

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 23 Dec 2020 17:01:49 +0000
To: (b) (6); LaTrielle, Sara; Plowright, Raina
Subject: RE: URGENT: Need Accomplishments List for RML MIPR

Hi Andrew, here it is

RML accomplishments:

- Screened >5000 bat samples from Australia and identified over 300 Hendra viruses
- Screened >5000 bat samples from Bangladesh and identified 10s of novel Nipah viruses
- developed targeted NSG full genome approach using vircapseq, and have sequenced several Hendra virus full genome sequences
- developed SARS-CoV-2 vaccine in phase 3 clinical trials (licensed to Astra Zeneca)
- developed environmental stability framework and mathematical decay models (together with UCLA, PI Lloyd-Smith)
- performed HeV and NiV cell line experiments to develop mathematical models

Let me know if this works?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

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

From: (b) (6)
Sent: Wednesday, December 23, 2020 8:02 AM
To: LaTrielle, Sara <(b) (6)> Plowright, Raina <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Subject: URGENT: Need Accomplishments List for RML MIPR

Hi gang. I think you may have provided this to me in an email earlier, but I can't seem to find it now and I'm attempting to prepare the funding document for RML. Could you please provide a few bullets citing updated progress of the RML effort. For last year's funding, the following bullets were provided:

- * Formalized working group, identified participants
- * In person meeting in Bozeman, met online multiple times with the other teams
- * Preliminary workflows for data inputs and integration with the other groups

Something akin to this, update to demonstrate FY20 accomplishments would work well.

I need this as soon as possible in order to get the funding action into the system for routing and approval. Regret short fuse.

Thanks.

(b) (6)
Contractor Support to DARPA BTO
Quantitative Scientific Solutions (QS-2)
(b) (6)
Cell: (b) (6)
Work Mobile: (b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 18 Dec 2020 15:41:30 +0000
To: Schountz, Tony
Cc: Schountz, Tony; epstein
Subject: RE: Grant idea

Yes, but that's not a guarantee and a shit ton of work (coronavirus rg is a bitch). So if that's the plan, they need to get funds for that.

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Schountz, Tony <[REDACTED] (b) (6)>
Sent: Friday, December 18, 2020 8:38 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Schountz, Tony <[REDACTED] (b) (6)> epstein <[REDACTED] (b) (6)>
Subject: Re: Grant idea

I haven't seen anything about isolates of RaTG13, but its genome is available so Eric should be able to make it.

<https://www.ncbi.nlm.nih.gov/nuccore/1916859392>

—

Tony Schountz, PhD
Associate Professor
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[REDACTED] (b) (6)

[REDACTED] (b) (6)

On Dec 18, 2020, at 8:28 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

I agree with Tony,

Especially as RaTG13/R is not SARS-CoV-2 (same as WIV-1 / SCH014 are not SARS-1 or 2) and I don't think RaTG13/R is isolated?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Schountz, Tony <[REDACTED] (b) (6)>
Sent: Friday, December 18, 2020 8:17 AM
To: epstein <[REDACTED] (b) (6)>
Cc: Schountz, Tony <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]
<[REDACTED] (b) (6)>
Subject: Re: Grant idea

Jon, I think *affinis* should definitely be one that we test. But if there are only 4 species, we might as well import them all, at least for susceptibility studies and to generate primary cell lines (that can be immortalized, too).

My concern is that a reviewer may say that we don't know which rhinolophid might be susceptible to SARS-CoV-2. So, I think we probably ought to say we will use RaTG13/R *affinis* as a model system if SARS/SARS2 do not infect any of the 4 species. Eric can make infectious clones of the virus for modification. Otherwise, it could be construed as a fatal flaw (4 bat species, none of which are susceptible to SARS/SARS2).

It would be helpful if you could find out what the other 3 species of *Rhinolophus* are.

Thanks,

Tony

—

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[REDACTED] (b) (6)

[REDACTED] (b) (6)

On Dec 17, 2020, at 6:00 PM, Jon Epstein <[REDACTED] (b) (6)> wrote:

I think there are 4 Rhinolophus species in Bangladesh, including affinis, which is the surreal RaTG13 came from. Should we not just target that one?

