Sent:** Tue, 8 Jun 2021 15:10:59 +0000  
**To:** (b) (6)  
**Cc:** Brian Bird; David J Wolking; Scott Nuismer; Michael Jarvis; LaTrielle, Sara; Munster, Vincent (NIH/NIAID) [E]  
**Subject:** Re: PREEMPT Phase II kickoff/site visits to Davis and Bozeman/Hamilton (combo trip for DARPA)

We can always pick you up from the airport too!

On Jun 7, 2021, at 9:31 PM, (b) (6) wrote:

Indeed! We may have to taxi/Uber or walk! Let's see if it loosens up at all by that time, but I won't hold my breath. ;-(

---

**From:** Plowright, Raina <(b) (6)>  
**Sent:** Monday, June 7, 2021 11:23 PM  
**To:** (b) (6)  
**Cc:** Brian Bird <(b) (6)> David J Wolking <(b) (6)> Scott Nuismer <(b) (6)> Michael Jarvis <(b) (6)> LaTrielle, Sara <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Subject:** Re: PREEMPT Phase II kickoff/site visits to Davis and Bozeman/Hamilton (combo trip for DARPA)

Sounds good. I just heard about the rental car crisis here. Tourists are renting UHaul trucks and people are renting their private cars at \$500/day! Crazy!

On Jun 7, 2021, at 9:19 PM, (b) (6) wrote:

Hi all,

Ok, so let's please plan as follows:

July 29: (b) (6) and 1 or 2 SETAs fly to Sac  
July 30: Day at UC Davis (preferable to have Michael and Scott there as well)  
Aug 1: (b) (6) and 1 or 2 SETAs fly to Bozeman  
Aug 2: Day at MSU (preferable to have Vincent there as well)  
Aug 3: drive to RML if possible / site visit  
Aug 3, 4 or 5: depart Montana back to D.C.

Hope this works for all and let's get this down in ink for now.

Thanks!  
(b) (6)

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 8 Jun 2021 11:44:49 +0000  
**To:** Plowright, Raina  
**Subject:** RE: PREEMPT Phase II kickoff/site visits to Davis and Bozeman/Hamilton (combo trip for DARPA)

That sounds like a lot of fun, like a retreat of some sorts

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Plowright, Raina <[REDACTED]> (b) (6)  
**Sent:** Monday, June 7, 2021 9:22 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Subject:** Fwd: PREEMPT Phase II kickoff/site visits to Davis and Bozeman/Hamilton (combo trip for DARPA)

would you like to bring your gp down for a lab get together? We could do something separate from [REDACTED] like we did at RML the other year. Emmie's gp welcome too.

Begin forwarded message:

**From:** [REDACTED] (b) (6)  
**Subject:** PREEMPT Phase II kickoff/site visits to Davis and Bozeman/Hamilton (combo trip for DARPA)  
**Date:** June 7, 2021 at 9:19:43 PM MDT  
**To:** Brian Bird <[REDACTED]> (b) (6) David J Wolking <[REDACTED]> (b) (6) Scott Nuismer <[REDACTED]> (b) (6) Michael Jarvis <[REDACTED]> (b) (6) "Plowright, Raina" <[REDACTED]> (b) (6) "LaTrielle, Sara" <[REDACTED]> (b) (6) "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED]> (b) (6)

Hi all,

Ok, so let's please plan as follows:

July 29: [REDACTED] (b) (6) and 1 or 2 SETAs fly to Sac  
July 30: Day at UC Davis (preferable to have Michael and Scott there as well)  
Aug 1: [REDACTED] (b) (6) and 1 or 2 SETAs fly to Bozeman  
Aug 2: Day at MSU (preferable to have Vincent there as well)  
Aug 3: drive to RML if possible / site visit  
Aug 3, 4 or 5: depart Montana back to D.C.

Hope this works for all and let's get this down in ink for now.

Thanks!

(b) (6)

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Mon, 7 Jun 2021 15:15:07 +0000  
**To:** LaTrielle, Sara; Plowright, Raina; (b) (6)  
**Cc:** Brian Bird; David J Wolking  
**Subject:** RE: TDY to MSU and Davis in combo

Same for me,

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** LaTrielle, Sara <(b) (6)>  
**Sent:** Sunday, June 6, 2021 9:27 PM  
**To:** Plowright, Raina <(b) (6)> (b) (6)  
**Cc:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Brian Bird <(b) (6)>  
David J Wolking <(b) (6)>  
**Subject:** Re: TDY to MSU and Davis in combo

Works for me.

Sara

---

**From:** Plowright, Raina <(b) (6)>  
**Sent:** Sunday, June 6, 2021 4:20 PM  
**To:** (b) (6)  
**Cc:** LaTrielle, Sara (b) (6) Munster, Vincent (NIH/NIAID) [E]  
<(b) (6)> Brian Bird <(b) (6)> David J Wolking  
<(b) (6)>  
**Subject:** Re: TDY to MSU and Davis in combo

Hi (b) (6)

August 2/3 works with me. Let's check with Sara.  
Raina

> On Jun 6, 2021, at 3:38 PM, (b) (6) wrote:

>

> Hi all -

>

> Given a few specifics (not being able to visit RML, hotel and rental cars being hard to get easily), I am going to postpone our TDY/trip to visit with you. We are still doing the kickoff virtually, but will look to reschedule the visits to MSU and Davis.

>



> A good option for now seems to be for us to do a combo trip to MSU and then UC Davis as follows: UC Davis July 29/30 and then MSU Aug 2/3. How does that work for all?

>

> Thanks!

> (b) (6)

>

**From:** Broder, Christopher  
**Sent:** Sun, 6 Jun 2021 17:13:35 -0400  
**To:** Munster, Vincent (NIH/NIAID) [E]  
**Subject:** Re: CeV

hi Vincent.

No, we are BSL-2 approved, so are several other labs we are collaborating with now.

Tom and Bob are putting in results and paperwork for stepping it down now too.  
There is no disease or pathology in hamsters (multiple pubs now) ferrets, or AGMs (us but not published)

I can send you all the SOPs and approval paperwork I have on this tomorrow if it will help.

v/r

Chris

On Fri, Jun 4, 2021 at 4:59 PM Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Hey Chris,

Short question, is CeV classified as BSL3 in your lab? Trying to down classify CeV to 3 here at RML (so I can do some isolation attempt on CeV positive bat samples from Oz)

Cheers,

Vincent Munster, PhD

Chief Virus Ecology Section

Rocky Mountain Laboratories

NIAID/NIH

--

**Christopher C. Broder, Ph.D.**

Professor and Chair  
Department of Microbiology and Immunology  
Uniformed Services University, B4152  
4301 Jones Bridge Rd, Bethesda, MD 20814-4799

**USU is "America's Medical School"**

Email: [REDACTED] (b) (6)

<https://www.usuhs.edu/national/faculty/christopher-broder-phd>

TEL: [REDACTED] (b) (6)

FAX: 301-295-3773

Lucille Washington  
Administrative Officer

email - [REDACTED] (b) (6)

phone - [REDACTED] (b) (6)

fax - 301-295-3773

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**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 1 Jun 2021 20:12:08 +0000  
**To:** Dylan H. Morris; Bushmaker, Trenton (NIH/NIAID) [E]  
**Cc:** Kwe Claude, Yinda (NIH/NIAID) [F]; Jamie Lloyd-Smith; Adney, Danielle (NIH/NIAID) [F]; Holbrook, Myndi (NIH/NIAID) [C]; Plowright, Raina; Amandine Gamble  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Great, let's get this finished

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED]> (b) (6)  
**Sent:** Tuesday, June 1, 2021 12:47 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6); Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6); Jamie Lloyd-Smith <[REDACTED]> (b) (6); Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6); Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6); Plowright, Raina <[REDACTED]> (b) (6); Amandine Gamble <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

8hr runs seems good to me for WA1. Anyone disagree? And any word on D614G?

Best,  
Dylan

On Jun 1, 2021, at 12:35 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Dylan,  
Vincent is talking about confirmation of the WA1 strain with doing some more runs. I have (5) tubes left of this stock. My suggestion, if we need to confirm, is to do (3) of the 8 hr runs.

Do we need to confirm for your view? If we all agree on yes, is my suggestion of the 8 hours a good idea?

-Trent

---

**From:** Dylan H. Morris <[REDACTED]> (b) (6)  
**Sent:** Saturday, April 24, 2021 3:43 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6); Amandine Gamble <[REDACTED]> (b) (6); Jamie Lloyd-Smith <[REDACTED]> (b) (6); Kwe Claude, Yinda <[REDACTED]> (b) (6)

(NIH/NIAID) [F] < [REDACTED] (b) (6) Adney, Danielle (NIH/NIAID) [F]  
< [REDACTED] (b) (6) Holbrook, Myndi (NIH/NIAID) [C] < [REDACTED] (b) (6) Plowright,  
Raina < [REDACTED] (b) (6)

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some initial fits and a table of medians and 95% intervals, but I'm not sure if they're actually meaningful. Amandine formatted the data and I analyzed it assuming that these were re-titrations of the same set of samples (so the RT-PCR for each sample should be the same for the three cell lines).

Questions:

- 1) Is that right?
- 2) If that's right, I'm a bit confused what further RT-PCR data is coming.

In any case, it looks to me like there's a reasonable signal of longer half-life for the new variants, which look similar to each other.

Given this, I am really curious to see D416G. I think we really don't want to claim B1355/B117 survive longer than WA only to learn that it's pretty much all D416G viruses that do that.

On Apr 24, 2021, at 8:18 AM, Munster, Vincent (NIH/NIAID) [E] < [REDACTED] (b) (6) wrote:

Try to look at the between virus differences on the cells and then cross the cells,

I'm trying to see whether there is a signal of better entry of B.1.1.7 and B.1.351 over WA1 explaining some of the kinetics.

You will have to wait a bit for the PCR data, as that would likely be needed as some sort of normalizer.

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris < [REDACTED] (b) (6)

**Sent:** Friday, April 23, 2021 4:37 PM

**To:** Bushmaker, Trenton (NIH/NIAID) [E] < [REDACTED] (b) (6)

**Cc:** Amandine Gamble < [REDACTED] (b) (6) Jamie Lloyd-Smith < [REDACTED] (b) (6) Kwe  
Claude, Yinda (NIH/NIAID) [F] < [REDACTED] (b) (6) Munster, Vincent (NIH/NIAID) [E]  
< [REDACTED] (b) (6) Adney, Danielle (NIH/NIAID) [F] < [REDACTED] (b) (6) Holbrook,

Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6) Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Wonderful, we'll run the model ASAP!

On Apr 23, 2021, at 3:14 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Kwe- Thank you for looking over the data and helping with the titrations last Friday.

Dylan/Amandine- I have attached the titration data for the Tmprss2 (japan) and VERO-UNC cells. I will have qRT-PCR from these samples next week probably Thursday (4/29).

Let me know if you have questions.

-Trent

---

**From:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6)  
**Sent:** Friday, April 23, 2021 10:41 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Looks good.

---

Kwe

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED]> (b) (6)  
**Date:** Thursday, April 22, 2021 at 4:01 PM  
**To:** "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED]> (b) (6)  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Could you look over the data to make sure I got everything transferred? Should be 15 minutes of work.

I will make graphs tomorrow morning.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Friday, April 16, 2021 9:29 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6)  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Btw for confirmation as well:

- Adding another WA1 lineage (need to get one ein)
- Adding D614G (we need to see if we have stock for this)
- Adding "simple" plastic stability based on Dylan's timepoints

We can discuss next week?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Friday, April 16, 2021 8:50 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Vincent,

I just wanted to confirm from yesterday's meeting that for the RT-qPCR we would like all the Inconulums, T0s, T3s, and T8s?

-Trent

---

**From:** Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:** Thursday, April 15, 2021 9:52 AM  
**To:** Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Cc:** Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Are we meeting today? Here is a Zoom link if needed:

Amandine Gamble (she/her) is inviting you to a scheduled Zoom meeting.

Topic: RML/UCLA stability

Time: Apr 15, 2021 09:00 AM Pacific Time (US and Canada)

Join Zoom Meeting

[https://ucla.zoom.us/j/\[REDACTED\] \(b\) \(6\)](https://ucla.zoom.us/j/[REDACTED] (b) (6))

Amandine

Le ven. 9 avr. 2021 à 13:36, Jamie Lloyd-Smith <[REDACTED] (b) (6)> a écrit :  
I can do that. (quite a miraculous shot in the dark in my tangled schedule)  
Jamie

On Thu, Apr 8, 2021 at 4:49 PM Dylan H. Morris <[REDACTED] (b) (6)> wrote:  
Works for me!

On Apr 8, 2021, at 2:49 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Can everyone meet next week at this time? I will send a weblink later.

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Thursday, April 8, 2021 1:13 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Sounds good. I am very flexible on timing next week.

On Apr 7, 2021, at 12:15 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Let's schedule a RML/UCLA call next week. Browsed through the manuscript and their experimental set-up. Although comparable is different as well:

- Ultracentrifuge concentration of virus
- Reconstitution in artificial mucosal secretion
- Multiple timepoints per run? Was a bit hard to figure this out

Unfortunately no raw data, otherwise Dylan could have used their data to see whether the analyses has a part to do with the differences

Vincent Munster, PhD  
Chief Virus Ecology Section



Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:** Wednesday, April 7, 2021 9:17 AM  
**To:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Dylan H. Morris <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Trent, do not hesitate to let us know if you would like someone from UCLA to join the call. We have a few questions about what to expect from the future data, which figures/tables you would like in the manuscript, how do you want to proceed with writing, etc... I think that at least one of us (Dylan, Jamie or I) should be available to join a call tomorrow or Friday. If you prefer to keep this call focused on the virological and logistical aspect, we can leave that to you, and plan another RML/UCLA call to talk about the manuscript later/soon.

Amandine

Le mer. 7 avr. 2021 à 10:42, Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> a écrit :  
Will be happy to talk tomorrow or Friday Trent.

Kwe

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** Wednesday, April 7, 2021 at 8:38 AM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Dylan H. Morris" <[REDACTED] (b) (6)>  
**Cc:** "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED] (b) (6)> "Plowright, Raina" <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Vincent- Please look at the email from yesterday at **Date:** Tuesday, April 6, 2021 at 12:05 PM the NBACC paper is there.

Agree with Dylan about the resolution(good call on the longer timepoints) and with Vincent regarding the correction with the PCR.

Vincent/Kwe-Would you like to have a meeting tomorrow sometime or Friday morning? We can discuss what need to be done to finish this up.

Thanks everyone!

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Wednesday, April 7, 2021 7:28 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Can you send the NBACC paper around, haven't seen it yet. I knew they were working on a comparison.

I think from our end it would be good if we see differences to confirm those. The best way of doing this doing it with a similar strains from these lineage (I think a repeat with a WA1-lineage virus might be good?). this will likely mean I have to see if we can get another early strain in (the only good one we have at the moment is the WA1

On a different note, have you ever tried to play with the data from the EID n=1 paper? Think chad Roy is on e of the co-authors?

I think if we push out a different message we need to be absolutely sure we are right, so that might need some additional work

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Wednesday, April 7, 2021 1:05 AM  
**To:** Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <raina.[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thoughts about the NBACC paper and ours:

1. We actually did sufficiently long experiments to get resolution on the half-lives. The experiments NBACC did were short; the lack of absolute decay observed makes it hard to determine whether the observed half-lives are truly different.

In other words, the lack of statistically discernible difference could just be due to insufficient absolute decay to gain statistical power.

2. Another is that we have B.1.351, which is valuable info.

3. That said, I think there might be value in pushing out a preprint relatively quickly, while the info remains timely. That said, we of course need to trust that the results are robust.

With that in mind, one potential issue: one question is how much we trust that the differential degrees of PCR loss across experiments, as those will drive how big/small we think the differences really are.

On Apr 7, 2021, at 12:31 AM, Dylan H. Morris <[REDACTED]> (b) (6) wrote:

Hi everyone,

Here are half-life estimates with PCR correction. Notice that the PCR correction makes all estimated half-lives longer, as expected. But it has a more profound effect on the variants, since we observed less decay with them.

Contrary to what the NBACC folks found, it looks like the variants might indeed be somewhat more persistent.

Indeed, we should think about how to make sure our paper is not "scooped" by theirs. Jamie, Amandine, and I chatted briefly about this today.

Will follow up with a second email summarizing our thoughts.

Fig. 1: est half-lives  
<figure-halflives.pdf>

Fig 2: Est. differences versus WA1  
<figure-differences.pdf>

Fig 3: Regression fit.  
<figure-regression.pdf>

On Apr 6, 2021, at 12:57 PM, Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6) wrote:

I'm available on the 16<sup>th</sup> and would love to help!

Thanks,  
Danielle

--

Danielle Adney, DVM, PhD  
Virus Ecology Section  
Laboratory of Virology  
NIH/NIAID

If you are receiving this email outside of your typical working hours, I hope you feel no pressure to read or respond until your schedule and workload permit.

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED]> (b) (6)  
**Date:** Tuesday, April 6, 2021 at 12:05 PM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED]> (b) (6)  
**Cc:** "Plowright, Raina" <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) "Dylan H. Morris" <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6)  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hey I would like to plan for titration day (24) plates on the TMPRESSII (Japan) and Vero-UNC cells for 4/16/2021? Either me and Kwe or me and Danielle can get this done. Readout would be the week after ~4/21/2021.

Please everyone have a look at this nice paper from NABCC (<https://academic.oup.com/jid/advance-article/doi/10.1093/infdis/jiab171/6209391>). Please have a close look at the conclusion and let me know if you have an opinion.

Hope you are all doing well.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Thursday, April 1, 2021 10:23 AM  
**To:** 'Jamie Lloyd-Smith' <[REDACTED]> (b) (6) 'Dylan H. Morris' <[REDACTED]> (b) (6) 'Amandine Gamble' <[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6)  
**Cc:** 'Plowright, Raina' <[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6) Munster, <[REDACTED]> (b) (6)

Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Dylan,

Here is the qRT-PCR data for aerosol samples for all the runs for WA1, Sav and the UKv in **yellow**.

Thank you Kwe for looking over the data with me.

Let me know if you have questions.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]

**Sent:** Wednesday, March 24, 2021 2:24 PM

**To:** 'Jamie Lloyd-Smith' <[REDACTED] (b) (6)> Dylan H. Morris <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>

**Cc:** Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>

**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Great can't wait to see the model output! Dylan/Amandine has been great and the quick turnaround.

I will get the RNA extracted this Friday but should have data early next week.

-Trent

---

**From:** Jamie Lloyd-Smith <[REDACTED] (b) (6)>

**Sent:** Wednesday, March 24, 2021 2:06 PM

**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Cc:** Dylan H. Morris <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thanks Trent. Fascinating -- it also looks more stable (by my very rough eyeball analysis of the 8h decays). Will await the formal model output, which brings in the 3h data.

cheers,  
Jamie

On Wed, Mar 24, 2021 at 12:48 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>

wrote:

Hey,

Here is the titration for SA Variant (new stock of B.1.351) hCoV-19/USA/MD-HP01542/2421.

Thank you!

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 23, 2021 9:23 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Wonder whether we need to confirm this with an additional B.1.1.7 strain, might be a bit tricky to base it on the analyses of one strain

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 23, 2021 8:49 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Good morning! Here's the model read-out. Hint that B.1.1.7 might be more persistent on top of everything else, though we'll want to do PCR correction to be sure (these are not PCR-corrected)

Best,  
Dylan

On Mar 22, 2021, at 6:05 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Here is the titration data for the UK variant for T0, 8hours. Thank you Kwe for having a look!

The new stock South African variant (B.1.351) for timepoint T0,8hours will be read on Wednesday.

Let me know if you have any questions.

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Thursday, March 18, 2021 2:49 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]  
<[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright,  
Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Jamie Lloyd-Smith  
<[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

New plots!

On Mar 17, 2021, at 10:38 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
wrote:

Here is the titration data for new stock South African variant(B.1.351) for timepoint T0,3hours.

I will have titration data for UKv(B.1.1.7) for T0,8hrs on Monday(22<sup>nd</sup>).

I will have titration data for new stock South African variant(B.1.351) for timepoint T0,8hours on  
Wednesday next week.

Happy St. Pats day, hope you all enjoy a green beer!

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Wednesday, March 10, 2021 11:51 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Oops forgot to attach!

On Mar 10, 2021, at 1:50 PM, Dylan H. Morris <[REDACTED]> (b) (6) wrote:

Here you go. Half-life looks to be above 2h, which would imply losing about 1.2 log<sub>10</sub> in 8 h. Only potential problem is the slightly lower T=0. Still, my guess is it will be fine. Worst case scenario, it's right around the LOD. Could probably get resolution by doing a couple extra wells at zero dilution

(e.g. if we're right around the LOD, might get 0 / 4 positive, but probably at least one of 8 wells positive)

On Mar 10, 2021, at 1:05 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Dylan/Amandine,

Here is the titration data for the UK variant (B.1.1.7) for the timepoint 0, 3hrs.

Could you have a quick look to confirm the later timepoint of 8 hour because I will need to start these runs on this Friday(3/12/21).

Thank you!

In addition, I will have the titrations for timepoint 0,3hrs for the new stock South African variant next week Wednesday(3/17/21). However, I will need to start on the T0, 8hour aerosol runs on Tuesday so I can get them done. We have a deadline for a lab recertification coming up.

Let me know if you have questions. Hope all is well!

-Trent

---

**From:**Bushmaker, Trenton (NIH/NIAID) [E]

**Sent:**Friday, March 5, 2021 10:58 AM

**To:**Dylan H. Morris <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)

**Cc:**Plowright, Raina <[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F]

<[REDACTED]> (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6)

**Subject:**IMPORTANT- RE: Goldberg drum - WA1, UK, and SA variants

Dylan/Amandine,

Important part- I will need a quick turn around because I'm starting the SA variant's LATER timepoint on Monday. We will need to figure out what we want to do for this LATER timepoint (8hr, 12-hardest, 18, or 24hrs) before Monday.

Titration sheet is attached.

WA1 has both T0,3hr and T0,8hr, I looks pretty good by eye balling it. I will work independent of you this afternoon to look at the decay for WA1. Dylan you did a really good job with the 8 hr timepoint!



For the SA variant, I redid the titrations but was only able to read 2 of the 3 plates. We had a little issue with the third plate because we missed a row which messed up the rest of the plate. Oh well. I did put all 5 plates on the titration sheet for T0,3hr for you to work with.

Talk with you both soon! Here is my cell phone if you want a quick reply:406-579-6739. I will be in BSL4 till 1:30pm MTime today.

-Trent

---

**From:**Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:**Tuesday, March 2, 2021 9:56 AM  
**To:**Dylan H. Morris <(b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<(b) (6)> Amandine Gamble <(b) (6)>  
**Cc:**Jamie Lloyd-Smith <(b) (6)> Plowright, Raina <(b) (6)>  
Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C]  
<(b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Thank you crew. Call me if you have questions. Just prepping for these studies today.

-Trent

---

**From:**Dylan H. Morris <(b) (6)>  
**Sent:**Tuesday, March 2, 2021 9:52 AM  
**To:**Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:**Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>; Amandine Gamble  
<(b) (6)> Jamie Lloyd-Smith <(b) (6)> Plowright, Raina  
<(b) (6)> Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <(b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

I can try to analyze the PCR data today.

On Mar 2, 2021, at 11:50 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Yes, so focus on the UK variant (B.1.1.7). Genotypically the current B.1.351 is weird (we'll have a correct one at the end of this week, but still needs to be grown). Whereas it shouldn't impact on the stability, the recovery sensitivity might be different.

Lets see what it looks like with the PCR data. Waiting until April does not make much sense (as there will likely be another variant)

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:**Dylan H. Morris <[REDACTED]> (b) (6)  
**Sent:**Tuesday, March 2, 2021 9:08 AM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:**Amandine Gamble <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E]  
<[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) Plowright, Raina  
<[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6) Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6)  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Thanks! Personally, I would suggest getting something out quickly rather than delaying to include CA VOC. B.1.351 and B.1.1.7 very informative for a lot of the other VOC/VOI, since there's so much convergence.

And less stress for Trent too.

On Mar 2, 2021, at 11:03 AM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Here is the qRT-PCR data for the E-assay "Results for UCLA\_qRT-PCR\_E-assay\_Aero WA1 and SAv\_2021-02-03".

Two things to keep on the radar:

1. If we add the CA VOC this will have to be done after we get Suite D back from the annual shutdown which is slotted for March 23- ~April 15<sup>th</sup>. For people that don't speak BSL4 lingo, I am currently booked till March 23<sup>rd</sup> with the current SAv, UKv, and WA1 strain project. This is already a tight window to get things done. This required annual shutdown will stop all aerosol work between the dates of March 23- ~April 15<sup>th</sup>.
2. This is mostly for Vincent but if we don't think this SAv (B.1.351) is the correct variant should we omit this upcoming longer timepoint. This can be decided after we see the data normalized with the qRT-PCR.

Thanks everyone for your input, learning a bunch.

-Trent

---

**From:**Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:**Tuesday, March 2, 2021 7:43 AM  
**To:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E]  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Hi Trent and Vincent,

Thanks for the info regarding B.1.351. Indeed it would be even better if you can get data for the CA VOC.

Dylan made this plot on the raw titration data. Trent, you can send the PCR data our way (I don't think we got them yet, right?) and we will see how much it changes after normalization.

Looking forward to more data! Thanks again for all the hard work getting the isolates and then in BSL4!

Amandine

Le mar. 2 mars 2021 à 09:19, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> a écrit :  
The B.1.351 is a bit weird, as it has several mutations (not fixed) at ~ 80% in the reads in spike (one transitioning the furin cleavage site into a trypsin site, so not the cleavage deletion but still a SNP not reported in the natural variant which might affect our ability to recover it a bit). We are working on getting better strain in. I think we need to repeat the B.1.351 with a fully genetic comparable one.

In addition, we should likely add the 452-CA-VOC as well, to make an even better panel.

Did you try to normalize based on the PCR data? Any good?

Cheers,

Vincent Munster, PhD  
Chief, Virus Ecology Section  
Laboratory of Virology  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:**"Dylan H. Morris" <[REDACTED] (b) (6)>  
**Date:**Monday, March 1, 2021 at 11:10 PM  
**To:**Trenton Bushmaker <[REDACTED] (b) (6)>

**Cc:**Amandine Gamble <[REDACTED]> (b) (6) Jamie Lloyd-Smith  
<[REDACTED]> (b) (6) "[REDACTED]" (b) (6) <[REDACTED]> (b) (6) "Plowright,  
Raina" <ra[REDACTED]> (b) (6) "Adney, Danielle (NIH/NIAID) [F]"  
<[REDACTED]> (b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED]> (b) (6)  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Here are some fits and half-life estimates for B.1.351 and WA1

Definitely need the later timepoint for B.1.351 to be sure, but it looks like there might be a real difference. There also might not.

The model is very uncertain about the half-life of B.1.351 since minimal infectious virus appeared to be lost during the 3 hr experiment.

Best,  
Dylan

On Mar 1, 2021, at 5:07 PM, Dylan H. Morris <[REDACTED]> (b) (6) wrote:

Excellent. Yes, please send it over!

On Mar 1, 2021, at 1:21 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Dylan,

Here is the titration data "2021-03-01 Raw data - 22C @ 65%RH- WA1, UK, & SA" for WA1 and SA (B.1.351). I will be very interested to hear what you think and what you think about the later timepoint.

I have the PCR data done for the WA1 and SA (B.1.351) samples | you want that data now?

Update for this week:

1. UK variant stock for aerosol runs does not detecting any deletion of the furin site from sequencing. Stock titer is  $10^{5.7}$ .
2. Aerosol runs for UK variant, for timepoints 0 and 3hrs, is on Monday(today), Wednesday, and Friday.
3. I will starting the titrations on the UKv 0 and 3hr on Friday and will be read next Wednesday(3/10).
4. Titration read out for WA1 0 and 8hour timepoints will be this Wednesday(3/3).

Let me know I you have questions.

-Trent

---

**From:**Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:**Monday, February 22, 2021 10:24 AM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Awesome! Thanks so much for your hard work!

On Feb 22, 2021, at 12:20 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
wrote:

Update for this week:

1. SAvariant titrations will be read on Wednesday, this is the 0 and 3 hours timepoints.
2. WA1 and SAV PCR samples will be extracted this week, this is the 0 and 3 hours timepoints.
3. UK variant stock is grown and I will have titers on Wednesday.
4. UK variant stock will be sequenced this week to look for furin cleavage site.
5. I'm starting the WA1 strain 0 and 8 hour timepoints today. Titrations will be start on Friday and read next Wednesday.

Update everyone later this week with data.

-Trent

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**From:**Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:**Tuesday, February 9, 2021 5:01 PM  
**To:**Dylan H. Morris <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine  
Gamble <[REDACTED] (b) (6)>  
**Cc:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

What is your estimate for 8 hours? Somewhere between  $10^{0.75}$ -  $10^1$ ? I would be more comfortable around  $10^1 - 10^{1.25}$  in case we see a drop.

8 hours can be done but Jamie will owe me tickets to a NHL game☐jk.

-Trent

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**From:**Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:**Tuesday, February 9, 2021 4:55 PM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Got it. Based on our back-of-the-envelope calculations, the best option in that case might be 8 hours. Would that potentially be an option? We can also do a bit more modeling. 9 could work too, but might be a little long.

On Feb 9, 2021, at 5:31 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan,  
It looks like all inoculum (WA1, SA, & UK) will be  $\sim 1 \times 10^6$ . The WA1 was  $1.7 \times 10^6$ .

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 3:07 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

If we can go high enough, 12 hours is viable, and then we'll get a clearer estimate of the half-life. Otherwise we can do 9.

On Feb 9, 2021, at 5:02 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

In this case, would it be the highest of the lowest? Or WA1 as a standalone?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 2:59 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

How high do you reckon you can get the WA1 inoculum? That'll determine 9 versus 12.

On Feb 9, 2021, at 4:51 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Sounds good, fingers crossed. Pretty sure we're still one of the only US labs with these viruses

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:**Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>  
**Sent:**Tuesday, February 9, 2021 2:46 PM  
**To:**Munster, Vincent (NIH/NIAID) [E] <(b) (6)>, Dylan H. Morris  
<(b) (6)>, Jamie Lloyd-Smith <(b) (6)>, Amandine Gamble  
<(b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Hello crew,  
I would like to figure out this extended timepoint (either 9 or 12) by the end of this week if we can? Just need some time to prep.

Plan for now...

Stocks:

- UKvariant- Start 2/12, titrations-2/19, Readout- 2/24

Runs:

- Feb.14-20 - 3x runs of SAvariant at T0,3hr
- Feb. 21-27 - 3x runs of WA1 at T0,9 or 12hr - this is the timepoint we need to figure out?
- Feb. 28-Mar.6 - 3x runs of UKvariant at T0,3hr
- Mar. 7-13 - 3x runs of SAvariant at T0,??hr
- Mar. 14-10 - 3x runs of UKvariant at T0,??hr

Titration and readout

- SAvariant at T0,3hr – 2/19, readout 2/24
- WA1 at T0, ??hr – 2/26, readout 3/3
- UKvariant at T0,3hr – 3/5, readout 3/10
- SAvariant at T0,??hr – 3/12, readout 3/17
- UKvariant at T0,??hr – 3/19, readout 3/24

-Trent

---

**From:**Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:**Monday, February 8, 2021 11:53 AM  
**To:**Munster, Vincent (NIH/NIAID) [E] <(b) (6)>, Dylan H. Morris  
<(b) (6)>  
**Cc:**Jamie Lloyd-Smith <(b) (6)>, Amandine Gamble <(b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

It takes ~1 ½ hours to get the Timepoint 0. It will take the 1 – 1 ½ for the final timepoint.

As Vincent said 15 hr point is not doable. 6 hour will take some work to do but not preferred. 9 and 12 can be done.

It is looking like our UK strain will be  $\sim 10^5$  for the starting inoculum. Can you run the model with this number for which timepoint you want?

South African will be higher ( $\sim 10^7$ ) so we should be good on that. Start with the same dilution as we did for the WA1. We will probably start with the SA strain and see if we can increase the inoculum titer for the UK.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Saturday, February 6, 2021 8:25 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

With a bit of planning every point might be doable, other than the 15 hour one

Trent: ho long exactly does it take you to start a run?

e.g. prep at 8, start run at 9 am? Sample at 9pm?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Friday, February 5, 2021 8:24 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

I think 18h is probably too long given the T=0h measurements. I think we'd dip below the LOD. And I'm especially concerned given what you said about smaller initial virus concentrations for the new variant.

Which of the following intervals would be most practical given your protocols in 4?

- A) T=0h, T=6h
- B) T=0h, T=9h
- C) T=0h, T=12h



D) T=0h, T=15h

Something else?

On Feb 5, 2021, at 4:47 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan/Amandine,

Thank you again for the quick turnaround for the graphs. It was a big hit today in the presentation I think!

So we need to discuss the later timepoint. What do you think would be a good timepoint? 18hrs?

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 8:41 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some quick figures. Half-life looks to be 1 to 2 hours.

On Feb 4, 2021, at 1:27 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

I think at the moment anything goes

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 11:18 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Good idea Vincent.

-Trent

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**From:**Dylan Morris <[REDACTED] (b) (6)>  
**Date:**Thursday, February 4, 2021 at 11:15 AM  
**To:**Vincent Munster <[REDACTED] (b) (6)>  
**Cc:**Trenton Bushmaker <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Could do a virological micropub? Or does that have to be genetics?

Or just a skinny preprint to which we can add B.1.351 when ready.

On Feb 4, 2021, at 1:11 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

I think we should be able to run the UK variant very soon, we should probably see if that alone would already be good to get a preprint out or at least some communication in the public domain while we work on getting the SA variant plugged in?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:**Thursday, February 4, 2021 11:09 AM  
**To:**Dylan H. Morris <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Dylan/Amandine,  
Here is the temp and RH for the first (3) run of WA1 at timepoints 0 and 180 minutes.

-Trent

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**From:**Dylan Morris <[REDACTED] (b) (6)>  
**Date:**Thursday, February 4, 2021 at 10:50 AM  
**To:**Vincent Munster <[REDACTED] (b) (6)>  
**Cc:**Trenton Bushmaker <[REDACTED] (b) (6)> Jamie Lloyd-Smith  
<[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Agreed. Data looks clean; congrats and thanks, Trent! I think we'll get a decent read out here on the half-life, and a good idea of how long to go for the longer run.

On Feb 4, 2021, at 12:48 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Looked pretty solid by eyeballing the data

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:**Thursday, February 4, 2021 10:42 AM  
**To:**Dylan H. Morris <[REDACTED] (b) (6)>  
**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Thank you! Let me know if you have questions.

-Trent

---

**From:**Dylan Morris <[REDACTED] (b) (6)>  
**Date:**Thursday, February 4, 2021 at 10:41 AM  
**To:**Trenton Bushmaker <[REDACTED] (b) (6)>  
**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)> Vincent Munster <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Excellent. Thanks, Trent! Will get right on this.

On Feb 4, 2021, at 12:39 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Hey crew,

Here is the excel file with the first (3) runs for WA1 at timepoints 0 and 180 minutes. Let me know what you think we should do for the extended timepoint after run through the model.

Dylan/Amadine- As we discussed I would like to include this in my talk tomorrow @ 1pm MT but just let me know if you can't make timeline.

I will get a better idea what the starting inoculum titers will be for the UK and South African variants the middle of next week. Estimate is that we will have to be starting with a lower titer. I will update you when I find out more.

I will start to grow those up at the end of next week. My schedule looks like you should have some data again around the first week of March.

Thank you everyone.

-Trent

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**From:**Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:**Wednesday, February 3, 2021 at 1:03 PM  
**To:**Vincent Munster <[REDACTED] (b) (6)>  
**Cc:**"Plowright, Raina" <[REDACTED] (b) (6)> "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Vincent,

Here is the titration data for the first (3) runs of WA1 variant at timepoints 0 or 180 mins. I will send UCLA the excel file once you approve here today.

-Trent

---

**From:**Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:**Wednesday, January 27, 2021 at 3:44 PM  
**To:**Vincent Munster <[REDACTED] (b) (6)>  
**Cc:**"Plowright, Raina" <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Vincent,

Updates the on the project:

1. For people helping on the project- Myndi will do the cells-TMEPRESS for titrations plates and the stocks. Danielle and me will do titrations. Kwe will help me with the quant qRT-PCR analysis and some paper writing. Dylan will work on the decay with me and paper writing. Let me know if you are ok with this?
2. For your email attached- For the aerosol stocks I think you already know the issues with the UK stock but the stock is only growing to  $10^4$  for the BEI isolate from California. Brand, Neeltje, and Myndi already know I need minimum of 120ml of stock of the highest stock. HOWEVER, if we get the South African (SA) variant grown up before the UK is figured out I will start with it.

I'm still projecting to be done with this project by the end of February.

Bob is in charge of the surface stability(according to Kwe) but let me know how you would like to proceed with it.

-Trent

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**From:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:**Tuesday, January 12, 2021 7:07 AM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Maybe ask in todays meeting: just lay-out the tasks and we can see who signs-up?

Vincent Munster, PhD  
Chief, Virus Ecology Section  
Laboratory of Virology  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:**Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:**Monday, January 11, 2021 at 2:04 PM  
**To:**"[REDACTED] (b) (6)" <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Vincent,  
I'm looking at personnel to help me with this experiment. I'm thinking Myndi to grow stocks because she will be doing it anyways in BSL3. Vicky and Myndi to maintain cells for titrations and do plates(Monday passage, Thursday plate for Friday titrations). Danielle to help me with titrations(Fridays) and reading plates(Wednesdays/Thursdays).

Danielle and Vicky I would like to have involved because it will free up the senior group for other experiments.

Let me know if you agree with this.

Looks like at Goldberg runs on Monday, Thursday, and Friday. Titrations on Friday afternoon. Might have to do a few weekend days to accomidnate for Cara's schedule and school.

-Trent

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**From:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:**Friday, January 8, 2021 11:56 AM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Dylan H. Morris  
<[REDACTED] (b) (6)>  
**Cc:**Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Hey guys,

Please do understand the technical limitation of the set-up in a high containment laboratory. I favor shorter experiments, which will allow us to more rapidly determine whether there are differences between the isolates.

Given that the transmission window is likely under 3 hours, I'm not particularly in favor making these experiments longer in duration than absolutely necessary. Anything over a 3 hour window will have massive implication on the way we conduct experiments.

My main priority is not running a model, but a providing good comparison between the different strains, which should be done in under 3 hours. A limited analyses as was done in the NEJM should be sufficient (I'm not against running a model, but human resources are extremely limited and I think it would be best to have an experimental design which would get us the best result with the least effort). Also this data is urgent, and I don't want to have any delays with getting this data out.

Of note, you don't "lose" 2 logs during the spray, that's just the experimental system (from collision to collection), this is fixed for every experiment so no difference is expected there between variants (or viruses)

As discussed this week, at the moment no isolates are in yet (again, try to understand that this is a massive undertaking and is a process of several weeks), but titers are expected in the WA1 range

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:**Thursday, January 7, 2021 8:14 PM  
**To:**Amandine Gamble <[REDACTED]> (b) (6); Jamie Lloyd-Smith <[REDACTED]> (b) (6); Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6); Dylan H. Morris <[REDACTED]> (b) (6); Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:**Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Thank you for the quick reply, I like the points you made. I have some time tomorrow in BSL4 from 9-2pm to think and reply, thanks crew.

-Trent

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**From:**"Amandine Gamble" <[REDACTED]> (b) (6)  
**Date:**Thursday, January 7, 2021 at 7:01:22 PM  
**To:**"Jamie Lloyd-Smith" <[REDACTED]> (b) (6); "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED]> (b) (6); "Dylan H. Morris" <[REDACTED]> (b) (6); "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED]> (b) (6); "Plowright, Raina" <[REDACTED]> (b) (6)  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Thanks Trent for all the info and your work on those new strains (among other things!). I only have two minor thoughts following up on Jamie's e-mail:

- As Jamie noted, the longer we wait before taking the second time point, the more precise our estimate of decay rate / half-life will be (as long as we are still above the LOD), so I would also be tempted to target 4 or 5h rather than 3h based on the data we had for the NEJM paper and the fact that you are now using a more sensitive titration protocol (if we understood well), however that obviously depends on the starting dose (the intercept on the graph Jamie put) so, my question is: **do you have any idea of the stock concentrations for the new variants**, and whether we have any reason to expect more loss during spraying? It looks from the NEJM paper that we lose around 2 log10 during spraying with WA1 (and SARS-CoV-1). I guess you all already thought about this, but just writing down in case (there are lots of things to think about!). Also, if you already have an idea on the stock concentration, Dylan can run some analyses on mock data (as mentioned by Jamie) accounting for this, the loss at spraying and potential decay rates, as pointed by Jamie.