Jonathan Epstein DVM, MPH, PhD

Vice President for Science and Outreach

EcoHealth Alliance
New York

(e) [REDACTED] (b) (6)

(o) [REDACTED] (b) (6)

(m) [REDACTED] (b) (6)

@epsteinjon

On Thu, Dec 17, 2020, 5:08 PM Schountz, Tony <[REDACTED] (b) (6)> wrote:

Thanks, Vinnie. Attached is a figure I've been working on that could go into the grant as preliminary data and showing the rationale for the work flow. Legend would be something like your VSV pseudotype system (A), that SARS2, but not SARS1, can bind to Jamaican fruit bat Ace2 and infect BHK cells (B), and detection of SARS-CoV-2 in small intestine and swabs of challenged Jamaican fruit bats for only a few days (C).

Of course, if there's only a few rhinolophid species in Bangladesh, we might as well import them all and test for susceptibility. It'll be helpful to know how many species the Bangladesh team might capture.

T.

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[REDACTED] (b) (6)

[REDACTED] (b) (6)

On Dec 17, 2020, at 3:00 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Yeah we can do that,

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Tony Schountz <[REDACTED] (b) (6)>
Date: Thursday, December 17, 2020 at 1:23 PM
To: "[REDACTED] (b) (6) <[REDACTED] (b) (6)>
Cc: Jon Epstein <[REDACTED] (b) (6)>
Subject: Grant idea

Vincent,

I'm working on the R24 proposal and for Aim 1 (capturing bats for import to USA) I think it might be a good idea to use your VSV pseudotype system to try to narrow down candidate *Rhinolophus* species that will be suitable for importation. There are 7 *Rhinolophus* Ace2 sequences in Genbank (*pearsonii*, *pusillus*, *macrootis*, *sinicus*, *landeri*, *ferrumequinum*, *alcyone*) but 78 species (plus many subspecies) listed in the NCBI taxonomy database. (I've asked Jon if he has a list of species that are found in Bangladesh.) Here's what I'm thinking:

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Test susceptibility to SARS1 and SARS2 with your VSV reporter system

What do you think? I realize there may be a receptor other than Ace2, but I think for the purposes of the grant this might convince reviewers that we at least have a rapid screening plan in place to identify candidate susceptible species.

I've attached a table of the 20 seemingly important ACE2 residues for SARS2 spike binding, plus the paper that identified these residues. Red species are susceptible.

Thanks,

Tony

—

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Center for Vector-borne Infectious Diseases

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(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 17 Dec 2020 15:53:20 -0700
To: Schountz, Tony
Subject: Re: Grant idea

Thinking about adapting it to the AJs

Still got 300+ sitting around ☐

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Tony Schountz <[REDACTED] (b) (6)>
Date: Thursday, December 17, 2020 at 3:26 PM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Cc: Jon Epstein <[REDACTED] (b) (6)>
Subject: Re: Grant idea

Right, I will go through Michael's paper again to mine rhinolophid information.

We've been distracted by the peromyscus studies and drug/monoclonal antibody studies. Another hurdle is we're restricted for time in lab because of social distancing policies by CSU. We have an immunosuppression study scheduled for early January to see if that leads to more robust infection in the Ajs.

T.

—

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[REDACTED] (b) (6)

[REDACTED] (b) (6)

On Dec 17, 2020, at 3:21 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Yeah, but a nice hardcore molecular rational would be good.

I would take some of these figures as well, Rhinolophus is added there as well

<https://www.nature.com/articles/s41564-020-0688-y>

whatever happened with the AJs? Planning to do some adaptation studies and then see if we get a bit more replication

Vincent Munster, PhD
Chief, Virus Ecology Section
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Rocky Mountain Laboratories
NIAID/NIH

From: Tony Schountz <[REDACTED] (b) (6)>
Date: Thursday, December 17, 2020 at 3:09 PM
To: "[REDACTED] (b) (6)" <[REDACTED] (b) (6)>
Cc: Tony Schountz <[REDACTED] (b) (6)> Jon Epstein
<[REDACTED] (b) (6)>
Subject: Re: Grant idea

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Of course, if there's only a few rhinolophid species in Bangladesh, we might as well import them all and test for susceptibility. It'll be helpful to know how many species the Bangladesh team might capture.

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(b) (6)

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From: Tony Schountz <(b) (6)>
Date: Thursday, December 17, 2020 at 1:23 PM
To: "(b) (6) <(b) (6)>
Cc: Jon Epstein <(b) (6)>
Subject: Grant idea

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I've attached a table of the 20 seemingly important ACE2 residues for SARS2 spike binding, plus the paper that identified these residues. Red species are susceptible.

Thanks,

Tony

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(b) (6)

From: Schountz, Tony
Sent: Thu, 17 Dec 2020 22:08:42 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Cc: Schountz, Tony; epstein
Subject: Re: Grant idea
Attachments: Aj Ace2 VSV figure.pdf

Thanks, Vinnie. Attached is a figure I've been working on that could go into the grant as preliminary data and showing the rationale for the work flow. Legend would be something like your VSV pseudotype system (A), that SARS2, but not SARS1, can bind to Jamaican fruit bat Ace2 and infect BHK cells (B), and detection of SARS-CoV-2 in small intestine and swabs of challenged Jamaican fruit bats for only a few days (C).

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From: Tony Schountz <[REDACTED] (b) (6)>
Date: Thursday, December 17, 2020 at 1:23 PM
To: "[REDACTED] (b) (6)" <[REDACTED] (b) (6)>
Cc: Jon Epstein <[REDACTED] (b) (6)>
Subject: Grant idea