- The second point can be discussed after you got the data as it is only about formatting. I see from the raw data attached to one of the e-mails (the scan of the hand-written data) that some wells are blank, although in the Excel file we received, all the wells were classified as + or -. I assume that you did not collect data from those blank wells because you could assume they were all positive (based on higher dilutions being positive) or negative (based on lower dilutions being negative), right? Dylan can correct me, but I think his model would run perfectly on the raw data, even if they are "incomplete". In other words, I think we can let the model do what you were already doing when you complete the blank wells so there is no need for you to do this. So in the future, **we are happy to work on the raw data (i.e., with +, - and blanks [that you can note "NA" so we know it is not just a forgotten well]), rather the completed version (with only + and -)**. You can even just send us a scan of your data and we can generate the Excel file if you prefer.

With all this, I also wish you all the best for 2021 =)

Amandine

Le jeu. 7 janv. 2021 à 16:53, Jamie Lloyd-Smith <[redacted]> (b) (6) a écrit :

Hi Trent, hi everyone (also copying in Amandine since she's the one on our side with most experience with the raw data),

Great to hear this -- a few quick responses.

- 22/65 makes sense to me

- great to add the SA strain!

- I hope we are planning to collect new data on the WA1 strain, not reuse the NEJM data. There were enough differences in design with the original experiments that I think it would be MUCH stronger

science to study all three strains using the same design (updated to avoid some of the challenges of the first round). (Actually from your comment about 'another 9 days' to add a timepoint, i.e. 3 viruses times 3 replicates, I think we're on the same page here.)

- I think the 5% decline in RH due to settling should be OK, if it's basically consistent across the viruses. We can think about whether to account for it in the modelling... my instinct is that we can leave it out of the model unless it differs significantly across replicates and viruses.
- Great to hear about T=0. That's especially crucial if we're just doing the one later time-point.
- Regarding the timing of the later timepoint, I was surprised by your statement, since my memory from the NEJM paper was that the above-LOD detections would have continued well beyond 3 hours. i.e. look at the plots:

<image001.png>

The SARS-CoV-2 data (red) started at a lower titer, but given the slopes it looks like there'd still be useful super-LOD data out to 5 and probably 6 hours. The SARS-CoV-1 data (blue) show the same slope with a higher intercept, and look like they'd stay above LOD out to 6 hours and beyond. Looking at the raw well data, the difference in + counts across time points isn't so striking, i.e. it's not like we're losing a dilution per hour - which makes sense, given the estimated half-life of ~3 hrs. Also if I'm not mistaken, Neeltje or Vincent mentioned that you guys have changed protocols (spin inoculation and different cell line) to get higher sensitivity in culture.

Bottom line: again, it will depend on the titers achievable at T=0, but unless I'm misreading things badly I think there would be value in extending that later timepoint. I know there are complexities about how long you can spend in BSL4, etc, but I'm just talking about the raw information content.

Dylan, Amandine, any further/other thoughts? Dylan, do you want to do a quick analysis with mock data (and reasonable noise) to think about the power we'd have to distinguish differences among variants using this design (i.e. 3 replicates of a single uninterrupted decay window)? And how that might change if we stretch the window to longer time periods? Or if we need more information to get better estimates, do we do as well by adding a 4th replicate at the long time point, rather than adding intermediate time points? (nothing magic about intermediate time points, except for prettier decay graphs. one replicate at 5h might be equivalent to 2 at 2h, in terms of information gained)

cheers,  
Jamie

On Thu, Jan 7, 2021 at 3:51 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Jamie/Dylan,

First, I have added the pervious email so we can all stay on the same page(UK variant shams).

Next, I have talked with Vincent today but would like your input. For a quick paper, I think we should do condition at 22C @ 65%RH – hospital setting. Is everyone ok with this? This was the same setting as we had in the NEJM paper.

Third, we will do the UK variant (VOC), South African (SA) variants, and the original NEJM paper Washington (WA1) for the comparison.



Four, will a 5% percent decrease over 3 hours of the relative humidity cause issues with anything? This happens when nothing is pulled out of the drum, it just happens because of the time frame of 3 hours with the deposition. It should be ok for this decay model(linear regression) correct? I just want to confirm.

Lastly and most important, we will “for sure” have a timepoint at 0 minutes to check for the start values. However, we need to discuss the last timepoint. The LOD for our titrations with our cell culture seems to happen between 180-240 mins, so I would stick with the 180 minute timepoint (titrations attached- “2019-nCoV titrations goldberg drum.jpeg”). Do you agree with this? It would give you two points at timepoint 0 and 180 minutes.

I will collect (4) qRT-PCR per timepoint 0 and (4) more during the later timepoint.

How does this sound? Think about the later timepoint. Each run is a day of work in BSL4 and 10ml of virus. If in addition you want to collect at a middle timepoint this will adding another 9 days of BSL4 work, that will have to be spread out over 3 weeks. We can also think about a later timepoint. The titrations will be useless but qRT-PCR might be interesting. I think this will be usefully for a later experiment because we want to get this out quickly.

-Trent

--

James O. Lloyd-Smith

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Department of Ecology & Evolutionary Biology  
Department of Biomathematics  
University of California, Los Angeles  
610 Charles E Young Dr South  
Box 723905  
Los Angeles, CA 90095-7239

Phone: (b) (6)

<https://www.eeb.ucla.edu/Faculty/lloydsmith/>

Office: 4135 Terasaki Life Sciences Building

Lab: 4000 Terasaki Life Sciences Building

<2020-03-24 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-01 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<Results for UCLA\_qRT-PCR\_E-assay\_Aero WA1 and SAV\_2021-02-03.xls>

<2021-03-10 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-17 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-22 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

--

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<Mail Attachment.ics>

--

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<2021-04-16\_Titration data\_TMPRESSII (Japan) cells - 22C @ 65%RH- WA1, UK, & SA.xlsx><2021-04-16\_Titration data\_UNC cells - 22C @ 65%RH- WA1, UK, & SA.v.xlsx>

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 1 Jun 2021 14:17:46 +0000  
**To:** Plowright, Raina  
**Subject:** RE: Connecting Montana State PREEMPT Team w/CEPI

I can chime in anytime, to “bolster” our standing with CEPI

Talking points:

Currently involved in

- chadox-platform
- moderna
- CureVac mRNA
- Pseudotype vaccine – pan corona

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Plowright, Raina <[REDACTED]> (b) (6)  
**Sent:** Tuesday, June 1, 2021 8:11 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

Do u want me to add slides for u? I took out your February slides bc hadn't heard if u were participating. U would only have 5 min so may be best to chat off top of your head?

Sent from my iPhone

On Jun 1, 2021, at 8:09 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

I'll call in as well,

Just got back from MD travel.

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Sent:** Monday, May 31, 2021 5:47 PM  
**To:** Olivier Restif <[REDACTED] (b) (6)>  
**Cc:** preempt <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

I'll be there too. I assume by G-P overview you mean slides 32-52 in that slide deck? I'm happy to do that, or of course I'm also happy if Hector wants to cover slides 36-41, since it's work from his lab. It'll be very much a 30,000-foot view in either case, given the 10 minute timeline.

cheers  
Jamie

On Mon, May 31, 2021 at 11:48 AM Olivier Restif <[REDACTED] (b) (6)> wrote:  
Thanks Raina, I'll be there.

Olivier

---

**From:** Plowright, Raina <[REDACTED] (b) (6)>  
**Sent:** Monday, May 31, 2021 7:41:58 PM  
**To:** preempt <[REDACTED] (b) (6)>  
**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

Hi all,

The slide deck for the CEPI presentation is in Box here  
[REDACTED] (b) (6)

If you need to edit, let me know bc I'll be working off my desktop version. (honestly I don't think it is worth spending time editing, I think we should go with what we have). I'll have to upload to DARPA early tomorrow or late tonight.

The slides are from our February DARPA presentation (with updates from Hector this morning). Given who I have heard from, and conversations with people traveling etc. I suggest this format:

Intro, me: 10 min

G-P overview, Jamie: 10 min

Aust modeling, me [ecology], Andy [model]: 10 min

Vaccine, Hector: 10 min

Conclusion, me (or Pete, you can jump in if you are on the call): 2 min.

We will essentially make it up as we go but I'll let people know if they are taking too long.

Olivier, I put 2 summary slides in for the modeling that you can explain if you are on the call, otherwise I can cover.

Raina

---

**From:** Plowright, Raina <[REDACTED] (b) (6)>  
**Date:** Monday, May 31, 2021 at 6:03 AM  
**To:** preempt <[REDACTED] (b) (6)>  
**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

Hi All,

I'll pull together a presentation for CEPI this morning from previous talks (end phase I talk). I'll assume that anyone who responded below is coming. Be prepared to jump in when called and present your previous slides. Like always, there will be a lot of making things up as we go.

Our talk is at 9am MT/11am ET tomorrow and you should all have a calendar invite.

Raina

---

**From:** Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Date:** Friday, May 14, 2021 at 10:51 AM  
**To:** Hoegh, Andrew <[REDACTED] (b) (6)>  
**Cc:** Hector Aguilar-Carreno <[REDACTED] (b) (6)> preempt <[REDACTED] (b) (6)>  
Plowright, Raina <[REDACTED] (b) (6)> Colin Ross Parrish <[REDACTED] (b) (6)>  
**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

Exciting connection. I can do those times on 5/28 and 6/1. Could also do 5/27, but not 5/26.

Jamie

On Fri, May 14, 2021 at 9:36 AM Hoegh, Andrew <[REDACTED]> (b) (6) wrote:

I'm not available on the 28th, but could make other times work.

Sent from my iPhone

On May 14, 2021, at 9:58 AM, Hector Aguilar-Carreno <[REDACTED]> (b) (6) wrote:

This is very exciting for me, particularly because of our pan-coronavirus and multivalent vaccine work, and our broad-spectrum antivirals. I can make any time work, but the best times for me are:

Wednesday 5/26 - Noon-1400. Any time

Thursday 5/27 - 1100-1400. 11-12, 1-2 pm

Friday 5/28 - 1100-1400. 12:30-2 pm

Tuesday 6/1 - 1100-1400. Any time.

Best,

Hector Aguilar-Carreno  
Associate Professor  
Microbiology and Immunology  
College of Veterinary Medicine  
Cornell University  
Office: [REDACTED] (b) (6)

---

**From:** Colin Ross Parrish [REDACTED] (b) (6)

**Sent:** Friday, May 14, 2021 11:52 AM

**To:** preempt <[REDACTED]> (b) (6) Plowright, Raina

< [REDACTED] (b) (6) >

**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

Wednesday 5/26 - Noon-1400 **can do noon -1pm**

Thursday 5/27 - 1100-1400 **can do 11am - noon; 1pm-2pm**

Friday 5/28 - 1100-1400 **is OK**

Tuesday 6/1 - 1100-1400 **is OK**

Colin R. Parrish

John M. Olin Professor of Virology

College of Veterinary Medicine

Cornell University

Ithaca, NY 14853, USA

Phone: [REDACTED] (b) (6) (cell anywhere); [REDACTED] (b) (6) (work - mostly not there - leave a message)

---

**From:** Plowright, Raina < [REDACTED] (b) (6) >

**Sent:** Friday, May 14, 2021 11:23 AM

**To:** preempt < [REDACTED] (b) (6) >

**Subject:** Fwd: Connecting Montana State PREEMPT Team w/CEPI

Folks, this is a great opportunity to present our work to CEPI. DARPA is facilitating this. Really exciting!

I'm sending to everyone but think key people will be on prediction and vaccination side e.g., Emily, Hector, Jamie, Barbara, Andy, Olivier, I know Vincent already works closely with them (as does Emily). Aussies would be great too if we can swing a suitable time.

For me, the 28th and 1st are best as I'm hoping to be on a kid school trip on the 27/28th

**Let me know if any of the times on the 28th or 1st don't work.**

Raina



Begin forwarded message:

**From:** "Cunningham, Adam (contr-bto)" <(b) (6)>

**Subject:** Connecting Montana State PREEMPT Team w/CEPI

**Date:** May 11, 2021 at 2:26:32 PM MDT

**To:** "Plowright, Raina" <(b) (6)> "LaTrielle, Sara" <(b) (6)> Gabrielle Breugelmans <(b) (6)>

**Cc:** (b) (6) (b) (6) (b) (6) (b) (6)

Good afternoon, Raina and Sara. Yesterday, (b) (6) and our team had an introductory call with Dr. Gabrielle Breugelmans, the Head of Epidemiology at the Coalition for Epidemic Preparedness Innovations (CEPI). Dr. Breugelmans discussed CEPI's Alliance X Development Plan which has an aspirational goal of 100 days from pandemic potential recognition to vaccine pipeline development. As part of that development plan, CEPI researchers are looking for computational tools for forecasting pandemics/spillover, surveillance and other applications. They are also interested in pan-coronavirus and Nipah countermeasures. Additionally, another CEPI group are studying Nipah incidence in Southeast Asia and genetic characterization.

(b) (6) and our team believe that there is an opportunity for synergy between CEPI and our PREEMPT performers for these important initiatives. We'd like to host a 90 minute teleconference later this month to introduce you all to one another and see where there may be potential for collaboration.

Raina and Sara, we would like for this discussion to include your subcontractor partners to show the full breadth and scope of your research.

Aiming for the last week in May or 1st week in June for this teleconference. Dr. Breugelmans is based in the Netherlands so aiming for a midday (Eastern) call to accommodate CEST and Mountain time zones. We could support this call within the following windows (All times Eastern):

Wednesday 5/26 - Noon-1400

Thursday 5/27 - 1100-1400

Friday 5/28 - 1100-1400

Tuesday 6/1 - 1100-1400

Raina and Sara, please poll your entire team and let me know if any of the above windows will work to support max participation on your end.

Gabrielle, please let me know whether or not you and your team would be able to support this call within any of the above windows.

Once we've agreed upon a time, I will send out an invitation for a Zoom meeting to accommodate presentations anyone wishes to make during the discussion.

Thank you for your help in scheduling this event. We look forward to connecting you all and to hopefully see a blossoming collaboration of benefit to all parties.

Adam Cunningham  
Contractor Support to DARPA BTO  
Quantitative Scientific Solutions (QS-2)

(b) (6)

Cell: (b) (6)

Work Mobile: (b) (6)

--

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**From:** Plowright, Raina  
**Sent:** Tue, 1 Jun 2021 12:00:36 +0000  
**To:** Emily Gurley; clifton.mckee; Dr. Mohammed Ziaur Rahman; Steve Luby; Ausraful Islam; Henrik Salje; Munster, Vincent (NIH/NIAID) [E]; Broder, Chris (USU-DoD); Eric Laing; Rebeca Sultana; Nadia Rimi  
**Subject:** Re: Updated science for Nipah R01

Hi Emily,  
That sounds like a more coherent proposal. Well done bringing those ideas together. I look forward to reading.  
Raina

---

**From:** Emily Gurley <(b) (6)>  
**Date:** Monday, May 31, 2021 at 8:45 PM  
**To:** clifton.mckee <(b) (6)> Dr. Mohammed Ziaur Rahman <(b) (6)> Steve Luby <(b) (6)> Plowright, Raina <(b) (6)> Ausraful Islam <(b) (6)> Henrik Salje <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Broder, Christopher <(b) (6)> Eric Laing <(b) (6)> Rebeca Sultana <(b) (6)> Nadia Rimi <(b) (6)>  
**Subject:** RE: Updated science for Nipah R01

Hi everyone,

I had a great meeting today with Eun-Chung Park from NIH. She gave us terrific feedback on parts of the grant that aren't well explained and we talked through some of the hypotheses. The good news is that she thinks the questions about intermediate hosts are really important and, following my discussions with her, I have some good ideas about how to improve the proposal. The bad news is that we have very little time to make revisions before the grant is due. Nonetheless, I think we should push forward as getting one round of comments from NIH will be really helpful for further refinements.

Here are some of the biggest changes I'm proposing for the proposal:

1. Switching from two sites – Faridpur and Chittagong – to one larger site in Faridpur. We will increase the size of the cohorts we're following there and add in surveillance for and sampling of sick animals for viral testing at RML. This is a much simpler story to tell in Faridpur than trying to explain why two sites are important.
2. I propose switching up the aims to go like this: 1) identify drivers of henipavirus spillovers into domesticated animals (more like previous aim 3), 2) describe which henipaviruses are spilling over into domesticated animals (new and will need some help from Vincent!), and 3) determine the risk of transmission to humans through contact with sick animals (new and comes from my conversation with Eun-Chung. I spent a considerable amount of time trying to decide why I think we haven't identified many human spillovers associated with intermediate hosts in Bangladesh. At this point, I've convinced myself that there are a number of systematic biases in surveillance that could be causing this. Let's see if my argument is convincing to you!)

Clif and I are working to revise the proposal. We had asked you to review by Tuesday, but would now request that you review either Tuesday afternoon or Wednesday morning to be sure that you're looking at as many revisions as possible. We're really short on time, but think that it's worth pushing to get something in since the next submission will greatly benefit from a round of comments from the review panel.

Here's the link to the document again, in case you need it:

(b) (6)

Thanks again for your help!

Emily

---

**From:** Clif McKee <(b) (6)>

**Sent:** Wednesday, May 26, 2021 7:07 PM

**To:** Emily Gurley <(b) (6)> Dr. Mohammed Ziaur Rahman <(b) (6)> Steve Luby <(b) (6)> Plowright, Raina <(b) (6)> Ausraful Islam <(b) (6)> Henrik Salje <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Broder, Christopher <(b) (6)> Eric Laing <(b) (6)> Rebeca Sultana <(b) (6)> Nadia Rimi <(b) (6)>

**Subject:** Updated science for Nipah R01

Dear colleagues,

I want to first thank you all for sending all of the certification forms, bio-sketches, and signed subaward documents. I appreciate your effort on all that and for tolerating my incessant emails, but we should be good to go on that front.

Emily and I are still making changes to the science document (specific aims and research strategy) before it is due to JHU on Thursday, June 3. We have now drafted the significance and innovation sections and added a section on team collaboration. There are some comments from Raina and Steve that we are working to address and we are rewriting some sections (in blue font), so this should be seen as an evolving document. We would greatly appreciate any feedback you may have, but would prefer to get your comments on the Google Doc if possible since that is where we are making real-time changes.

(b) (6)

When making changes to the text, we only ask that you switch to 'suggesting edits' mode, which you can change by clicking the pencil icon in the top right corner of the screen. If you cannot work in the Google Doc, email me and I can provide you with a Word version.

There are a few areas where we do need specific input from folks.

- **Eric**, we need you to provide some details about the design and validation of the serological assays. I have pointed out where these need to go with red font in the innovation section, the

overall strategy, and the Aim 2 strategy and limitations. We also need a short statement about your relevant experience in the study team section at the end of the document.

- **Rajib**, we just need you to add the estimated date that you started leading field investigations on Nipah in bats and domesticated animals. That is in the study team section and is marked with purple font.

We ask that you please provide your suggested edits and comments by **end-of-day on Tuesday, June 1** so that we can make changes prior to the due date.

Best regards,  
Clif

**From:** Plowright, Raina  
**Sent:** Mon, 31 May 2021 12:53:48 +0000  
**To:** Jamie Lloyd-Smith; Hector Aguilar-Carreno; Munster, Vincent (NIH/NIAID) [E]  
**Subject:** FW: Connecting Montana State PREEMPT Team w/CEPI

G-P team. I'm going to use the same slides we used for USAID. Vincent, I'm assuming you wont be on the call tomorrow (didn't see a response, and assume you have close ties with CEPI already), so I wont include your slides from phase I review but let me know if otherwise. Would be great to have you if you can make it.

---

**From:** Plowright, Raina <[REDACTED]> (b) (6)  
**Date:** Monday, May 31, 2021 at 6:03 AM  
**To:** preempt <[REDACTED]> (b) (6)  
**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

Hi All,

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Raina

---

**From:** Jamie Lloyd-Smith <[REDACTED]> (b) (6)  
**Date:** Friday, May 14, 2021 at 10:51 AM  
**To:** Hoegh, Andrew <[REDACTED]> (b) (6)  
**Cc:** Hector Aguilar-Carreno <[REDACTED]> (b) (6) preempt <[REDACTED]> (b) (6)  
Plowright, Raina <[REDACTED]> (b) (6) Colin Ross Parrish <[REDACTED]> (b) (6)  
**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

Exciting connection. I can do those times on 5/28 and 6/1. Could also do 5/27, but not 5/26.

Jamie

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Best,

Hector Aguilar-Carreno  
Associate Professor  
Microbiology and Immunology  
College of Veterinary Medicine  
Cornell University  
Office: (b) (6)

---

**From:** Colin Ross Parrish <(b) (6)>  
**Sent:** Friday, May 14, 2021 11:52 AM  
**To:** preempt <(b) (6)> Plowright, Raina <(b) (6)>  
**Subject:** Re: Connecting Montana State PREEMPT Team w/CEPI

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John M. Olin Professor of Virology  
College of Veterinary Medicine  
Cornell University  
Ithaca, NY 14853, USA  
Phone: (b) (6) (cell anywhere); (b) (6) (work - mostly not there - leave a message)

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**From:** Plowright, Raina <(b) (6)>  
**Sent:** Friday, May 14, 2021 11:23 AM  
**To:** preempt <(b) (6)>  
**Subject:** Fwd: Connecting Montana State PREEMPT Team w/CEPI

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**From:** "Cunningham, Adam (contr-bto)" <(b) (6)>  
**Subject:** Connecting Montana State PREEMPT Team w/CEPI  
**Date:** May 11, 2021 at 2:26:32 PM MDT  
**To:** "Plowright, Raina" <(b) (6)> "LaTrielle, Sara"  
<(b) (6)> Gabrielle Breugelmans <(b) (6)>  
**Cc:** (b) (6) (b) (6)  
<(b) (6)>

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Adam Cunningham  
Contractor Support to DARPA BTO  
Quantitative Scientific Solutions (QS-2)

[REDACTED] (b) (6)

Cell: [REDACTED] (b) (6)

Work Mobile: [REDACTED] (b) (6)

--

James O. Lloyd-Smith

Professor  
Department of Ecology & Evolutionary Biology  
Department of Biomathematics  
University of California, Los Angeles  
610 Charles E Young Dr South  
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Office: 4135 Terasaki Life Sciences Building

Lab: 4000 Terasaki Life Sciences Building

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Wed, 26 May 2021 17:49:11 +0000  
**To:** Alison Peel; Plowright, Raina; Tamika Lunn  
**Cc:** Manuel Ruiz; Kwe Claude, Yinda (NIH/NIAID) [F]; Tamika Lunn; Hamish McCallum  
**Subject:** RE: Lab update discussion

Sounds good Ali,

One thing I would like to stress that based on all the data so far, there is no intrinsic difference between AVL and VTM. So other than the dilution difference the data is directly comparable.

The discrepancy between samples appears to be technical rather than fundamental flaw (as would be inspected), and hopefully we can figure this out.

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Alison Peel <[REDACTED]> (b) (6)  
**Sent:** Monday, May 24, 2021 5:09 PM  
**To:** Plowright, Raina <[REDACTED]> (b) (6); Tamika Lunn <[REDACTED]> (b) (6)  
**Cc:** Manuel Ruiz <[REDACTED]> (b) (6); Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6); Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6); Tamika Lunn <[REDACTED]> (b) (6); Hamish McCallum <[REDACTED]> (b) (6)  
**Subject:** Re: Lab update discussion

Hi all,

Thanks for the discussion today.

So, actions from the meeting are to:

1. When Kwe returns from leave - re-extract and re-screen the 100 VTM samples that were replicates of AVL positives. Expect to have results from this within 1 month
2. Ali to look into whether there are any AVL negative samples that have VTM replicates at RML (for a random control check as per Hamish's suggestion)
3. Ali to look into whether there are any additional VTM replicates from the 100 samples here in Australia – either for screening in Australia or shipping to RML
4. Consider collecting further AVL/VTM replicates this winter

If we can't solve the issue with these samples, at least understanding where the discrepancy comes from will be useful. We can then account for it in analyses and also plan future work to prevent this kind of issue in the future.

We should aim to meet to discuss results within 1 month so as to allow Tamika to continue moving forward.

Cheers

Ali

---

**From:** Plowright, Raina <[REDACTED] (b) (6)>  
**Date:** Tuesday, 25 May 2021 at 8:01 am  
**To:** Tamika Lunn <[REDACTED] (b) (6)>  
**Cc:** Alison Peel <[REDACTED] (b) (6)> Manuel Ruiz <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Tamika Lunn <[REDACTED] (b) (6)>  
**Subject:** Re: Lab update discussion

Join Zoom Meeting

[https://us04web.zoom.us/j/\[REDACTED\] \(b\) \(6\)?pwd=MklqVUdoZFJXV2RKemErb3gvpnR5UT09](https://us04web.zoom.us/j/[REDACTED] (b) (6)?pwd=MklqVUdoZFJXV2RKemErb3gvpnR5UT09)

Meeting ID: [REDACTED] (b) (6)

Passcode: [REDACTED] (b) (6)

On May 24, 2021, at 3:59 PM, Tamika Lunn <[REDACTED] (b) (6)> wrote:

Hi all,

Just confirming that we are meeting in a few minutes? I can't seem to find a Zoom link - should I make one for us quickly, or have I just misplaced a link somewhere?

Thanks!

Tamika

---

**From:** Alison Peel <[REDACTED] (b) (6)>  
**Sent:** Friday, May 14, 2021 11:25 AM  
**To:** Tamika Lunn <[REDACTED] (b) (6)>; Plowright, Raina <[REDACTED] (b) (6)>; Manuel Ruiz <[REDACTED] (b) (6)>  
**Cc:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>; Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Tamika Lunn <[REDACTED] (b) (6)>  
**Subject:** Re: Lab update discussion

Thanks all,

I've sent through a calendar invite – though tentative at this stage awaiting Vincent's availability

Cheers

Ali

---

**From:** Tamika Lunn <[REDACTED] (b) (6)>  
**Date:** Thursday, 13 May 2021 at 6:52 pm  
**To:** Plowright, Raina <[REDACTED] (b) (6)> Manuel Ruiz  
<[REDACTED] (b) (6)>  
**Cc:** Alison Peel <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
Tamika Lunn <[REDACTED] (b) (6)>  
**Subject:** Re: Lab update discussion

Hi Ali,

That sounds great. Last two options would be best for me - 31st MT (1st AEST) or 2nd MT (3rd AEST). Anytime in the time window given.

Thanks!  
Tamika

---

**From:** Plowright, Raina <[REDACTED] (b) (6)>  
**Sent:** Thursday, 13 May 2021, 11:33 am  
**To:** Manuel Ruiz  
**Cc:** Alison Peel; Munster, Vincent (NIH/NIAID) [E]; Kwe Claude, Yinda (NIH/NIAID) [F]; Tamika Lunn  
**Subject:** Re: Lab update discussion

24th or 31st or 2nd best for me. Although 31st is public holiday.

On May 12, 2021, at 6:15 PM, Manuel Ruiz <[REDACTED] (b) (6)> wrote:

Hi Ali,

Any of those days and times work for me.

Cheers,  
M

**Manuel Ruiz Aravena**  
Postdoctoral Researcher  
Department of Microbiology and Immunology | Montana State University,  
USA  
Mobile: [REDACTED] (b) (6)

<https://batonehealth.org/>

On Wed, May 12, 2021 at 6:01 PM Alison Peel <[REDACTED]> (b) (6) wrote:

Hi all,

Kwe and I are thinking it would be good to touch base over zoom to discuss recent progress in the lab, rather than back and forth email discussions that can sometimes result in misunderstandings. Some things to chat about include:

- (1) HeV sequencing results – e.g. and a plan for restarting conversations with Kim Halpin about obtaining horse HeV sequences from recent years to fill out the phylogeny
- (2) novel isolations – characterisation/G-P options if CVOs allow further work or if they don't
- (3) Overview of the current thoughts on the AVL vs VTM situation
- (4) the possibility of further follow up on two samples that were recorded as coming from Grey-headed flying foxes that tested HeV positive in AVL but negative in VTM. It would be great to do some PCRs for host species DNA. There is a raging debate here about the role of GHFF in Hendra transmission and those two samples are the only ones that appear to show the potential for GHFF being able to shed HeV.

Do any of the following times suit?

1. Monday 24<sup>th</sup> May between 3-6pm MT (Tuesday 25<sup>th</sup> May between 7-10am AEST)
2. Tuesday 25<sup>th</sup> May between 3-6pm MT (Wednesday 26<sup>th</sup> May between 7-10am AEST)
3. Thursday 27<sup>th</sup> May between 3-6pm MT (Friday 28<sup>th</sup> May between 7-10am AEST)
  
4. Monday 31<sup>st</sup> May between 3-5pm MT (Tuesday 1<sup>st</sup> June between 7-9am AEST)
5. Wednesday 2<sup>nd</sup> June between 3-6pm MT (Thursday 3<sup>rd</sup> June between 7-10am AEST)

Cheers

Ali

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Sat, 22 May 2021 15:55:18 +0000  
**To:** Laing, Eric  
**Cc:** Broder, Chris (USU-DoD)  
**Subject:** RE: bat sera from Jordan

That would be great, no big rush, we are still characterizing the coronaviruses we have found in these samples.

Would be good to run them here indeed,

Hope all is well,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Laing, Eric <[REDACTED] (b) (6)>  
**Sent:** Friday, May 14, 2021 8:08 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Broder, Chris (USU-DoD) <[REDACTED] (b) (6)>  
**Subject:** Re: bat sera from Jordan

Hi Vincent,

Yes, I'm interested in running these samples with the coronavirus spike protein assay we're developing. We are a little behind on the development of bat-CoV spike portion of the assay but should have spike ectodomain trimers for Rp3, RatG13, ZXC21, HKU9, WiV16 and PDF-1280 (MERS-like from Pipistrellus). Currently we have SARS-1, SARS-2, MERS, 4 HCoV, Rs4874 and Rs4231 (essentially WiV-16s).

If you can wait till the end of June we can update you about the status of these proteins. We can send spike-beads to you if that's more direct and easier than sera to us.

This panel should make its way into two labs in SE Asia and into Raina's PREEMPT testing so having bats from Jordan with known beta-CoV exposure would be a nice way to compare SARS-like vs MERS-like Ab responses.

Eric D. Laing, Ph.D.  
Research Assistant Professor  
Department of Microbiology and Immunology  
Uniformed Services University  
4301 Jones Bridge Road  
Bethesda, MD 20814

cell: (b) (6)

office: (b) (6)

lab: (b) (6)

(b) (6)

On Fri, Apr 30, 2021 at 10:09 AM Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:  
Hi guys,

Hope all is well,

We are currently working on a study with bats from Jordan in which we detected several coronaviruses (including some b-coronaviruses). Would you guys be interested in running some serology on these samples?

Alternatively we can run the serology here as well if you have beads available,

Hope all is well

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH



**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Fri, 21 May 2021 18:36:33 +0000  
**To:** (b) (6); Plowright, Raina; LaTrielle, Sara  
**Cc:** (b) (6)  
**Subject:** RE: site visit: June 24-25, 2021

If needed – beneficial, I could travel up to Bozeman for some of the discussions.

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** (b) (6)  
**Sent:** Friday, May 21, 2021 12:34 PM  
**To:** Plowright, Raina <(b) (6)> LaTrielle, Sara <(b) (6)>  
**Cc:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)> (b) (6)  
<(b) (6)>  
**Subject:** RE: site visit: June 24-25, 2021

Hi Raina/Sara –

I am putting in for these days. Looks like visiting RML may not be possible (per Vincent), so we can just do a site visit pow-wow in Bozeman. We will try and travel out on June 23 evening, else June 24. Likely just plan for a full day with you on Fri June 25. I should be able to bring (b) (6), trying to bring (b) (6) as well.

So a heads-up to save those dates for now. If some of the key subs (Vincent, Hector, UCLA, etc) can join, that would be great.

Thanks,

(b) (6)

---

**From:** Plowright, Raina <(b) (6)>  
**Sent:** Tuesday, May 18, 2021 12:01 AM  
**To:** (b) (6) (b) (6)  
**Cc:** LaTrielle, Sara <(b) (6)> (b) (6)  
<(b) (6)>  
**Subject:** Re: site visit: June 24-25, 2021

That works for me. Would be great to have you out here. Sara, does that work for you?

---

**From:** [REDACTED] (b) (6)  
**Date:** Monday, May 17, 2021 at 9:01 PM  
**To:** Plowright, Raina <[REDACTED] (b) (6) [REDACTED] (b) (6)>  
<[REDACTED] (b) (6)>  
**Cc:** LaTrielle, Sara <[REDACTED] (b) (6) [REDACTED] (b) (6)>  
<[REDACTED] (b) (6)>  
**Subject:** site visit: June 24-25, 2021

Hi Raina and Vincent,

I am considering a site visit to you on June 24-25 (Thurs/Fri). We can fly in on Wed evening, visit with you on Thurs, and then visit RML on Friday. Would that work? The DARPA team would likely only be myself and [REDACTED] (b) (6) might join, too). That's it from my side. We can keep it informal generally, so whomever is available to meet and greet and show us around. It will be a welcome TDY (duty travel) after a loooong while.

Let me know if that works on your end and we can save the date.

Thanks!  
[REDACTED] (b) (6)

--  
[REDACTED] (b) (6)  
Program Manager  
Biological Technologies Office (BTO)  
DARPA  
Work mobile: [REDACTED] (b) (6)  
Personal mobile: [REDACTED] (b) (6)  
[REDACTED] (b) (6)  
[REDACTED] (b) (6)

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Wed, 19 May 2021 17:52:07 +0000  
**To:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Cc:** Plowright, Raina  
**Subject:** RE: MB 598 (internship) and finish up Variant project

Would work from my end

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Wednesday, May 19, 2021 11:37 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:** RE: MB 598 (internship) and finish up Variant project

9am would work for me but let me know what works for you.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Wednesday, May 19, 2021 8:48 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:** RE: MB 598 (internship) and finish up Variant project

Lets do in the morning, still [REDACTED] (b) (6) so an afternoon meeting not ideal

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Wednesday, May 19, 2021 8:30 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:** RE: MB 598 (internship) and finish up Variant project

Sounds good. I will talk with Kwe/Juli/Vicky.

Friday at 3pm? I have DMT meeting 1:30-3pm.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Wednesday, May 19, 2021 8:13 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:** RE: MB 598 (internship) and finish up Variant project

Sounds good, in addition I think you should register with the scientific writing course at NIH (for graduate students and post-docs). This course will help you write your paper and will be very valuable

Check with Kwe / Julia / Vicky on the exact details of this course

Let's go over the experiments on Friday?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Tuesday, May 18, 2021 3:13 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:** MB 598 (internship) and finish up Variant project

Vincent,

To keep you updated with graduate school situation. One class I was going to take this summer they couldn't find a person to teach (scientific writing). So I signed up for another class (cell and molecular techniques) but this class has also be cancelled.

As a backup plan I am looking into an internship for maybe the summer and the fall. What I am looking into is organoids with Dr. Diane Bimczok and some infections experiments. We have discussed this briefly in the past when you asked about it. I have a few ideas that I would like to run by you but I would like your input so we can both get something out of this.

Let me know if you have a few minutes to discuss this week. In addition we need to discuss the D614G aerosol in the Goldberg drum.

-Trent

**From:** Broder, Christopher  
**Sent:** Wed, 19 May 2021 12:04:58 -0400  
**To:** Laing, Eric  
**Cc:** Munster, Vincent (NIH/NIAID) [E]; Schountz, Tony;  
(b) (6)  
**Subject:** Re: bat cellular question  
**Attachments:** IBC Application rCedV-Ammeded-Broder-Jan2021-signed-scan.pdf, Broder lab rCedPV SOP-02122021-Update-Final.pdf, Broder lab rCedV procedures and manipulations-01152021.pdf

hi all

thanks for all the replies. I have a call with David Friday PM on another matter but will discuss the bat mab/B cell ideas.

Yes, if we have a labeled antigen perhaps sorting will be straightforward, this should be doable of course with sG or sF even potentially with naive animals -- who knows.

Tony, sorry for this delay. I should have sent you the latest revised chimera approvals. Attached here.

We did have an issue with one hamster but still waiting for Tom and Bob to finish all the path work up.

rCedV-HeV (redlands) has not caused any issues, with 16 animals, it also protects from NiV-B challenge.

We are making another chimera for both HeV and NiV-B and are attempting to remove or significantly reduce ephrin-B3 use by the chimeras.

I believe this is the issue.

Its too bad we cant just get the HeV sG vaccine as an EUA..... if the clinical trial was closer I would have signed up.

but yes the mab would work, but we of course do not know the therapeutic window very well.

chris

On Wed, May 19, 2021 at 11:23 AM Laing, Eric <(b) (6)> wrote:  
Chris,

What were the three species you were thinking of? If the R24 comes thru Tony will have intermediate horseshoe bats and Vincent will have some Indian flying foxes. If you add those into the mix with Tony's Jamacian fruit bats and ERBs (Rousettus) then you could really chase after virus-specific Ab responses comparatively and explore whether Ab responses are conserved across the order Chiroptera.

I remember that some of Tony's preliminary data indicated that the virus challenged JFB did not make high neutralizing antibody titers. Veesler has been really successful with their SARS-CoV-2 research, it would be cool to see Abs what comes out of specific viru/bat host challenge experiments.

MARV --> ERB

NiV --> Pteropus medius

SARS-2 --> intermediate horseshoe bat

Eric D. Laing, Ph.D.  
Research Assistant Professor  
Department of Microbiology and Immunology  
Uniformed Services University  
4301 Jones Bridge Road  
Bethesda, MD 20814  
cell: (b) (6)  
office: (b) (6)  
lab: (b) (6)

(b) (6)

On Tue, May 18, 2021 at 11:15 AM Munster, Vincent (NIH/NIAID) [E]

<(b) (6)> wrote:

We have never tried this on our end, but are slowly trying to get back on track with the bat work.

If reached out to our vet branch for the name of our supplier,

Vincent Munster, PhD

Chief Virus Ecology Section

Rocky Mountain Laboratories

NIAID/NIH

---

**From:** Broder, Christopher <[REDACTED] (b) (6)>  
**Sent:** Wednesday, May 12, 2021 1:57 PM  
**To:** Schountz, Tony <[REDACTED] (b) (6)> Eric Laing <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> [REDACTED] (b) (6)  
**Subject:** bat cellular question

hey Tony and Vincent

before I reach out to Linfa and SIN

Do you know of anyone else that may have had success in sorting B cells from PBMCs from bats (pteropus)? Dont see much following the attached paper.

Tony, what about your bats ? ever try this? and Vincent do you think if possible you could connect us to your source of Rousettus?

Catochin is just up the road for us.

We want to reboot ab discovery project that was just about ready with the Lubee folks for fresh PMBCs overnighted, but never executed because student was redirected in the thesis/

We could try 3 species and this would partner with David Veessler at UniWash

all best

chris

--

**Christopher C. Broder, Ph.D.**  
Professor and Chair

Department of Microbiology and Immunology  
Uniformed Services University, B4152  
4301 Jones Bridge Rd, Bethesda, MD 20814-4799

**USU is "America's Medical School"**

Email: [REDACTED] (b) (6)

<https://www.usuhs.edu/national/faculty/christopher-broder-phd>

TEL: [REDACTED] (b) (6)

FAX: 301-295-3773

Lucille Washington

Administrative Officer

email - [REDACTED] (b) (6)

phone - [REDACTED] (b) (6)

fax - 301-295-3773

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--

**Christopher C. Broder, Ph.D.**

Professor and Chair  
Department of Microbiology and Immunology  
Uniformed Services University, B4152  
4301 Jones Bridge Rd, Bethesda, MD 20814-4799

**USU is "America's Medical School"**

Email: [REDACTED] (b) (6)

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TEL: [REDACTED] (b) (6)

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Lucille Washington

Administrative Officer

email - [REDACTED] (b) (6)

phone - [REDACTED] (b) (6)

fax - 301-295-3773

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## USUHS Institutional Biosafety Committee (IBC) Project Registration

Please use the attached application for requesting a review and approval of activities involving recombinant DNA (rDNA) and biohazardous agents by the Uniformed Services University Institutional Biosafety Committee (IBC). This application should be used for all activities including research, teaching, and testing. The IBC requests the information in accordance with its charge. This information is required by the Occupational Safety and Health Administration's *Occupational Exposure to Hazardous Chemicals in Laboratories Standard*, its *Blood-Borne Pathogen Standard*, the *Biosafety in Microbiological and Biomedical Laboratories, 5<sup>th</sup> Edition* and/or the *NIH Guidelines for Research Involving Recombinant DNA (rDNA) Molecules*.