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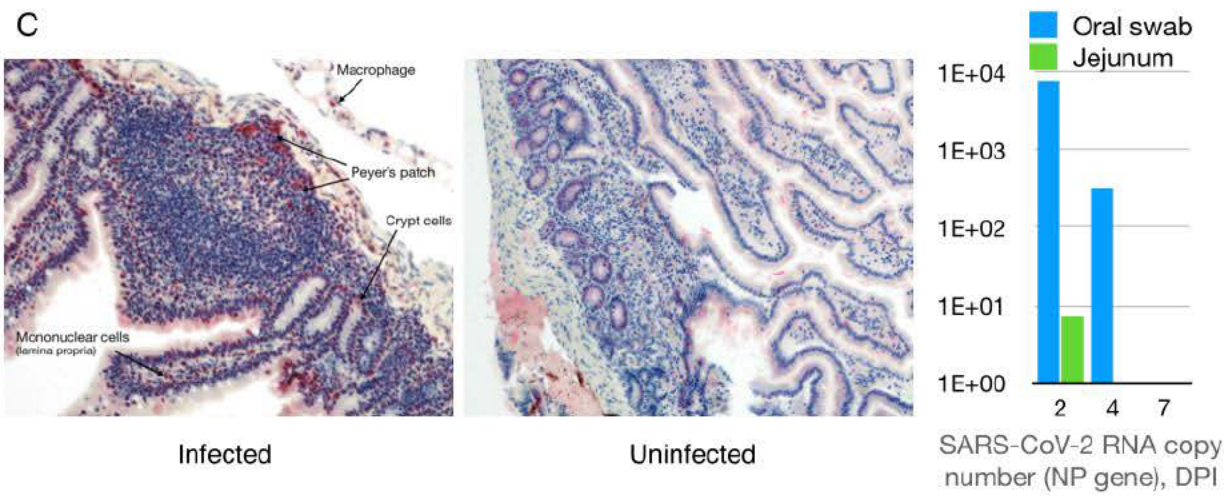
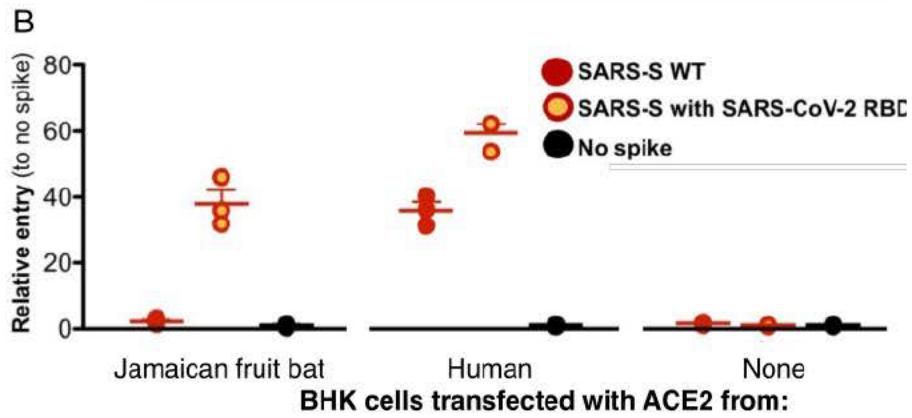
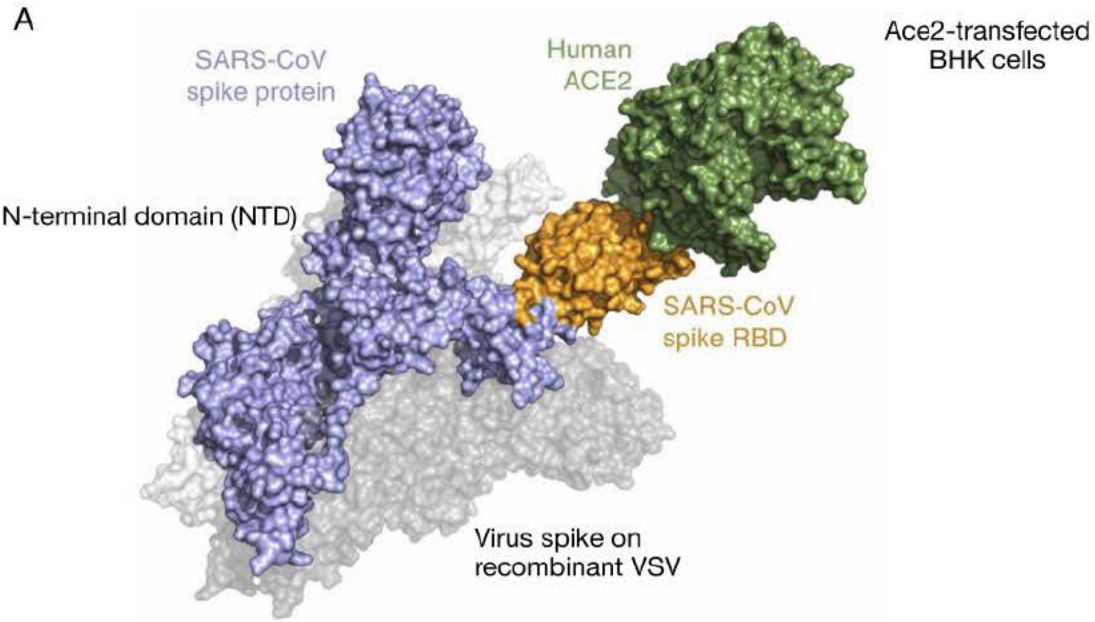
Thanks,

Tony

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[REDACTED] (b) (6)



From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 17 Dec 2020 15:00:34 -0700
To: Schountz, Tony
Cc: epstein
Subject: Re: Grant idea

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Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Tony Schountz <[REDACTED] (b) (6)>
Date: Thursday, December 17, 2020 at 1:23 PM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Cc: Jon Epstein <[REDACTED] (b) (6)>
Subject: Grant idea

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(b) (6)

(b) (6)

(b) (6)

ACE2	AA position	
------	-------------	--

Common Name

Species name

- 24
- 27
- 28
- 30
- 31
- 34
- 35
- 37
- 38
- 41
- 42
- 45
- 82
- 83
- 330
- 353
- 354
- 355
- 357
- 393

ID

Human

Homo sapiens

- Q
- T
- F
- D
- K

H
E
E
D
Y
Q
L
M
Y
N
K
G
D
R
R

20

Syrian hamster

Mesocricetus auratus

Q
T
F
D
K
Q
E
E
D
Y
Q
L
N
Y
N
K
G
D
R
R

Leschenault's rousette

Rousettus leschenaultii

L
T
F
E
K
T
E

E
D
Y
Q
L
L
T
Y
K
K
G
D
R
R

16

Domestic cat
Felis catus

L
T
F
E
K
H
E
E
E
E
Y
Q
L
T
Y
N
K
G
D
R
R

16

Pearson's horseshoe bat
Rhinolophus pearsonii

R
T
F
D
K
H
E
E
D

H
E
L
D
Y
N
K
D
D
R
R

15

Least horseshoe bat
Rhinolophus pusillus

L
K
F
N
D
S
E
E
D
Y
E
L
N
Y
N
K
G
D
R
R

14

Ferret
Mustela putorius

L
T
F
E
K
Y
E
E
E
Y
Q

L
T
Y
N
K
R
D
R
R

Big-eared horseshoe bat
Rhinolophus macrotis

E
K
F
D
K
S
K
E
D
Y
E
L
N
Y
K
K
G
D
R
R

Chinese rufous horseshoe bat
Rhinolophus sinicus

E
I
F
D
K
T
K
E
D
H
Q
L
N

Y
N
K
G
D
R
R

13

Lander's horseshoe bat
Rhinolophus landeri

L
T
F
D
D
S
A
E
N
Y
Q
L
N
F
N
K
G
D
R
R

13

Jamaican fruit bat
Artibeus jamaicensis

D
T
F
E
K
T
E
E
E
Y
E
L
A
Y
N

Norway rat
Rattus norvegicus

K
N
D
R
R

13

K
S
F
N
K
Q
E
E
D
Y
Q
L
N
F
N
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D
R
R

13

House mouse
Mus musculus

N
T
F
N
N
Q
E
E
D
Y
Q
L
S
F
N
H
G

D
R
R

Greater horseshoe bat
Rhinolophus ferrumequinum

L
K
F
D
D
S
E
E
N
H
Q
L
N
F
N
K
G
D
R
R

Vampire bat
Desmodus rotundus

E
T
F
E
N
T
E
E
E
Y
Q
L
T
Y
N
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D
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12

Halcyon horseshoe bat

Rhinolophus alcyone

L

I

F

D

N

S

E

E

N

H

Q

L

K

F

N

K

N

D

R

R

11

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 16 Dec 2020 15:41:34 +0000
To: [REDACTED] (b) (6) Bushmaker, Trenton (NIH/NIAID) [E]; Kwe Claude, Yinda (NIH/NIAID) [F]
Cc: Raina Plowright
Subject: RE: Priority isolation samples

For the PCR the freeze thaw doesn't matter.

So my suggestion is, get a good outline of the samples. Take all the positive samples into 4. We'll discuss what will be feasible and whether to freeze them back or remain them at 4C.

Kwe / Trent lets discuss. It will take quite some organization to start isolating these samples.

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Alison Peel <[REDACTED] (b) (6)>
Sent: Tuesday, December 15, 2020 9:40 PM
To: 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)>
Cc: Raina Plowright <[REDACTED] (b) (6)>
Subject: Priority isolation samples

Hi all,

The 100 urine samples in VTM in box AUS_247 are all known HeV positives (with initial positive results coming from replicates in AVL). The plan for these samples was twofold:
(1) provide VTM sample to allow more opportunities for isolation
(2) re-extract and PCR these samples to show that the change in field sample collection protocols from AVL to VTM as primary sample type did not result in any obvious change in results/Ct values (as the data shows very few low-Ct value samples after this change. We think that this is likely ecological, but want to check)

So, before re-freezing these, is it possible to also take an aliquot to re-extract?