Principal investigators are required to take the Introduction to the NIH Guidelines for Principal Investigators before review of any submitted project application occurs. If you have not had this initial training, or if you have any questions or need assistance with completing this form, please contact the USUHS Biosafety Officer (BSO) in A2020 (b) (6), (b) (6).

### Project Title

Advancement of Vaccines and Therapies for Henipaviruses (U19 AI142764)

*Check any that apply.*

- This application is an initial registration for Grant/Project Number: U19 AI142764
- This is an amendment/modification to a previous registration using this form. (*Please fill out and attach all relevant Sections.*) Grant/Project Number: G173JQ (Henipavirus Entry and Virion Assembly)
- All materials and techniques fall under a previous registration using this form. (*Please fill out Section A*). Grant/Project Number(s): G173JQ (Henipavirus Entry and Virion Assembly)

### Principal Investigator Information

|                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PI Name: <u>Christopher C. Broder</u>                                                                                                                                                          |
| Department: <u>MIC</u> Office (Bldg/Room): <u>(b) (4)</u>                                                                                                                                      |
| Phone: <u>(b) (6)</u> Email: <u>(b) (6)</u>                                                                                                                                                    |
| Statement of Responsibility: I accept responsibility for the safe conduct of work with the agents described in this application. The information in this application is accurate and complete. |
| <u>BRODER.CHRISTOPHER.C</u> (b) (6) Digitally signed by (b) (6) BRODER.CHRISTOPHER.C (b) (6)<br>(b) (6) Date: 2021.01.18 12:09:07 -05'00'                                                      |
| Date: <u>01/18/2021</u>                                                                                                                                                                        |
| (Signature of Principal Investigator)                                                                                                                                                          |

*Please contact the BSO if there are materials that are considered proprietary.*

## **Section A: Location of Research and Overview**

1.) List all areas at USUHS/AFRRI where work will be performed:

(b) (4)

2.) Please briefly describe the experimental design, highlighting the recombinant DNA methodology used and/or the use of infectious microorganisms if either are part of the study. Write for non-specialists.

See attached PDF document:

1. Broder lab rCedV procedures and manipulations-01152021

In brief; the goals of this project are to rescue recombinant Cedar virus (rCedV) and rCedV variants or chimeras from cDNA clones using recombinant DNA plasmid clones the CedV genome. The non-pathogenic CedV will be used as a model Henipavirus to elucidate antiviral mechanisms during Henipavirus infection in both bat and human cell lines' serve as a replication competent viral vector surrogate for other henipavirus species. CedV is a RG1 agent.

**Section B: Recombinant DNA**

Will this project involve recombinant DNA?  Yes  No

*If yes, please complete the following question. If no, proceed to the Section C.*

1.) Please describe the source of the rDNA, vectors used for cloning, and host(s) if applicable. (Use the Supplemental Recombinant DNA Table and attach if necessary.)

| Recombinant DNA (source)                                                                                                                                                                                                                              | Plasmid/vector(s) cloned into | Host(s)                                                         | Gene Expressed |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------|----------------|
| <i>Example: GRP78 – glucose regulated proteins 78; The chaperone molecule required to maintain ER function during toxic insults (Human)</i>                                                                                                           | <i>pIRES-GFP</i>              | <i>Dh5α E. coli (K12 strain), HeLa cells, NIT-1 cells, Mice</i> | <i>Yes/No</i>  |
| CedV antigenomic cDNA - full length clones of CedV and variants including: (GFP or Luciferase reporter gene encoding genomes; chimeric rCedV genomes encoding alternative F and G envelope glycoprotein genes derived from other henipavirus species) | pOLTV5                        | Stabl-2 E. coli (K-12 JM109 derivative)                         | No             |
| CedV N - nucleoprotein; required for encapsidation and replication                                                                                                                                                                                    | phCMV                         | Stabl-2 E. coli (K-12 JM109 derivative)                         | Yes            |
| CedV P - phosphoprotein; required for encapsidation and replication                                                                                                                                                                                   | phCMV                         | Stabl-2 E. coli (K-12 JM109 derivative)                         | Yes            |
| CedV L - viral RNA polymerase; required for replication                                                                                                                                                                                               | phCMV                         | Stabl-2 E. coli (K-12 JM109 derivative)                         | Yes            |

2.) Will the cloning or expression of any genes result in production of a known toxin or hazard?

Yes  No      If yes, please explain below:

3.) Are any of the vectors listed above considered viral vectors?  Yes  No

a. If yes, are there any changes/additions involving viral vectors on most recent Biosafety Audit that need to be made as a result of this new project?  Yes  No

*If yes, please attach or contact the Biosafety Officer.*

## Section B: Recombinant DNA (Continued)

4.) Please specify the relevant category or categories listed below from the *NIH Guidelines* that cover the proposed work. Refer to <http://www4.od.nih.gov/oba/rac/guidelines/guidelines.html> for complete details or you can contact the Biosafety Officer for help (A2020; 295-3531). *[The descriptions in parentheses are provided only as a guide. Keep in mind that more than one category may apply.]*

**Section III-A** (Transfer of drug resistance genes into microorganisms that are not known to acquire the trait naturally, if such acquisition could compromise the use of the drug to control disease agents in humans, veterinary medicine, or agriculture)

**Section III-B** (Cloning of toxins with LD50 < 100 ng/kg body weight)

**Section III-C** (Transfer of rDNA, DNA, or RNA derived from rDNA *into human subjects*)

**Section III-D** (rDNA from Risk Group 2, 3, 4, or restricted agents as vector systems; Infectious or defective DNA or RNA viruses; Whole animals; Volumes > 10 L)

**Section III-E** (rDNA involving < 2/3 of the genome of any eukaryotic virus in the absence of helper virus or plasmids; transgenic rodents)

**Section III-F** (Exempt Experiments, see below and circle any that apply)

1. Those that are not in organisms (*example: identification by PCR*).
2. Those that consist entirely of DNA segments from a single non-chromosomal or viral DNA source.
3. Those that consist entirely of DNA from a prokaryotic host including its indigenous plasmids or viruses when propagated only in that host (or related strain).
4. Those that consist entirely of DNA from an eukaryotic host including its chloroplasts, mitochondria, or plasmids (excluding viruses) when propagated only in that host (or related strain)
5. Those that consist entirely of DNA segments from different species that exchange DNA by known physiological processes. *Lists of exchangers are provided in Appendix A.*
6. Those that do not present a significant risk to health or the environment (*See Appendix C*). Including the following:
  - a.) rDNA in Tissue Culture (< 1/2 of viral genome; no genes coding for molecules toxic to vertebrates; no DNA from RG 3, 4, or restricted agents).
  - b.) *E. coli K-12* Host-Vector Systems (no conjugation proficient plasmids or generalized transducing phages; no DNA from RG 3, 4, or restricted agents).
  - c.) *Saccharomyces* Host-Vector Systems (no DNA from RG 3, 4, or restricted agents).
  - d.) *Bacillus subtilis* or *Bacillus licheniformis* Host-Vector systems (no DNA from RG 3, 4, or restricted agents).
  - e.) Extrachromosomal Elements of Gram Positive Organisms
  - f.) The Purchase or Transfer of Transgenic Rodents

### Section C: Infectious Agents and Biological Toxins

Does this project involve the use of human or animal pathogens or biological toxins?  Yes  No  
*If yes, please complete the following section. If no, proceed to Section D.*

1.) Has an Annual Biosafety Audit been conducted within the last year?  Yes  No

2.) Please list all new infectious agents or biological toxins not identified in the latest Biosafety Audit to be used in this project and identify the Risk Group. [See Appendix B of NIH Guidelines; Example: *Staphylococcus aureus* (RG2)]

3.) Does this project involve agents or toxins considered Select Agents or Toxins by the Center for Disease Control?

Yes  No      If yes, contact the CDC Responsible Official in EHS (295-9443).

### Section D: Projects Involving Animal Studies

*All research with animals must be properly registered with IACUC. All animals must be identified and housed appropriately to ensure safety of the animals and laboratory personnel.*

Will this project involve work with animals not currently identified in the latest Biosafety Audit?

Yes  No      *If yes, please complete the following questions. If no, proceed to Section E.*

1.) Please list the type of animal(s) to be used: \_\_\_\_\_

2.) Will this project involve the inoculation of animals with infectious agents or toxins?  Yes  No

Please specify if and how inoculated animal species may shed the infectious agent or toxin.

## Section E: Containment and Safety Procedures

- 4.) Please indicate the proposed biosafety containment level(s) to be used in the project. You can refer to the *NIH Guidelines*, Appendix G ([http://oba.od.nih.gov/rdna/nih\\_guidelines\\_oba.html](http://oba.od.nih.gov/rdna/nih_guidelines_oba.html)) or the CDC publication *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, 5<sup>th</sup> Edition (<http://www.cdc.gov/biosafety/publications/bmbl5/>) for guidance or contact the USUHS Biosafety Officer (b) (6) for help.

- |                                                               |                                                             |
|---------------------------------------------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> Biosafety Level 1 (BSL-1)            | <input type="checkbox"/> Animal Biosafety Level 1 (ABSL-1)  |
| <input checked="" type="checkbox"/> Biosafety Level 2 (BSL-2) | <input type="checkbox"/> Animal Biosafety Level 2 (ABSL-2)  |
| <input type="checkbox"/> Biosafety Level 3 (BSL-3)*           | <input type="checkbox"/> Animal Biosafety Level 3 (ABSL-3)* |

\*For BSL-3 containment requirements and use of BSL-3 laboratory space in AFRRI, please contact the Biosafety Officer, Mr. Peter Bouma (b) (6) (b) (6).

- 5.) All laboratory personnel are required to have **General Laboratory Safety Training** and **Hazardous Communications Training** (both required every two years). Please check additional training which is required for work within this protocol:

- Blood Borne Pathogen (*Annual*)
- Regulated Medical Waste Handling (*One Time*)
- CDC Select Agent Safety & Security (*Annual*)
- Site Specific Training (Required for BSL-2 or higher laboratories; *PI monitored*)

- 6.) Please list any special precautions (*Mouth/nose/respiratory protection, eye wear/face shield, special sharps precautions, decontamination methods, aerosol containment, etc.*), in addition to the personal protective equipment and the biosafety guideline requirements that may be employed to the laboratory for safety and waste handling. You may attach your **Laboratory Specific Biosafety Manual** and or **Experimental SOPs** if applicable.

See attached PDF document: Biosafety Standard Operating Procedures for Recombinant Cedar virus (RG1)

1. Broder lab rCedPV SOP-01152021-Update

# **Biosafety Standard Operating Procedures for Recombinant Cedar virus**

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## Purpose

This document outlines procedures for the use of Biosafety Level-2 agents handled in the Broder laboratory. Specifically, it describes the procedures to be followed to insure a safe working environment while working with recombinant Cedar virus (rCedV) and rCedV variants. This manual will be reviewed annually by the Principal Investigator and updated as needed to ensure that the content is accurate.

## Background

Henipaviruses are unique members of the *Paramyxoviridae* family (1). The prototypical henipavirus species, Hendra virus (HeV) and Nipah virus (NiV), are highly pathogenic Biological Safety Level-4 (BSL-4) select agents that emerged in the 1990s in Australia and peninsular Malaysia, respectively. They possess a broad host range spanning six mammalian orders (2) and cause infections that can result in severe respiratory illnesses and/or encephalitis with associated high fatality rates in humans (40-100%) (3) and other mammals, such as horses and pigs (4). Presently, the well-characterized and well-accepted animal models of NiV (both the Malaysian (NiV-M) and Bangladesh (NiV-B) strains) and HeV infection and pathogenesis that replicate features of human henipavirus disease are the hamster, ferret, and African green monkey (2). There are no licensed NiV and HeV therapeutics or vaccines approved for human use are currently available.

The genus *Henipavirus* also includes three additional species, two of which include viruses that were detected in or isolated from individual bats. The species, *Ghanaian bat henipavirus*, includes Ghana virus (GhV), which was identified by targeted RNA sequencing of fecal samples collected from straw-colored fruit bats (*Eidolon helvum*) (5). Cedar virus (CedV) (*Cedar henipavirus*), a non-pathogenic virus, was isolated from fruit bat urine samples in Australia (6). The third *Henipavirus* species, Mojiang virus (MojV) (*Mojiang henipavirus*), was discovered in 2012 specimens collected from yellow-breasted rats (*Rattus flavipectus*) in the Tongguan mine in Mojiang, Yunnan, China, where three miners had died of pneumonia of unknown etiology (7). No viral isolates of GhV and MojV have been recovered to date; GhV and MojV are known only from genetic sequence data and the pathogenic potential of either of these henipaviruses remains unknown.

Products of the P gene of NiV and HeV inhibit both double-stranded RNA signaling and interferon signaling and the P, V, W and C proteins can all antagonize the host interferon response, and have now been demonstrated to play roles in the modulation of henipavirus pathogenicity (8). The NiV W protein is the most potent interferon antagonist and P protein the least (9). Infectious virus studies have shown that interferon signaling remains functional during henipavirus infection of human cell lines while interferon production was inhibited (10). NiV has been central to understanding the V, W, P and C protein's roles in antagonizing the innate immune responses via a diverse set of mechanisms. NiV lacking either the V or C protein suppressed the interferon response as well as wild-type NiV, but were significantly less pathogenic in hamsters suggesting that their roles in pathogenicity can also be independent of their interferon antagonist activity (11). Indeed, studies with recombinant NiV variants in the ferret model

further detailed the relative importance of the V, W, C and P proteins in pathogenesis, revealing that their absence (with the exception of V) or disruption in their STAT1-binding capacity leads to an altered, but still lethal, pathological outcome in comparison to wild-type NiV, whereas only a recombinant NiV lacking the V protein resulted in a non-lethal productive infection in ferrets (12-14). Thus, the inhibition of viral recognition and innate immune signaling induction may be the major role of NiV P, V, and W proteins in NiV-mediated disease, and the inhibition of IFN signaling having a less important role (12).

In contrast, CedV does not cause pathogenesis following infection in ferrets, guinea pigs or hamsters (6, 15), or African green monkeys (Geisbert and Broder, unpublished). Unlike HeV and NiV, CedV does not possess the RNA editing site within the phosphoprotein gene (P) that results in the expression of the V and W proteins (6). CedV infection of human cells elicits an interferon- $\beta$  response (6). These findings allowed approval to develop and use a reverse genetics system to successfully rescue recombinant CedV (rCedV) and several reporter gene variants (16, 17). The rCedV laboratory manipulation guidelines and standard operating procedures (This Document) under BSL-2 conditions were developed and reviewed and approved by the Uniformed Services University, Institutional Biosafety Committee (IBC) in accordance with NIH guidelines (G173JQ; October 2, 2014). The latest guidelines published in the Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition, proposes that work with CedV in a new animal model should be performed at ABSL-3 until it is demonstrated that the virus does not result in observable illness, and work with CedV in susceptible animal hosts can be performed at ABSL-2 if it has been demonstrated that the virus is avirulent/non-pathogenic and following a risk assessment of the proposed work (18).

In brief, using our established rCedV antigenome clone (those with or without reporter genes such as GFP or luciferase) we can generate variants whereby the F or G envelope glycoprotein genes of CedV can be replaced with the F and G glycoprotein genes of other henipaviruses that are known to be pathogenic (NiV-M or NiV-B or HeV) or presumed to be pathogenic based on their encoding of the P gene products (V and W) (GhV and MojV). The significance of this approach is that such novel rCedV variants or chimeras will be an authentic non-pathogenic henipavirus (rCedV) that is changed only by the chosen fusion and attachment glycoproteins (F and G) from another henipavirus. These replication competent rCedV chimeras can be used under BSL-2 containment, providing ideal tools in establishing robust virus neutralization assays to assess and characterize virus neutralizing antibodies or antibody responses in vaccine studies for NiV or HeV. The rCedV based chimeras can also serve as tools in the study of henipavirus entry mechanisms and entry receptor studies of other henipaviruses.

To rescue replication competent rCedV chimeras; such as rCedV-NiV-B, rCedV-HeV, rCedV-GhV, or other yet to be described henipaviruses) from cDNA clones, BSR-T7/5 cells that stably express T7 RNA polymerase are transfected with four plasmids: first; with the individual rCedV antigenome clone, and three support plasmids expressing CedV nucleoprotein (N), phosphoprotein (P), and polymerase protein (L) required for encapsidation and replication. Forty eight hours post transfection, GFP expression (if included in the genome construction) or syncytia formation are monitored. After seven days, supernatant will be passaged to fresh Vero cells to amplify rescued virus. Alternatively, six hours post-transfection, media will be changed and Vero cells will be co-

## Recombinant Cedar virus Standard Operating Procedure

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cultured with transfected BSR-T7/5 cells. GFP expression and syncytia will be monitored and after seven days supernatant will be passaged to fresh Vero cells, which will be monitored for syncytia and GFP expression. When maximal GFP expression and syncytia is observed, supernatants will be purified by centrifugation and stored or used for experimentation.

For virus stock storage, rCedVs will be stored at -80°C in sealed screw-top tubes in a freezer that can be locked. The virus will be removed and thawed and diluted for infection immediately prior to use. Dilution will take place within biological safety cabinet. Excess virus will be disposed of in biohazard waste bags. For all experiments using rCedVs, personnel will be required to wear PPE appropriate for a BSL-2 agent (lab coat and gloves).

### Description of Laboratories.

All laboratories are designed and equipped for molecular virological experimentation and designated as BSL-2 work areas. Each laboratory can carry out cell and virus culture procedures.

**Laboratory Locations:** (b) (4)

### General Lab Rules

Work with live human and other mammalian cell line cultures, and infected cell virus cultures, will be performed in (b) (4). Cell and virus cultures will be handled inside the Biological Safety Cabinet (BSC). Virus cultures using recombinant CedV will be conducted in (b) (4).

Access to laboratories is restricted when experiments are in progress. No unauthorized personnel, including sales persons, family members, and especially children are permitted within the laboratory.

The laboratory door is kept closed during operation.

Work surfaces are decontaminated once a day and after any spill of viable material. Contaminated liquids and solids are autoclaved before disposal. Contaminated materials are transported to the autoclave room in leak-proof containers. Autoclave bags are closed loosely with tape or a rubber band to allow steam to penetrate packaging. For dry materials, some water must be added into the bag to ensure that steam is produced inside the bag because steam will not penetrate the polypropylene bag.

NO eating, drinking, smoking, handling contact lenses, or applying cosmetics in laboratories at any time. Persons who wear contact lenses should also wear goggles or a face shield while working with infectious materials. Mouth pipetting is prohibited; always use mechanical/automatic pipetting aids with filters.

All procedures are performed carefully to minimize the creation of splashes or aerosols. Additionally, aerosols are controlled by the use of sealed centrifuge rotors and biological safety cabinets. Following centrifugation, rotors are taken to a biological safety cabinet before opening.

Lab coats are to be worn at all times in labs and removed in clean areas. Other personal protective gear may be worn according to the tasks performed.

## Wash hands

- after handling biohazardous materials,
- after removing gloves, and
- before leaving the laboratory.

Razor blades, scalpels, and hypodermic needles (“sharps”) should be used only when absolutely needed. Disposable syringes will be of the fixed needle or LUER-LOK type (or equivalent) to assure that the needle cannot separate during use.

--Double gloving provides an extra barrier of protection. Loss of dexterity and the discomfort incurred should be considered during risk assessments, but use of double gloves is recommended when handling needles with infectious agents and/or animals.

--Disposable syringes, scalpels, and contaminated glass pipettes will be discarded in puncture-proof rigid “SHARPS” containers. Needles must not be bent, sheared, broken, reused, recapped, removed from disposable syringes, or otherwise manipulated by hand before disposal. Sharps containers will be disposed of as Regulated Medical Waste as autoclaving can compromise the rigid SHARPS containers and expose SHARPS. Place in red, biowaste bag and then place in Regulated Medical Waste/Biowaste boxes.

--Broken glassware must not be handled directly. Instead, use a brush and dustpan, tongs, or forceps and dispose in Broken Glass Boxes. Potentially contaminated broken glass should be placed in SHARPS waste containers as mentioned above.

## Additional Precautions for Handling rCedVs

1. Only authorized personnel will conduct experiments with viable organisms.
2. Gloves are used at all times with viable organisms.
3. A face shield or a glass shield on the front of the biosafety cabinet is necessary.
4. Waste should be decontaminated chemically or by autoclave before disposal.
5. Records are maintained of all environmental contamination studies and autoclave operations.
6. Post “**Live Virus in Use**” signs on door, incubator, and biosafety cabinet until decontaminated.

## Emergency Phone Numbers and Procedures

|                                                    |               |
|----------------------------------------------------|---------------|
| <b>Emergency Phone Numbers</b>                     |               |
| Emergency System Dispatcher                        | 777           |
| Campus Security Desk                               | 295-3033      |
| <b>Non-Emergency Phone Numbers</b>                 |               |
| Environmental Health and Occupational Safety (EHS) | 295-9443/3305 |

## Emergency Procedures

In case of fire, evacuate immediately. Appropriate judgment should be exercised in deciding whether to store or contain any hazardous materials prior to evacuation.

**Any injury to a laboratory worker shall be reported immediately to Christopher Broder and EHS** and timely and appropriate action shall be taken to evacuate such employee from the laboratory and to obtain appropriate medical treatment.

### Serious Injuries

If it is an emergency, the emergency system dispatcher should be contacted (777), first aid should be administered, and procedures outlined for response to injury and accident should be followed (<https://sites.google.com/usuhs.edu/ehs/home/publications>).

Administer first aid outside of the lab if the injured person is ambulatory.

If an accident involves a biohazardous spill, move the injured person away from the spill. Inactivate the spill after attending to the injured person. (See "Spills" below for procedure).

Do not attempt to move a non-ambulatory person unless it is absolutely necessary.

Remove from the injured person all protective clothing (i.e., lab coat) that may have been contaminated, and rip away the protective clothing only if necessary. Do **NOT** move the injured person to remove the protective clothing. Wash any contaminated skin with disinfectant such as Betadine or Envirocide.

### Splash to the Eye (<https://sites.google.com/usuhs.edu/ehs/home/publications>)

1. Immediately flush the eye with a gentle stream of clean, temperate water for 15 minutes. Hold the eyelid open. Be careful not to wash the contaminant into the other eye. Use an emergency eyewash if one is accessible.
2. Contact the Occupational Health Office (301-295-9444 or 301-400-4073) to obtain care. If unavailable or after hours, military and civilian personnel go to Walter Reed (WRNMMC) emergency room and contractors go to Suburban Hospital emergency room.

### **Proper Use of Biological Safety Cabinets (BSC)**

(From "Biohazardous and Dangerous Materials Guide" at:

<https://sites.google.com/usuhs.edu/ehs/home/publications>)

1. Turn on BSC fan 15 minutes before beginning work.
2. Disinfect the cabinet work surface with 70% ethanol or other disinfectant.
3. Place supplies in the cabinet. Locate container inside the BSC for disposal of pipettes. (Movement of hands in and out of the cabinet to discard pipettes into a container located outside of the cabinet creates turbulence and disrupts the air barrier that maintains sterility inside the cabinet.) Work as far to the back (beyond the air split) of the BSC work space as possible. Always use mechanical pipetting aids. Avoid using open flames inside BSCs. A touch-plate Bunsen burner is recommended if necessary and be placed to the rear of the work space. Flames disrupt the airflow and contribute to the heat load inside the BSC. Flames have burned holes through HEPA filters and have caused explosions in BSCs. Do not work in a BSC while a warning light or alarm is signaling.
4. Locate liquid waste traps inside the cabinet and use a hydrophobic filter to protect the vacuum line. If traps must be located on the floor, place them in a secondary

- container (Do not use a cardboard box. Place them in an impermeable, secondary container (such as a hard, plastic tray) to prevent spilling).
5. Always wear gloves when there is potential for skin contact with infectious material.
  6. Keep the work area of the BSC free of unnecessary equipment or supplies. Clutter inside the BSC may affect proper air flow and the level of protection provided. Also, keep the front and rear grilles clear.
  7. When work is completed, remove equipment and supplies from the cabinet. Wipe the work area with 70% ethanol and allow the cabinet to run for 15 minutes.
  8. At the end of the work day, turn on the ultraviolet (UV) light. UV radiation should not take the place of 70% ethanol for disinfection of the cabinet interior.
  9. The UV lamp should NEVER be on while an operator is working in the cabinet.
  10. Minimize traffic around the BSC and avoid drafts from doors and air conditioning.

### ***NEVER place anything over the front or rear grille of a biosafety cabinet.***

Disrupting the air flow into the front grill allows contaminated air from inside the cabinet to blow into the lab or directly at the person sitting at the cabinet! It also allows non-sterile air from the room to blow into the biosafety cabinet over your experiments!

Materials should be placed in the cabinet so as not to block air flow into the rear grille. Leave a few inches for air to flow around things. Any disruption of the air flow in the cabinet decreases its effectiveness.

### **Decontamination Procedures**

Infectious agents must remain in the Biosafety Cabinet until they are properly decontaminated. Infectious material should NEVER be in an open vessel OUTSIDE of the cabinet.

Any items used in conjunction with infectious material must be decontaminated by wiping with either 10% (v/v) fresh-diluted bleach or 70% ethanol.

Chemical Sterilization: Whenever possible, materials should be immersed in a solution of bleach (NaOCl) (mercury-free bleach diluted 1 part with 9 parts water, or 10% (v/v)) for minimum of fifteen minutes before any further handling. Alternatively, equipment that is not compatible with bleach should be decontaminated with 70% ethanol by thoroughly spraying and allowing to air dry.

Autoclaving: All solid, contaminated waste should be autoclaved in autoclavable bags. Following the appropriate sterilization cycle, the bag should be disposed of in a **red** biohazard waste bag.

Decontamination of liquid: This should be done by adding undiluted bleach, NaOCl, (sold as 6% w/v concentration) to a final concentration of AT LEAST 0.6% w/v NaOCl (or 10% dilution). Mix well and let stand for fifteen minutes before pouring into the drain. Rinse with copious amounts of cold water. Liquid waste that is not compatible with NaOCl should be autoclaved for at least 30 minutes, using slow exhaust before disposal.



Plasticware and other reusable items: These items are to be chemically decontaminated and rinsed (whenever possible) before removal from the laboratory.

Decontamination of all equipment: Upon removal from the BSC, all equipment will be decontaminated.

Note: Avoid autoclaving large quantities of bleach solution. Flush decontaminated liquids down the drain and rinse non-disposable items with water before removal from the laboratory. If it is impractical to rinse items, the NaOCl (bleach) should be neutralized by adding 1 mL of 10% sodium thiosulfate per mL of 10% hypochlorite ion.

For more detailed information about Decontamination and Disposal, refer to USUHS Instructions 6401 "Biohazardous and Dangerous Materials Guide" at <https://sites.google.com/usuhs.edu/ehs/home/publications>

### **Spills**

(From "Guidance for Chemical/Biological Spills and "Spill Kits" – at: <https://sites.google.com/usuhs.edu/ehs/osd/lab-safety>)

#### Small Chemical/Biological Spill Clean-up Procedure:

- Alert people in the immediate area of the spill and restrict access to only those necessary to contain the spill.
- Locate spill kit.
- Don appropriate personal protective equipment (PPE) – consult MSDS for special precautions.
- Long sleeve lab coat, back fastening gown, or jumpsuit.
- Disposable gloves.
- Disposable shoe covers.
- Safety goggles, mask, or full-face shield.
- For Chemical spills – use kit material to absorb liquid, and then dispose as chemical waste. If powder form, carefully sweep into dustpan. Avoid generating respirable dust. Dispose of as chemical waste.
- Mercury spills – Don appropriate personal protective equipment (PPE) - and use kit material to carefully collect broken thermometer and loose mercury and place into a sealable container. Contact the Industrial Hygiene Division at 295-9442/3678/9443 for pick-up or additional information.
- For Biological spills – Don appropriate personal protective equipment (PPE) - Carefully pour disinfectant around edges of spill then into spill. Avoid splashing. Let sit 20 minutes. Absorb spill, then clean spill area with clean towels soaked with disinfectant. Place all contaminated material in plastic bag, autoclave, and dispose as medical waste.

#### Large Chemical Spill Clean-up Procedure:

- Contain the spill, if you can do so without risk to yourself or others.
- Warn others in the immediate area, notify the PI or supervisor.
- Evacuate the area if necessary.

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- Contact the Base Hazardous Material Response Team at phone number:
- 777 immediately and provide your name, extension, location of spill, (USUHS, Building Number, Room Number) quantity and name of chemical spilled. They are specially trained to handle hazardous chemical spills. Also notify EHS as soon as possible thereafter.

| Category | Size               | Response                         | Treatment Materials                    |
|----------|--------------------|----------------------------------|----------------------------------------|
| Small    | up to 300 cc       | chemical treatment or absorption | neutralization or absorption spill kit |
| Medium   | 300 cc - 5 liters  | Absorption                       | absorption spill kit                   |
| Large    | more than 5 liters | call Base HAZMAT Team at “777”   | outside help                           |

### History of Manual’s Creation

The recombinant Cedar virus laboratory manipulation guidelines and standard operating procedures under BSL-2 conditions were developed and reviewed and last approved by the Uniformed Services University, Institutional Biosafety Committee (IBC) in accordance with NIH guidelines (G173JQ; October 2, 2014).

Date Drafted: June 16, 2010

Date Updated: March, 8, 2014, April, 5, 2018 (this update: January, 15, 2021)

Authors: Drs. Christopher Broder, Dawn Weir, Eric Laing, Moushimi Amaya

### Resources:

- Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition Revised June 2020; <https://www.cdc.gov/labs/pdf/CDC-BiosafetyMicrobiologicalBiomedicalLaboratories-2020-P.pdf>
- EHS website: <https://sites.google.com/usuhs.edu/ehs/home>

### References:

1. Wang L-F, Mackenzie JS, Broder CC. 2013. Henipaviruses, p 1070-1085. *In* Knipe DM, Howley PM (ed), Fields Virology, vol 1. Lippincott Williams & Wilkins, Philadelphia.
2. Geisbert TW, Feldmann H, Broder CC. 2012. Animal Challenge Models of Henipavirus Infection and Pathogenesis. *Curr Top Microbiol Immunol* 359:153-77.
3. Sharma V, Kaushik S, Kumar R, Yadav JP, Kaushik S. 2019. Emerging trends of Nipah virus: A review. *Rev Med Virol* 29:e2010.
4. Eaton BT, Broder CC, Middleton D, Wang LF. 2006. Hendra and Nipah viruses: different and dangerous. *Nat Rev Microbiol* 4:23-35.
5. Drexler JF, Corman VM, Gloza-Rausch F, Seebens A, Annan A, Ipsen A, Kruppa T, Muller MA, Kalko EK, Adu-Sarkodie Y, Oppong S, Drosten C. 2009. Henipavirus RNA in African bats. *PLoS One* 4:e6367.

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6. Marsh GA, de Jong C, Barr JA, Tachedjian M, Smith C, Middleton D, Yu M, Todd S, Foord AJ, Haring V, Payne J, Robinson R, Broz I, Crameri G, Field HE, Wang LF. 2012. Cedar virus: a novel Henipavirus isolated from Australian bats. *PLoS Pathog* 8:e1002836.
7. Wu Z, Yang L, Yang F, Ren X, Jiang J, Dong J, Sun L, Zhu Y, Zhou H, Jin Q. 2014. Novel Henipa-like virus, Mojiang Paramyxovirus, in rats, China, 2012. *Emerg Infect Dis* 20:1064-6.
8. Pelissier R, Iampietro M, Horvat B. 2019. Recent advances in the understanding of Nipah virus immunopathogenesis and anti-viral approaches. *F1000Res* 8.
9. Park MS, Shaw ML, Munoz-Jordan J, Cros JF, Nakaya T, Bouvier N, Palese P, Garcia-Sastre A, Basler CF. 2003. Newcastle disease virus (NDV)-based assay demonstrates interferon-antagonist activity for the NDV V protein and the Nipah virus V, W, and C proteins. *J Virol* 77:1501-11.
10. Virtue ER, Marsh GA, Wang LF. 2011. Interferon signaling remains functional during henipavirus infection of human cell lines. *J Virol* 85:4031-4.
11. Yoneda M, Guillaume V, Sato H, Fujita K, Georges-Courbot MC, Ikeda F, Omi M, Muto-Terao Y, Wild TF, Kai C. 2010. The nonstructural proteins of Nipah virus play a key role in pathogenicity in experimentally infected animals. *PLoS One* 5:e12709.
12. Satterfield BA, Borisevich V, Foster SL, Rodriguez SE, Cross RW, Fenton KA, Agans KN, Basler CF, Geisbert TW, Mire CE. 2019. Antagonism of STAT1 by Nipah virus P gene products modulates disease course but not lethal outcome in the ferret model. *Sci Rep* 9:16710.
13. Satterfield BA, Cross RW, Fenton KA, Agans KN, Basler CF, Geisbert TW, Mire CE. 2015. The immunomodulating V and W proteins of Nipah virus determine disease course. *Nat Commun* 6:7483.
14. Satterfield BA, Cross RW, Fenton KA, Borisevich V, Agans KN, Deer DJ, Graber J, Basler CF, Geisbert TW, Mire CE. 2016. Nipah Virus C and W Proteins Contribute to Respiratory Disease in Ferrets. *J Virol* 90:6326-43.
15. Schountz T, Campbell C, Wagner K, Rovnak J, Martellaro C, DeBuysscher BL, Feldmann H, Prescott J. 2019. Differential Innate Immune Responses Elicited by Nipah Virus and Cedar Virus Correlate with Disparate In Vivo Pathogenesis in Hamsters. *Viruses* 11.
16. Laing ED, Amaya M, Navaratnarajah CK, Feng YR, Cattaneo R, Wang LF, Broder CC. 2018. Rescue and characterization of recombinant cedar virus, a non-pathogenic Henipavirus species. *Virol J* 15:56.
17. Laing ED, Navaratnarajah CK, Cheliout Da Silva S, Petzing SR, Xu Y, Sterling SL, Marsh GA, Wang LF, Amaya M, Nikolov DB, Cattaneo R, Broder CC, Xu K. 2019. Structural and functional analyses reveal promiscuous and species specific use of ephrin receptors by Cedar virus. *Proc Natl Acad Sci U S A* 116:20707-20715.
18. Anonymous. 2020. Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition. HHS Publication No. (CDC) 21-1112; pp248-250; US Government Printing Office, Washington. <https://www.cdc.gov/labs/pdf/CDC-BiosafetyMicrobiologicalBiomedicalLaboratories-2020-P.pdf>.

**Original project title:** Henipavirus Entry and Virion Assembly  
**Project number:** G173JQ;

The recombinant Cedar virus laboratory manipulation guidelines and standard operating procedures under BSL-2 conditions were developed and reviewed and last approved by the Uniformed Services University, Institutional Biosafety Committee (IBC) in accordance with NIH guidelines (G173JQ; October 2, 2014).

=====  
**New project title:** Advancement of Vaccines and Therapies for Henipaviruses  
**Project number:** U19 AI142764

**Project Principal Investigator:** Christopher C. Broder, Ph.D.  
**Department:** Microbiology and Immunology (MIC)

*History of document:*

Date drafted: June 16, 2010

Dates Updated: March, 8, 2014, April, 5, 2018 (this update: January, 15, 2021)

Authors: Drs. Christopher Broder, Eric Laing, Moushimi Amaya

This document describes the reverse genetics methodology, laboratory procedures and experimental outline for the generation and manipulation of recombinant Cedar virus (rCedV). A second document: *Biosafety Standard Operating Procedures (SOPs) for Recombinant Cedar virus* (Broder lab) provides all SOPs that address working with rCedV.

### **Experimental Goals**

The goals of this project are to rescue recombinant Cedar virus (rCedV) and rCedV variants or chimeras from cDNA clones using recombinant DNA plasmid clones the CedV genome. The non-pathogenic CedV will be used as a model *Henipavirus* to elucidate antiviral mechanisms during *Henipavirus* infection in both bat and human cell lines' serve as a replication competent viral vector surrogate for other henipavirus species.

### **Background**

Henipaviruses are unique members of the *Paramyxoviridae* family (1). The prototypical henipavirus species, Hendra virus (HeV) and Nipah virus (NiV), are highly pathogenic Biological Safety Level-4 (BSL-4) select agents that emerged in the 1990s in Australia and peninsular Malaysia, respectively. They possess a broad host range spanning six mammalian orders (2) and cause infections that can result in severe respiratory illnesses and/or encephalitis with associated high fatality rates in humans (40-100%) (3) and other mammals, such as horses and pigs (4). Presently, the well-characterized and well-accepted animal models of NiV and HeV infection and pathogenesis that replicate features of human henipavirus disease are the hamster, ferret, and African green monkey (2). There are no licensed NiV and HeV therapeutics or vaccines approved for human use are currently available.

The genus *Henipavirus* also includes three additional species, two of which include viruses that were detected in or isolated from individual bats. The species, *Ghanaian bat henipavirus*, includes Ghana virus (GhV), which was identified by targeted RNA sequencing of fecal samples collected from straw-colored fruit bats (*Eidolon helvum*) (5). Cedar virus (CedV) (*Cedar henipavirus*), a non-pathogenic virus, was isolated from fruit bat urine samples in Australia (6). The third *Henipavirus* species, Mojiang virus (MojV) (*Mojiang henipavirus*), was discovered in 2012 specimens collected from yellow-breasted rats (*Rattus flavipectus*) in the Tongguan mine in Mojiang, Yunnan, China, where three miners had died of pneumonia of unknown etiology (7). No viral isolates of GhV and MojV have been recovered to date; GhV and MojV are known only from genetic sequence data and the pathogenic potential of either of these henipaviruses remains unknown.

Products of the P gene of NiV and HeV inhibit both double-stranded RNA signaling and interferon signaling and the P, V, W and C proteins can all antagonize the host interferon response, and have now been demonstrated to play roles in the modulation of henipavirus pathogenicity (8). The NiV W protein is the most potent interferon antagonist and P protein the least (9). Infectious virus studies have shown that interferon signaling remains functional during henipavirus infection of human cell lines while interferon production was inhibited (10). NiV has been central to understanding the V, W, P and C protein's roles in antagonizing the innate immune responses via a diverse set of mechanisms. NiV lacking either the V or C protein suppressed the interferon response as well as wild-type NiV, but were significantly less pathogenic in hamsters suggesting that their roles in pathogenicity can also be independent of their interferon antagonist activity (11). Indeed, studies with recombinant NiV variants in the ferret model further detailed the relative importance of the V, W, C and P proteins in pathogenesis, revealing that their absence (with the exception of V) or disruption in their STAT1-binding capacity leads to an altered, but still lethal, pathological outcome in comparison to wild-type NiV, whereas only a recombinant NiV lacking the V protein resulted in a non-lethal productive infection in ferrets (12-14). Thus, the inhibition of viral recognition and innate immune signaling induction may be the major role of Nipah virus P, V, and W proteins in NiV-mediated disease, and the inhibition of IFN signaling having a less important role (12).

CedV does not cause pathogenesis following infection in ferrets, guinea pigs or hamsters (6, 15), or African green monkeys (Geisbert and Broder, unpublished). Unlike HeV and NiV, CedV does not possess the RNA editing site within the phosphoprotein gene (P) that results in the expression of the V and W proteins (6). CedV infection of human cells elicits an interferon- $\beta$  response (6). These findings allowed approval to develop and use a reverse genetics system to successfully rescue recombinant CedV (rCedV) and several reporter gene variants (16). The rCedV laboratory manipulation guidelines and standard operating procedures (This document) under BSL-2 conditions were developed and reviewed and approved by the Uniformed Services University, Institutional Biosafety Committee (IBC) in accordance with NIH guidelines (G173JQ; October 2, 2014). The latest guidelines published in the Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition, proposes that work with CedV in a new animal model should be performed at ABSL-3 until it is demonstrated that the virus does not result in observable illness, and work with CedV in susceptible animal hosts can be

performed at ABSL-2 if it has been demonstrated that the virus is avirulent/non-pathogenic and following a risk assessment of the proposed work (17).

### **Laboratory experimental procedures and manipulations:**

#### ***Experimental Design: Work with recombinant DNA***

##### *Description of recombinant DNA (rDNA)*

A cDNA clone of the CedV genome has been generated will be used to rescue infectious reporter CedV (rCedV-GFP). The expression plasmid will encode the full-length antigenomic (positive-sense) viral RNA, and the max green fluorescent protein (GFP) under the control of viral transcription start and stop sites. The expression plasmid contains a T7 promoter at the 5' end and a Hepatitis delta virus ribozyme sequence that enable transcription and self-cleavage of the antigenomic CedV viral RNA. In the prior approved protocol rCedV with GFP and without GFP has been recused and well-characterized (16, 18).

##### *Amplification of plasmids carrying rDNA*

Plasmids carrying rDNA will be transformed into E. coli Stbl-2 cell (K-12 JM109 derivative) for amplification and purification. DNA will be purified from transformed cells according to standard protocols.

##### *Recovery of recombinant viruses*

##### *Biosafety precautions*

For all experiments, personnel will work under BSL-2 safety conditions and wear gloves and a lab coat. Liquid waste will be diluted with bleach to a 10% final concentration. Solid waste will be chemically disinfected with 10% bleach or 70% ethanol and disposed of in autoclavable biohazard bags.

##### *Protocol for rescue of replication competent rCedPV*

##### Generation of plasmids and rescue of rCedV

To construct the rCedV antigenome clone, large DNA fragments of CedV based on the Cedar virus isolate CG1a sequence, NCBI Accession number NC\_025351.1 were synthesized (GenScript; NJ, USA). These DNA fragments corresponded to CedV nucleotide bases: 1-4530, 4531-10,517, and 10,518-18,162. These fragments were sequentially cloned into an expression plasmid, pOLTV5 (19), between the T7 RNA promoter and hepatitis delta virus (HDV) ribozyme (**Figure 1**). The pOLTV5 vector was similarly used for cloning and expression of recombinant HeV (20). At the time of the rCedV cDNA clone design, the nucleotide at position 7 in the CedV reference genome was a cytosine, which was later revised to an adenine. Our rCedV cDNA clones have the cytosine at position 7. Furthermore, internal SmaI restriction sites in the CedV reference genome were removed (C395A and C4816A) in the rCedV cDNA clone to preserve the cloning strategy. A MluI restriction site was created between the P and M genes at nucleotide position 4531, after the M transcriptional start sequence, to facilitate insertion of a

modified turbo Green Fluorescent Protein (GFP) gene (Lonza Inc., Allendale, NJ). To insert the GFP gene into the rCedV antigenome plasmid, CedV untranslated regions: transcriptional P stop, intergenic region, and transcriptional M start sequences (TAAGAAAAA ACTTAGGATCCCAG) were amplified by polymerase chain reaction and cloned into the 3' terminus of the GFP gene with an additional non-coding 3' thymine nucleotide to maintain the "rule of six". As noted in the rescue of recombinant HeV (20) and in contrast to the rescue of a recombinant NiV-GFP (21), GFP was inserted between the P and M genes to maintain the level of N and P necessary for proper virus replication. To generate replication helper plasmids, polymerase chain reaction was used to amplify the open reading frames of N, P, and L genes from rCedV DNA plasmids, which were subsequently cloned into expression vectors that contain a cytomegalovirus promoter (pCMV) (22). All plasmids were sequenced to obtain at least 2-fold sequence coverage. We adopted reverse genetic methods previously used to rescue recombinant HeV and NiV reporter viruses to generate rCedV (20, 21).

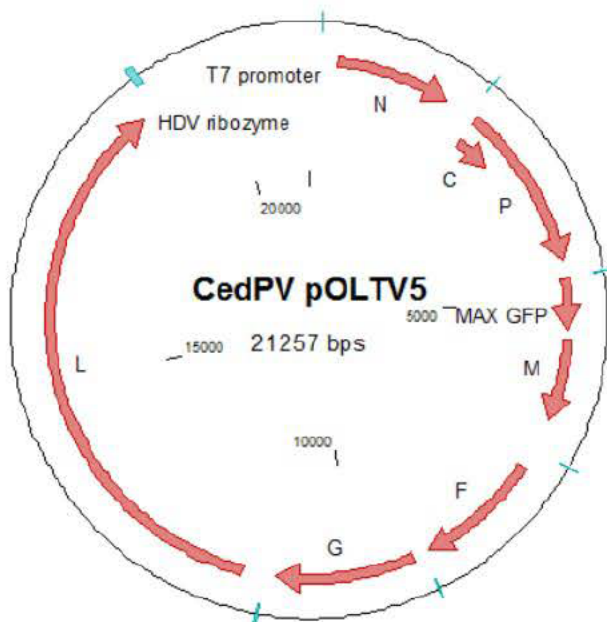
To generate rCedV-GFP and rCedV-wt, pCMV-CedV-N (1.25 µg), pCMV-CedV-P (0.8 µg), pCMV-CedPV-L (0.4 µg), and pOLTV5 full-length CedV antigenome plasmid (3.5 µg) were mixed with 12 µL of Lipofectamine LTX (Invitrogen; Carlsbad, CA) in 500 µL OptiMEM (GIBCO; Gaithersburg, MD) and incubated for 30 minutes at room temperature. This mixture of plasmid DNA and Lipofectamine LTX was used to transfect 5x10<sup>5</sup> BSR-T7/5 cells. Four days post-transfection, GFP was observed in BSR-T7/5 cells transfected with the rCedV-GFP antigenome and N, P, and L helper plasmids. Adherent BSR-T7/5 cells were collected along with culture supernatant and subjected to three rounds of freeze-thaw using -80°C EtOH and 37°C water baths. Vero cells at a density of 1x10<sup>6</sup> cells/well in 6-well cell culture plates (Corning Inc.; Corning, NY, USA) were infected with 500 µL of freeze-thawed cell culture supernatant. Six days post infection, when maximal GFP signal and syncytia was observed, supernatant was clarified by centrifugation (2400 rpm) and 300 µL of virus supernatant was passaged to fresh 1x10<sup>6</sup> Vero cells in 6-well cell culture plates. Within 24 hours post infection (hpi), GFP signal and syncytia were observed. After three days, maximal GFP signal was observed and supernatant was again clarified then passaged to fresh Vero cells (75 cm<sup>2</sup> flasks) for amplification of rCedV-GFP. Virus supernatant was concentrated by ultracentrifugation (28,000 rpm; 2 hours) through a sucrose cushioned buffer. Stock rCedV-GFP was serially diluted and incubated with Vero cells for 72 hours to determine titer. Similarly, rCedV-wt was harvested when maximal syncytia was observed, clarified and passaged onto fresh Vero cells for amplification. Stock titers of rCedV-wt were determined by CPE-based plaque assay.

#### Replication kinetics of recombinant CedPV (plaque assay)

Vero cells at a density of 5x10<sup>4</sup> cells/well in 96-well cell culture plates were infected at a multiplicity of infection (MOI) of 1.0. Supernatants were collected at 0, 8, 24, 48 and 72hpi and viral titers were determined by plaque assay as described by Weingartl *et al.* (23). Briefly, 400 µL/well of virus inoculum was added to Vero cells at a density of 5x10<sup>5</sup> cells/well in 12-well cell culture plates and incubated for 1hr at 37°C, 5% CO<sub>2</sub>. Two mL of 2% carboxymethylcellulose sodium salt (medium viscosity) + DMEM-3% CCS was then added to each well and incubated for 5 days at 37°C, 5% CO<sub>2</sub>. The plates were fixed with 4% formaldehyde and then stained with

0.5% crystal violet-80% methanol in phosphate buffered saline (PBS). Plaques were counted and calculated as PFU/mL.

**Figure 1.**



## References

1. Wang L-F, Mackenzie JS, Broder CC. 2013. Henipaviruses, p 1070-1085. *In* Knipe DM, Howley PM (ed), *Fields Virology*, vol 1. Lippincott Williams & Wilkins, Philadelphia.
2. Geisbert TW, Feldmann H, Broder CC. 2012. Animal Challenge Models of Henipavirus Infection and Pathogenesis. *Curr Top Microbiol Immunol* 359:153-77.
3. Sharma V, Kaushik S, Kumar R, Yadav JP, Kaushik S. 2019. Emerging trends of Nipah virus: A review. *Rev Med Virol* 29:e2010.
4. Eaton BT, Broder CC, Middleton D, Wang LF. 2006. Hendra and Nipah viruses: different and dangerous. *Nat Rev Microbiol* 4:23-35.
5. Drexler JF, Corman VM, Gloza-Rausch F, Seebens A, Annan A, Ipsen A, Kruppa T, Muller MA, Kalko EK, Adu-Sarkodie Y, Oppong S, Drosten C. 2009. Henipavirus RNA in African bats. *PLoS One* 4:e6367.
6. Marsh GA, de Jong C, Barr JA, Tachedjian M, Smith C, Middleton D, Yu M, Todd S, Foord AJ, Haring V, Payne J, Robinson R, Broz I, Crameri G, Field HE, Wang LF. 2012. Cedar virus: a novel Henipavirus isolated from Australian bats. *PLoS Pathog* 8:e1002836.
7. Wu Z, Yang L, Yang F, Ren X, Jiang J, Dong J, Sun L, Zhu Y, Zhou H, Jin Q. 2014. Novel Henipa-like virus, Mojiang Paramyxovirus, in rats, China, 2012. *Emerg Infect Dis* 20:1064-6.
8. Pelissier R, Iampietro M, Horvat B. 2019. Recent advances in the understanding of Nipah virus immunopathogenesis and anti-viral approaches. *F1000Res* 8.
9. Park MS, Shaw ML, Munoz-Jordan J, Cros JF, Nakaya T, Bouvier N, Palese P, Garcia-Sastre A, Basler CF. 2003. Newcastle disease virus (NDV)-based assay demonstrates



- interferon-antagonist activity for the NDV V protein and the Nipah virus V, W, and C proteins. *J Virol* 77:1501-11.
10. Virtue ER, Marsh GA, Wang LF. 2011. Interferon signaling remains functional during henipavirus infection of human cell lines. *J Virol* 85:4031-4.
  11. Yoneda M, Guillaume V, Sato H, Fujita K, Georges-Courbot MC, Ikeda F, Omi M, Muto-Terao Y, Wild TF, Kai C. 2010. The nonstructural proteins of Nipah virus play a key role in pathogenicity in experimentally infected animals. *PLoS One* 5:e12709.
  12. Satterfield BA, Borisevich V, Foster SL, Rodriguez SE, Cross RW, Fenton KA, Agans KN, Basler CF, Geisbert TW, Mire CE. 2019. Antagonism of STAT1 by Nipah virus P gene products modulates disease course but not lethal outcome in the ferret model. *Sci Rep* 9:16710.
  13. Satterfield BA, Cross RW, Fenton KA, Agans KN, Basler CF, Geisbert TW, Mire CE. 2015. The immunomodulating V and W proteins of Nipah virus determine disease course. *Nat Commun* 6:7483.
  14. Satterfield BA, Cross RW, Fenton KA, Borisevich V, Agans KN, Deer DJ, Graber J, Basler CF, Geisbert TW, Mire CE. 2016. Nipah Virus C and W Proteins Contribute to Respiratory Disease in Ferrets. *J Virol* 90:6326-43.
  15. Schountz T, Campbell C, Wagner K, Rovnak J, Martellaro C, DeBuysscher BL, Feldmann H, Prescott J. 2019. Differential Innate Immune Responses Elicited by Nipah Virus and Cedar Virus Correlate with Disparate In Vivo Pathogenesis in Hamsters. *Viruses* 11.
  16. Laing ED, Amaya M, Navaratnarajah CK, Feng YR, Cattaneo R, Wang LF, Broder CC. 2018. Rescue and characterization of recombinant cedar virus, a non-pathogenic Henipavirus species. *Virol J* 15:56.
  17. Anonymous. 2020. Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition. (CDC) 21-1112; pp248-250; US Government Printing Office, Washington. <https://www.cdc.gov/labs/pdf/CDC-BiosafetyMicrobiologicalBiomedicalLaboratories-2020-P.pdf>.
  18. Laing ED, Navaratnarajah CK, Cheliout Da Silva S, Petzing SR, Xu Y, Sterling SL, Marsh GA, Wang LF, Amaya M, Nikolov DB, Cattaneo R, Broder CC, Xu K. 2019. Structural and functional analyses reveal promiscuous and species specific use of ephrin receptors by Cedar virus. *Proc Natl Acad Sci U S A* 116:20707-20715.
  19. Peeters BP, de Leeuw OS, Koch G, Gielkens AL. 1999. Rescue of Newcastle disease virus from cloned cDNA: evidence that cleavability of the fusion protein is a major determinant for virulence. *J Virol* 73:5001-9.
  20. Marsh GA, Virtue ER, Smith I, Todd S, Arkinstall R, Frazer L, Monaghan P, Smith GA, Broder CC, Middleton D, Wang LF. 2013. Recombinant Hendra viruses expressing a reporter gene retain pathogenicity in ferrets. *Virol J* 10:95.
  21. Yoneda M, Guillaume V, Ikeda F, Sakuma Y, Sato H, Wild TF, Kai C. 2006. Establishment of a Nipah virus rescue system. *Proc Natl Acad Sci U S A* 103:16508-13.
  22. Chan YP, Yan L, Feng YR, Broder CC. 2009. Preparation of recombinant viral glycoproteins for novel and therapeutic antibody discovery. *Methods Mol Biol* 525:31-58, xiii.
  23. Weingartl HM, Berhane Y, Caswell JL, Loosmore S, Audonnet JC, Roth JA, Czub M. 2006. Recombinant nipah virus vaccines protect pigs against challenge. *J Virol* 80:7929-38.

**From:** Plowright, Raina  
**Sent:** Tue, 18 May 2021 22:43:41 +0000  
**To:** (b) (6)  
**Cc:** Munster, Vincent (NIH/NIAID) [E]  
**Subject:** Re: Evolutionary stability/ drift of SARS-CoV-2 tasks

THanks (b) (6)

I'm booked all Thursday and Friday mornings so I'll catch up with Vincent about this later.  
Raina

On May 18, 2021, at 2:08 PM, (b) (6) wrote:

Vincent,  
Thanks. I'm sending out an invite for Thursday 5/20 at 8 MT/10 EDT.  
Raina, I will add you as an optional attendee for your SA.  
Thanks,  
(b) (6)

(b) (6)  
SETA Support to DARPA BTO  
Quantitative Scientific Solutions (QS-2)  
(b) (6)  
Office: (b) (6)  
Work Mobile: (b) (6)

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**From:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Tuesday, May 18, 2021 2:18 PM  
**To:** (b) (6)  
**Cc:** Plowright, Raina <(b) (6)>  
**Subject:** RE: Evolutionary stability/ drift of SARS-CoV-2 tasks

Sounds good,

I was aware that (b) (6), but wasn't aware of the time-frame.

We can schedule a call on Thursday or Friday at 8 or 9 mountain time?

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** [REDACTED] (b) (6)

**Sent:** Tuesday, May 18, 2021 9:36 AM

**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Cc:** Plowright, Raina <[REDACTED] (b) (6)>

**Subject:** RE: Evolutionary stability/ drift of SARS-CoV-2 tasks

Hello Vincent,

Thank you for getting back to me, I was going to wait a few days after your [REDACTED] (b) (6) so you could catch up (I'm sure you're swamped!).

I would definitely want to have a discussion about ultimate goals with you and USAMRIID.

Unfortunately, [REDACTED] (b) (6) will be taking over his position (not sure if temporarily or permanently).

But first, if you could please let me know when you have time, I could set up a 30 min call for you and I to go over a few details like:

- 1) what kind of samples would be sent (hamster nasal swabs, infected donor, recipient)
- 2) tasks to be performed by USAMRIID (WGS and population genetics only, no passaging or in vivo transmission studies)
- 3) sample shipping logistics (cost, permits, etc.)

We can also go over any other questions or concerns you may have.

Thank you,

[REDACTED] (b) (6)

[REDACTED] (b) (6)

SETA Support to DARPA BTO

Quantitative Scientific Solutions (QS-2)

[REDACTED] (b) (6)

Office: [REDACTED] (b) (6)

Work Mobile: [REDACTED] (b) (6)

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Sent:** Tuesday, May 18, 2021 11:12 AM

**To:** [REDACTED] (b) (6)

**Cc:** Plowright, Raina <[REDACTED] (b) (6)>

**Subject:** RE: Evolutionary stability/ drift of SARS-CoV-2 tasks

Hi [REDACTED] (b) (6)

We should have samples available but it would be good to discuss with [REDACTED] (b) (6) the ultimate goals (so we can share the appropriate samples and the desired input virus e.g. b.1.351, b.1.1.7 etc.)

We should be able to get this moving quite rapidly,

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** [REDACTED] (b) (6)  
**Sent:** Friday, May 7, 2021 9:26 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:** Evolutionary stability/ drift of SARS-CoV-2 tasks

Hello Vincent,

As PREEMPT moves into Phase II, we are initiating our Independent Verification and Validation (IV&V) activities to be performed by the Genomics and Virology groups at USAMRIID (Gustavo Palacios and team from USAMRIID have been joining our MSR calls and PI review meetings).

We have just finalized the SOW that USAMRIID drafted, outlining the tasks they will performing, and one of the tasks is "sequencing analysis of the evolutionary drift produced after in vivo passaging of SARS-CoV-2 in deer mice". The IV&V team is proposing to perform viral population genomic analysis and evaluate the changes occurring during passages derived from in vivo transmission studies in an animal model (deer mice or hamsters) through direct and indirect contact. **They will leverage swab or tissue samples (up to 30 samples) that you have collected in order to perform these analyses.** We will address sample transport costs and permits in upcoming calls.

Because IV&V work will depend on samples sent to them by your lab, we would like to 1) make sure that you have no major concerns with the proposed task and 2) make sure that the samples that your group has worked on are still available and can be sent to USAMRIID for analysis. Finally, we would like to make sure that the timeline works well with yours, and that you would be able to send samples to USAMRIID by August 2021 (if not, we can push back that milestone).

Please let me know if you would like to schedule a quick call to go over any of this.  
Thank you and have a great weekend

[REDACTED] (b) (6)

[REDACTED] (b) (6)  
SETA Support to DARPA BTO  
Quantitative Scientific Solutions (QS-2)

[REDACTED] (b) (6)

Office: [REDACTED] (b) (6)

Work Mobile: [REDACTED] (b) (6)

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 18 May 2021 15:22:11 +0000  
**To:** Broder, Christopher  
**Subject:** RE: bat cellular question

This is the name of the guy for the  
Rousettus:

Callan Hahn (b) (6)

<https://www.linkedin.com/in/callan-hahn-060a3371/>

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Broder, Christopher <(b) (6)>  
**Sent:** Wednesday, May 12, 2021 1:57 PM  
**To:** Schountz, Tony <(b) (6)> Eric Laing <(b) (6)> Munster,  
Vincent (NIH/NIAID) [E] <(b) (6)> (b) (6)  
**Subject:** bat cellular question

hey Tony and Vincent

before I reach out to Linfa and SIN

Do you know of anyone else that may have had success in sorting B cells from PBMCs from  
bats (pteropus) ? Dont see much following the attached paper.

Tony, what about your bats ? ever try this? and Vincent do you think  
if possible you could connect us to your source of Rousettus?  
Catochin is just up the road for us.

We want to reboot ab discovery project that was just about ready  
with the Lubee folks for fresh PMBCs overnighted, but never executed  
because student was redirected in the thesis/

We could try 3 species and this would partner with David Veesler at UniWash

all best  
chris

--

**Christopher C. Broder, Ph.D.**  
Professor and Chair  
Department of Microbiology and Immunology  
Uniformed Services University, B4152

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**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 18 May 2021 15:05:46 +0000  
**To:** Caylee Falvo; Kwe Claude, Yinda (NIH/NIAID) [F]  
**Cc:** Manuel Ruiz; Plowright, Raina; Kwe Claude, Yinda (NIH/NIAID) [F]; Holbrook, Myndi (NIH/NIAID) [C]; Fischer, Robert (NIH/NIAID) [F]; Dan Crowley  
**Subject:** RE: Serum irradiation experiments

Kwe: can you ship some a bag of the sarsteadts and a bag of the black caps to Bozeman?

They are for irradiation testing of the bat sera from Australia

Thanks!

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Caylee Falvo <[REDACTED]> (b) (6)  
**Sent:** Friday, May 14, 2021 9:37 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Manuel Ruiz <[REDACTED]> (b) (6); Plowright, Raina <[REDACTED]> (b) (6); Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6); Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6); Fischer, Robert (NIH/NIAID) [F] <[REDACTED]> (b) (6); Dan Crowley <[REDACTED]> (b) (6)  
**Subject:** Re: Serum irradiation experiments

Hi all,

Just wanted to check in, and see whether it's possible to ship us some of the black capped gasketed sarstedt vials.

Thanks,  
Caylee

On Fri, Apr 23, 2021 at 4:41 PM Caylee Falvo <[REDACTED]> (b) (6) wrote:  
Hi Vincent,

Great, thanks for helping us with this.

We do not have any of those vials, so it would be great if you could send us some. If it's possible to fit more than 16 samples in the irradiation chambers, I would like to run more replicates (possibly, as many as can fit).

Thanks,  
Caylee

On Fri, Apr 23, 2021 at 8:35 AM Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:  
Yes, this should be no problem,

Make sure they are 2 ml gasketed sarsted screwtop vials with black caps (if you don't have these, Kwe can ship them), that way we don't have to move the sera to new tubes (and go through an additional freeze-thaw)

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Manuel Ruiz <[REDACTED] (b) (6)>  
**Sent:** Tuesday, April 20, 2021 12:41 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
<[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Fischer, Robert (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Caylee Falvo <[REDACTED] (b) (6)> Dan Crowley <[REDACTED] (b) (6)>  
**Subject:** Serum irradiation experiments

Hi Vincent,

I hope all goes well.

As we have discussed previously, Dan and Caylee (CCd here) have been working in designing an experiment to test the potential effects of irradiation on some serum enzymes and proteins. The thing is that the experiment here at MSU would take a very long time ~20 days to irradiate samples at the same dose as you do at RML, though the whole procedure wouldn't be completely the same since, for example, we can't use dry ice here. So, we are wondering whether we could do this experiment with your help at RML?

If so, we are hoping to send serum (human serum, non-infectious) to RML to be irradiated at the same dose that the bat samples are irradiated at, then send the serum back to us at MSU. The serum we send would be 8 - 16 tubes of serum with different proteins/enzymes spiked in.

Would this be feasible?

Thanks in advance,  
Manuel

**Manuel Ruiz Aravena**



Postdoctoral Researcher

Department of Microbiology and Immunology | Montana State University,  
USA

Mobile: [REDACTED] (b) (6)

<https://batonehealth.org/>

--

Caylee Falvo, MSc

Ph.D. Student | Bozeman Disease Ecology Lab

Department of Microbiology & Immunology

Montana State University

she/her

--

Caylee Falvo, MSc

Ph.D. Student | Bozeman Disease Ecology Lab

Department of Microbiology & Immunology

Montana State University

she/her

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 18 May 2021 14:06:36 +0000  
**To:** LaTrielle, Sara; (b) (6); Plowright, Raina  
**Cc:** (b) (6)  
**Subject:** RE: site visit: June 24-25, 2021

Hi (b) (6)

Site visits to RML / NIH are still off limit until further notice. We are still operating under pandemic restrictions dictated by our OHS. Its currently unclear when the NIH will be opening up (full return of staff) or open for visitors,

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** LaTrielle, Sara <(b) (6)>  
**Sent:** Tuesday, May 18, 2021 6:51 AM  
**To:** (b) (6); Plowright, Raina <(b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:** (b) (6)  
**Subject:** Re: site visit: June 24-25, 2021

Works for me.  
Sara

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---

**From:** (b) (6)  
**Sent:** Tuesday, May 18, 2021 3:43:25 AM  
**To:** Plowright, Raina <(b) (6)> <(b) (6)>  
<(b) (6)>  
**Cc:** LaTrielle, Sara <(b) (6)> <(b) (6)>  
<(b) (6)>  
**Subject:** RE: site visit: June 24-25, 2021

That sounds great. Vincent/Sara, does this work for you? Cheers, (b) (6)

---

**From:** Plowright, Raina <(b) (6)>  
**Sent:** Tuesday, May 18, 2021 12:01 AM  
**To:** (b) (6) <(b) (6)>  
**Cc:** LaTrielle, Sara <(b) (6)>; (b) (6)

(b) (6)

**Subject:** Re: site visit: June 24-25, 2021

That works for me. Would be great to have you out here. Sara, does that work for you?

---

**From:** (b) (6)

**Date:** Monday, May 17, 2021 at 9:01 PM

**To:** Plowright, Raina <(b) (6)> <(b) (6)>  
<(b) (6)>

**Cc:** LaTrielle, Sara <(b) (6)> <(b) (6)>  
<(b) (6)>

**Subject:** site visit: June 24-25, 2021

Hi Raina and Vincent,

I am considering a site visit to you on June 24-25 (Thurs/Fri). We can fly in on Wed evening, visit with you on Thurs, and then visit RML on Friday. Would that work? The DARPA team would likely only be myself and (b) (6) might join, too). That's it from my side. We can keep it informal generally, so whomever is available to meet and greet and show us around. It will be a welcome TDY (duty travel) after a loooong while.

Let me know if that works on your end and we can save the date.

Thanks!

(b) (6)

--

(b) (6)

Program Manager  
Biological Technologies Office (BTO)  
DARPA

Work mobile: (b) (6)

Personal mobile: (b) (6)

(b) (6)

(b) (6)

**From:** Plowright, Raina  
**Sent:** Tue, 18 May 2021 04:14:44 +0000  
**To:** Dylan H. Morris; LaTrielle, Sara  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E]; Jamie Lloyd-Smith; Kwe Claude, Yinda (NIH/NIAID) [F]; Munster, Vincent (NIH/NIAID) [E]; Amandine Gamble  
**Subject:** Re: Presentation to (b) (6) DARPA?

Huge thank you Dylan, Amandine, Trent and Kwe. That was an excellent presentation. Really nicely done on the questions too...and there were some tough ones. The work you are doing is beyond exciting – tackling such fundamental questions about transmission biology. Thanks again for getting the presentation together on short notice – you rocked it!

---

**From:** Dylan H. Morris <(b) (6)>  
**Date:** Sunday, May 16, 2021 at 8:51 PM  
**To:** LaTrielle, Sara <(b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Plowright, Raina <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** Re: Presentation to (b) (6) DARPA?

Sure which channel is best?

On May 16, 2021, at 8:50 PM, LaTrielle, Sara (b) (6) wrote:

You can also upload directly to slack... go ahead and on me there just to make sure. Thanks!

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---

**From:** Dylan H. Morris <(b) (6)>  
**Sent:** Sunday, May 16, 2021 8:49:28 PM  
**To:** LaTrielle, Sara <(b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Plowright, Raina <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** Re: Presentation to (b) (6) DARPA?

Here are the slides. I'm providing a download link as the file is too large to email. Please let me know if you have edits or additions.

Best,  
Dylan

(b) (6)

On May 16, 2021, at 11:10 AM, LaTrielle, Sara <(b) (6)> wrote:

For sure- that works. A few hours later works too- if needed.

Many thanks for the teams hard work on this- without much notice to boot.

Sara

---

**From:** Dylan H. Morris <(b) (6)>

**Sent:** Sunday, May 16, 2021 11:06 AM

**To:** LaTrielle, Sara

**Cc:** Bushmaker, Trenton (NIH/NIAID) [E]; Plowright, Raina; Jamie Lloyd-Smith; Kwe Claude, Yinda (NIH/NIAID) [F]; Munster, Vincent (NIH/NIAID) [E]; Amandine Gamble

**Subject:** Re: Presentation to (b) (6) DARPA?

I am polishing them this afternoon. Would 5pm be okay?

On May 16, 2021, at 9:36 AM, LaTrielle, Sara <(b) (6)> wrote:

Morning!

Please let me know when you will be able to send your slides (incorporated into the slide deck I sent)? We need to forward to (b) (6) by this evening.

Best,  
Sara

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] (b) (6)

**Sent:** Friday, May 14, 2021 3:01 PM

**To:** Plowright, Raina; Jamie Lloyd-Smith

**Cc:** LaTrielle, Sara; Kwe Claude, Yinda (NIH/NIAID) [F]; Munster, Vincent (NIH/NIAID) [E];

(b) (6) Amandine Gamble

**Subject:** Re: Presentation to (b) (6) DARPA?

With a lovely update for my computer it has crashed. RML IT is working on it currently. I will not be about to contribute to the presentation till this is fixed(hopefully still today). Currently working from my phone if anyone has questions.

-Trent

Cell: (b) (6)

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---

**From:** Plowright, Raina <(b) (6)>  
**Sent:** Thursday, May 13, 2021 2:11:12 PM  
**To:** Jamie Lloyd-Smith <(b) (6)>  
**Cc:** LaTrielle, Sara <(b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> <(b) (6)> <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** Re: Presentation to (b) (6) DARPA?

I think it's time to put the junior team forward and DARPA will be great with it.

On May 13, 2021, at 10:28 AM, Jamie Lloyd-Smith <(b) (6)> wrote:

Hi,

I have a hard conflict since I'm teaching at that time. Amandine and Dylan can certainly represent our team, so it's not a problem for me, but I wanted to make sure it wouldn't be a problem for DARPA.

Jamie

On Thu, May 13, 2021 at 6:10 AM LaTrielle, Sara <(b) (6)> wrote:  
A few of your emails blocked the invite: Here are the details:

**Participant here is your 2 part dialing Instructions:**

1. Dial your Instant Meeting Conferencing access number: (b) (6)
2. Passcode: (b) (6)

Sara LaTrielle  
Program Manager  
PREEMPT Project  
Montana State University

(b) (6)  
[<Outlook-cseop3we.png>](#)

---

**From:** LaTrielle, Sara <(b) (6)>  
**Sent:** Thursday, May 13, 2021 7:00 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Plowright, Raina <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Jamie Lloyd-Smith <(b) (6)> <(b) (6)> <(b) (6)>

Amandine Gamble <[REDACTED]> (b) (6)

**Subject:** Re: Presentation to [REDACTED] DARPA?  
(6)

All,

Few pieces for the discussion with [REDACTED] (b) (6) on Monday:

The meeting is actually set for 10am MST Monday 17th. I hope this time works for all. I will forward the invite from DARPA just now.

Please know this is an audio line only- no video. When you are talking, you will need to say what slide # you are talking about- each and every time. Assume the teams' knowledge is at a basic/intermediate level, so ensure to initially explain in a very basic way. They will stop and ask questions along the way. The first 5-10 mins of the call will cover general project admin for Raina and I but please be on the call a few minutes before 10am [REDACTED] (b) (6) takes 'roll'. ☐ It is generally a very relaxed atmosphere with the team being very inquisitive and appreciative.

We are excited to have you on the call.

Also, I will need your slides by COB tomorrow on the DARPA slide template. Is this doable?

Best,  
Sara

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] [REDACTED] (b) (6)

**Sent:** Wednesday, May 12, 2021 10:02 AM

**To:** Plowright, Raina [REDACTED] (b) (6); Kwe Claude, Yinda (NIH/NIAID) [F]

<[REDACTED] (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)

**Cc:** LaTrielle, Sara <[REDACTED] (b) (6) Jamie Lloyd-Smith <[REDACTED] (b) (6)

[REDACTED] (b) (6) <[REDACTED] (b) (6) Amandine Gamble <[REDACTED] (b) (6)

**Subject:** RE: Presentation to [REDACTED] (b) (6) DARPA?

Vincent has already discussed with Paul at NABACC the aerosol findings (general overview). However, they have not seen the data/graphs from my knowledge. He can comment more.

USAMRIID is not doing much of aerosol work from my source.

-Trent

---

**From:** Plowright, Raina <[REDACTED] (b) (6)

**Sent:** Wednesday, May 12, 2021 9:21 AM

**To:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)

**Cc:** LaTrielle, Sara <[REDACTED] (b) (6) Bushmaker, Trenton (NIH/NIAID) [E]

(b) (6) Jamie Lloyd-Smith <(b) (6)> Munster, Vincent  
(NIH/NIAID) [E] <(b) (6)> (b) (6) Amandine Gamble  
<(b) (6)>  
**Subject:** Re: Presentation to (b) (6) DARPA?

Thanks Kwe! Let us know if there are any issues with MBAC/USAMRIID on the call.

On May 12, 2021, at 7:46 AM, Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> wrote:

Raina and all,

I will be happy to be on the call.

Thanks

---

Kwe

---

**From:** "Plowright, Raina" <(b) (6)>  
**Date:** Tuesday, May 11, 2021 at 8:49 PM  
**To:** "LaTrielle, Sara" <(b) (6)>  
**Cc:** "Bushmaker, Trenton (NIH/NIAID) [E]" <(b) (6)> Jamie Lloyd-Smith  
<(b) (6)> "Munster, Vincent (NIH/NIAID) [E]" <(b) (6)>  
" (b) (6) <(b) (6)> Amandine Gamble  
<(b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]"  
<(b) (6)>  
**Subject:** Re: Presentation to (b) (6) DARPA?

Dylan and Amandine would be great. DARPA don't need to see a finished product. They are interested in how the research is done and where it is going.

Note that some others from FBI/MBAC and USAMRIID now join the calls. So if you are concerned about leakage of information to competitors, we can ask that they are left off the call.

I think it would be great to have Kwe and Trent on the call as we get lots of virology questions these days. its also great experience to report to dARPA..they ask lots of questions and really try to understand the material. It can end up being more of a conversation than a presentation. They know far less than we do and so they are not trying to trip us up, but are simply trying to understand what we do.

Raina

On May 11, 2021, at 3:52 PM, LaTrielle, Sara <(b) (6)> wrote:



Afternoon All~

I will let Raina converse with all to decide best way forward.

Best,  
Sara

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Tuesday, May 11, 2021 10:15 AM  
**To:** Jamie Lloyd-Smith <(b) (6)> Plowright, Raina <(b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
<(b) (6)> <(b) (6)> <(b) (6)>  
**Cc:** LaTrielle, Sara <(b) (6)> Amandine Gamble <(b) (6)>  
Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>  
**Subject:** RE: Presentation to (b) (6) DARPA?

Personally, this might be a little bit out of my experience with this shorter timeframe and never doing this before.

However, I think it would be important for Dylan to show his work for analysis plus the influence on airborne transmission. This bring a good story to the situation.

I will let Vincent reply what he is thinking. Believe he is traveling till this Sunday.

-Trent

---

**From:** Jamie Lloyd-Smith <(b) (6)>  
**Sent:** Monday, May 10, 2021 10:29 PM  
**To:** Plowright, Raina <(b) (6)>  
**Cc:** LaTrielle, Sara <(b) (6)> Amandine Gamble <(b) (6)>  
Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]  
<(b) (6)> <(b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<(b) (6)>  
**Subject:** Re: Presentation to (b) (6) DARPA?

Hi,

We've discussed a bit, and Dylan and Amandine are willing to contribute to this, if needed. We were wondering a few things though:

- did you cc this group because you wanted to highlight the variant stability analyses Trent has been leading?
- if so... Trent do you want to present it? (you certainly have right of first refusal)
- also, Trent, Kwe, Vincent, are you comfortable presenting these preliminary results now (with appropriate caveats) or would you want to wait a few weeks for the new data to come in?

One plan could be to present the new stability findings, emphasizing that they are preliminary, but then to pivot to the modeling work Dylan is doing on how changes in viral traits can influence airborne transmissibility. Then this, in turn, could be connected to the transmission experiments that Julia and Kwe are doing (probably connected in a fairly hand-wavy way for now, but we are working toward a model that connects to those data directly -- and can already talk about model-based analyses to aid the design).

what do people think?

Jamie

On Mon, May 10, 2021 at 12:21 PM Plowright, Raina [REDACTED] (b) (6) wrote:  
I was thinking of this as something that could be led by junior team members. A chance to show [REDACTED] (b) (6) DARPA what you have been doing — show the outputs and discuss. If that sounds like too much work and too scary, I understand. I've been doing the monthly meetings for so long now that I'm happy to do these on the fly, but I can imagine it may be harder when you are not used to reporting. We could postpone to a later time if needed.

On May 10, 2021, at 1:10 PM, LaTrielle, Sara [REDACTED] (b) (6) wrote:

All,

Thinking it would be great to have a presentation to [REDACTED] (b) (6) Team with a few slides on all the recent results between your labs.... possible for next Monday (2pm MST)?

I know this is on short notice, so if we need to request another date, it may be possible, but hoping to keep the date, 17th if possible.

But first- is this something the combined teams can present on?

Best,

Sara LaTrielle  
Program Manager  
PREEMPT Project  
Montana State University

[REDACTED] (b) (6)  
[<Outlook-53ujztyl.png>](#)

--

James O. Lloyd-Smith

Professor  
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Department of Biomathematics  
University of California, Los Angeles  
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Lab: 4000 Terasaki Life Sciences Building

--

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Phone: (b) (6)

<https://www.eeb.ucla.edu/Faculty/lloydsmith/>

Office: 4135 Terasaki Life Sciences Building

Lab: 4000 Terasaki Life Sciences Building

**From:** Schountz, Tony  
**Sent:** Thu, 13 May 2021 02:46:27 +0000  
**To:** Broder, Chris (USU-DoD)  
**Cc:** Eric Laing; Munster, Vincent (NIH/NIAID) [E]; epstein  
**Subject:** Re: bat cellular question

It sounds like you have a fluorescently-labeled antigen? If so, we can do sorting on those B cells.

I suspect the CedV with NiV F/G will set off red flags with my IBC. They typically consult with CDC in such circumstances.

T.

—

Tony Schountz, PhD  
Associate Professor  
Arthropod-borne and Infectious Disease Laboratory  
Department of Microbiology, Immunology and Pathology  
College of Veterinary Medicine  
Colorado State University  
3185 Rampart Road  
Fort Collins, CO 80523-1692  
(b) (6)  
(b) (6)

**From:** Broder, Christopher <(b) (6)>  
**Sent:** Wednesday, May 12, 2021 6:59 PM  
**To:** Schountz, Tony <(b) (6)>  
**Cc:** Eric Laing <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
epstein <(b) (6)>  
**Subject:** Re: bat cellular question

hey Tony this sounds excellent, thank you.

Yes, if we actually infected or immunized bats of course it would/should drastically improve antigen-specific B cell isolations,  
But also, it may be possible to pull out germline or GL-like B cells with ag specific staining as well.

Followed by NGS

Other rCedV we can also now infect your bats with replication competent rCedV that has NiV-B F/G in place of CedV F/G. (HeV Redlands F/G also) could be a specific targeting of what epitopes a bat makes abs too on henipavirus G and F.

cheers  
Chris

On Wed, May 12, 2021 at 4:37 PM Schountz, Tony <[REDACTED] (b) (6)> wrote:  
Hi Chris,

We're using the same CD19 antibody (clone 1D3) for our Jamaican fruit bats and it works really well (attached figure of stained splenocytes). I'm not aware of anyone doing sorting on B cells but it seems to be tractable with this antibody.

We still only see low-titer antibody responses to infections (ELISA) regardless of virus; however, if we immunize our bats with soluble antigen (KLH and rabies N so far) emulsified in CFA we get really nice titers from just a single dose and bleeding on day 28.

If there's something we can do for you that requires live bats, just let us know and we'll do our best to get it done.