In terms of selecting a 'reasonable number' from these samples to start with for isolations, I've attached a spreadsheet which lists all the samples and prioritises them in two ways. Firstly, if they were from a sampling session that was associated with a spillover (and therefore might be useful to compare with the horse sequences if we ever get them) or not, and Secondly, by Ct.

Within those, I'll let you decide which are highest priority - or perhaps we can discuss.

Thanks
Ali

From: Plowright, Raina
Sent: Wed, 16 Dec 2020 15:36:44 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: FW: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

Never ever been conversation about 200K... (b) (6) is very disorganized.

From: Plowright, Raina <(b) (6)>
Date: Wednesday, December 16, 2020 at 8:36 AM
To: LaTrielle, Sara <(b) (6)>
Subject: FW: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

I'll let you answer. There has never even been a conversation about 200K. Only ever discussed 75K. You will find a nicer way to say this!

From: (b) (6)
Date: Wednesday, December 16, 2020 at 8:21 AM
To: LaTrielle, Sara <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: Plowright, Raina <(b) (6)>
Subject: RE: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

Hi Sara, Raina and Vincent. I went ahead and removed (b) (6) from this thread as (b) (6) has returned to supporting (b) (6) other PMs.

I guess I was confused about the plan. I had initially thought that the intention was to shift \$200K from the remainder of the RML effort supporting MSU's work to cover the costs of the UCLA post-doc. Then the NIH Interagency Agreement (IAA) approval document arrived showing ~\$150K reduction in the RML budget.

If the total amount that you guys need to shift from RML to MSU is \$75,157, I'm good with that. Just would like for everyone to confirm so that we're all on the same page.

Vincent, if the IAA with RML is to be reduced by only \$75,157, we'll need a new IAA from NIH reflecting that before I'm able to get it signed. I am happy to go back directly to Mark Eyron and company at NIH to request a revised IAA, but wanted to see if you'd prefer to work this through your connections with them.

I'm working with BTO leadership to try to obtain some funding to cover your FY21 costs in full. Not sure, yet, if that effort will be successful so I may end up having to send you just an initial incremental funding and then another once we've received our full budget. Still working that out on this end and hoping to get additional funding so that I can fund this effort in full with a single action.

Please provide concurrence that the remaining RML budget will be reduced by \$75,157,

the MSU budget will be increased by the same (separate from any changes resulting from the re-scope effort and associated SOW changes), and confirm whether you'd like me to go back to NIH to request a revised IAA (Forms 7600A and 7600B) or if you, Vincent, would prefer to do that from your end.

Thanks.

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

From: LaTrielle, Sara <(b) (6)>
Sent: Tuesday, December 15, 2020 12:47 PM
To: (b) (6); Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: (b) (6); Plowright, Raina <(b) (6)>
Subject: Re: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

(b) (6)

Please note, the total to be transferred from RML to UCLA (via MSU) is \$75,157.00, not 150k as mentioned below. We have only ever intended on transferring ~75k.

Can you please ensure RML amount is only reduced by this amount?

Thank you,

Sara LaTrielle

Program Manager
PREEMPT Project
Montana State University

(b) (6)

From: (b) (6)
Sent: Monday, December 14, 2020 12:26 PM
To: LaTrielle, Sara <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: (b) (6); Plowright, Raina <(b) (6)>
Subject: RE: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

Thanks, Sara. "Duke" should have been UCLA. I've got about a thousand things going on at the moment. Sorry for the error. UCLA was what I was thinking of.

According to the IAA that NIH sent, Phase II costs for RML are \$315,685.01 for FY21 and \$220,492.44 for FY22 for a total Phase II of \$536,178.45. I believe RML agreed to part with ~\$75K/year over the last 2 years of the project as I show the difference between the FY21 + FY22 revised total and the original plan for FY21&22 totals \$150,314.

I think we're square. I just lost the bubble on what was agreed to and wanted to ensure the IAA document NIH had provided reflected that agreement. I think we're good.

If anyone thinks otherwise after this conversation, please let me know. I have the IAA moving forward for approval within DARPA now. Once I can secure sufficient funding, I will process a MIPR to provide that funding.