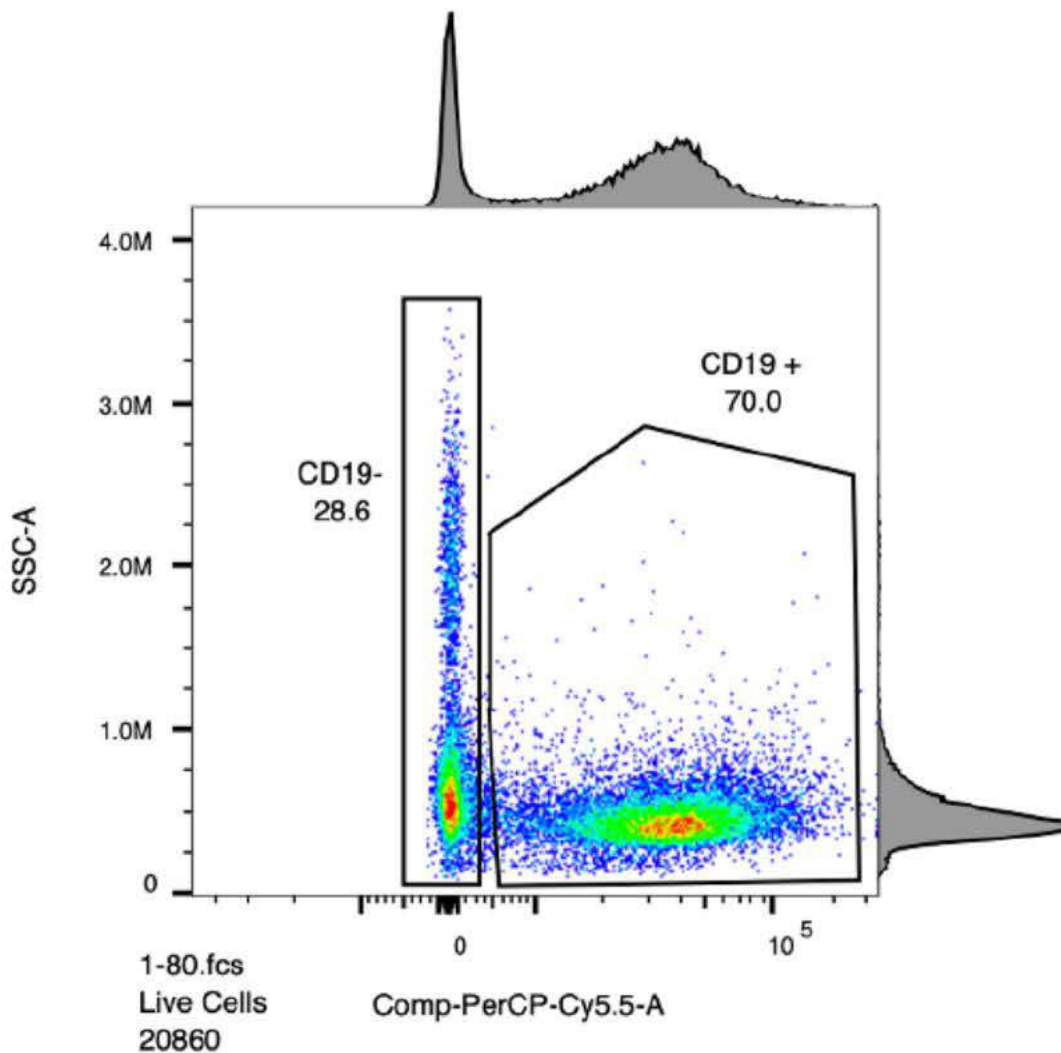
Tony

—

Tony Schountz, PhD  
Associate Professor  
Center for Vector-borne Infectious Diseases  
Department of Microbiology, Immunology and Pathology  
College of Veterinary Medicine  
Colorado State University  
200 West Lake Street  
1685 Campus Delivery  
Fort Collins, CO 80523-1692

[REDACTED] (b) (6)

(b) (6)



On May 12, 2021, at 1:56 PM, Broder, Christopher <[REDACTED]> wrote:

hey Tony and Vincent

before I reach out to Linfa and SIN

Do you know of anyone else that may have had success in sorting B cells from PBMCs from bats (pteropus)? Dont see much following the attached paper.

Tony, what about your bats ? ever try this? and Vincent do you think if possible you could connect us to your source of Rousettus? Catochin is just up the road for us.

We want to reboot ab discovery project that was just about ready with the Lubee folks for fresh PMBCs overnighted, but never executed because student was redirected in the thesis/

We could try 3 species and this would partner with David Veessler at UniWash

all best  
chris

--

**Christopher C. Broder, Ph.D.**

Professor and Chair  
Department of Microbiology and Immunology  
Uniformed Services University, B4152  
4301 Jones Bridge Rd, Bethesda, MD 20814-4799

**USU is "America's Medical School"**

Email: (b) (6)

<https://www.usuhs.edu/national/faculty/christopher-broder-phd>

TEL: (b) (6)

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Lucille Washington  
Administrative Officer

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fax - 301-295-3773

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**Christopher C. Broder, Ph.D.**

Professor and Chair  
Department of Microbiology and Immunology  
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**From:** Broder, Christopher  
**Sent:** Wed, 12 May 2021 15:56:40 -0400  
**To:** Schountz, Tony; Eric Laing; Munster, Vincent (NIH/NIAID) [E];  
[REDACTED] (b) (6)  
**Subject:** bat cellular question  
**Attachments:** fimmu-10-00489.pdf

hey Tony and Vincent

before I reach out to Linfa and SIN

Do you know of anyone else that may have had success in sorting B cells from PBMCs from bats (pteropus) ? Dont see much following the attached paper.

Tony, what about your bats ? ever try this? and Vincent do you think if possible you could connect us to your source of Rousettus? Catochin is just up the road for us.

We want to reboot ab discovery project that was just about ready with the Lubee folks for fresh PMBCs overnighted, but never executed because student was redirected in the thesis/

We could try 3 species and this would partner with David Veessler at UniWash

all best  
chris

--

**Christopher C. Broder, Ph.D.**  
Professor and Chair  
Department of Microbiology and Immunology  
Uniformed Services University, B4152  
4301 Jones Bridge Rd, Bethesda, MD 20814-4799

**USU is "America's Medical School"**

Email: [REDACTED] (b) (6)  
<https://www.usuhs.edu/national/faculty/christopher-broder-phd>  
TEL: 301-295-3401  
FAX: 301-295-3773

Lucille Washington  
Administrative Officer  
email - [REDACTED] (b) (6)  
phone - 301-295-3411  
fax - 301-295-3773

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distribution is prohibited. If you are not the intended recipient, please contact the sender by replying to this e-mail and destroy all copies of the original message. (Uniformed Services University)

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Thu, 6 May 2021 17:07:04 +0000  
**To:** Alison Peel; Kwe Claude, Yinda (NIH/NIAID) [F]; Plowright, Raina  
**Subject:** Re: exciting updates

Hi Ali,

Realistically I would have done a short report first and an extensive one later. It's rather unrealistic to have a fully fledged report with all the ins and outs in a couple of days. This puts us under a lot of unnecessary time pressure with potentially room for error and mistakes.

And yes the isolates can be requested by AAHL (would be good to get the wording right, as 'sending' them might imply we would take care of the financial side of it (and shipment of these isolates are very expensive)).

It would be good to stress that "we" as in "us" have prepared this overview pretty much in real time which is quite impress considering that programs like predict would literally take years to get their reports to the stakeholders. so we need to strike a (very) positive tone as this quite the achievement.

Cheers,

Vincent

---

**From:** "Alison Peel" <(b) (6)>  
**Date:** Wednesday, May 5, 2021 at 6:26:57 PM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <(b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <(b) (6)> "Plowright, Raina" <(b) (6)>  
**Subject:** Re: exciting updates

Hi Vincent,

Thanks for the clarification about the (b) (4)

Regarding the detail in the current report, I understood that you wanted to inform the CVOs of the (b) (4) This relationship with the CVOs has been successful because an iterative give and take approach. We have to give and feedback information and insights before asking to take again, and this is why I asked for other information on progress to be included, and also information on what you see the next steps to be. If I've misunderstood that, and you're (b) (4), then yes, then I can simply report the core findings.

Additionally, as agreed in the MTA and when permission was granted by the CVOs, we must also offer to send viral isolates to CSIRO ACDP (prev AAHL). I have now included that in the final paragraph of the report. Feel free to make any edits to the document as you see fit. If not, I will send the attached version later today.

Kwe, [REDACTED] (b) (4)

[REDACTED] Not necessary to change here now, but I'm just thinking about publication of this work.

Cheers

Ali

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Date:** Thursday, 6 May 2021 at 12:14 am  
**To:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Alison Peel  
<[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:** RE: exciting updates

Hi Ali,

Your train of thought is not completely correct, [REDACTED] (b) (4)

(b) (4)

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section

Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Sent:** Tuesday, May 4, 2021 10:02 PM  
**To:** Alison Peel <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:** Re: exciting updates

Thanks Ali,

Should I have realised this earlier.

I am not connected to the server now, [REDACTED] (b) (4)

Kwe

---

**From:** "Alison Peel" <[REDACTED] (b) (6)>  
**Date:** Tuesday, 4 May 2021 at 21:15:40  
**To:** "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)> "Plowright, Raina" <[REDACTED] (b) (6)>  
**Subject:** Re: exciting updates

Thanks for the explanation Kwe. I can understand how this happened, and this information is vital for communication of this to CVOs. I'm glad that you realised this immediately, though please also communicate this to me when something like this happens. I feel that our relationship with the CVOs is so delicate and we can't afford to get them off-side – for example, if I hadn't noticed this, but they had questioned me during a meeting and then I had no explanation for them. Anyway, I will add a note to the report to explain this.

Can you please advise the [REDACTED] (b) (4)

[REDACTED] (b) (4)

Other than that, once I have some further feedback from Vincent on the [REDACTED] (b) (4) and the final section (see previous email), I will forward to the CVOs.

Thanks,  
Ali

---

**From:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Date:** Wednesday, 5 May 2021 at 12:47 pm  
**To:** Alison Peel <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]

< (b) (6) Plowright, Raina < (b) (6)

**Subject:** Re: exciting updates

Hi Ali,

(b) (4)

I am available if you want us to briefly talk.

Thanks

Kwe

---

**From:** Alison Peel < (b) (6)

**Date:** Tuesday, May 4, 2021 at 8:02 PM

**To:** "Kwe Claude, Yinda (NIH/NIAID) [F]" < (b) (6) "Munster, Vincent (NIH/NIAID) [E]" < (b) (6) "Plowright, Raina"

< (b) (6)

**Subject:** Re: exciting updates

Hi Kwe and Vincent,

(b) (4)

Ali

---

**From:** Kwe Claude, Yinda (NIH/NIAID) [F] < (b) (6)

**Date:** Wednesday, 5 May 2021 at 10:57 am

**To:** Alison Peel < (b) (6) Munster, Vincent (NIH/NIAID) [E]

< (b) (6) Plowright, Raina (b) (6)

**Subject:** Re: exciting updates

Hi Ali,

It should be

(b) (4)

I think the rest of the questions Vincent can answer.

---

Kwe Claude Yinda, PhD

Postdoc Fellow

Virus Ecology Section, Laboratory of Virology

Rocky Mountain Laboratories, NIAID/NIH

903S 4th St. Hamilton, MT 59840

Email: (b) (6)

Tel: (b) (6)

---

**From:** Alison Peel <[REDACTED] (b) (6)>

**Date:** Tuesday, May 4, 2021 at 6:32 PM

**To:** "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)> "Plowright, Raina" <[REDACTED] (b) (6)>

**Subject:** Re: exciting updates

Thanks all,

A couple more points that I'm hoping you might be able to clarify:

[REDACTED] (b) (4)



- What, specifically, would be the key next steps, and how would these address the questions above?

While the CVOs are interested in the Science, in many senses, that is peripheral. The bottom line for their job is "how do we need to respond?" and "what are the immediate implications for policy and biosecurity on the ground?"

Thanks  
Alison

---

**From:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Date:** Wednesday, 5 May 2021 at 1:49 am  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel  
<[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:** Re: exciting updates

Thanks Vincent, I have updated the numbers.

Ali, here are [REDACTED] (b) (4)

(b) (4)

Thanks

---

Kwe

---

**From:** "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** Tuesday, May 4, 2021 at 9:13 AM  
**To:** Alison Peel <[REDACTED] (b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]"  
<[REDACTED] (b) (6)> "Plowright, Raina" <[REDACTED] (b) (6)>  
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Hi Ali,

Update the language:

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Kwe: can you add this or send the sample ids to Ali, so she can look up the location of these samples?

Kwe: can you go over the numbers, make sure the numbers match throughout the sections.

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Alison Peel <[REDACTED] (b) (6)>  
**Sent:** Tuesday, May 4, 2021 12:36 AM  
**To:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
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As mentioned, I think the other main thing would be getting some clarity on which samples these isolates came from. That is important in determining which State CVO I need to report the results to, and will be an obvious question of theirs.

Thanks! Nearly there! I'll cc you when I pass it on to the CVOs. Oh, and I've used the same word template as I've previously used for the reports. It has Griffith's logo, but let me know if you want to add an RML logo or anything if that is important.

Cheers

Ali

---

**From:** Alison Peel <[REDACTED] (b) (6)>  
**Date:** Tuesday, 4 May 2021 at 10:12 am  
**To:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
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Wonderful – thanks so much for this Kwe! This is fabulous and provides almost all the information I need for now. Can I just clarify the steps and a few of the details in the isolation section?

(b) (4)

Can you also please clarify which samples each of these isolations came from (i.e. accession/sample number) so I can look into species, location, date of these samples – this is something the CVOs will be interested in.

Thanks!!  
Ali

---

**From:** Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>  
**Date:** Tuesday, 4 May 2021 at 9:29 am  
**To:** Alison Peel <(b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<(b) (6)> Plowright, Raina <(b) (6)>  
**Subject:** Re: exciting updates

Ali,

I have just the a box folder containing the file because for some reason it could not go through. I tried sending since very early today. The max that cannot be send is 100mb but this file was less.

Hope you get the file. Let me know if there is anything to adjust.

Kwe

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**From:** Alison Peel <(b) (6)>  
**Date:** Monday, May 3, 2021 at 4:27 PM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <(b) (6)> "Plowright, Raina"  
<(b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]"

< [REDACTED] (b) (6) >

**Subject:** Re: exciting updates

Ok, thanks Vincent. Even something brief ASAP would be great, as legally, I should report to them about [REDACTED] (b) (4), but can push it to tomorrow. If that's not feasible, I'll write them a note to say we've isolated them and will get further details shortly.

Thanks!

Ali

---

**From:** Munster, Vincent (NIH/NIAID) [E] < [REDACTED] (b) (6) >

**Sent:** Sunday, May 2, 2021 12:49:36 AM

**To:** Alison Peel < [REDACTED] (b) (6) > Plowright, Raina < [REDACTED] (b) (6) > Kwe

Claude, Yinda (NIH/NIAID) [F] < [REDACTED] (b) (6) >

**Subject:** RE: exciting updates

Sounds good, we might need a couple of additional days though depending how much work it is

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Alison Peel < [REDACTED] (b) (6) >

**Sent:** Friday, April 30, 2021 4:56 PM

**To:** Munster, Vincent (NIH/NIAID) [E] < [REDACTED] (b) (6) > Plowright, Raina

[REDACTED] (b) (6); Kwe Claude, Yinda (NIH/NIAID) [F] < [REDACTED] (b) (6) >

**Subject:** Re: exciting updates

Hi Vincent,

Yep, I'm happy to provide that context/introduction. We have another long weekend here (lovely, but 4 in a month plus school holidays isn't helpful for productivity!). If you can start with your stuff, I'll fill in whatever blanks I think is needed.

I think we should [REDACTED] (b) (4)

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Cheers

Ali

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**Sent:** Friday, April 30, 2021 11:36:57 PM

**To:** Alison Peel <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** RE: exciting updates

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Ali: can you provide a 1-2 paragraph intro ion the Oz screening efforts? Then we'll dive into the screening, sequencing and isolation efforts.

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Should we [REDACTED] (b) (4) for now then?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**Sent:** Friday, April 30, 2021 12:11 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
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Hi Vincent, Kwe, and all,

This is great progress, thanks for the update Vincent. [REDACTED] (b) (4)

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Is a 2-3 page report (including figures) something you could quickly put together for me to pass onto the CVOs?

Thanks Kwe for all your hard work!

Thanks  
Ali

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Date:** Friday, 30 April 2021 at 5:20 am

**To:** Alison Peel <[REDACTED] (b) (6)>, Alison Peel <[REDACTED] (b) (6)>, Plowright, Raina <[raina.plowright@montana.edu](mailto:raina.plowright@montana.edu)>, Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>

**Subject:** exciting updates

Hi guys,

Over here at RML Kwe is working hard on the PREEMPT project.

[REDACTED] (b) (4)

Btw, data is straight of the press and we will not communicate this further other than this group,

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 04 May 2021 16:54:59 -0600  
**To:** Plowright, Raina; [REDACTED] (b) (6)  
**Cc:** Port, Julia (NIH/NIAID) [F]  
**Subject:** Teaching opportunities

Hi Raina and Michele,

Julie in my lab is looking for some teaching opportunities

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Port, Julia (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Sent:** Monday, May 3, 2021 7:22 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Teaching opportunities

Hi Vincent,

I am well aware, that we do not really teach at NIH. But [REDACTED] (b) (5)  
[REDACTED]. So I thought to reach out to you in case in the future something may come up: If something ever comes your way, I would be happy to do some lecturing.

Best,  
Juli

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 4 May 2021 15:12:43 +0000  
**To:** Alison Peel; Kwe Claude, Yinda (NIH/NIAID) [F]; Plowright, Raina  
**Subject:** RE: exciting updates  
**Attachments:** 20210505 CVO - Bat OneHealth Update - sequencing and isolation\_APVM.docx

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NIAID/NIH











**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Sat, 1 May 2021 14:48:57 +0000  
**To:** Plowright, Raina; Alison Peel  
**Cc:** Kwe Claude, Yinda (NIH/NIAID) [F]  
**Subject:** RE: exciting updates

Indeed pretty exciting,

Hope you had a great time!

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Plowright, Raina <[REDACTED] (b) (6)>  
**Sent:** Friday, April 30, 2021 8:49 PM  
**To:** Alison Peel <[REDACTED] (b) (6)>  
**Cc:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]  
<[REDACTED] (b) (6)>  
**Subject:** Re: exciting updates

[REDACTED] (b) (6)  
[REDACTED]  
[REDACTED]

Let me know if I can do anything to help with the CVO communication. Eg framing emails/reports etc.

Sent from my iPhone

On Apr 30, 2021, at 4:56 PM, Alison Peel <[REDACTED] (b) (6)> wrote:

Hi Vincent,  
Yep, I'm happy to provide that context/introduction. We have another long weekend here (lovely, but 4 in a month plus school holidays isn't helpful for productivity!). If you can start with your stuff, I'll fill in whatever blanks I think is needed.

I think we should [REDACTED] (b) (4)  
[REDACTED] If there's any chance of getting your part of the report to me by Monday afternoon your time (Tuesday morning my time), that would be great, then I can edit and forward to the CVOs.

Cheers  
Ali

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Friday, April 30, 2021 11:36:57 PM  
**To:** Alison Peel <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Kwe  
Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** RE: exciting updates

I think we can do this,

Ali: can you provide a 1-2 paragraph intro ion the Oz screening efforts? Then we'll dive into the screening, sequencing and isolation efforts.

Kwe: can you start drafting a short overview of the screen results, the sequencing and the isolation?

Should we [REDACTED] (b) (4) now then?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Alison Peel <[REDACTED] (b) (6)>  
**Sent:** Friday, April 30, 2021 12:11 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** Re: exciting updates

Hi Vincent, Kwe, and all,

This is great progress, thanks for the update Vincent. [REDACTED] (b) (4)

[REDACTED]

[REDACTED] (b) (4)

Is a 2-3 page report (including figures) something you could quickly put together for me to pass onto the CVOs?

Thanks Kwe for all your hard work!

Thanks  
Ali

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Date:** Friday, 30 April 2021 at 5:20 am

**To:** Alison Peel <[REDACTED] (b) (6)>, Alison Peel <[REDACTED] (b) (6)>, Plowright, Raina <[REDACTED] (b) (6)>, Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>

**Subject:** exciting updates

Hi guys,

Over here at RML Kwe is working hard on the PREEMPT project.

[REDACTED] (b) (4)

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Thu, 29 Apr 2021 14:11:48 +0000  
**To:** Raina Plowright; Clif McKee  
**Cc:** Peter J. Hudson; Colin Parrish; Olivier Restif; Bharti, Nita; Schountz, Tony; Agnieszka Rynda; Alison Peel; Hector Aguilar-Carreno; Jamie Lloyd-Smith; Emily Gurley  
**Subject:** RE: Updated version of CoV review

Hi Raina and Clif,

Any update on the Nature Microbiology review?. It's important to realize that a lot of junior members of our team worked hard to get the drafts together, and are directly depending for their career on potential high-impact papers like this. In addition, we need to set an example to them how to finish projects / manuscripts effectively in a reasonable time-frame, this is a crucial skill in science.

Let me know if there is anything I can do to move this to submission,

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Raina Plowright <(b) (6)>  
**Sent:** Monday, December 14, 2020 11:34 AM  
**To:** Clif McKee <(b) (6)>  
**Cc:** Manuel Ruiz <(b) (6)> Peter J. Hudson <(b) (6)> Colin Parrish <(b) (6)> Olivier Restif <(b) (6)> Bharti, Nita <(b) (6)> Schountz, Tony <(b) (6)> Caylee Falvo <(b) (6)> Dan Crowley <(b) (6)> Agnieszka Rynda <(b) (6)> Aaron M <(b) (6)> Tamika Lunn <(b) (6)> Alison Peel <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Amandine Gamble <(b) (6)> Cara Brook <(b) (6)> Hector Aguilar-Carreno <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Emily Gurley <(b) (6)> Devin Jones <(b) (6)> Maureen Kessler <(b) (6)> Port, Julia (NIH/NIAID) [F] <(b) (6)> CELINE SNEDDEN <(b) (6)> German Botto <(b) (6)> David William Buchholz <(b) (6)> <(b) (6)>

**Subject:** Re: Updated version of CoV review

Update from Nature Reviews.

They gave us February deadline but we will try for early January.

Again ignore author order. We just had to get it into the system. But happy they have accepted the large number of authors so we can go full steam ahead.

Raina

Dear Raina,

Manuscript number: NRMICRO-20-591V1

Title: Bats as reservoir hosts of coronaviruses

Authors: Raina Plowright, Manuel Ruiz-Aravena, Clifton McKee, Amandine Gamble, German Botto, David Buchholz, Lauren Dee, Caylee Falvo, Christina Faust, Elinor Jax, Devin Jones, Maureen Kessler, Claude Kwe Yinda, Tamika Lunn, Aaron Morris, Alison Peel, Julia Port, Celine Snedden, Yao Yu Yeo, Cara Brook, Hector Aguilar, Nita Bharti, Tony Schountz, Emily Gurley, Colin Parrish, Peter Hudson, James Lloyd-Smith, Olivier Restif, and Vincent Munster

Submission date: 15th February 2021

Thank you again for submitting your proposal to Nature Reviews Microbiology. We have now had a chance to consider your submission and I am pleased to tell you that we would like to consider it for inclusion in the journal. Please note, this invitation does not guarantee publication; your article will go through the normal editorial assessments and peer-review processes before a final decision is made.

The structure of your Review should follow the format outlined below. Please refer to our [guidelines for authors](#) and our [article format guide](#) for Review for further information about formatting.

The key specifications for this article are as follows:

\*Length 4,500 words plus 120 references maximum

\*Full article to be submitted by 15th February 2021 using our manuscript tracking system:

(b) (6)

Please let me know if this deadline is feasible — we can be flexible and are happy to work with you around your schedule and other obligations.

Once a complete manuscript is submitted, it will be assessed by the editorial team. If assessment is favourable it will be sent for peer review. If the referees recommend publication, we will ask you to revise the article according to their suggestions. We will then edit the revised article for scientific clarity and readability and have the figures redrawn by our in-house art editor. Once accepted, the article will be passed to our copy editor to be edited for grammar and house style. Overall, your manuscript will go through several rounds of revision, which will result in a highly polished article.

In addition to the information in the guidelines for authors, there are a few points for you to consider:

- Please let me know if you have just written, or have agreed to write, an article on this, or a related topic. We aim to reduce unnecessary overlap with other articles and to maximize the impact of Nature Reviews articles. In addition, the Nature Reviews journals use CrossCheck (for details, see the guidelines for authors); the journals will not knowingly publish an article containing text copied from previously published work, including your own work and work published in a language other than English.
- If you do wish to work with any additional co-authors, I'd be grateful if you could let me know their names and affiliations before you invite them. Please note that we do not consider manuscripts that

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-Finally, please note that the Nature Reviews journals don't currently offer gold open access options. We do, however, support green open access and encourage sharing through self-archiving and by offering readers a shareable, view-only Readcube link to the full text, both of which hopefully help your article to be read as widely as possible.

Please don't hesitate to get in touch if you have any problems or questions. I'm really looking forward to working with you on this article.

Best wishes,  
Ashley

Ashley York, D.Phil.  
Acting Chief Editor  
Nature Reviews Microbiology  
4 Crinan Street  
London  
N1 9XW

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here [www.springernature.com/orcid-for-nature-research](http://www.springernature.com/orcid-for-nature-research).

**\*Our flexible approach during the COVID-19 pandemic\***

*If you need more time at any stage of the peer-review process, please do let us know. While our systems will continue to remind you of the original timelines, we aim to be as flexible as possible during the current pandemic.*

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On Dec 7, 2020, at 1:11 PM, Raina Plowright <[REDACTED] (b) (6)> wrote:

Hi Everyone,

You should have all received a notification from Nature Reviews Microbiology. The editor asked me to submit the synopsis online so it is in their system. Sorry if you got excited and thought the paper was finished! Far from it!

Ignore author order, that is TBD. Don't you love entering authors in the ms system!

We are planning to submit a final paper in early January. Expect more requests and drafts to review soon.

Raina

On Nov 30, 2020, at 6:37 PM, Raina Plowright <[REDACTED] (b) (6)> wrote:

Hello everyone,



We have some good news. We (Manuel, Clif, Vincent, and I) submitted a proposal to the editor at Nature Reviews Microbiology... and they said 'yes', they are interested in publishing our review. They have asked for a January 2021 submission; earlier is ok too but their office closes mid-December to January.

Their only concern was the number of authors and they state:

"I noticed that there are over 30 authors listed on the synopsis. In general, our reviews have 2-5 authors. This helps to maximize the impact of our articles, as many readers express a preference for reviews that provide them with the overview and opinions of leaders in the field. Our policy is that authors must have made a substantial contribution to either writing, researching data, discussion of content, or editing of the manuscript prior to submission. Please can you confirm that all authors will make a substantial contribution to the review."

If you have not met their criteria for authorship (substantial contribution—see above), can you please email Manuel, Clif, and myself so we can remove your name (or if others are still listed but did not contribute to your group effort, can you please let us know). In general, we do not know who contributed what, and hence must rely on you to tell us. If you do not meet criteria for authorship, but would still like to be an author, message us — we would love help with figures and tables and some sections need more research.

We have updated the manuscript and will reach out to some of the senior authors to help us finalize the intro/conclusion soon.

Raina

On Oct 19, 2020, at 4:34 PM, Clif McKee <[REDACTED]> (b) (6) wrote:

Dear colleagues,

Our collaborative review of coronaviruses in bats has now gone through several rounds of editing between me, Manuel, and Raina. I have attached the latest compiled version of the text with preliminary figures and text for Box 2.

We request that teams check their sections, especially areas where we have commented, and update findings to reflect the latest literature since April. Additionally, please reduce the number of references where possible to only the most relevant citations. We are currently at over 171 references and would need to reduce this number to 125-150 for the journals we are considering for submission.

We would like to move this towards completion quickly, so please return your revisions to us by **Friday, October 30**.

Many thanks,  
Clif, Manuel, & Raina

<CoV\_review\_compiled\_2020\_10\_09\_RP\_CM\_RP.docx><Box2\_evidence\_summary\_July\_20\_CM.docx>



**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Sun, 25 Apr 2021 15:29:29 +0000  
**To:** Dylan H. Morris  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E]; Amandine Gamble; Jamie Lloyd-Smith; Kwe Claude, Yinda (NIH/NIAID) [F]; Adney, Danielle (NIH/NIAID) [F]; Holbrook, Myndi (NIH/NIAID) [C]; Plowright, Raina  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hey Dylan, pretty cool. I think it starts to make a cool story rather than the intrinsic stability it seems to be that the change in biological avidity of S towards ACE2 changes the half-life as it changes the TCID50. In that sense it's better to compare the UNC with the Japan (as this cell line is better characterized), the other TMPRSS2 is an in-house one (by another group at RML) and it's not completely clear what is all functionally expressed on this cell line. I'm wondering whether we need to add a couple of stock / start inoculum titrations with more human more cell line like Calu3 to huh7.5 and Caco2. If this would show the same difference between WA1 and later viruses I think we would have good supporting evidence

- 1 yes
- 2 I think only the initial back titrations do not have PCR data, so yes you already have 90 % of the data

We are working on the D614G (and trying to get another original Wuhan-like strain) and to add some surface stability as well.

Trent:

- can you check Calu3 (check with Neeltje) and the other cell lines as well (huh7 and CACo2s)? Michael used them in his paper (<https://www.nature.com/articles/s41564-020-0688-y/figures/2>)
- Determine the genome copy / TCID50 ratios of the different viruses on the different cell lines (and do this for the other cell lines as well)
- Missing anything?

Kwe:

- Would be good to support this with entry data on some of these cell lines as well.
- <https://elifesciences.org/articles/65365>
- <https://www.nature.com/articles/s41586-020-2895-3>

Also, it would be good if we somehow can think of a cell line where the s mutations in B.1.1.7 and B.1.1351 have a net 0 or even negative effect compared to WA1.

Vincent Munster, PhD  
Chief Virus Ecology Section

Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Saturday, April 24, 2021 3:43 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some initial fits and a table of medians and 95% intervals, but I'm not sure if they're actually meaningful. Amandine formatted the data and I analyzed it assuming that these were re-titrations of the same set of samples (so the RT-PCR for each sample should be the same for the three cell lines).

Questions:

- 1) Is that right?
- 2) If that's right, I'm a bit confused what further RT-PCR data is coming.

In any case, it looks to me like there's a reasonable signal of longer half-life for the new variants, which look similar to each other.

Given this, I am really curious to see D416G. I think we really don't want to claim B1355/B117 survive longer than WA only to learn that it's pretty much all D416G viruses that do that.

On Apr 24, 2021, at 8:18 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Try to look at the between virus differences on the cells and then cross the cells,

I'm trying to see whether there is a signal of better entry of B.1.1.7 and B.1.351 over WA1 explaining some of the kinetics.

You will have to wait a bit for the PCR data, as that would likely be needed as some sort of normalizer.

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Friday, April 23, 2021 4:37 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Wonderful, we'll run the model ASAP!

On Apr 23, 2021, at 3:14 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Kwe- Thank you for looking over the data and helping with the titrations last Friday.

Dylan/Amandine- I have attached the titration data for the Tmprss2 (japan) and VERO-UNC cells. I will have qRT-PCR from these samples next week probably Thursday (4/29).

Let me know if you have questions.

-Trent

---

**From:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Sent:** Friday, April 23, 2021 10:41 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Looks good.

---  
Kwe

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** Thursday, April 22, 2021 at 4:01 PM  
**To:** "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Could you look over the data to make sure I got everything transferred? Should be 15 minutes of work.

I will make graphs tomorrow morning.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Friday, April 16, 2021 9:29 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Btw for confirmation as well:

- Adding another WA1 lineage (need to get one ein)
- Adding D614G (we need to see if we have stock for this)
- Adding "simple" plastic stability based on Dylan's timepoints

We can discuss next week?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Friday, April 16, 2021 8:50 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Vincent,  
I just wanted to confirm from yesterday's meeting that for the RT-qPCR we would like all the Inconulums, T0s, T3s, and T8s?

-Trent

---

**From:** Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:** Thursday, April 15, 2021 9:52 AM  
**To:** Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Cc:** Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Are we meeting today? Here is a Zoom link if needed:

Amandine Gamble (she/her) is inviting you to a scheduled Zoom meeting.

Topic: RML/UCLA stability

Time: Apr 15, 2021 09:00 AM Pacific Time (US and Canada)

Join Zoom Meeting

<https://ucla.zoom.us/j/> (b) (6)

Amandine

Le ven. 9 avr. 2021 à 13:36, Jamie Lloyd-Smith <(b) (6)> a écrit :

I can do that. (quite a miraculous shot in the dark in my tangled schedule)

Jamie

On Thu, Apr 8, 2021 at 4:49 PM Dylan H. Morris <(b) (6)> wrote:

Works for me!

On Apr 8, 2021, at 2:49 PM, Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> wrote:

Can everyone meet next week at this time? I will send a weblink later.

-Trent

---

**From:** Dylan H. Morris <(b) (6)>

**Sent:** Thursday, April 8, 2021 1:13 PM

**To:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>

**Cc:** Amandine Gamble <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]

<(b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>

Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Plowright, Raina

<(b) (6)>; Jamie Lloyd-Smith <(b) (6)> Adney, Danielle

(NIH/NIAID) [F] <(b) (6)>

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Sounds good. I am very flexible on timing next week.

On Apr 7, 2021, at 12:15 PM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Let's schedule a RML/UCLA call next week. Browsed through the manuscript and their experimental set-up. Although comparable is different as well:

- Ultracentrifuge concentration of virus
- Reconstitution in artificial mucosal secretion
- Multiple timepoints per run? Was a bit hard to figure this out

Unfortunately no raw data, otherwise Dylan could have used their data to see whether the analyses has a part to do with the differences

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:** Wednesday, April 7, 2021 9:17 AM  
**To:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Dylan H. Morris <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Trent, do not hesitate to let us know if you would like someone from UCLA to join the call. We have a few questions about what to expect from the future data, which figures/tables you would like in the manuscript, how do you want to proceed with writing, etc... I think that at least one of us (Dylan, Jamie or I) should be available to join a call tomorrow or Friday. If you prefer to keep this call focused on the virological and logistical aspect, we can leave that to you, and plan another RML/UCLA call to talk about the manuscript later/soon.

Amandine

Le mer. 7 avr. 2021 à 10:42, Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> a écrit :  
Will be happy to talk tomorrow or Friday Trent.

Kwe

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** Wednesday, April 7, 2021 at 8:38 AM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Dylan H. Morris" <[REDACTED] (b) (6)>  
**Cc:** "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED] (b) (6)> "Plowright, Raina" <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants



Vincent- Please look at the email from yesterday at **Date:** Tuesday, April 6, 2021 at 12:05 PM the NBACC paper is there.

Agree with Dylan about the resolution(good call on the longer timepoints) and with Vincent regarding the correction with the PCR.

Vincent/Kwe-Would you like to have a meeting tomorrow sometime or Friday morning? We can discuss what need to be done to finish this up.

Thanks everyone!

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Wednesday, April 7, 2021 7:28 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Can you send the NBACC paper around, haven't seen it yet. I knew they were working on a comparison.

I think from our end it would be good if we see differences to confirm those. The best way of doing this doing it with a similar strains from these lineage (I think a repeat with a WA1-lineage virus might be good?). this will likely mean I have to see if we can get another early strain in (the only good one we have at the moment is the WA1

On a different note, have you ever tried to play with the data from the EID n=1 paper? Think chad Roy is on e of the co-authors?

I think if we push out a different message we need to be absolutely sure we are right, so that might need some additional work

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Wednesday, April 7, 2021 1:05 AM  
**To:** Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina

< (b) (6) Jamie Lloyd-Smith < (b) (6) Amandine Gamble  
< (b) (6)

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thoughts about the NBACC paper and ours:

1. We actually did sufficiently long experiments to get resolution on the half-lives. The experiments NBACC did were short; the lack of absolute decay observed makes it hard to determine whether the observed half-lives are truly different.

In other words, the lack of statistically discernible difference could just be due to insufficient absolute decay to gain statistical power.

2. Another is that we have B.1.351, which is valuable info.

3. That said, I think there might be value in pushing out a preprint relatively quickly, while the info remains timely. That said, we of course need to trust that the results are robust.

With that in mind, one potential issue: one question is how much we trust that the differential degrees of PCR loss across experiments, as those will drive how big/small we think the differences really are.

On Apr 7, 2021, at 12:31 AM, Dylan H. Morris < (b) (6) wrote:

Hi everyone,

Here are half-life estimates with PCR correction. Notice that the PCR correction makes all estimated half-lives longer, as expected. But it has a more profound effect on the variants, since we observed less decay with them.

Contrary to what the NBACC folks found, it looks like the variants might indeed be somewhat more persistent.

Indeed, we should think about how to make sure our paper is not "scooped" by theirs. Jamie, Amandine, and I chatted briefly about this today.

Will follow up with a second email summarizing our thoughts.

Fig. 1: est half-lives  
<figure-half-lives.pdf>

Fig 2: Est. differences versus WA1  
<figure-differences.pdf>

Fig 3: Regression fit.  
<figure-regression.pdf>

On Apr 6, 2021, at 12:57 PM, Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> wrote:

I'm available on the 16<sup>th</sup> and would love to help!

Thanks,  
Danielle

--

Danielle Adney, DVM, PhD  
Virus Ecology Section  
Laboratory of Virology  
NIH/NIAID

If you are receiving this email outside of your typical working hours, I hope you feel no pressure to read or respond until your schedule and workload permit.

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** Tuesday, April 6, 2021 at 12:05 PM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED] (b) (6)>  
**Cc:** "Plowright, Raina" <[REDACTED] (b) (6)>, Jamie Lloyd-Smith <[REDACTED] (b) (6)> "Dylan H. Morris" <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hey I would like to plan for titration day (24) plates on the TMPRESSII (Japan) and Vero-UNC cells for 4/16/2021? Either me and Kwe or me and Danielle can get this done. Readout would be the week after ~4/21/2021.

Please everyone have a look at this nice paper from NABCC (<https://academic.oup.com/jid/advance-article/doi/10.1093/infdis/jiab171/6209391>). Please have a close look at the conclusion and let me know if you have an opinion.

Hope you are all doing well.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]

**Sent:** Thursday, April 1, 2021 10:23 AM

**To:** 'Jamie Lloyd-Smith' <[REDACTED]> (b) (6) 'Dylan H. Morris' <[REDACTED]> (b) (6) 'Amandine Gamble' <[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]

<[REDACTED]> (b) (6)

**Cc:** 'Plowright, Raina' <[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F]

<[REDACTED]> (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)

**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Dylan,

Here is the qRT-PCR data for aerosol samples for all the runs for WA1, Sav and the UKv in **yellow**.

Thank you Kwe for looking over the data with me.

Let me know if you have questions.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]

**Sent:** Wednesday, March 24, 2021 2:24 PM

**To:** 'Jamie Lloyd-Smith' <[REDACTED]> (b) (6) Dylan H. Morris <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6)

**Cc:** Plowright, Raina <[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F]

<[REDACTED]> (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]

<[REDACTED]> (b) (6)

**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Great can't wait to see the model output! Dylan/Amandine has been great and the quick turnaround.

I will get the RNA extracted this Friday but should have data early next week.

-Trent

---

**From:** Jamie Lloyd-Smith <[REDACTED]> (b) (6)

**Sent:** Wednesday, March 24, 2021 2:06 PM

**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)

**Cc:** Dylan H. Morris <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6)

Plowright, Raina <[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F]

<[REDACTED]> (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]

<[REDACTED]> (b) (6)

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thanks Trent. Fascinating -- it also looks more stable (by my very rough eyeball analysis of the 8h decays). Will await the formal model output, which brings in the 3h data.

cheers,  
Jamie

On Wed, Mar 24, 2021 at 12:48 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
wrote:

Hey,  
Here is the titration for SA Variant (new stock of B.1.351) hCoV-19/USA/MD-HP01542/2421.

Thank you!

-Trent

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**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 23, 2021 9:23 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>  
Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Wonder whether we need to confirm this with an additional B.1.1.7 strain, might be a bit tricky to base it on the analyses of one strain

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 23, 2021 8:49 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Good morning! Here's the model read-out. Hint that B.1.1.7 might be more persistent on top of everything else, though we'll want to do PCR correction to be sure (these are not PCR-corrected)

Best,  
Dylan

On Mar 22, 2021, at 6:05 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Here is the titration data for the UK variant for T0, 8hours. Thank you Kwe for having a look!

The new stock South African variant (B.1.351) for timepoint T0,8hours will be read on Wednesday.

Let me know if you have any questions.

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Thursday, March 18, 2021 2:49 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

New plots!

On Mar 17, 2021, at 10:38 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Here is the titration data for new stock South African variant(B.1.351) for timepoint T0,3hours.

I will have titration date for UKv(B.1.1.7) for T0,8hrs on Monday(22<sup>nd</sup>).

I will have titration data for new stock South African variant(B.1.351) for timepoint T0,8hours on Wednesday next week.

Happy St. Pats day, hope you all enjoy a green beer!

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Wednesday, March 10, 2021 11:51 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,

Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6) Jamie Lloyd-Smith <[REDACTED] (b) (6)  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Oops forgot to attach!

On Mar 10, 2021, at 1:50 PM, Dylan H. Morris <[REDACTED] (b) (6) wrote:

Here you go. Half-life looks to be above 2h, which would imply losing about 1.2 log<sub>10</sub> in 8 h. Only potential problem is the slightly lower T=0. Still, my guess is it will be fine. Worst case scenario, it's right around the LOD. Could probably get resolution by doing a couple extra wells at zero dilution

(e.g. if we're right around the LOD, might get 0 / 4 positive, but probably at least one of 8 wells positive)

On Mar 10, 2021, at 1:05 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6) wrote:

Dylan/Amandine,  
Here is the titration data for the UK variant (B.1.1.7) for the timepoint 0, 3hrs.

Could you have a quick look to confirm the later timepoint of 8 hour because I will need to start these runs on this Friday(3/12/21).

Thank you!

In addition, I will have the titrations for timepoint 0,3hrs for the new stock South African variant next week Wednesday(3/17/21). However, I will need to start on the T0, 8hour aerosol runs on Tuesday so I can get them done. We have a deadline for a lab recertification coming up.

Let me know if you have questions. Hope all is well!

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Friday, March 5, 2021 10:58 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6) Amandine Gamble <[REDACTED] (b) (6) Jamie Lloyd-Smith <[REDACTED] (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)  
**Cc:** Plowright, Raina <[REDACTED] (b) (6) Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)  
**Subject:** IMPORTANT- RE: Goldberg drum - WA1, UK, and SA variants

Dylan/Amandine,

Important part- I will need a quick turn around because I'm starting the SA variant's LATER timepoint on Monday. We will need to figure out what we want to do for this LATER timepoint (8hr, 12-hardest, 18, or 24hrs) before Monday.

Titration sheet is attached.

WA1 has both T0,3hr and T0,8hr, I looks pretty good by eye balling it. I will work independent of you this afternoon to look at the decay for WA1. Dylan you did a really good job with the 8 hr timepoint!

For the SA variant, I redid the titrations but was only able to read 2 of the 3 plates. We had a little issue with the third plate because we missed a row which messed up the rest of the plate. Oh well. I did put all 5 plates on the titration sheet for T0,3hr for you to work with.

Talk with you both soon! Here is my cell phone if you want a quick reply (b) (6). I will be in BSL4 till 1:30pm MTime today.

-Trent

---

**From:**Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:**Tuesday, March 2, 2021 9:56 AM  
**To:**Dylan H. Morris <(b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<(b) (6)> Amandine Gamble <(b) (6)>  
**Cc:**Jamie Lloyd-Smith <(b) (6)> Plowright, Raina <(b) (6)>  
Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C]  
<(b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Thank you crew. Call me if you have questions. Just prepping for these studies today.

-Trent

---

**From:**Dylan H. Morris <(b) (6)>  
**Sent:**Tuesday, March 2, 2021 9:52 AM  
**To:**Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:**Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Amandine Gamble  
<(b) (6)> Jamie Lloyd-Smith <(b) (6)> Plowright, Raina  
<(b) (6)> Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <(b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

I can try to analyze the PCR data today.



On Mar 2, 2021, at 11:50 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Yes, so focus on the UK variant (B.1.1.7). Genotypically the current B.1.351 is weird (we'll have a correct one at the end of this week, but still needs to be grown). Whereas it shouldn't impact on the stability, the recovery sensitivity might be different.

Lets see what it looks like with the PCR data. Waiting until April does not make much sense (as there will likely be another variant)

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:**Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:**Tuesday, March 2, 2021 9:08 AM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Amandine Gamble <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Thanks! Personally, I would suggest getting something out quickly rather than delaying to include CA VOC. B.1.351 and B.1.1.7 very informative for a lot of the other VOC/VOI, since there's so much convergence.

And less stress for Trent too.

On Mar 2, 2021, at 11:03 AM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Here is the qRT-PCR data for the E-assay "Results for UCLA\_qRT-PCR\_E-assay\_Aero WA1 and SA<sub>v</sub>\_2021-02-03".

Two things to keep on the radar:

1. If we add the CA VOC this will have to be done after we get Suite D back from the annual shutdown which is slotted for March 23- ~April 15<sup>th</sup>. For people that don't speak BSL4 lingo, I am currently booked till March 23<sup>rd</sup> with the current SA<sub>v</sub>, UK<sub>v</sub>, and WA1 strain project. This is already a tight window to get things done. This required annual shutdown will stop all aerosol work between the dates of March 23- ~April 15<sup>th</sup>.
2. This is mostly for Vincent but if we don't think this SA<sub>v</sub> (B.1.351) is the correct variant should we omit this upcoming longer timepoint. This can be decided after we see the data normalized with the qRT-PCR.

Thanks everyone for your input, learning a bunch.

-Trent

---

**From:**Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:**Tuesday, March 2, 2021 7:43 AM  
**To:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E]  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Hi Trent and Vincent,

Thanks for the info regarding B.1.351. Indeed it would be even better if you can get data for the CA VOC.

Dylan made this plot on the raw titration data. Trent, you can send the PCR data our way (I don't think we got them yet, right?) and we will see how much it changes after normalization.

Looking forward to more data! Thanks again for all the hard work getting the isolates and then in BSL4!

Amandine

Le mar. 2 mars 2021 à 09:19, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> a écrit :  
The B.1.351 is a bit weird, as it has several mutations (not fixed) at ~ 80% in the reads in spike (one transitioning the furin cleavage site into a trypsin site, so not the cleavage deletion but still a SNP not reported in the natural variant which might affect our ability to recover it a bit). We are working on getting better strain in. I think we need to repeat the B.1.351 with a fully genetic comparable one.

In addition, we should likely add the 452-CA-VOC as well, to make an even better panel.

Did you try to normalize based on the PCR data? Any good?

Cheers,

Vincent Munster, PhD  
Chief, Virus Ecology Section  
Laboratory of Virology  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** "Dylan H. Morris" <(b) (6)>  
**Date:** Monday, March 1, 2021 at 11:10 PM  
**To:** Trenton Bushmaker <(b) (6)>  
**Cc:** Amandine Gamble <(b) (6)> Jamie Lloyd-Smith  
<(b) (6)> " (b) (6) <(b) (6)> (b) (6) "Plowright,  
Raina" (b) (6), "Adney, Danielle (NIH/NIAID) [F]"  
<(b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" <(b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some fits and half-life estimates for B.1.351 and WA1

Definitely need the later timepoint for B.1.351 to be sure, but it looks like there might be a real difference. There also might not.

The model is very uncertain about the half-life of B.1.351 since minimal infectious virus appeared to be lost during the 3 hr experiment.

Best,  
Dylan

On Mar 1, 2021, at 5:07 PM, Dylan H. Morris <(b) (6)> wrote:

Excellent. Yes, please send it over!

On Mar 1, 2021, at 1:21 PM, Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> wrote:

Dylan,

Here is the titration data "2021-03-01 Raw data - 22C @ 65%RH- WA1, UK, & SA" for WA1 and SAv (B.1.351). I will be very interested to hear what you think and what you think about the later timepoint.

I have the PCR data done for the WA1 and SAv (B.1.351) samples | you want that data now?

Update for this week:

1. UK variant stock for aerosol runs does not detecting any deletion of the furin site from sequencing. Stock titer is  $10^{5.7}$ .
2. Aerosol runs for UK variant, for timepoints 0 and 3hrs, is on Monday(today), Wednesday, and Friday.
3. I will starting the titrations on the UKv 0 and 3hr on Friday and will be read next Wednesday(3/10).
4. Titration read out for WA1 0 and 8hour timepoints will be this Wednesday(3/3).

Let me know if you have questions.

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Monday, February 22, 2021 10:24 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Awesome! Thanks so much for your hard work!

On Feb 22, 2021, at 12:20 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Update for this week:

1. SA variant titrations will be read on Wednesday, this is the 0 and 3 hours timepoints.
2. WA1 and SAV PCR samples will be extracted this week, this is the 0 and 3 hours timepoints.
3. UK variant stock is grown and I will have titers on Wednesday.
4. UK variant stock will be sequenced this week to look for furin cleavage site.
5. I'm starting the WA1 strain 0 and 8 hour timepoints today. Titrations will be start on Friday and read next Wednesday.

Update everyone later this week with data.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Tuesday, February 9, 2021 5:01 PM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine  
Gamble <[REDACTED] (b) (6)>  
**Cc:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

What is your estimate for 8 hours? Somewhere between  $10^{0.75}$ -  $10^1$ ? I would be more comfortable around  $10^1 - 10^{1.25}$  in case we see a drop.

8 hours can be done but Jamie will owe me tickets to a NHL game ☐jk.

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 4:55 PM

**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Got it. Based on our back-of-the-envelope calculations, the best option in that case might be 8 hours. Would that potentially be an option? We can also do a bit more modeling. 9 could work too, but might be a little long.

On Feb 9, 2021, at 5:31 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan,  
It looks like all inoculum (WA1, SA, & UK) will be  $\sim 1 \times 10^6$ . The WA1 was  $1.7 \times 10^6$ .

-Trent

---

**From:**Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:**Tuesday, February 9, 2021 3:07 PM  
**To:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

If we can go high enough, 12 hours is viable, and then we'll get a clearer estimate of the half-life. Otherwise we can do 9.

On Feb 9, 2021, at 5:02 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

In this case, would it be the highest of the lowest? Or WA1 as a standalone?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:**Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:**Tuesday, February 9, 2021 2:59 PM  
**To:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

How high do you reckon you can get the WA1 inoculum? That'll determine 9 versus 12.

On Feb 9, 2021, at 4:51 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Sounds good, fingers crossed. Pretty sure we're still one of the only US labs with these viruses

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:**Tuesday, February 9, 2021 2:46 PM  
**To:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) Dylan H. Morris  
<[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) Amandine Gamble  
<[REDACTED]> (b) (6)  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Hello crew,  
I would like to figure out this extended timepoint (either 9 or 12) by the end of this week if we can? Just need some time to prep.

Plan for now...

Stocks:

- UKvariant- Start 2/12, titrations-2/19, Readout- 2/24

Runs:

- Feb.14-20 - 3x runs of SAvariant at T0,3hr
- Feb. 21-27 - 3x runs of WA1 at T0,9 or 12hr - this is the timepoint we need to figure out?
- Feb. 28-Mar.6 - 3x runs of UKvariant at T0,3hr
- Mar. 7-13 - 3x runs of SAvariant at T0,??hr
- Mar. 14-10 - 3x runs of UKvariant at T0,??hr

Titrations and readout

- SAvariant at T0,3hr – 2/19, readout 2/24
- WA1 at T0, ??hr – 2/26, readout 3/3
- UKvariant at T0,3hr – 3/5, readout 3/10
- SAvariant at T0,??hr – 3/12, readout 3/17
- UKvariant at T0,??hr – 3/19, readout 3/24

-Trent

---

**From:**Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:**Monday, February 8, 2021 11:53 AM  
**To:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) Dylan H. Morris  
<[REDACTED]> (b) (6)

**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

It takes ~1 ½ hours to get the Timepoint 0. It will take the 1 – 1 ½ for the final timepoint.

As Vincent said 15 hr point is not doable. 6 hour will take some work to do but not preferred. 9 and 12 can be done.

It is looking like our UK strain will be ~ 10<sup>5</sup> for the starting inoculum. Can you run the model with this number for which timepoint you want?

South African will be higher (~10<sup>7</sup>) so we should be good on that. Start with the same dilution as we did for the WA1. We will probably start with the SA strain and see if we can increase the inoculum titer for the UK.

-Trent

---

**From:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:**Saturday, February 6, 2021 8:25 AM  
**To:**Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

With a bit of planning every point might be doable, other than the 15 hour one

Trent: ho long exactly does it take you to start a run?

e.g. prep at 8, start run at 9 am? Sample at 9pm?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:**Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:**Friday, February 5, 2021 8:24 PM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

I think 18h is probably too long given the T=0h measurements. I think we'd dip below the LOD. And I'm especially concerned given what you said about smaller initial virus concentrations for the new variant.

Which of the following intervals would be most practical given your protocols in 4?

- A) T=0h, T=6h
- B) T=0h, T=9h
- C) T=0h, T=12h
- D) T=0h, T=15h

Something else?

On Feb 5, 2021, at 4:47 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan/Amandine,  
Thank you again for the quick turnaround for the graphs. It was a big hit today in the presentation I think!

So we need to discuss the later timepoint. What do you think would be a good timepoint? 18hrs?

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 8:41 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some quick figures. Half-life looks to be 1 to 2 hours.

On Feb 4, 2021, at 1:27 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

I think at the moment anything goes

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 11:18 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants



Good idea Vincent.

-Trent

---

**From:** Dylan Morris <[REDACTED] (b) (6)>  
**Date:** Thursday, February 4, 2021 at 11:15 AM  
**To:** Vincent Munster <[REDACTED] (b) (6)>  
**Cc:** Trenton Bushmaker <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Could do a virological micropub? Or does that have to be genetics?

Or just a skinny preprint to which we can add B.1.351 when ready.

On Feb 4, 2021, at 1:11 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

I think we should be able to run the UK variant very soon, we should probably see if that alone would already be good to get a preprint out or at least some communication in the public domain while we work on getting the SA variant plugged in?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 11:09 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Dylan/Amandine,  
Here is the temp and RH for the first (3) run of WA1 at timepoints 0 and 180 minutes.

-Trent

---

**From:** Dylan Morris <[REDACTED] (b) (6)>  
**Date:** Thursday, February 4, 2021 at 10:50 AM  
**To:** Vincent Munster <[REDACTED] (b) (6)>  
**Cc:** Trenton Bushmaker <[REDACTED] (b) (6)> Jamie Lloyd-Smith

< (b) (6) Amandine Gamble < (b) (6)

**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Agreed. Data looks clean; congrats and thanks, Trent! I think we'll get a decent read out here on the half-life, and a good idea of how long to go for the longer run.

On Feb 4, 2021, at 12:48 PM, Munster, Vincent (NIH/NIAID) [E] < (b) (6) wrote:

Looked pretty solid by eyeballing the data

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:**Bushmaker, Trenton (NIH/NIAID) [E] < (b) (6)

**Sent:**Thursday, February 4, 2021 10:42 AM

**To:**Dylan H. Morris < (b) (6)

**Cc:**Jamie Lloyd-Smith < (b) (6) Amandine Gamble < (b) (6)

Munster, Vincent (NIH/NIAID) [E] < (b) (6)

**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Thank you! Let me know if you have questions.

-Trent

---

**From:**Dylan Morris < (b) (6)

**Date:**Thursday, February 4, 2021 at 10:41 AM

**To:**Trenton Bushmaker < (b) (6)

**Cc:**Jamie Lloyd-Smith < (b) (6) Amandine Gamble

< (b) (6) Vincent Munster < (b) (6)

**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Excellent. Thanks, Trent! Will get right on this.

On Feb 4, 2021, at 12:39 PM, Bushmaker, Trenton (NIH/NIAID) [E] < (b) (6) wrote:

Hey crew,

Here is the excel file with the first (3) runs for WA1 at timepoints 0 and 180 minutes. Let me know what you think we should do for the extended timepoint after run through the model.

Dylan/Amadine- As we discussed I would like to include this in my talk tomorrow @ 1pm MT but just let me know if you can't make timeline.

I will get a better idea what the starting inoculum titers will be for the UK and South African variants the middle of next week. Estimate is that we will have to be starting with a lower titer. I will update you when I find out more.

I will start to grow those up at the end of next week. My schedule looks like you should have some data again around the first week of March.

Thank you everyone.

-Trent

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**From:**Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:**Wednesday, February 3, 2021 at 1:03 PM  
**To:**Vincent Munster <[REDACTED] (b) (6)>  
**Cc:**"Plowright, Raina" <[REDACTED] (b) (6)> "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Vincent,

Here is the titration data for the first (3) runs of WA1 variant at timepoints 0 or 180 mins. I will send UCLA the excel file once you approve here today.

-Trent

---

**From:**Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:**Wednesday, January 27, 2021 at 3:44 PM  
**To:**Vincent Munster <[REDACTED] (b) (6)>  
**Cc:**"Plowright, Raina" <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Vincent,

Updates the on the project:

1. For people helping on the project- Myndi will do the cells-TMEPRESS for titrations plates and the stocks. Danielle and me will do titrations. Kwe will help me with the quant qRT-PCR analysis and some paper writing. Dylan will work on the decay with me and paper writing. Let me know if you are ok with this?
2. For your email attached- For the aerosol stocks I think you already know the issues with the UK stock but the stock is only growing to  $10^4$  for the BEI isolate from California. Brand, Neeltje, and Myndi already know I need minimum of 120ml of stock of the highest stock. HOWEVER, if we get the South African (SA) variant grown up before the UK is figured out I will start with it.

I'm still projecting to be done with this project by the end of February.

Bob is in charge of the surface stability(according to Kwe) but let me know how you would like to proceed with it.

-Trent

---

**From:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:**Tuesday, January 12, 2021 7:07 AM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Maybe ask in todays meeting: just lay-out the tasks and we can see who signs-up?

Vincent Munster, PhD  
Chief, Virus Ecology Section  
Laboratory of Virology  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:**Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:**Monday, January 11, 2021 at 2:04 PM  
**To:**'[REDACTED] (b) (6)' <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Vincent,  
I'm looking at personnel to help me with this experiment. I'm thinking Myndi to grow stocks because she will be doing it anyways in BSL3. Vicky and Myndi to maintain cells for titrations and do plates(Monday passage, Thursday plate for Friday titrations). Danielle to help me with titrations(Fridays) and reading plates(Wednesdays/Thursdays).

Danielle and Vicky I would like to have involved because it will free up the senior group for other experiments.

Let me know if you agree with this.

Looks like at Goldberg runs on Monday, Thursday, and Friday. Titrations on Friday afternoon. Might have to do a few weekend days to accomidnate for Cara's schedule and school.

-Trent

---

**From:**Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:**Friday, January 8, 2021 11:56 AM  
**To:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Dylan H. Morris  
<[REDACTED] (b) (6)>  
**Cc:**Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:**RE: Goldberg drum - WA1, UK, and SA variants

Hey guys,

Please do understand the technical limitation of the set-up in a high containment laboratory. I favor shorter experiments, which will allow us to more rapidly determine whether there are differences between the isolates.

Given that the transmission window is likely under 3 hours, I'm not particularly in favor making these experiments longer in duration than absolutely necessary. Anything over a 3 hour window will have massive implication on the way we conduct experiments.

My main priority is not running a model, but a providing good comparison between the different strains, which should be done in under 3 hours. A limited analyses as was done in the NEJM should be sufficient (I'm not against running a model, but human resources are extremely limited and I think it would be best to have an experimental design which would get us the best result with the least effort). Also this data is urgent, and I don't want to have any delays with getting this data out.

Of note, you don't "lose" 2 logs during the spray, that's just the experimental system (from collision to collection), this is fixed for every experiment so no difference is expected there between variants (or viruses)

As discussed this week, at the moment no isolates are in yet (again, try to understand that this is a massive undertaking and is a process of several weeks), but titers are expected in the WA1 range

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:**Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:**Thursday, January 7, 2021 8:14 PM  
**To:**Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Dylan H. Morris  
<[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:**Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Thank you for the quick reply, I like the points you made. I have some time tomorrow in BSL4 from 9-2pm to think and reply, thanks crew.

-Trent

---

**From:**"Amandine Gamble" <[REDACTED] (b) (6)>  
**Date:**Thursday, January 7, 2021 at 7:01:22 PM

To: "Jamie Lloyd-Smith" <[REDACTED] (b) (6) "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED] (b) (6) "Dylan H. Morris" <[REDACTED] (b) (6) "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6) "Plowright, Raina" <[REDACTED] (b) (6)  
**Subject:**Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Thanks Trent for all the info and your work on those new strains (among other things!). I only have two minor thoughts following up on Jamie's e-mail:

- As Jamie noted, the longer we wait before taking the second time point, the more precise our estimate of decay rate / half-life will be (as long as we are still above the LOD), so I would also be tempted to target 4 or 5h rather than 3h based on the data we had for the NEJM paper and the fact that you are now using a more sensitive titration protocol (if we understood well), however that obviously depends on the starting dose (the intercept on the graph Jamie put) so, my question is: **do you have any idea of the stock concentrations for the new variants**, and whether we have any reason to expect more loss during spraying? It looks from the NEJM paper that we lose around 2 log<sub>10</sub> during spraying with WA1 (and SARS-CoV-1). I guess you all already thought about this, but just writing down in case (there are lots of things to think about!). Also, if you already have an idea on the stock concentration, Dylan can run some analyses on mock data (as mentioned by Jamie) accounting for this, the loss at spraying and potential decay rates, as pointed by Jamie.

- The second point can be discussed after you got the data as it is only about formatting. I see from the raw data attached to one of the e-mails (the scan of the hand-written data) that some wells are blank, although in the Excel file we received, all the wells were classified as + or -. I assume that you did not collect data from those blank wells because you could assume they were all positive (based on higher dilutions being positive) or negative (based on lower dilutions being negative), right? Dylan can correct me, but I think his model would run perfectly on the raw data, even if they are "incomplete". In other words, I think we can let the model do what you were already doing when you complete the blank wells so there is no need for you to do this. So in the future, **we are happy to work on the raw data (i.e., with +, - and blanks [that you can note "NA" so we know it is not just a forgotten well]), rather the completed version (with only + and -)**. You can even just send us a scan of your data and we can generate the Excel file if you prefer.

With all this, I also wish you all the best for 2021 =)

Amandine

Le jeu. 7 janv. 2021 à 16:53, Jamie Lloyd-Smith <[REDACTED] (b) (6) a écrit :  
Hi Trent, hi everyone (also copying in Amandine since she's the one on our side with most experience with the raw data),

Great to hear this -- a few quick responses.

- 22/65 makes sense to me

- great to add the SA strain!

- I hope we are planning to collect new data on the WA1 strain, not reuse the NEJM data. There were enough differences in design with the original experiments that I think it would be MUCH stronger science to study all three strains using the same design (updated to avoid some of the challenges of the first round). (Actually from your comment about 'another 9 days' to add a timepoint, i.e. 3 viruses times 3 replicates, I think we're on the same page here.)

- I think the 5% decline in RH due to settling should be OK, if it's basically consistent across the viruses. We can think about whether to account for it in the modelling... my instinct is that we can leave it out of the model unless it differs significantly across replicates and viruses.

- Great to hear about T=0. That's especially crucial if we're just doing the one later time-point.

- Regarding the timing of the later timepoint, I was surprised by your statement, since my memory from the NEJM paper was that the above-LOD detections would have continued well beyond 3 hours. i.e. look at the plots:

<image001.png>

The SARS-CoV-2 data (red) started at a lower titer, but given the slopes it looks like there'd still be useful super-LOD data out to 5 and probably 6 hours. The SARS-CoV-1 data (blue) show the same slope with a higher intercept, and look like they'd stay above LOD out to 6 hours and beyond. Looking at the raw well data, the difference in + counts across time points isn't so striking, i.e. it's not like we're losing a dilution per hour - which makes sense, given the estimated half-life of ~3 hrs. Also if I'm not mistaken, Neeltje or Vincent mentioned that you guys have changed protocols (spin inoculation and different cell line) to get higher sensitivity in culture.

Bottom line: again, it will depend on the titers achievable at T=0, but unless I'm misreading things badly I think there would be value in extending that later timepoint. I know there are complexities about how long you can spend in BSL4, etc, but I'm just talking about the raw information content.

Dylan, Amandine, any further/other thoughts? Dylan, do you want to do a quick analysis with mock data (and reasonable noise) to think about the power we'd have to distinguish differences among variants using this design (i.e. 3 replicates of a single uninterrupted decay window)? And how that might change if we stretch the window to longer time periods? Or if we need more information to get better estimates, do we do as well by adding a 4th replicate at the long time point, rather than adding intermediate time points? (nothing magic about intermediate time points, except for prettier decay graphs. one replicate at 5h might be equivalent to 2 at 2h, in terms of information gained)

cheers,

Jamie

On Thu, Jan 7, 2021 at 3:51 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Jamie/Dylan,

First, I have added the pervious email so we can all stay on the same page(UK variant shams).

Next, I have talked with Vincent today but would like your input. For a quick paper, I think we should do condition at 22C @ 65%RH – hospital setting. Is everyone ok with this? This was the same setting as we had in the NEJM paper.

Third, we will do the UK variant (VOC), South African (SA) variants, and the original NEJM paper Washington (WA1) for the comparison.

Four, will a 5% percent decrease over 3 hours of the relative humidity cause issues with anything? This happens when nothing is pulled out of the drum, it just happens because of the time frame of 3 hours with the deposition. It should be ok for this decay model(linear regression) correct? I just want to confirm.

Lastly and most important, we will “for sure” have a timepoint at 0 minutes to check for the start values. However, we need to discuss the last timepoint. The LOD for our titrations with our cell culture seems to happen between 180-240 mins, so I would stick with the 180 minute timepoint (titrations attached- “2019-nCoV titrations goldberg drum.jpeg”). Do you agree with this? It would give you two points at timepoint 0 and 180 minutes.

I will collect (4) qRT-PCR per timepoint 0 and (4) more during the later timepoint.

How does this sound? Think about the later timepoint. Each run is a day of work in BSL4 and 10ml of virus. If in addition you want to collect at a middle timepoint this will adding another 9 days of BSL4 work, that will have to be spread out over 3 weeks. We can also think about a later timepoint. The titrations will be useless but qRT-PCR might be interesting. I think this will be usefully for a later experiment because we want to get this out quickly.

-Trent

--

James O. Lloyd-Smith

Professor  
Department of Ecology & Evolutionary Biology  
Department of Biomathematics  
University of California, Los Angeles  
610 Charles E Young Dr South  
Box 723905  
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Office: 4135 Terasaki Life Sciences Building

Lab: 4000 Terasaki Life Sciences Building

<2020-03-24 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-01 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<Results for UCLA\_qRT-PCR\_E-assay\_Aero WA1 and SAv\_2021-02-03.xls>

<2021-03-10 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-17 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-22 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

--

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Lab: 4000 Terasaki Life Sciences Building

<Mail Attachment.ics>

--

James O. Lloyd-Smith

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Lab: 4000 Terasaki Life Sciences Building

<2021-04-16\_Titration data\_TMPRESSII (Japan) cells - 22C @ 65%RH- WA1, UK, & SA.xlsx><2021-04-16\_Titration data\_UNC cells - 22C @ 65%RH- WA1, UK, & SA.xlsx>

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Fri, 9 Apr 2021 19:05:49 +0000  
**To:** Gay, Cyril; Broder, Chris (USU-DoD); Korch, George W. (CTR); De wit, Emmie (NIH/NIAID) [E]; Feldmann, Heinrich (NIH/NIAID) [E]; Ksiazek, Thomas (Galveston National Laboratory-UT)  
**Subject:** RE: Thank you! NBAF ZEDRU Position

That's great to hear Cyril,

Good luck with the task ahead!

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Gay, Cyril <(b) (6)>  
**Sent:** Friday, April 9, 2021 1:01 PM  
**To:** Broder, Chris (USU-DoD) <(b) (6)> Korch, George W. (CTR)  
<(b) (6)> De wit, Emmie (NIH/NIAID) [E] <(b) (6)> Feldmann, Heinrich (NIH/NIAID) [E] <(b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<(b) (6)> Ksiazek, Thomas (Galveston National Laboratory-UT) <(b) (6)>  
**Subject:** Thank you! NBAF ZEDRU Position

Hi Everyone,

This is a short note to thank you in helping me recruit candidates for the subject position. An interviewing committee has been organized and is getting ready to start the interviews of candidates but I wanted you to know that thanks to your help we had a very successful search with 17 candidates applying and, importantly, several with outstanding credentials.

Thank you!

Cyril

Cyril Gerard Gay, DVM, PhD  
Senior National Program Leader  
Animal Production and Protection  
Agricultural Research Service  
Tel: (b) (6); e-mail (b) (6)  
Website: <https://www.ars.usda.gov/>

 **United States Department of Agriculture**  
Agricultural Research Service

---

**From:** Gay, Cyril

**Sent:** Thursday, January 28, 2021 6:08 PM

**To:** Broder, Christopher <(b) (6)> Korch, George W. (CTR)

<(b) (6)> (b) (6) Munster,  
Vincent (NIH/NIAID) [E] <(b) (6)>

**Subject:** Research Leader (RL) Position for the NBAF BSL-4 Zoonotic and Emerging Disease Research unit (ZEDRU) - Search Committee

**Importance:** High

Dear Chris, George, Emmie, Heinz, and Vincent,

I was wondering if you could help me recruiting candidates for the subject position at NBAF? Specifically, I've been asked to lead a search committee and I would like to invite you to be on the committee. We've had a hard time so far recruiting candidates for NBAF and we want to make sure the job announcement below will result in some good scientists with experience working in a BSK4 lab.

<https://www.usajobs.gov/GetJob/ViewDetails/590498300>

The research at the ZEDRU at NBAF will involve studies on the pathogen-vector-host interrelationships of zoonotic and emerging BSL-4 diseases such as Crimean Congo Hemorrhagic Fever (CCHF) and Nipah Virus, and potentially other emerging or zoonotic diseases.

As you know, NBAF (National Agro and Biodefense Facility) is our \$1.4 billion facility that will give USDA for the first time the ability to research BSL4 agents. I don't think serving on the committee will take much of your time. I anticipate 2-3 zoom meetings at the most and for you to contact directly the scientists we identify as potential candidates. Of course, some of you may want to apply as well, seriously!

If for some reason you can't help me on the search committee, could I ask you to at least send the announcement withing your BSL4 network? As you know, this is a select agent-regulated facility and the applicants must be U.S citizens and will have to obtain security clearance.

Thank you so much gentlemen for considering this request.

Cyril

Cyril Gerard Gay, DVM, PhD  
Senior National Program Leader  
Animal Production and Protection  
Agricultural Research Service

Tel: (b) (6); e-mail (b) (6)

Website: <https://www.ars.usda.gov/>

 **United States Department of Agriculture**  
Agricultural Research Service

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**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Thu, 8 Apr 2021 13:59:48 +0000  
**To:** Manuel Ruiz  
**Cc:** Plowright, Raina; Kwe Claude, Yinda (NIH/NIAID) [F]; Fischer, Robert (NIH/NIAID) [F]; van Doremalen, Neeltje (NIH/NIAID) [E]; Holbrook, Myndi (NIH/NIAID) [C]  
**Subject:** RE: Options for inactivation of serum samples

Hi guys,

In case you didn't know or completely realized, but Trent is no longer part of my lab. In his new position he can no longer be involved in DARPA and should therefore not be included in any discussions anymore.

From our end , we have Bob & Myndi will be taking over part of Trent's responsibilities and Kwe is obviously still here

cheers

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Manuel Ruiz <[REDACTED] (b) (6)>  
**Sent:** Thursday, April 1, 2021 2:17 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Plowright, Raina <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** Re: Options for inactivation of serum samples

Hi Vincent,

Very timely message, I am just in a call with Dan and Caylee. They will prepare a list of samples for this first batch (matching samples that they have for other assays too).

Would it be ok if we get this list to you by Monday morning?

As you mentioned before you would run batches of 84 or 168, right?

Thank you,  
Manuel

**Manuel Ruiz Aravena**  
Postdoctoral Researcher  
Department of Microbiology and Immunology | Montana State University,  
USA

Mobile: (b) (6)  
<https://batonehealth.org/>

On Thu, Apr 1, 2021 at 2:01 PM Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:  
Hi Manuel,

We are gearing-up to start the irradiation, do you have a list of samples or should we just go through the samples?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Manuel Ruiz (b) (6)  
**Sent:** Wednesday, March 10, 2021 3:09 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Plowright, Raina  
<(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>  
**Subject:** Re: Options for inactivation of serum samples

Thank you, Vincent for the replies,

I'll have a chat with Dan and Caylee here. There are a few interesting results for which we want to be sure we are considering all possible caveats affecting them. We are preparing an executive summary to share with you.

To have in mind as reference, when do you think you would be able to do a first run of irradiation of serum samples? (Since there isn't a way around irradiating the samples, we would like to send you the list for the first batch of samples.

How would you prefer to receive the list of samples to move, 1) whole list with prioritization in groups of 84?, 2) specific lists for each batch of irradiation separately?, any other option that would work best for you?

Thank you, again, for all your help (and patience answering our questions!),

Cheers,  
Manuel

**Manuel Ruiz Aravena**

Postdoctoral Researcher

Department of Microbiology and Immunology | Montana State University,  
USA

Mobile: (b) (6)

<https://batonehealth.org/>

On Wed, Mar 10, 2021 at 9:57 AM Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:  
Not really,

These samples were send under our CDC permit. We can only share them, according to this permit, if they are properly inactivated. We don't have any other way of inactivating serum samples while maintaining their integrity. This is how we do everything with our own field and lab samples as well. With our in-house testing we don't see an effect of irradiation of the protein function (e.g. antibody function).

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Manuel Ruiz <(b) (6)>  
**Sent:** Tuesday, March 9, 2021 12:52 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Plowright, Raina  
<(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>  
**Subject:** Re: Options for inactivation of serum samples

Thanks Vincent,

Would there be any chance of running an experiment with a small subset of samples before irradiation to have an idea of any "correction" that we should consider for our results?



**Manuel Ruiz Aravena**

Postdoctoral Researcher

Department of Microbiology and Immunology | Montana State University,  
USA

Mobile: [REDACTED] (b) (6)

<https://batonehealth.org/>

On Tue, Mar 9, 2021 at 12:47 PM Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:  
Hi Manuel,

We continuously run immune assays on irradiated samples including serology and cytokine assays. Just for reference: <https://www.nature.com/articles/s41586-020-2324-7>

It's a bit of a mood point as there is no other way (this holds true for ourselves as well)

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Manuel Ruiz [REDACTED] (b) (6)

**Sent:** Tuesday, March 9, 2021 12:04 PM

**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>

**Subject:** Options for inactivation of serum samples

Hi Vincent,

The immunology team has some concerns about the irradiation breaking down some proteins in the serum samples... which could be influencing some results. They are currently running some experiments with non-irradiated samples from Lubee.

Do you have any other options for inactivation of serum samples that we could explore/discuss as options?

Thank you,  
M

**Manuel Ruiz Aravena**

Postdoctoral Researcher

Department of Microbiology and Immunology | Montana State University,  
USA

Mobile: [REDACTED] (b) (6)

<https://batonehealth.org/>

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Wed, 7 Apr 2021 18:15:23 +0000  
**To:** Amandine Gamble; Kwe Claude, Yinda (NIH/NIAID) [F]  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E]; Dylan H. Morris; Holbrook, Myndi (NIH/NIAID) [C]; Plowright, Raina; Jamie Lloyd-Smith; Adney, Danielle (NIH/NIAID) [F]  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Let's schedule a RML/UCLA call next week. Browsed through the manuscript and their experimental set-up. Although comparable is different as well:

- Ultracentrifuge concentration of virus
- Reconstitution in artificial mucosal secretion
- Multiple timepoints per run? Was a bit hard to figure this out

Unfortunately no raw data, otherwise Dylan could have used their data to see whether the analyses has a part to do with the differences

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:** Wednesday, April 7, 2021 9:17 AM  
**To:** Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Dylan H. Morris <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Trent, do not hesitate to let us know if you would like someone from UCLA to join the call. We have a few questions about what to expect from the future data, which figures/tables you would like in the manuscript, how do you want to proceed with writing, etc... I think that at least one of us (Dylan, Jamie or I) should be available to join a call tomorrow or Friday. If you prefer to keep this call focused on the virological and logistical aspect, we can leave that to you, and plan another RML/UCLA call to talk about the manuscript later/soon.

Amandine

Le mer. 7 avr. 2021 à 10:42, Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> a écrit :  
Will be happy to talk tomorrow or Friday Trent.

Kwe

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED] (b) (6)>  
**Date:** Wednesday, April 7, 2021 at 8:38 AM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Dylan H. Morris" <[REDACTED] (b) (6)>  
**Cc:** "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED] (b) (6)> "Plowright, Raina" <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Vincent- Please look at the email from yesterday at **Date:** Tuesday, April 6, 2021 at 12:05 PM the NBACC paper is there.

Agree with Dylan about the resolution(good call on the longer timepoints) and with Vincent regarding the correction with the PCR.

Vincent/Kwe-Would you like to have a meeting tomorrow sometime or Friday morning? We can discuss what need to be done to finish this up.

Thanks everyone!

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Wednesday, April 7, 2021 7:28 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Can you send the NBACC paper around, haven't seen it yet. I knew they were working on a comparison.

I think from our end it would be good if we see differences to confirm those. The best way of doing this doing it with a similar strains from these lineage (I think a repeat with a WA1-lineage virus might be good?). this will likely mean I have to see if we can get another early strain in (the only good one we have at the moment is the WA1

On a different note, have you ever tried to play with the data from the EID n=1 paper? Think chad Roy is one of the co-authors?

I think if we push out a different message we need to be absolutely sure we are right, so that might need some additional work

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <(b) (6)>  
**Sent:** Wednesday, April 7, 2021 1:05 AM  
**To:** Adney, Danielle (NIH/NIAID) [F] <(b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>; Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Plowright, Raina <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thoughts about the NBACC paper and ours:

1. We actually did sufficiently long experiments to get resolution on the half-lives. The experiments NBACC did were short; the lack of absolute decay observed makes it hard to determine whether the observed half-lives are truly different.

In other words, the lack of statistically discernible difference could just be due to insufficient absolute decay to gain statistical power.

2. Another is that we have B.1.351, which is valuable info.

3. That said, I think there might be value in pushing out a preprint relatively quickly, while the info remains timely. That said, we of course need to trust that the results are robust.

With that in mind, one potential issue: one question is how much we trust that the differential degrees of PCR loss across experiments, as those will drive how big/small we think the differences really are.

On Apr 7, 2021, at 12:31 AM, Dylan H. Morris <(b) (6)> wrote:

Hi everyone,

Here are half-life estimates with PCR correction. Notice that the PCR correction makes all estimated half-lives longer, as expected. But it has a more profound effect on the variants, since we observed less decay with them.

Contrary to what the NBACC folks found, it looks like the variants might indeed be somewhat more persistent.

Indeed, we should think about how to make sure our paper is not "scooped" by theirs. Jamie, Amandine, and I chatted briefly about this today.

Will follow up with a second email summarizing our thoughts.

Fig. 1: est half-lives  
<figure-halfives.pdf>

Fig 2: Est. differences versus WA1  
<figure-differences.pdf>

Fig 3: Regression fit.  
<figure-regression.pdf>

On Apr 6, 2021, at 12:57 PM, Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6) wrote:

I'm available on the 16<sup>th</sup> and would love to help!

Thanks,  
Danielle

--

Danielle Adney, DVM, PhD  
Virus Ecology Section  
Laboratory of Virology  
NIH/NIAID

If you are receiving this email outside of your typical working hours, I hope you feel no pressure to read or respond until your schedule and workload permit.

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED]> (b) (6)  
**Date:** Tuesday, April 6, 2021 at 12:05 PM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED]> (b) (6)  
**Cc:** "Plowright, Raina" <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) "Dylan H. Morris" <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6)  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hey I would like to plan for titration day (24) plates on the TMPRESSII (Japan) and Vero-UNC cells for 4/16/2021? Either me and Kwe or me and Danielle can get this done. Readout would be the week after ~4/21/2021.

Please everyone have a look at this nice paper from NABCC (<https://academic.oup.com/jid/advance-article/doi/10.1093/infdis/jiab171/6209391>). Please have a close look at the conclusion and let me know if you have an opinion.

Hope you are all doing well.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Thursday, April 1, 2021 10:23 AM  
**To:** 'Jamie Lloyd-Smith' <(b) (6)> 'Dylan H. Morris' <(b) (6)> 'Amandine Gamble' <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>  
**Cc:** 'Plowright, Raina' <(b) (6)> Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Dylan,  
Here is the qRT-PCR data for aerosol samples for all the runs for WA1, Sav and the UKv in **yellow**.

Thank you Kwe for looking over the data with me.

Let me know if you have questions.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Wednesday, March 24, 2021 2:24 PM  
**To:** 'Jamie Lloyd-Smith' <(b) (6)> Dylan H. Morris <(b) (6)> Amandine Gamble <(b) (6)>  
**Cc:** Plowright, Raina <(b) (6)> Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Great can't wait to see the model output! Dylan/Amandine has been great and the quick turnaround.

I will get the RNA extracted this Friday but should have data early next week.