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

From: LaTrielle, Sara <(b) (6)>

Sent: Monday, December 14, 2020 2:15 PM

To: (b) (6); Munster,

Vincent (NIH/NIAID) [E] <(b) (6)>

Cc: (b) (6); Plowright, Raina

<(b) (6)>

Subject: Re: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

(b) (6)

Sorry for the delay- I am out sick today but wanted to make sure to respond. I have cc'ed Raina here as well.

The original total I have noted for RML for Phase 2 is \$686,492.45. Vincent kindly agreed to transfer \$75,157 of this amount to UCLA (by way of MSU contract), leaving RML total to \$611,335.45. Happy to discuss over the phone, but perhaps it is good to write out in an email- so all have a clear understanding of the figures.

You mentioned 'Duke' in your initial email. Can you let me know what/who this is in reference to?

Thank you,
Sara

Sara LaTrielle

Program Manager
PREEMPT Project
Montana State University

(b) (6)

From: (b) (6)
Sent: Monday, December 14, 2020 11:11 AM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: (b) (6); LaTrielle, Sara
<(b) (6)>
Subject: RE: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

Thanks, Vincent. There is a note at the bottom of the budget of the IAA form indicating FY21 funding in the amount of \$315,686 and FY22 for \$220,493, so your finance folks are aware. I've forwarded this for Ro's signature and then need to route it through the gauntlet here at DARPA. I will push this as I know it is delayed, but I was waiting on the fallout from the PREEMPT re-scope effort to take action. Now that we have an agreed-upon path forward with DARPA leadership that includes the MSU project, I'm able to move this along.

My intention is to provide your full FY21 funding as soon as possible. Only problem right now is that I don't have enough funding available to do so due to the CR. I've requested some additional funding from the BTO front office to cover your FY21 costs in full and am currently awaiting a response.

In the meantime, unless Sara notes otherwise, I will be getting NIH's IAA form signed and will process a MIPR to provide funding in the amount of \$315,686 as soon as I have sufficient funding on hand to do so.

I will be providing a separate response to Mark Eyrond to let him know the status and provide an explanation for the delay.

Thanks for your help in setting me straight on what we had all agreed to.

(b) (6)

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

From: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>

Sent: Monday, December 14, 2020 11:32 AM

To: (b) (6)

Cc: (b) (6); LaTrielle, Sara

<(b) (6)>

Subject: RE: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

Hi (b) (6)

Please update the amount based on our discussions. I think the reduction of funding was 65,000 per fiscal year (Sara, feel free to chime in her). Typically our money people are not directly in the loop so they are probably still working with the old figures (although we did inform them). Just let me know when you feel confident to route this through. Also, similar to DoD, we are subject to end of fiscal year, so it would be good not to drag this out too long.

Hope all is well and your staying safe,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

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

From: (b) (6)

Sent: Monday, December 14, 2020 9:23 AM

To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>

Cc: (b) (6); LaTrielle, Sara

<(b) (6)>

Subject: FW: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

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Also, I am further constrained by the CR and the fact that we simply do not have our funding allocated yet, so I am unable to process a MIPR for payment until our next tranche of CR funding arrives (hopefully soon, but Congress...). Just to let you know where we stand right now. I hope to get a chunk of funding in the next CR, but I don't

know what size that will be and there are a few performers that need funding soon, so I'm going to have to juggle some priorities and do what I can to keep the Program on track in this CR environment.

Please let me know if the funding amount in the attached document should be altered to reflect our discussions from a couple months back.

Thanks.

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

From: Eyrond, Mark (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Tuesday, December 1, 2020 1:49 PM
To: [REDACTED] (b) (6)
Cc: Taggart, Brian (NIH/NIAID) [E] <[REDACTED] (b) (6)> Haddock, Elaine (NIH/NIAID) [E] <[REDACTED] (b) (6)> Barr, Leona (NIH/NIAID) [E] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> NIAID IAMB RMS BUDGET TEAM <[REDACTED] (b) (6) [REDACTED] (b) (6)>
Subject: RE: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

[REDACTED] (b) (6)

I am here to follow up with DARPA Agreement- I still haven't get fully signed back from you.