-Trent

---

**From:** Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Sent:** Wednesday, March 24, 2021 2:06 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Dylan H. Morris <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F]  
<[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Munster,  
Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]  
<[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thanks Trent. Fascinating -- it also looks more stable (by my very rough eyeball analysis of the 8h decays). Will await the formal model output, which brings in the 3h data.

cheers,  
Jamie

On Wed, Mar 24, 2021 at 12:48 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:  
Hey,  
Here is the titration for SA Variant (new stock of B.1.351) hCoV-19/USA/MD-HP01542/2421.

Thank you!

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 23, 2021 9:23 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E]  
<[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)>; Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Wonder whether we need to confirm this with an additional B.1.1.7 strain, might be a bit tricky to base it on the analyses of one strain

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 23, 2021 8:49 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>



Kwe Claude, Yinda (NIH/NIAID) [F] < [REDACTED] (b) (6) Munster, Vincent (NIH/NIAID) [E] < [REDACTED] (b) (6) Plowright, Raina < [REDACTED] (b) (6) Adney, Danielle (NIH/NIAID) [F] < [REDACTED] (b) (6) Holbrook, Myndi (NIH/NIAID) [C] < [REDACTED] (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Good morning! Here's the model read-out. Hint that B.1.1.7 might be more persistent on top of everything else, though we'll want to do PCR correction to be sure (these are not PCR-corrected)

Best,  
Dylan

On Mar 22, 2021, at 6:05 PM, Bushmaker, Trenton (NIH/NIAID) [E] < [REDACTED] (b) (6) wrote:

Here is the titration data for the UK variant for T0, 8hours. Thank you Kwe for having a look!

The new stock South African variant (B.1.351) for timepoint T0,8hours will be read on Wednesday.

Let me know if you have any questions.

-Trent

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**From:** Dylan H. Morris < [REDACTED] (b) (6) >  
**Sent:** Thursday, March 18, 2021 2:49 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] < [REDACTED] (b) (6) >  
**Cc:** Amandine Gamble < [REDACTED] (b) (6) > Kwe Claude, Yinda (NIH/NIAID) [F] < [REDACTED] (b) (6) > Munster, Vincent (NIH/NIAID) [E] < [REDACTED] (b) (6) > Plowright, Raina < [REDACTED] (b) (6) > Adney, Danielle (NIH/NIAID) [F] < [REDACTED] (b) (6) > Holbrook, Myndi (NIH/NIAID) [C] < [REDACTED] (b) (6) > Jamie Lloyd-Smith < [REDACTED] (b) (6) >  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

New plots!

On Mar 17, 2021, at 10:38 PM, Bushmaker, Trenton (NIH/NIAID) [E] < [REDACTED] (b) (6) > wrote:

Here is the titration data for new stock South African variant(B.1.351) for timepoint T0,3hours.

I will have titration date for UKv(B.1.1.7) for T0,8hrs on Monday(22<sup>nd</sup>).

I will have titration data for new stock South African variant(B.1.351) for timepoint T0,8hours on Wednesday next week.

Happy St. Pats day, hope you all enjoy a green beer!

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Wednesday, March 10, 2021 11:51 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Oops forgot to attach!

On Mar 10, 2021, at 1:50 PM, Dylan H. Morris <[REDACTED] (b) (6)> wrote:

Here you go. Half-life looks to be above 2h, which would imply losing about 1.2 log<sub>10</sub> in 8 h. Only potential problem is the slightly lower T=0. Still, my guess is it will be fine. Worst case scenario, it's right around the LOD. Could probably get resolution by doing a couple extra wells at zero dilution

(e.g. if we're right around the LOD, might get 0 / 4 positive, but probably at least one of 8 wells positive)

On Mar 10, 2021, at 1:05 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan/Amandine,

Here is the titration data for the UK variant (B.1.1.7) for the timepoint 0, 3hrs.

Could you have a quick look to confirm the later timepoint of 8 hour because I will need to start these runs on this Friday(3/12/21).

Thank you!

In addition, I will have the titrations for timepoint 0,3hrs for the new stockSouth African variant next week Wednesday(3/17/21). However, I will need to start on the T0, 8hour aerosol runs on Tuesday so I can get them done. We have a deadline for a lab recertification coming up.

Let me know if you have questions. Hope all is well!

-Trent

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**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Friday, March 5, 2021 10:58 AM  
**To:** Dylan H. Morris <(b) (6)> Amandine Gamble <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Plowright, Raina <(b) (6)> Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)>  
**Subject:** IMPORTANT- RE: Goldberg drum - WA1, UK, and SA variants

Dylan/Amandine,  
Important part- I will need a quick turn around because I'm starting the SA variant's LATER timepoint on Monday. We will need to figure out what we want to do for this LATER timepoint (8hr, 12-hardest, 18, or 24hrs) before Monday.

Titration sheet is attached.

WA1 has both T0,3hr and T0,8hr, I looks pretty good by eye balling it. I will work independent of you this afternoon to look at the decay for WA1. Dylan you did a really good job with the 8 hr timepoint!

For the SA variant, I redid the titrations but was only able to read 2 of the 3 plates. We had a little issue with the third plate because we missed a row which messed up the rest of the plate. Oh well. I did put all 5 plates on the titration sheet for T0,3hr for you to work with.

Talk with you both soon! Here is my cell phone if you want a quick reply (b) (6). I will be in BSL4 till 1:30pm MTime today.

-Trent

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**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Tuesday, March 2, 2021 9:56 AM  
**To:** Dylan H. Morris <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Amandine Gamble <(b) (6)>  
**Cc:** Jamie Lloyd-Smith <(b) (6)> Plowright, Raina <(b) (6)> Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Thank you crew. Call me if you have questions. Just prepping for these studies today.

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 2, 2021 9:52 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

I can try to analyze the PCR data today.

On Mar 2, 2021, at 11:50 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Yes, so focus on the UK variant (B.1.1.7). Genotypically the current B.1.351 is weird (we'll have a correct one at the end of this week, but still needs to be grown). Whereas it shouldn't impact on the stability, the recovery sensitivity might be different.

Lets see what it looks like with the PCR data. Waiting until April does not make much sense (as there will likely be another variant)

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 2, 2021 9:08 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thanks! Personally, I would suggest getting something out quickly rather than delaying to include CA VOC. B.1.351 and B.1.1.7 very informative for a lot of the other VOC/VOI, since there's so much convergence.

And less stress for Trent too.

On Mar 2, 2021, at 11:03 AM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Here is the qRT-PCR data for the E-assay "Results for UCLA\_qRT-PCR\_E-assay\_Aero WA1 and SAv\_2021-02-03".

Two things to keep on the radar:

1. If we add the CA VOC this will have to be done after we get Suite D back from the annual shutdown which is slotted for March 23- ~April 15<sup>th</sup>. For people that don't speak BSL4 lingo, I am currently booked till March 23<sup>rd</sup> with the current SAv, UKv, and WA1 strain project. This is already a tight window to get things done. This required annual shutdown will stop all aerosol work between the dates of March 23- ~April 15<sup>th</sup>.
2. This is mostly for Vincent but if we don't think this SAv (B.1.351) is the correct variant should we omit this upcoming longer timepoint. This can be decided after we see the data normalized with the qRT-PCR.

Thanks everyone for your input, learning a bunch.

-Trent

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**From:** Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 2, 2021 7:43 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E]  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi Trent and Vincent,

Thanks for the info regarding B.1.351. Indeed it would be even better if you can get data for the CA VOC.

Dylan made this plot on the raw titration data. Trent, you can send the PCR data our way (I don't think we got them yet, right?) and we will see how much it changes after normalization.

Looking forward to more data! Thanks again for all the hard work getting the isolates and then in BSL4!

Amandine

Le mar. 2 mars 2021 à 09:19, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> a écrit :  
The B.1.351 is a bit weird, as it has several mutations (not fixed) at ~ 80% in the reads in spike (one transitioning the furin cleavage site into a trypsin site, so not the cleavage deletion but still a SNP not

reported in the natural variant which might affect our ability to recover it a bit). We are working on getting better strain in. I think we need to repeat the B.1.351 with a fully genetic comparable one.

In addition, we should likely add the 452-CA-VOC as well, to make an even better panel.

Did you try to normalize based on the PCR data? Any good?

Cheers,

Vincent Munster, PhD  
Chief, Virus Ecology Section  
Laboratory of Virology  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** "Dylan H. Morris" <(b) (6)>  
**Date:** Monday, March 1, 2021 at 11:10 PM  
**To:** Trenton Bushmaker <(b) (6)>  
**Cc:** Amandine Gamble <(b) (6)> Jamie Lloyd-Smith  
<(b) (6)> "Plowright, Raina" <(b) (6)> "Adney, Danielle (NIH/NIAID) [F]"  
<(b) (6)> "Holbrook, Myndi (NIH/NIAID) [C]" <(b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some fits and half-life estimates for B.1.351 and WA1

Definitely need the later timepoint for B.1.351 to be sure, but it looks like there might be a real difference. There also might not.

The model is very uncertain about the half-life of B.1.351 since minimal infectious virus appeared to be lost during the 3 hr experiment.

Best,  
Dylan

On Mar 1, 2021, at 5:07 PM, Dylan H. Morris <(b) (6)> wrote:

Excellent. Yes, please send it over!

On Mar 1, 2021, at 1:21 PM, Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> wrote:

Dylan,

Here is the titration data "2021-03-01 Raw data - 22C @ 65%RH- WA1, UK, & SA" for WA1 and SA<sub>v</sub> (B.1.351). I will be very interested to hear what you think and what you think about the later timepoint.

I have the PCR data done for the WA1 and SA<sub>v</sub> (B.1.351) samples I you want that data now?

Update for this week:

1. UK variant stock for aerosol runs does not detecting any deletion of the furin site from sequencing. Stock titer is  $10^{5.7}$ .
2. Aerosol runs for UK variant, for timepoints 0 and 3hrs, is on Monday(today), Wednesday, and Friday.
3. I will starting the titrations on the UKv 0 and 3hr on Friday and will be read next Wednesday(3/10).
4. Titration read out for WA1 0 and 8hour timepoints will be this Wednesday(3/3).

Let me know I you have questions.

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Monday, February 22, 2021 10:24 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Awesome! Thanks so much for your hard work!

On Feb 22, 2021, at 12:20 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Update for this week:

1. SAvariant titrations will be read on Wednesday, this is the 0 and 3 hours timepoints.
2. WA1 and SA<sub>v</sub> PCR samples will be extracted this week, this is the 0 and 3 hours timepoints.
3. UK variant stock is grown and I will have titers on Wednesday.
4. UK variant stock will be sequenced this week to look for furin cleavage site.
5. I'm starting the WA1 strain 0 and 8 hour timepoints today. Titrations will be start on Friday and read next Wednesday.

Update everyone later this week with data.

-Trent

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**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Tuesday, February 9, 2021 5:01 PM

**To:** Dylan H. Morris <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Cc:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

What is your estimate for 8 hours? Somewhere between  $10^{0.75}$ -  $10^1$ ? I would be more comfortable around  $10^1 - 10^{1.25}$  in case we see a drop.

8 hours can be done but Jamie will owe me tickets to a NHL game ☐jk.

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 4:55 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Got it. Based on our back-of-the-envelope calculations, the best option in that case might be 8 hours. Would that potentially be an option? We can also do a bit more modeling. 9 could work too, but might be a little long.

On Feb 9, 2021, at 5:31 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan,  
It looks like all inoculum (WA1, SA, & UK) will be  $\sim 1 \times 10^6$ . The WA1 was  $1.7 \times 10^6$ .

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 3:07 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

If we can go high enough, 12 hours is viable, and then we'll get a clearer estimate of the half-life. Otherwise we can do 9.

On Feb 9, 2021, at 5:02 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

In this case, would it be the highest of the lowest? Or WA1 as a standalone?



Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Dylan H. Morris <(b) (6)>  
**Sent:** Tuesday, February 9, 2021 2:59 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

How high do you reckon you can get the WA1 inoculum? That'll determine 9 versus 12.

On Feb 9, 2021, at 4:51 PM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Sounds good, fingers crossed. Pretty sure we're still one of the only US labs with these viruses

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Tuesday, February 9, 2021 2:46 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Dylan H. Morris <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hello crew,  
I would like to figure out this extended timepoint (either 9 or 12) by the end of this week if we can? Just need some time to prep.

Plan for now...

Stocks:

- UKvariant- Start 2/12, titrations-2/19, Readout- 2/24

Runs:

- Feb.14-20 - 3x runs of SAvariant at T0,3hr
- Feb. 21-27 - 3x runs of WA1 at T0, 9 or 12hr - this is the timepoint we need to figure out?
- Feb. 28-Mar.6 - 3x runs of UKvariant at T0,3hr
- Mar. 7-13 - 3x runs of SAvariant at T0,??hr
- Mar. 14-10 - 3x runs of UKvariant at T0,??hr

Titration and readout

- SAvariant at T0,3hr – 2/19, readout 2/24
- WA1 at T0, ??hr – 2/26, readout 3/3
- UKvariant at T0,3hr – 3/5, readout 3/10
- SAvariant at T0,??hr – 3/12, readout 3/17
- UKvariant at T0,??hr – 3/19, readout 3/24

-Trent

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**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Monday, February 8, 2021 11:53 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Dylan H. Morris <(b) (6)>  
**Cc:** Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

It takes ~1 ½ hours to get the Timepoint 0. It will take the 1 – 1 ½ for the final timepoint.

As Vincent said 15 hr point is not doable. 6 hour will take some work to do but not preferred. 9 and 12 can be done.

It is looking like our UK strain will be ~ 10<sup>5</sup> for the starting inoculum. Can you run the model with this number for which timepoint you want?

South African will be higher (~10<sup>7</sup>) so we should be good on that. Start with the same dilution as we did for the WA1. We will probably start with the SA strain and see if we can increase the inoculum titer for the UK.

-Trent

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**From:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Saturday, February 6, 2021 8:25 AM  
**To:** Dylan H. Morris <(b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

With a bit of planning every point might be doable, other than the 15 hour one

Trent: how long exactly does it take you to start a run?

e.g. prep at 8, start run at 9 am? Sample at 9pm?

Vincent Munster, PhD

Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Friday, February 5, 2021 8:24 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

I think 18h is probably too long given the T=0h measurements. I think we'd dip below the LOD. And I'm especially concerned given what you said about smaller initial virus concentrations for the new variant.

Which of the following intervals would be most practical given your protocols in 4?

- A) T=0h, T=6h
- B) T=0h, T=9h
- C) T=0h, T=12h
- D) T=0h, T=15h

Something else?

On Feb 5, 2021, at 4:47 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan/Amandine,  
Thank you again for the quick turnaround for the graphs. It was a big hit today in the presentation I think!

So we need to discuss the later timepoint. What do you think would be a good timepoint? 18hrs?

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 8:41 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some quick figures. Half-life looks to be 1 to 2 hours.

On Feb 4, 2021, at 1:27 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

I think at the moment anything goes

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Thursday, February 4, 2021 11:18 AM  
**To:** Dylan H. Morris <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Amandine Gamble <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Good idea Vincent.

-Trent

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**From:** Dylan Morris <[REDACTED]> (b) (6)  
**Date:** Thursday, February 4, 2021 at 11:15 AM  
**To:** Vincent Munster <[REDACTED]> (b) (6)  
**Cc:** Trenton Bushmaker <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Could do a virological micropub? Or does that have to be genetics?

Or just a skinny preprint to which we can add B.1.351 when ready.

On Feb 4, 2021, at 1:11 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

I think we should be able to run the UK variant very soon, we should probably see if that alone would already be good to get a preprint out or at least some communication in the public domain while we work on getting the SA variant plugged in?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Thursday, February 4, 2021 11:09 AM  
**To:** Dylan H. Morris <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6)

**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Dylan/Amandine,

Here is the temp and RH for the first (3) run of WA1 at timepoints 0 and 180 minutes.

-Trent

---

**From:** Dylan Morris <[REDACTED] (b) (6)>

**Date:** Thursday, February 4, 2021 at 10:50 AM

**To:** Vincent Munster <[REDACTED] (b) (6)>

**Cc:** Trenton Bushmaker <[REDACTED] (b) (6)> Jamie Lloyd-Smith

<[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Agreed. Data looks clean; congrats and thanks, Trent! I think we'll get a decent read out here on the half-life, and a good idea of how long to go for the longer run.

On Feb 4, 2021, at 12:48 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Looked pretty solid by eyeballing the data

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Sent:** Thursday, February 4, 2021 10:42 AM

**To:** Dylan H. Morris <[REDACTED] (b) (6)>

**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>

Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thank you! Let me know if you have questions.

-Trent

---

**From:** Dylan Morris <[REDACTED] (b) (6)>

**Date:** Thursday, February 4, 2021 at 10:41 AM

**To:** Trenton Bushmaker <[REDACTED] (b) (6)>

**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble

< (b) (6) Vincent Munster < (b) (6)

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Excellent. Thanks, Trent! Will get right on this.

On Feb 4, 2021, at 12:39 PM, Bushmaker, Trenton (NIH/NIAID) [E] < (b) (6) wrote:

Hey crew,

Here is the excel file with the first (3) runs for WA1 at timepoints 0 and 180 minutes. Let me know what you think we should do for the extended timepoint after run through the model.

Dylan/Amadine- As we discussed I would like to include this in my talk tomorrow @ 1pm MT but just let me know if you can't make timeline.

I will get a better idea what the starting inoculum titers will be for the UK and South African variants the middle of next week. Estimate is that we will have to be starting with a lower titer. I will update you when I find out more.

I will start to grow those up at the end of next week. My schedule looks like you should have some data again around the first week of March.

Thank you everyone.

-Trent

---

**From:** Trenton Bushmaker < (b) (6)

**Date:** Wednesday, February 3, 2021 at 1:03 PM

**To:** Vincent Munster < (b) (6)

**Cc:** "Plowright, Raina" < (b) (6) "Adney, Danielle (NIH/NIAID) [F]"

< (b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" < (b) (6)

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Vincent,

Here is the titration data for the first (3) runs of WA1 variant at timepoints 0 or 180 mins. I will send UCLA the excel file once you approve here today.

-Trent

---

**From:** Trenton Bushmaker < (b) (6)

**Date:** Wednesday, January 27, 2021 at 3:44 PM

**To:** Vincent Munster < (b) (6)

**Cc:** "Plowright, Raina" < (b) (6)

**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Vincent,

Updates the on the project:

1. For people helping on the project- Myndi will do the cells-TMEPRESS for titrations plates and the stocks. Danielle and me will do titrations. Kwe will help me with the quant qRT-PCR analysis and some paper writing. Dylan will work on the decay with me and paper writing. Let me know if you are ok with this?
2. For your email attached- For the aerosol stocks I think you already know the issues with the UK stock but the stock is only growing to  $10^4$  for the BEI isolate from California. Brand, Neeltje, and Myndi already know I need minimum of 120ml of stock of the highest stock. HOWEVER, if we get the South African (SA) variant grown up before the UK is figured out I will start with it.

I'm still projecting to be done with this project by the end of February.

Bob is in charge of the surface stability(according to Kwe) but let me know how you would like to proceed with it.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Tuesday, January 12, 2021 7:07 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Maybe ask in todays meeting: just lay-out the tasks and we can see who signs-up?

Vincent Munster, PhD  
Chief, Virus Ecology Section  
Laboratory of Virology  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:** Monday, January 11, 2021 at 2:04 PM  
**To:** "[REDACTED] (b) (6)" <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Vincent,

I'm looking at personnel to help me with this experiment. I'm thinking Myndi to grow stocks because she will be doing it anyways in BSL3. Vicky and Myndi to maintain cells for titrations and do plates(Monday passage, Thursday plate for Friday titrations). Danielle to help me with titrations(Fridays) and reading plates(Wednesdays/Thursdays).

Danielle and Vicky I would like to have involved because it will free up the senior group for other experiments.

Let me know if you agree with this.

Looks like at Goldberg runs on Monday, Thursday, and Friday. Titrations on Friday afternoon. Might have to do a few weekend days to accommodate for Cara's schedule and school.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Friday, January 8, 2021 11:56 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Amandine Gamble  
<(b) (6)> Jamie Lloyd-Smith <(b) (6)> Dylan H. Morris  
<(b) (6)>  
**Cc:** Plowright, Raina <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hey guys,

Please do understand the technical limitation of the set-up in a high containment laboratory. I favor shorter experiments, which will allow us to more rapidly determine whether there are differences between the isolates.

Given that the transmission window is likely under 3 hours, I'm not particularly in favor making these experiments longer in duration than absolutely necessary. Anything over a 3 hour window will have massive implication on the way we conduct experiments.

My main priority is not running a model, but a providing good comparison between the different strains, which should be done in under 3 hours. A limited analyses as was done in the NEJM should be sufficient (I'm not against running a model, but human resources are extremely limited and I think it would be best to have an experimental design which would get us the best result with the least effort). Also this data is urgent, and I don't want to have any delays with getting this data out.

Of note, you don't "lose" 2 logs during the spray, that's just the experimental system (from collision to collection), this is fixed for every experiment so no difference is expected there between variants (or viruses)

As discussed this week, at the moment no isolates are in yet (again, try to understand that this is a massive undertaking and is a process of several weeks), but titers are expected in the WA1 range

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Thursday, January 7, 2021 8:14 PM



**To:** Amandine Gamble <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) Dylan H. Morris <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thank you for the quick reply, I like the points you made. I have some time tomorrow in BSL4 from 9-2pm to think and reply, thanks crew.

-Trent

---

**From:** "Amandine Gamble" <[REDACTED]> (b) (6)  
**Date:** Thursday, January 7, 2021 at 7:01:22 PM  
**To:** "Jamie Lloyd-Smith" <[REDACTED]> (b) (6) "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Dylan H. Morris" <[REDACTED]> (b) (6) "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Plowright, Raina" <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Thanks Trent for all the info and your work on those new strains (among other things!). I only have two minor thoughts following up on Jamie's e-mail:

- As Jamie noted, the longer we wait before taking the second time point, the more precise our estimate of decay rate / half-life will be (as long as we are still above the LOD), so I would also be tempted to target 4 or 5h rather than 3h based on the data we had for the NEJM paper and the fact that you are now using a more sensitive titration protocol (if we understood well), however that obviously depends on the starting dose (the intercept on the graph Jamie put) so, my question is: **do you have any idea of the stock concentrations for the new variants**, and whether we have any reason to expect more loss during spraying? It looks from the NEJM paper that we lose around 2 log<sub>10</sub> during spraying with WA1 (and SARS-CoV-1). I guess you all already thought about this, but just writing down in case (there are lots of things to think about!). Also, if you already have an idea on the stock concentration, Dylan can run some analyses on mock data (as mentioned by Jamie) accounting for this, the loss at spraying and potential decay rates, as pointed by Jamie.

- The second point can be discussed after you got the data as it is only about formatting. I see from the raw data attached to one of the e-mails (the scan of the hand-written data) that some wells are blank, although in the Excel file we received, all the wells were classified as + or -. I assume that you did not collect data from those blank wells because you could assume they were all positive (based on higher dilutions being positive) or negative (based on lower dilutions being negative), right? Dylan can correct me, but I think his model would run perfectly on the raw data, even if they are

"incomplete". In other words, I think we can let the model do what you were already doing when you complete the blank wells so there is no need for you to do this. So in the future, **we are happy to work on the raw data (i.e., with +, - and blanks [that you can note "NA" so we know it is not just a forgotten well]), rather the completed version (with only + and -)**. You can even just send us a scan of your data and we can generate the Excel file if you prefer.

With all this, I also wish you all the best for 2021 =)

Amandine

Le jeu. 7 janv. 2021 à 16:53, Jamie Lloyd-Smith <[REDACTED]> (b) (6) a écrit :

Hi Trent, hi everyone (also copying in Amandine since she's the one on our side with most experience with the raw data),

Great to hear this -- a few quick responses.

- 22/65 makes sense to me

- great to add the SA strain!

- I hope we are planning to collect new data on the WA1 strain, not reuse the NEJM data. There were enough differences in design with the original experiments that I think it would be MUCH stronger science to study all three strains using the same design (updated to avoid some of the challenges of the first round). (Actually from your comment about 'another 9 days' to add a timepoint, i.e. 3 viruses times 3 replicates, I think we're on the same page here.)

- I think the 5% decline in RH due to settling should be OK, if it's basically consistent across the viruses. We can think about whether to account for it in the modelling... my instinct is that we can leave it out of the model unless it differs significantly across replicates and viruses.

- Great to hear about T=0. That's especially crucial if we're just doing the one later time-point.

- Regarding the timing of the later timepoint, I was surprised by your statement, since my memory from the NEJM paper was that the above-LOD detections would have continued well beyond 3 hours. i.e. look at the plots:

<image001.png>

The SARS-CoV-2 data (red) started at a lower titer, but given the slopes it looks like there'd still be useful super-LOD data out to 5 and probably 6 hours. The SARS-CoV-1 data (blue) show the same slope with a higher intercept, and look like they'd stay above LOD out to 6 hours and beyond. Looking at the raw well data, the difference in + counts across time points isn't so striking, i.e. it's not like we're losing a dilution per hour - which makes sense, given the estimated half-life of ~3 hrs. Also if I'm not mistaken, Neeltje or Vincent mentioned that you guys have changed protocols (spin inoculation and different cell line) to get higher sensitivity in culture.

Bottom line: again, it will depend on the titers achievable at T=0, but unless I'm misreading things badly I think there would be value in extending that later timepoint. I know there are complexities about how long you can spend in BSL4, etc, but I'm just talking about the raw information content.

Dylan, Amandine, any further/other thoughts? Dylan, do you want to do a quick analysis with mock data (and reasonable noise) to think about the power we'd have to distinguish differences among variants using this design (i.e. 3 replicates of a single uninterrupted decay window)? And how that might change if we stretch the window to longer time periods? Or if we need more information to get

better estimates, do we do as well by adding a 4th replicate at the long time point, rather than adding intermediate time points? (nothing magic about intermediate time points, except for prettier decay graphs. one replicate at 5h might be equivalent to 2 at 2h, in terms of information gained)

cheers,  
Jamie

On Thu, Jan 7, 2021 at 3:51 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
wrote:

Jamie/Dylan,

First, I have added the pervious email so we can all stay on the same page(UK variant shams).

Next, I have talked with Vincent today but would like your input. For a quick paper, I think we should do condition at 22C @ 65%RH – hospital setting. Is everyone ok with this? This was the same setting as we had in the NEJM paper.

Third, we will do the UK variant (VOC), South African (SA) variants, and the original NEJM paper Washington (WA1) for the comparison.

Four, will a 5% percent decrease over 3 hours of the relative humidity cause issues with anything? This happens when nothing is pulled out of the drum, it just happens because of the time frame of 3 hours with the deposition. It should be ok for this decay model(linear regression) correct? I just want to confirm.

Lastly and most important, we will “for sure” have a timepoint at 0 minutes to check for the start values. However, we need to discuss the last timepoint. The LOD for our titrations with our cell culture seems to happen between 180-240 mins, so I would stick with the 180 minute timepoint (titrations attached- “2019-nCoV titrations goldberg drum.jpeg”). Do you agree with this? It would give you two points at timepoint 0 and 180 minutes.

I will collect (4) qRT-PCR per timepoint 0 and (4) more during the later timepoint.

How does this sound? Think about the later timepoint. Each run is a day of work in BSL4 and 10ml of virus. If in addition you want to collect at a middle timepoint this will adding another 9 days of BSL4 work, that will have to be spread out over 3 weeks. We can also think about a later timepoint. The titrations will be useless but qRT-PCR might be interesting. I think this will be usefully for a later experiment because we want to get this out quickly.

-Trent

--

James O. Lloyd-Smith

Professor

Department of Ecology & Evolutionary Biology

Department of Biomathematics

University of California, Los Angeles

610 Charles E Young Dr South

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Office: 4135 Terasaki Life Sciences Building

Lab: 4000 Terasaki Life Sciences Building

<2020-03-24 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-01 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<Results for UCLA\_qRT-PCR\_E-assay\_Aero WA1 and SA\_v\_2021-02-03.xls>

<2021-03-10 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-17 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-22 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

--

James O. Lloyd-Smith

Professor

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**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Wed, 7 Apr 2021 13:36:20 +0000  
**To:** Dylan H. Morris; Adney, Danielle (NIH/NIAID) [F]  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E]; Kwe Claude, Yinda (NIH/NIAID) [F];  
Holbrook, Myndi (NIH/NIAID) [C]; Plowright, Raina; Jamie Lloyd-Smith; Amandine Gamble  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Forgot to answer your other question, I think the correction with the PCR is the way to do is. To be absolutely sure, we can repeat the extraction (as Trent is planning a titration) and run them again to see how consistent they are.

Trent if you rerun these, you need to check whether the first set was run on the rotorgene or the quant studio. Make sure that only the gRNA is run and not sgRNA.

Lastly, it would (again) be good to double check with an independent strain from the same lineage to ensure we are not running into some strain dependent effect

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <(b) (6)>  
**Sent:** Wednesday, April 7, 2021 12:31 AM  
**To:** Adney, Danielle (NIH/NIAID) [F] <(b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Plowright, Raina <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Here are half-life estimates with PCR correction. Notice that the PCR correction makes all estimated halflives longer, as expected. But it has a more profound effect on the variants, since we observed less decay with them.

Contrary to what the NBACC folks found, it looks like the variants might indeed be somewhat more persistent.

Indeed, we should think about how to make sure our paper is not "scooped" by theirs. Jamie, Amandine, and I chatted briefly about this today.

Will follow up with a second email summarizing our thoughts.

Fig. 1: est half-lives

Fig 2: Est. differences versus WA1

Fig 3: Regression fit.

On Apr 6, 2021, at 12:57 PM, Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6) wrote:

I'm available on the 16<sup>th</sup> and would love to help!

Thanks,  
Danielle

--

Danielle Adney, DVM, PhD  
Virus Ecology Section  
Laboratory of Virology  
NIH/NIAID

If you are receiving this email outside of your typical working hours, I hope you feel no pressure to read or respond until your schedule and workload permit.

---

**From:** "Bushmaker, Trenton (NIH/NIAID) [E]" <[REDACTED]> (b) (6)  
**Date:** Tuesday, April 6, 2021 at 12:05 PM  
**To:** "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED]> (b) (6)  
**Cc:** "Plowright, Raina" <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) "Dylan H. Morris" <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6)  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hey I would like to plan for titration day (24) plates on the TMPRESSII (Japan) and Vero-UNC cells for 4/16/2021? Either me and Kwe or me and Danielle can get this done. Readout would be the week after ~4/21/2021.

Please everyone have a look at this nice paper from NABCC (<https://academic.oup.com/jid/advance-article/doi/10.1093/infdis/jiab171/6209391>). Please have a close look at the conclusion and let me know if you have an opinion.

Hope you are all doing well.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Thursday, April 1, 2021 10:23 AM  
**To:** 'Jamie Lloyd-Smith' <(b) (6)> 'Dylan H. Morris' <(b) (6)> 'Amandine Gamble' <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]  
<(b) (6)>  
**Cc:** 'Plowright, Raina' <(b) (6)> Adney, Danielle (NIH/NIAID) [F]  
<(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Dylan,  
Here is the qRT-PCR data for aerosol samples for all the runs for WA1, Sav and the UKv in **yellow**.

Thank you Kwe for looking over the data with me.

Let me know if you have questions.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Wednesday, March 24, 2021 2:24 PM  
**To:** 'Jamie Lloyd-Smith' <(b) (6)> Dylan H. Morris <(b) (6)> Amandine Gamble <(b) (6)>  
**Cc:** Plowright, Raina <(b) (6)> Adney, Danielle (NIH/NIAID) [F]  
<(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]  
<(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Great can't wait to see the model output! Dylan/Amandine has been great and the quick turnaround.

I will get the RNA extracted this Friday but should have data early next week.

-Trent

---

**From:** Jamie Lloyd-Smith <(b) (6)>  
**Sent:** Wednesday, March 24, 2021 2:06 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Dylan H. Morris <(b) (6)> Amandine Gamble <(b) (6)> Plowright, Raina <(b) (6)> Adney, Danielle (NIH/NIAID) [F]  
<(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]  
<(b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants



Thanks Trent. Fascinating -- it also looks more stable (by my very rough eyeball analysis of the 8h decays). Will await the formal model output, which brings in the 3h data.

cheers,  
Jamie

On Wed, Mar 24, 2021 at 12:48 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Hey,  
Here is the titration for SA Variant (new stock of B.1.351) hCoV-19/USA/MD-HP01542/2421.

Thank you!

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Sent:** Tuesday, March 23, 2021 9:23 AM  
**To:** Dylan H. Morris <[REDACTED]> (b) (6) Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Amandine Gamble <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6) Plowright, Raina <[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6)  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Wonder whether we need to confirm this with an additional B.1.1.7 strain, might be a bit tricky to base it on the analyses of one strain

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Dylan H. Morris <[REDACTED]> (b) (6)  
**Sent:** Tuesday, March 23, 2021 8:49 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Amandine Gamble <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) Plowright, Raina <[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Good morning! Here's the model read-out. Hint that B.1.1.7 might be more persistent on top of everything else, though we'll want to do PCR correction to be sure (these are not PCR-corrected)

Best,  
Dylan

On Mar 22, 2021, at 6:05 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Here is the titration data for the UK variant for T0, 8hours. Thank you Kwe for having a look!

The new stock South African variant (B.1.351) for timepoint T0,8hours will be read on Wednesday.

Let me know if you have any questions.

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Thursday, March 18, 2021 2:49 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

New plots!

On Mar 17, 2021, at 10:38 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Here is the titration data for new stock South African variant(B.1.351) for timepoint T0,3hours.

I will have titration date for UKv(B.1.1.7) for T0,8hrs on Monday(22<sup>nd</sup>).

I will have titration data for new stock South African variant(B.1.351) for timepoint T0,8hours on Wednesday next week.

Happy St. Pats day, hope you all enjoy a green beer!

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Wednesday, March 10, 2021 11:51 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Cc:** Amandine Gamble <[REDACTED]> (b) (6) Plowright, Raina  
<[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F] <[REDACTED]> (b) (6) Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6)  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Oops forgot to attach!

On Mar 10, 2021, at 1:50 PM, Dylan H. Morris <[REDACTED]> (b) (6) wrote:

Here you go. Half-life looks to be above 2h, which would imply losing about 1.2 log<sub>10</sub> in 8 h. Only potential problem is the slightly lower T=0. Still, my guess is it will be fine. Worst case scenario, it's right around the LOD. Could probably get resolution by doing a couple extra wells at zero dilution

(e.g. if we're right around the LOD, might get 0 / 4 positive, but probably at least one of 8 wells positive)

On Mar 10, 2021, at 1:05 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Dylan/Amandine,  
Here is the titration data for the UK variant (B.1.1.7) for the timepoint 0, 3hrs.

Could you have a quick look to confirm the later timepoint of 8 hour because I will need to start these runs on this Friday(3/12/21).

Thank you!

In addition, I will have the titrations for timepoint 0,3hrs for the new stock South African variant next week Wednesday(3/17/21). However, I will need to start on the T0, 8hour aerosol runs on Tuesday so I can get them done. We have a deadline for a lab recertification coming up.

Let me know if you have questions. Hope all is well!

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Friday, March 5, 2021 10:58 AM  
**To:** Dylan H. Morris <[REDACTED]> (b) (6) Amandine Gamble <[REDACTED]> (b) (6) Jamie  
Lloyd-Smith <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6) Adney, Danielle (NIH/NIAID) [F]  
<[REDACTED]> (b) (6) Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED]> (b) (6)  
**Subject:** IMPORTANT- RE: Goldberg drum - WA1, UK, and SA variants

Dylan/Amandine,

Important part- I will need a quick turn around because I'm starting the SA variant's LATER timepoint on Monday. We will need to figure out what we want to do for this LATER timepoint (8hr, 12-hardest, 18, or 24hrs) before Monday.

Titration sheet is attached.

WA1 has both T0,3hr and T0,8hr, I looks pretty good by eye balling it. I will work independent of you this afternoon to look at the decay for WA1. Dylan you did a really good job with the 8 hr timepoint!

For the SA variant, I redid the titrations but was only able to read 2 of the 3 plates. We had a little issue with the third plate because we missed a row which messed up the rest of the plate. Oh well. I did put all 5 plates on the titration sheet for T0,3hr for you to work with.

Talk with you both soon! Here is my cell phone if you want a quick reply: (b) (6). I will be in BSL4 till 1:30pm MTime today.

-Trent

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Tuesday, March 2, 2021 9:56 AM  
**To:** Dylan H. Morris <(b) (6)> Munster, Vincent (NIH/NIAID) [E]  
<(b) (6)> Amandine Gamble <(b) (6)>  
**Cc:** Jamie Lloyd-Smith <(b) (6)> Plowright, Raina <(b) (6)>  
Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C]  
<(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Thank you crew. Call me if you have questions. Just prepping for these studies today.

-Trent

---

**From:** Dylan H. Morris <(b) (6)>  
**Sent:** Tuesday, March 2, 2021 9:52 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Amandine Gamble  
<(b) (6)> Jamie Lloyd-Smith <(b) (6)> Plowright, Raina  
<(b) (6)> Adney, Danielle (NIH/NIAID) [F] <(b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <(b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

I can try to analyze the PCR data today.

On Mar 2, 2021, at 11:50 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Yes, so focus on the UK variant (B.1.1.7). Genotypically the current B.1.351 is weird (we'll have a correct one at the end of this week, but still needs to be grown). Whereas it shouldn't impact on the stability, the recovery sensitivity might be different.

Lets see what it looks like with the PCR data. Waiting until April does not make much sense (as there will likely be another variant)

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 2, 2021 9:08 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thanks! Personally, I would suggest getting something out quickly rather than delaying to include CA VOC. B.1.351 and B.1.1.7 very informative for a lot of the other VOC/VOI, since there's so much convergence.

And less stress for Trent too.

On Mar 2, 2021, at 11:03 AM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Here is the qRT-PCR data for the E-assay "Results for UCLA\_qRT-PCR\_E-assay\_Aero WA1 and SAv\_2021-02-03".

Two things to keep on the radar:

1. If we add the CA VOC this will have to be done after we get Suite D back from the annual shutdown which is slotted for March 23- ~April 15<sup>th</sup>. For people that don't speak BSL4 lingo, I am currently booked till March 23<sup>rd</sup> with the current SAv, UKv, and WA1 strain project. This is already a tight window to get things done. This required annual shutdown will stop all aerosol work between the dates of March 23- ~April 15<sup>th</sup>.

2. This is mostly for Vincent but if we don't think this SAv (B.1.351) is the correct variant should we omit this upcoming longer timepoint. This can be decided after we see the data normalized with the qRT-PCR.

Thanks everyone for your input, learning a bunch.

-Trent

---

**From:** Amandine Gamble <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 2, 2021 7:43 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Dylan H. Morris <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E]  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi Trent and Vincent,

Thanks for the info regarding B.1.351. Indeed it would be even better if you can get data for the CA VOC.

Dylan made this plot on the raw titration data. Trent, you can send the PCR data our way (I don't think we got them yet, right?) and we will see how much it changes after normalization.

Looking forward to more data! Thanks again for all the hard work getting the isolates and then in BSL4!

Amandine

Le mar. 2 mars 2021 à 09:19, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> a écrit :  
The B.1.351 is a bit weird, as it has several mutations (not fixed) at ~ 80% in the reads in spike (one transitioning the furin cleavage site into a trypsin site, so not the cleavage deletion but still a SNP not reported in the natural variant which might affect our ability to recover it a bit). We are working on getting better strain in. I think we need to repeat the B.1.351 with a fully genetic comparable one.

In addition, we should likely add the 452-CA-VOC as well, to make an even better panel.

Did you try to normalize based on the PCR data? Any good?

Cheers,

Vincent Munster, PhD

Chief, Virus Ecology Section  
Laboratory of Virology  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** "Dylan H. Morris" <(b) (6)>  
**Date:** Monday, March 1, 2021 at 11:10 PM  
**To:** Trenton Bushmaker <(b) (6)>  
**Cc:** Amandine Gamble <(b) (6)> Jamie Lloyd-Smith  
<(b) (6)> " (b) (6) <(b) (6)> "Plowright,  
Raina" <(b) (6)> "Adney, Danielle (NIH/NIAID) [F]"  
<(b) (6)> "Holbrook, Myndi (NIH/NIAID) [C]" <(b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some fits and half-life estimates for B.1.351 and WA1

Definitely need the later timepoint for B.1.351 to be sure, but it looks like there might be a real difference. There also might not.

The model is very uncertain about the half-life of B.1.351 since minimal infectious virus appeared to be lost during the 3 hr experiment.

Best,  
Dylan

On Mar 1, 2021, at 5:07 PM, Dylan H. Morris <(b) (6)> wrote:

Excellent. Yes, please send it over!

On Mar 1, 2021, at 1:21 PM, Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> wrote:

Dylan,  
Here is the titration data "2021-03-01 Raw data - 22C @ 65%RH- WA1, UK, & SA" for WA1 and SAv (B.1.351). I will be very interested to hear what you think and what you think about the later timepoint.

I have the PCR data done for the WA1 and SAv (B.1.351) samples I you want that data now?

Update for this week:

1. UK variant stock for aerosol runs does not detecting any deletion of the furin site from sequencing. Stock titer is  $10^{5.7}$ .

2. Aerosol runs for UK variant, for timepoints 0 and 3hrs, is on Monday(today), Wednesday, and Friday.
  3. I will starting the titrations on the UKv 0 and 3hr on Friday and will be read next Wednesday(3/10).
  4. Titration read out for WA1 0 and 8hour timepoints will be this Wednesday(3/3).
- Let me know I you have questions.

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Monday, February 22, 2021 10:24 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina  
<[REDACTED] (b) (6)> Adney, Danielle (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook,  
Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Awesome! Thanks so much for your hard work!

On Feb 22, 2021, at 12:20 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Update for this week:

1. SAvariant titrations will be read on Wednesday, this is the 0 and 3 hours timepoints.
2. WA1 and SAV PCR samples will be extracted this week, this is the 0 and 3 hours timepoints.
3. UK variant stock is grown and I will have titers on Wednesday.
4. UK variant stock will be sequenced this week to look for furin cleavage site.
5. I'm starting the WA1 strain 0 and 8 hour timepoints today. Titrations will be start on Friday and read next Wednesday.

Update everyone later this week with data.

-Trent

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**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Tuesday, February 9, 2021 5:01 PM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine  
Gamble <[REDACTED] (b) (6)>  
**Cc:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

What is your estimate for 8 hours? Somewhere between  $10^{0.75}$ -  $10^1$ ? I would be more comfortable around  $10^1$  –  $10^{1.25}$  in case we see a drop.

8 hours can be done but Jamie will owe me tickets to a NHL game ☐jk.



-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 4:55 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Got it. Based on our back-of-the-envelope calculations, the best option in that case might be 8 hours. Would that potentially be an option? We can also do a bit more modeling. 9 could work too, but might be a little long.

On Feb 9, 2021, at 5:31 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan,  
It looks like all inoculum (WA1, SA, & UK) will be  $\sim 1 \times 10^6$ . The WA1 was  $1.7 \times 10^6$ .

-Trent

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 3:07 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

If we can go high enough, 12 hours is viable, and then we'll get a clearer estimate of the half-life. Otherwise we can do 9.

On Feb 9, 2021, at 5:02 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

In this case, would it be the highest of the lowest? Or WA1 as a standalone?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 2:59 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Jamie Lloyd-Smith  
<[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

How high do you reckon you can get the WA1 inoculum? That'll determine 9 versus 12.

On Feb 9, 2021, at 4:51 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Sounds good, fingers crossed. Pretty sure we're still one of the only US labs with these viruses

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Tuesday, February 9, 2021 2:46 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Dylan H. Morris  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hello crew,  
I would like to figure out this extended timepoint (either 9 or 12) by the end of this week if we can? Just need some time to prep.

Plan for now...

Stocks:

- UKvariant- Start 2/12, titrations-2/19, Readout- 2/24

Runs:

- Feb.14-20 - 3x runs of SAvariant at T0,3hr
- Feb. 21-27 - 3x runs of WA1 at T0, 9 or 12hr - this is the timepoint we need to figure out?
- Feb. 28-Mar.6 - 3x runs of UKvariant at T0,3hr
- Mar. 7-13 - 3x runs of SAvariant at T0,??hr
- Mar. 14-10 - 3x runs of UKvariant at T0,??hr

Titration and readout

- SAvariant at T0,3hr – 2/19, readout 2/24
- WA1 at T0, ??hr – 2/26, readout 3/3
- UKvariant at T0,3hr – 3/5, readout 3/10
- SAvariant at T0,??hr – 3/12, readout 3/17
- UKvariant at T0,??hr – 3/19, readout 3/24

-Trent

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**From:** Bushmaker, Trenton (NIH/NIAID) [E]  
**Sent:** Monday, February 8, 2021 11:53 AM  
**To:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Dylan H. Morris <(b) (6)>  
**Cc:** Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

It takes ~1 ½ hours to get the Timepoint 0. It will take the 1 – 1 ½ for the final timepoint.

As Vincent said 15 hr point is not doable. 6 hour will take some work to do but not preferred. 9 and 12 can be done.

It is looking like our UK strain will be ~ 10<sup>5</sup> for the starting inoculum. Can you run the model with this number for which timepoint you want?

South African will be higher (~10<sup>7</sup>) so we should be good on that. Start with the same dilution as we did for the WA1. We will probably start with the SA strain and see if we can increase the inoculum titer for the UK.

-Trent

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**From:** Munster, Vincent (NIH/NIAID) [E] <(b) (6)>  
**Sent:** Saturday, February 6, 2021 8:25 AM  
**To:** Dylan H. Morris <(b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

With a bit of planning every point might be doable, other than the 15 hour one

Trent: how long exactly does it take you to start a run?

e.g. prep at 8, start run at 9 am? Sample at 9pm?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Dylan H. Morris <(b) (6)>  
**Sent:** Friday, February 5, 2021 8:24 PM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>  
**Cc:** Jamie Lloyd-Smith <(b) (6)> Amandine Gamble <(b) (6)>

Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

I think 18h is probably too long given the T=0h measurements. I think we'd dip below the LOD. And I'm especially concerned given what you said about smaller initial virus concentrations for the new variant.

Which of the following intervals would be most practical given your protocols in 4?

- A) T=0h, T=6h
- B) T=0h, T=9h
- C) T=0h, T=12h
- D) T=0h, T=15h

Something else?

On Feb 5, 2021, at 4:47 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Dylan/Amandine,

Thank you again for the quick turnaround for the graphs. It was a big hit today in the presentation I think!

So we need to discuss the later timepoint. What do you think would be a good timepoint? 18hrs?

-Trent

---

**From:** Dylan H. Morris <[REDACTED] (b) (6)>

**Sent:** Thursday, February 4, 2021 8:41 PM

**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble

<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>

**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Here are some quick figures. Half-life looks to be 1 to 2 hours.

On Feb 4, 2021, at 1:27 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

I think at the moment anything goes

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 11:18 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Good idea Vincent.

-Trent

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**From:** Dylan Morris <[REDACTED] (b) (6)>  
**Date:** Thursday, February 4, 2021 at 11:15 AM  
**To:** Vincent Munster <[REDACTED] (b) (6)>  
**Cc:** Trenton Bushmaker <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Could do a virological micropub? Or does that have to be genetics?

Or just a skinny preprint to which we can add B.1.351 when ready.

On Feb 4, 2021, at 1:11 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

I think we should be able to run the UK variant very soon, we should probably see if that alone would already be good to get a preprint out or at least some communication in the public domain while we work on getting the SA variant plugged in?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 11:09 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Dylan/Amandine,  
Here is the temp and RH for the first (3) run of WA1 at timepoints 0 and 180 minutes.

-Trent

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**From:** Dylan Morris <[REDACTED] (b) (6)>  
**Date:** Thursday, February 4, 2021 at 10:50 AM  
**To:** Vincent Munster <[REDACTED] (b) (6)>  
**Cc:** Trenton Bushmaker <[REDACTED] (b) (6)> Jamie Lloyd-Smith  
<[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Agreed. Data looks clean; congrats and thanks, Trent! I think we'll get a decent read out here on the half-life, and a good idea of how long to go for the longer run.

On Feb 4, 2021, at 12:48 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Looked pretty solid by eyeballing the data

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, February 4, 2021 10:42 AM  
**To:** Dylan H. Morris <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thank you! Let me know if you have questions.

-Trent

---

**From:** Dylan Morris <[REDACTED] (b) (6)>  
**Date:** Thursday, February 4, 2021 at 10:41 AM  
**To:** Trenton Bushmaker <[REDACTED] (b) (6)>  
**Cc:** Jamie Lloyd-Smith <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)> Vincent Munster <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Excellent. Thanks, Trent! Will get right on this.

On Feb 4, 2021, at 12:39 PM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Hey crew,

Here is the excel file with the first (3) runs for WA1 at timepoints 0 and 180 minutes. Let me know what you think we should do for the extended timepoint after run through the model.

Dylan/Amadine- As we discussed I would like to include this in my talk tomorrow @ 1pm MT but just let me know if you can't make timeline.

I will get a better idea what the starting inoculum titers will be for the UK and South African variants the middle of next week. Estimate is that we will have to be starting with a lower titer. I will update you when I find out more.

I will start to grow those up at the end of next week. My schedule looks like you should have some data again around the first week of March.

Thank you everyone.

-Trent

---

**From:** Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:** Wednesday, February 3, 2021 at 1:03 PM  
**To:** Vincent Munster <[REDACTED] (b) (6)>  
**Cc:** "Plowright, Raina" <ra[REDACTED] (b) (6)> "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Vincent,

Here is the titration data for the first (3) runs of WA1 variant at timepoints 0 or 180 mins. I will send UCLA the excel file once you approve here today.

-Trent

---

**From:** Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:** Wednesday, January 27, 2021 at 3:44 PM  
**To:** Vincent Munster <[REDACTED] (b) (6)>  
**Cc:** "Plowright, Raina" <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Vincent,

Updates the on the project:

1. For people helping on the project- Myndi will do the cells-TMEPRESS for titrations plates and the stocks. Danielle and me will do titrations. Kwe will help me with the quant qRT-PCR analysis and some paper writing. Dylan will work on the decay with me and paper writing. Let me know if you are ok with this?
2. For your email attached- For the aerosol stocks I think you already know the issues with the UK stock but the stock is only growing to  $10^4$  for the BEI isolate from California. Brand, Neeltje,

and Myndi already know I need minimum of 120ml of stock of the highest stock. HOWEVER, if we get the South African (SA) variant grown up before the UK is figured out I will start with it.

I'm still projecting to be done with this project by the end of February.

Bob is in charge of the surface stability(according to Kwe) but let me know how you would like to proceed with it.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Tuesday, January 12, 2021 7:07 AM  
**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Maybe ask in today's meeting: just lay-out the tasks and we can see who signs-up?

Vincent Munster, PhD  
Chief, Virus Ecology Section  
Laboratory of Virology  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Trenton Bushmaker <[REDACTED] (b) (6)>  
**Date:** Monday, January 11, 2021 at 2:04 PM  
**To:** "[REDACTED] (b) (6)" <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Vincent,

I'm looking at personnel to help me with this experiment. I'm thinking Myndi to grow stocks because she will be doing it anyways in BSL3. Vicky and Myndi to maintain cells for titrations and do plates(Monday passage, Thursday plate for Friday titrations). Danielle to help me with titrations(Fridays) and reading plates(Wednesdays/Thursdays).

Danielle and Vicky I would like to have involved because it will free up the senior group for other experiments.

Let me know if you agree with this.

Looks like at Goldberg runs on Monday, Thursday, and Friday. Titrations on Friday afternoon. Might have to do a few weekend days to accommodate for Cara's schedule and school.

-Trent

---

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Friday, January 8, 2021 11:56 AM



**To:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Amandine Gamble  
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Dylan H. Morris  
<[REDACTED] (b) (6)>  
**Cc:** Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:** RE: Goldberg drum - WA1, UK, and SA variants

Hey guys,

Please do understand the technical limitation of the set-up in a high containment laboratory. I favor shorter experiments, which will allow us to more rapidly determine whether there are differences between the isolates.

Given that the transmission window is likely under 3 hours, I'm not particularly in favor making these experiments longer in duration than absolutely necessary. Anything over a 3 hour window will have massive implication on the way we conduct experiments.

My main priority is not running a model, but a providing good comparison between the different strains, which should be done in under 3 hours. A limited analyses as was done in the NEJM should be sufficient (I'm not against running a model, but human resources are extremely limited and I think it would be best to have an experimental design which would get us the best result with the least effort). Also this data is urgent, and I don't want to have any delays with getting this data out.

Of note, you don't "lose" 2 logs during the spray, that's just the experimental system (from collision to collection), this is fixed for every experiment so no difference is expected there between variants (or viruses)

As discussed this week, at the moment no isolates are in yet (again, try to understand that this is a massive undertaking and is a process of several weeks), but titers are expected in the WA1 range

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Thursday, January 7, 2021 8:14 PM  
**To:** Amandine Gamble <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>  
Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Dylan H. Morris  
<[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Plowright, Raina <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Thank you for the quick reply, I like the points you made. I have some time tomorrow in BSL4 from 9-2pm to think and reply, thanks crew.

-Trent

---

**From:** "Amandine Gamble" <[REDACTED] (b) (6)>  
**Date:** Thursday, January 7, 2021 at 7:01:22 PM  
**To:** "Jamie Lloyd-Smith" <[REDACTED] (b) (6)> "Bushmaker, Trenton (NIH/NIAID) [E]"  
<[REDACTED] (b) (6)> "Dylan H. Morris" <[REDACTED] (b) (6)> "Munster, Vincent  
(NIH/NIAID) [E]" <[REDACTED] (b) (6)> "Plowright, Raina" <[REDACTED] (b) (6)>  
**Subject:** Re: Goldberg drum - WA1, UK, and SA variants

Hi everyone,

Thanks Trent for all the info and your work on those new strains (among other things!). I only have two minor thoughts following up on Jamie's e-mail:

- As Jamie noted, the longer we wait before taking the second time point, the more precise our estimate of decay rate / half-life will be (as long as we are still above the LOD), so I would also be tempted to target 4 or 5h rather than 3h based on the data we had for the NEJM paper and the fact that you are now using a more sensitive titration protocol (if we understood well), however that obviously depends on the starting dose (the intercept on the graph Jamie put) so, my question is: **do you have any idea of the stock concentrations for the new variants**, and whether we have any reason to expect more loss during spraying? It looks from the NEJM paper that we lose around 2 log<sub>10</sub> during spraying with WA1 (and SARS-CoV-1). I guess you all already thought about this, but just writing down in case (there are lots of things to think about!). Also, if you already have an idea on the stock concentration, Dylan can run some analyses on mock data (as mentioned by Jamie) accounting for this, the loss at spraying and potential decay rates, as pointed by Jamie.

- The second point can be discussed after you got the data as it is only about formatting. I see from the raw data attached to one of the e-mails (the scan of the hand-written data) that some wells are blank, although in the Excel file we received, all the wells were classified as + or -. I assume that you did not collect data from those blank wells because you could assume they were all positive (based on higher dilutions being positive) or negative (based on lower dilutions being negative), right? Dylan can correct me, but I think his model would run perfectly on the raw data, even if they are "incomplete". In other words, I think we can let the model do what you were already doing when you complete the blank wells so there is no need for you to do this. So in the future, **we are happy to work on the raw data (i.e., with +, - and blanks [that you can note "NA" so we know it is not just a forgotten well]), rather the completed version (with only + and -)**. You can even just send us a scan of your data and we can generate the Excel file if you prefer.

With all this, I also wish you all the best for 2021 =)

Amandine

Le jeu. 7 janv. 2021 à 16:53, Jamie Lloyd-Smith <[REDACTED]> a écrit :

Hi Trent, hi everyone (also copying in Amandine since she's the one on our side with most experience with the raw data),

Great to hear this -- a few quick responses.

- 22/65 makes sense to me

- great to add the SA strain!

- I hope we are planning to collect new data on the WA1 strain, not reuse the NEJM data. There were enough differences in design with the original experiments that I think it would be MUCH stronger science to study all three strains using the same design (updated to avoid some of the challenges of the first round). (Actually from your comment about 'another 9 days' to add a timepoint, i.e. 3 viruses times 3 replicates, I think we're on the same page here.)

- I think the 5% decline in RH due to settling should be OK, if it's basically consistent across the viruses. We can think about whether to account for it in the modelling... my instinct is that we can leave it out of the model unless it differs significantly across replicates and viruses.

- Great to hear about T=0. That's especially crucial if we're just doing the one later time-point.

- Regarding the timing of the later timepoint, I was surprised by your statement, since my memory from the NEJM paper was that the above-LOD detections would have continued well beyond 3 hours. i.e. look at the plots:

<image001.png>

The SARS-CoV-2 data (red) started at a lower titer, but given the slopes it looks like there'd still be useful super-LOD data out to 5 and probably 6 hours. The SARS-CoV-1 data (blue) show the same slope with a higher intercept, and look like they'd stay above LOD out to 6 hours and beyond. Looking at the raw well data, the difference in + counts across time points isn't so striking, i.e. it's not like we're losing a dilution per hour - which makes sense, given the estimated half-life of ~3 hrs. Also if I'm not mistaken, Neeltje or Vincent mentioned that you guys have changed protocols (spin inoculation and different cell line) to get higher sensitivity in culture.

Bottom line: again, it will depend on the titers achievable at T=0, but unless I'm misreading things badly I think there would be value in extending that later timepoint. I know there are complexities about how long you can spend in BSL4, etc, but I'm just talking about the raw information content.

Dylan, Amandine, any further/other thoughts? Dylan, do you want to do a quick analysis with mock data (and reasonable noise) to think about the power we'd have to distinguish differences among variants using this design (i.e. 3 replicates of a single uninterrupted decay window)? And how that might change if we stretch the window to longer time periods? Or if we need more information to get better estimates, do we do as well by adding a 4th replicate at the long time point, rather than adding intermediate time points? (nothing magic about intermediate time points, except for prettier decay graphs. one replicate at 5h might be equivalent to 2 at 2h, in terms of information gained)

cheers,  
Jamie

On Thu, Jan 7, 2021 at 3:51 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)

wrote:

Jamie/Dylan,

First, I have added the pervious email so we can all stay on the same page(UK variant shams).

Next, I have talked with Vincent today but would like your input. For a quick paper, I think we should do condition at 22C @ 65%RH – hospital setting. Is everyone ok with this? This was the same setting as we had in the NEJM paper.

Third, we will do the UK variant (VOC), South African (SA) variants, and the original NEJM paper Washington (WA1) for the comparison.

Four, will a 5% percent decrease over 3 hours of the relative humidity cause issues with anything? This happens when nothing is pulled out of the drum, it just happens because of the time frame of 3 hours with the deposition. It should be ok for this decay model(linear regression) correct? I just want to confirm.

Lastly and most important, we will “for sure” have a timepoint at 0 minutes to check for the start values. However, we need to discuss the last timepoint. The LOD for our titrations with our cell culture seems to happen between 180-240 mins, so I would stick with the 180 minute timepoint (titrations attached- “2019-nCoV titrations goldberg drum.jpeg”). Do you agree with this? It would give you two points at timepoint 0 and 180 minutes.

I will collect (4) qRT-PCR per timepoint 0 and (4) more during the later timepoint.

How does this sound? Think about the later timepoint. Each run is a day of work in BSL4 and 10ml of virus. If in addition you want to collect at a middle timepoint this will adding another 9 days of BSL4 work, that will have to be spread out over 3 weeks. We can also think about a later timepoint. The titrations will be useless but qRT-PCR might be interesting. I think this will be usefully for a later experiment because we want to get this out quickly.

-Trent

--

James O. Lloyd-Smith

Professor

Department of Ecology & Evolutionary Biology

Department of Biomathematics

University of California, Los Angeles

610 Charles E Young Dr South

Box 723905

Los Angeles, CA 90095-7239

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<https://www.eeb.ucla.edu/Faculty/lloydsmith/>

Office: 4135 Terasaki Life Sciences Building

Lab: 4000 Terasaki Life Sciences Building

<2020-03-24 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-01 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<Results for UCLA\_qRT-PCR\_E-assay\_Aero WA1 and SA\_v\_2021-02-03.xls>

<2021-03-10 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-17 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

<2021-03-22 Raw data - 22C @ 65%RH- WA1, UK, & SA.xlsx>

--

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**From:** Plowright, Raina  
**Sent:** Wed, 7 Apr 2021 02:34:45 +0000  
**To:** Hector Aguilar-Carreno  
**Cc:** Colin Parrish; preempt; Alison Peel; Munster, Vincent (NIH/NIAID) [E]; Manuel Ruiz; Amandine Gamble  
**Subject:** Re: UCD viral spillover tool

The reporter just emailed me the Nat Geo article link. I was very 'tactful/political' in my brief comment, BUT SO HAPPY TO SEE MORE BATONEHEALTH SCIENTISTS quoted than scientists from the authoring institution. Nice job Hector and Emily!

<https://www.nationalgeographic.com/science/article/can-a-new-app-predict-the-next-pandemic>

On Apr 6, 2021, at 7:56 AM, Hector Aguilar-Carreno <[REDACTED] (b) (6)> wrote:

I agree with Colin as well.

Hector Aguilar-Carreno  
Associate Professor  
Microbiology and Immunology  
College of Veterinary Medicine  
Cornell University  
Office: [REDACTED] (b) (6)  
[REDACTED]

**From:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Sent:** Tuesday, April 6, 2021 9:53 AM  
**To:** Colin Ross Parrish <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> preempt <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>  
**Cc:** Manuel Ruiz <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** RE: UCD viral spillover tool

Yep, completely agree with Colin

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Colin Ross Parrish <[REDACTED] (b) (6)>  
**Sent:** Monday, April 5, 2021 5:43 PM  
**To:** Plowright, Raina <[REDACTED] (b) (6)> preempt <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>  
**Cc:** Manuel Ruiz <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: UCD viral spillover tool

I had a quick look - not sure what to say about it. They have been doing these things for many years now, and I was also involved in some of the earlier discussions with them, then got cut out of the actual product.

These exercises are OK, and this one is refined and likely improved from the previous ones these people have put out before.

But my guess is that these are better at predicting the past than the future, as most emerged viruses have been those that we have not seen before until they caused an outbreak. The key issues important for epidemic or pandemic emergence are not well understood, and difficult to predict ahead of time. Maybe that will change in the future...

Colin

Colin R. Parrish  
John M. Olin Professor of Virology  
College of Veterinary Medicine  
Cornell University  
Ithaca, NY 14853, USA  
Phone: (b) (6) (cell anywhere); (b) (6) (work - mostly not there - leave a message)

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**From:** Alison Peel <(b) (6)>  
**Sent:** Monday, April 5, 2021 7:30 PM  
**To:** Plowright, Raina <(b) (6)> preempt <(b) (6)>  
**Cc:** Manuel Ruiz <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** Re: UCD viral spillover tool

Thanks Raina,  
Looks like there were a few of us that were on the 'Expert panel' for this – me, Olivier, Barbara, Vincent. From memory, it involved filling out a survey several years ago!  
The website tool doesn't seem to be functioning as planned at the moment – in the ranking comparison site, the filters aren't picking up the correct viruses, and interestingly, they haven't included Hendra or Cedar. I haven't gone through the paper yet to see whether this was deliberate.  
Cheers

Ali

---

**From:** Plowright, Raina <ra (b) (6)>  
**Date:** Tuesday, 6 April 2021 at 12:18 am  
**To:** preempt <(b) (6)>  
**Cc:** Manuel Ruiz <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** UCD viral spillover tool

Hi All,

I was asked to comment on this by a reporter this morning... she didn't send it to me ahead of time so I made some broad and mostly positive comments about what I could gather in 5 minutes (prior to morning coffee!), and I gave her a bunch of your names/email addresses for further interviews.

UCD team present an online spillover assessment tool that combines expert opinion and knowledge of viral traits likely to lead to spillover... would be worthy of a 'preempt lab meeting' some time soon to assess this! Their paper is attached and I think it comes out today or tomorrow.

See you all later today on the PI call.

Raina

**IMAGE:** PRIMATES AND LIVESTOCK EXPLORE THE GROUNDS OUTSIDE A RESIDENCE IN GHANA. [view more](#)

CREDIT: TERRA KELLY, UC DAVIS

SARS-CoV-2 showed the world with devastating clarity the threat undetected viruses can pose to global public health. [SpillOver](#), a new web application developed by scientists at the University of California, Davis, and contributed to by experts from all over the world, ranks the risk of wildlife-to-human spillover for newly-discovered viruses.

SpillOver is the first open-source risk assessment tool that evaluates wildlife viruses to estimate their zoonotic spillover and pandemic potential. It effectively creates a watchlist of newly-discovered viruses to help policymakers and health scientists prioritize them for further characterization, surveillance, and risk-reducing interventions.

The tool is linked to a study published in the journal PNAS, in which the authors identified the most relevant viral, host and environmental risk factors for virus spillover. Then the team ranked the risk from 887 wildlife viruses using data collected from a variety of sources, including viruses detected by the USAID Emerging Pandemic Threats [PREDICT](#) project, which UC Davis' One Health Institute led from 2009 to 2020.

### **CORONAVIRUSES RANK HIGH**

Topping the list were 12 known human pathogens, which was expected and validates the tool's utility. Interestingly, SpillOver ranked several newly-discovered coronaviruses as higher risk for spillover than some viruses already known to be zoonotic. This watchlist includes a novel coronavirus provisionally named PREDICT\_CoV-35, which ranked within the top 20.

The power of the tool lies in the fact that it is open-source--the more data entered, the more robust the ranking. SARS CoV-2 currently ranks second out of the 887 viruses analyzed, between Lassa and Ebola viruses.

That may seem counterintuitive, the authors note, given the pandemic's current global devastation. They explain that the tool is ranking the potential for another spillover beyond what has happened historically. In addition, key information remains undiscovered about SARS CoV-2 and its spillover risk, such as the number



and range of its host species. As scientists learn more about this virus, it is possible SARS CoV-2 will move to No. 1.

"SARS-CoV-2 is just one example of many thousands of viruses out there that have the potential to spillover from animals to humans," said lead author Zoë Grange, who led the development of SpillOver as a postdoctoral researcher with the UC Davis One Health Institute. "We need to not only identify but also prioritize viral threats with the greatest spillover risk before another devastating pandemic happens. Our SpillOver Viral Risk Ranking tool is the starting point for building proactive solutions."

### **VIRUS 'CREDIT SCORE'**

SpillOver was inspired by risk assessments used by banks and insurance companies. It creates a "credit-like" score for viruses by looking at key risk factors and using them to prioritize those viruses posing the greatest potential threats to human health for a watchlist. Users can customize the watchlist to their own circumstances, such as country of interest.

Previous virus-ranking tools have been limited in the number or types of viruses analyzed, with minimal risk factors considered. SpillOver considers 32 risk factors about the virus and hosts, including associated environment and human behaviors. It also includes 25 different viral families, from coronaviruses to the viral family that causes ebolaviruses.

### **RANK YOUR VIRUS**

SpillOver produces a detailed risk report for each virus, and its 'Risk Comparison' tool allows users to compare and contrast ranked viruses, as well as filter viruses on a selection of key attributes, including virus species, host species and country of detection.

As an open-source tool, SpillOver provides a living platform for ongoing ranking of spillover risk. Scientists can contribute data to existing viruses or assess risk of new viruses using the 'Rank Your Virus' application.

"This tool is intended to start a global conversation that will allow us to go far beyond how we thought about ranking viruses in the past and allow real-time scientific collaboration to identify new threats early," said corresponding author Jonna Mazet, a professor at the UC Davis School of Veterinary Medicine, founding director of the One Health Institute and former global director of PREDICT. "SpillOver can help advance our understanding of viral health threats and enable us to act to reduce the risk of spillover before pandemics can catch fire."

SpillOver engages and enables scientists who are discovering viruses to collaborate in a One Health framework that is focused not only on viral characteristics but also on all of the circumstances present at

high-risk areas for disease emergence. This allows the tool to be a catalyst for rapidly identifying and ranking newly-discovered viruses and their animal-human transmission interfaces.

This paradigm shift can facilitate collaboration early, across disciplinary and national boundaries. Identifying and ranking viruses for human-health risks can help scientists identify critical control points and address human behaviors that put humans and animals at risk for novel viral infection.

###

The study's co-authors include hundreds of individuals who supported the PREDICT Project in their countries and home institutions, as well as global scientific leaders in viral emergence and the core collaborating institutions, including the Wildlife Conservation Society, EcoHealth Alliance, Metabiota, Smithsonian Conservation Biology Institute, Columbia University's Center for Infection and Immunity.

Funding support for the study was provided by the USAID Emerging Threats Project.

**For news media only:**

Additional media contacts:

- Jonna Mazet, UC Davis One Health Institute, (b) (6)
- Zoë Grange, UC Davis One Health Institute, (b) (6)

Press kit with FAQ, Executive Summary and photo available at <https://ucdavis.box.com/s/tizexjq4crwnjdlgrkhqde775xvxue5e>

<image001.png>

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Sarah Elizabeth Richards  
Journalist • Speaker • Content Strategist  
San Diego, California  
Time Zone: Pacific (GMT-8)  
Mobile/ WhatsApp: (b) (6)  
Skype: serichards7000

Learn more about my work on my [personal website](#)  
Connect with me on [Twitter](#), [Instagram](#) and [LinkedIn](#)

**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Tue, 6 Apr 2021 13:53:52 +0000  
**To:** Colin Ross Parrish; Plowright, Raina; preempt; Alison Peel  
**Cc:** Manuel Ruiz; Amandine Gamble  
**Subject:** RE: UCD viral spillover tool

Yep, completely agree with Colin

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

---

**From:** Colin Ross Parrish <[REDACTED] (b) (6)>  
**Sent:** Monday, April 5, 2021 5:43 PM  
**To:** Plowright, Raina <[REDACTED] (b) (6)> preempt <[REDACTED] (b) (6)>  
Alison Peel <[REDACTED] (b) (6)>  
**Cc:** Manuel Ruiz <[REDACTED] (b) (6)> Amandine Gamble <[REDACTED] (b) (6)>  
**Subject:** Re: UCD viral spillover tool

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Colin

Colin R. Parrish

John M. Olin Professor of Virology

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Ithaca, NY 14853, USA

Phone: (b) (6) (cell anywhere); (b) (6) (work - mostly not there - leave a message)

---

**From:** Alison Peel <(b) (6)>  
**Sent:** Monday, April 5, 2021 7:30 PM  
**To:** Plowright, Raina (b) (6); preempt <(b) (6)>  
**Cc:** Manuel Ruiz <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** Re: UCD viral spillover tool

Thanks Raina,

Looks like there were a few of us that were on the 'Expert panel' for this – me, Olivier, Barbara, Vincent. From memory, it involved filling out a survey several years ago!

The website tool doesn't seem to be functioning as planned at the moment – in the ranking comparison site, the filters aren't picking up the correct viruses, and interestingly, they haven't included Hendra or Cedar. I haven't gone through the paper yet to see whether this was deliberate.

Cheers

Ali

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**From:** Plowright, Raina (b) (6)  
**Date:** Tuesday, 6 April 2021 at 12:18 am  
**To:** preempt <(b) (6)>  
**Cc:** Manuel Ruiz <(b) (6)> Amandine Gamble <(b) (6)>  
**Subject:** UCD viral spillover tool

Hi All,

I was asked to comment on this by a reporter this morning... she didn't send it to me ahead of time so I made some broad and mostly positive comments about what I could gather in 5 minutes (prior to morning coffee!), and I gave her a bunch of your names/email addresses for further interviews.

UCD team present an online spillover assessment tool that combines expert opinion and knowledge of viral traits likely to lead to spillover... would be worthy of a 'preempt lab meeting' some time soon to assess this! Their paper is attached and I think it comes out today or tomorrow.

See you all later today on the PI call.

Raina

**IMAGE:** PRIMATES AND LIVESTOCK EXPLORE THE GROUNDS OUTSIDE A RESIDENCE IN GHANA. [view more](#)

CREDIT: TERRA KELLY, UC DAVIS

SARS-CoV-2 showed the world with devastating clarity the threat undetected viruses can pose to global public health. [SpillOver](#), a new web application developed by scientists at the University of California, Davis, and contributed to by experts from all over the world, ranks the risk of wildlife-to-human spillover for newly-discovered viruses.

SpillOver is the first open-source risk assessment tool that evaluates wildlife viruses to estimate their zoonotic spillover and pandemic potential. It effectively creates a watchlist of newly-discovered viruses to help policymakers and health scientists prioritize them for further characterization, surveillance, and risk-reducing interventions.

The tool is linked to a study published in the journal PNAS, in which the authors identified the most relevant viral, host and environmental risk factors for virus spillover. Then the team ranked the risk from 887 wildlife viruses using data collected from a variety of sources, including viruses detected by the USAID Emerging Pandemic Threats [PREDICT](#) project, which UC Davis' One Health Institute led from 2009 to 2020.

### **CORONAVIRUSES RANK HIGH**

Topping the list were 12 known human pathogens, which was expected and validates the tool's utility. Interestingly, SpillOver ranked several newly-discovered coronaviruses as higher risk for spillover than some viruses already known to be zoonotic. This watchlist includes a novel coronavirus provisionally named PREDICT\_CoV-35, which ranked within the top 20.

The power of the tool lies in the fact that it is open-source--the more data entered, the more robust the ranking. SARS CoV-2 currently ranks second out of the 887 viruses analyzed, between Lassa and Ebola viruses.

That may seem counterintuitive, the authors note, given the pandemic's current global devastation. They explain that the tool is ranking the potential for another spillover beyond what has happened historically. In addition, key information remains undiscovered about SARS CoV-2 and its spillover risk, such as the number and range of its host species. As scientists learn more about this virus, it is possible SARS CoV-2 will move to No. 1.

"SARS-CoV-2 is just one example of many thousands of viruses out there that have the potential to spillover from animals to humans," said lead author Zoë Grange, who led the development of SpillOver as a postdoctoral researcher with the UC Davis One Health Institute. "We need to not only identify but also prioritize viral threats with the greatest spillover risk before another devastating pandemic happens. Our SpillOver Viral Risk Ranking tool is the starting point for building proactive solutions."

### **VIRUS 'CREDIT SCORE'**

SpillOver was inspired by risk assessments used by banks and insurance companies. It creates a "credit-like" score for viruses by looking at key risk factors and using them to prioritize those viruses posing the greatest potential threats to human health for a watchlist. Users can customize the watchlist to their own circumstances, such as country of interest.

Previous virus-ranking tools have been limited in the number or types of viruses analyzed, with minimal risk factors considered. SpillOver considers 32 risk factors about the virus and hosts, including associated environment and human behaviors. It also includes 25 different viral families, from coronaviruses to the viral family that causes ebolaviruses.

## **RANK YOUR VIRUS**

SpillOver produces a detailed risk report for each virus, and its 'Risk Comparison' tool allows users to compare and contrast ranked viruses, as well as filter viruses on a selection of key attributes, including virus species, host species and country of detection.

As an open-source tool, SpillOver provides a living platform for ongoing ranking of spillover risk. Scientists can contribute data to existing viruses or assess risk of new viruses using the 'Rank Your Virus' application.

"This tool is intended to start a global conversation that will allow us to go far beyond how we thought about ranking viruses in the past and allow real-time scientific collaboration to identify new threats early," said corresponding author Jonna Mazet, a professor at the UC Davis School of Veterinary Medicine, founding director of the One Health Institute and former global director of PREDICT. "SpillOver can help advance our understanding of viral health threats and enable us to act to reduce the risk of spillover before pandemics can catch fire."

SpillOver engages and enables scientists who are discovering viruses to collaborate in a One Health framework that is focused not only on viral characteristics but also on all of the circumstances present at high-risk areas for disease emergence. This allows the tool to be a catalyst for rapidly identifying and ranking newly-discovered viruses and their animal-human transmission interfaces.

This paradigm shift can facilitate collaboration early, across disciplinary and national boundaries. Identifying and ranking viruses for human-health risks can help scientists identify critical control points and address human behaviors that put humans and animals at risk for novel viral infection.

###

The study's co-authors include hundreds of individuals who supported the PREDICT Project in their countries and home institutions, as well as global scientific leaders in viral emergence and the core collaborating institutions, including the Wildlife Conservation Society, EcoHealth Alliance, Metabiota, Smithsonian Conservation Biology Institute, Columbia University's Center for Infection and Immunity.

Funding support for the study was provided by the USAID Emerging Threats Project.

**For news media only:**

Additional media contacts:

- Jonna Mazet, UC Davis One Health Institute, (b) (6)

- Zoë Grange, UC Davis One Health Institute, (b) (6)

Press kit with FAQ, Executive Summary and photo available

at <https://ucdavis.box.com/s/tizexjq4crwnjdlgrkhqde775xvxue5e>

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**From:** Munster, Vincent (NIH/NIAID) [E]  
**Sent:** Thu, 1 Apr 2021 20:44:44 +0000  
**To:** Manuel Ruiz  
**Cc:** Plowright, Raina; Kwe Claude, Yinda (NIH/NIAID) [F]  
**Subject:** RE: Options for inactivation of serum samples

Yes, start with 84 so we can see how the pipeline works

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Manuel Ruiz <[REDACTED]> (b) (6)  
**Sent:** Thursday, April 1, 2021 2:17 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Plowright, Raina <[REDACTED]> (b) (6); Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6)  
**Subject:** Re: Options for inactivation of serum samples

Hi Vincent,

Very timely message, I am just in a call with Dan and Caylee. They will prepare a list of samples for this first batch (matching samples that they have for other assays too).  
Would it be ok if we get this list to you by Monday morning?

As you mentioned before you would run batches of 84 or 168, right?

Thank you,  
Manuel

**Manuel Ruiz Aravena**  
Postdoctoral Researcher  
Department of Microbiology and Immunology | Montana State University,  
USA  
Mobile: [REDACTED] (b) (6)  
<https://batonehealth.org/>



On Thu, Apr 1, 2021 at 2:01 PM Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:  
Hi Manuel,

We are gearing-up to start the irradiation, do you have a list of samples or should we just go through the samples?

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Manuel Ruiz <[REDACTED]> (b) (6)  
**Sent:** Wednesday, March 10, 2021 3:09 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) Plowright, Raina  
<[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6)  
**Subject:** Re: Options for inactivation of serum samples

Thank you, Vincent for the replies,

I'll have a chat with Dan and Caylee here. There are a few interesting results for which we want to be sure we are considering all possible caveats affecting them. We are preparing an executive summary to share with you.

To have in mind as reference, when do you think you would be able to do a first run of irradiation of serum samples? (Since there isn't a way around irradiating the samples, we would like to send you the list for the first batch of samples.

How would you prefer to receive the list of samples to move, 1) whole list with prioritization in groups of 84?, 2) specific lists for each batch of irradiation separately?, any other option that would work best for you?

Thank you, again, for all your help (and patience answering our questions!),

Cheers,  
Manuel

**Manuel Ruiz Aravena**  
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Mobile: [REDACTED] (b) (6)

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On Wed, Mar 10, 2021 at 9:57 AM Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:  
Not really,

These samples were send under our CDC permit. We can only share them, according to this permit, if they are properly inactivated. We don't have any other way of inactivating serum samples while maintaining their integrity. This is how we do everything with our own field and lab samples as well. With our in-house testing we don't see an effect of irradiation of the protein function (e.g. antibody function).

Cheers,

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Manuel Ruiz <[REDACTED] (b) (6)>  
**Sent:** Tuesday, March 9, 2021 12:52 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>  
**Cc:** Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>; Plowright, Raina <[REDACTED] (b) (6)>; Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)>  
**Subject:** Re: Options for inactivation of serum samples

Thanks Vincent,

Would there be any chance of running an experiment with a small subset of samples before irradiation to have an idea of any "correction" that we should consider for our results?

**Manuel Ruiz Aravena**  
Postdoctoral Researcher  
Department of Microbiology and Immunology | Montana State University,  
USA  
Mobile: [REDACTED] (b) (6)

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On Tue, Mar 9, 2021 at 12:47 PM Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:  
Hi Manuel,

We continuously run immune assays on irradiated samples including serology and cytokine assays. Just for reference: <https://www.nature.com/articles/s41586-020-2324-7>

It's a bit of a mood point as there is no other way (this holds true for ourselves as well)

Vincent Munster, PhD  
Chief Virus Ecology Section  
Rocky Mountain Laboratories  
NIAID/NIH

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**From:** Manuel Ruiz <[REDACTED]> (b) (6)  
**Sent:** Tuesday, March 9, 2021 12:04 PM  
**To:** Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) Plowright, Raina <[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6)  
**Subject:** Options for inactivation of serum samples

Hi Vincent,

The immunology team has some concerns about the irradiation breaking down some proteins in the serum samples... which could be influencing some results. They are currently running some experiments with non-irradiated samples from Lube.

Do you have any other options for inactivation of serum samples that we could explore/discuss as options?

Thank you,  
M

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