The lab is depending on that agreement to fund upcoming personnel.

Thanks,

Mark Eyrond
NIAID/NIH/OSMO/IAMB/RMS
Budget Analyst

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

From: Eyrond, Mark (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Thursday, October 29, 2020 3:14 PM
To: [REDACTED] (b) (6)
Cc: Taggart, Brian (NIH/NIAID) [E] <[REDACTED] (b) (6)> Barr, Leona (NIH/NIAID) [E] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> NIAID IAMB RMS BUDGET TEAM <[REDACTED] (b) (6) [REDACTED] (b) (6)>
Subject: RE: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

[REDACTED] (b) (6)

The attached agreement has been signed by NIAID.

When fully signed can you please return a copy?

Please let us know if there are questions or if you need more information.

Thanks,

Mark Eyrond
NIAID/NIH/OSMO/IAMB/RMS
Budget Analyst

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

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, October 2, 2020 10:15 AM
To: Ser Voss, Rita (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Eyrond, Mark (NIH/NIAID) [E] <[REDACTED] (b) (6)> Barr, Leona (NIH/NIAID) [E] <[REDACTED] (b) (6)> Taggart, Brian (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: RE: FY21 Funding for IAA - Munster

Hi Rita,

The decrease will be 75157 per year and then 150314 over two years (let me know if you need the exact numbers fully confirmed).

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

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

From: Ser Voss, Rita (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, October 2, 2020 8:11 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
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Subject: RE: FY21 Funding for IAA - Munster

Hi Vincent - Based on this budget schedule in last year's agreement (page 29 of the attached), we were going to prepare the FY21 IAA to accept 390,843. Maybe it should be reduced by the \$200,000 as noted below though? Please let us know. Thanks.

Rita Ser Voss

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

From: [REDACTED] (b) (6)
Sent: Thursday, October 1, 2020 2:40 PM
To: [REDACTED] (b) (6); Ser Voss, Rita (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: RE: FY21 Funding for IAA - Munster

Hi Rita. Sorry for the delayed response and pleased to make your virtual acquaintance.

I can confirm that the LOA information you provided below is accurate.

Please be sure to confirm with Victor the funding he anticipates for FY21 as this amount has been reduced based upon discussions with Victor and the Prime, Montana State University, and as approved by (b) (6) as the PM for DARPA. I believe they have all agreed that RML would receive \$200K less than originally planned. Please confirm with Vincent.

Thank you.

(b) (6)
Contractor Support to DARPA BTO
Quantitative Scientific Solutions (QS-2)
(b) (6)
Cell: (b) (6)
Work Mobile: (b) (6)

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

From: (b) (6)
Sent: Monday, September 28, 2020 9:30 AM
To: Ser Voss, Rita (NIH/NIAID) [E] <(b) (6)>
Cc: (b) (6)
Subject: FW: FY21 Funding for IAA - Munster

Hi Rita,

Thank you. Good to hear from you and hope you are well. I have cc'd (b) (6), who is taking over the Business Financial Management of (b) (6) programs. He can help you from here.

I hope our paths cross again on future DARPA-NIH collaborations!

Best,
(b) (6)

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

From: Ser Voss, Rita (NIH/NIAID) [E] <(b) (6)>
Sent: Friday, September 25, 2020 2:42 PM
To: (b) (6)
Cc: Eyrond, Mark (NIH/NIAID) [E] <(b) (6)>
Subject: FY21 Funding for IAA - Munster

Hi (b) (6) - We're working on an early start to receive FY21 funding for Dr. Munster. It will be a continuation of the FY20 IAA attached.

Can you please confirm your Funding Information for preparation of the FY21 Documents? Here's what we think:

TAS: 97 2021/2022 0400

AID 97

BPOA 2021

EPOA 2022

MAIN 0400

BPN: DODHR0011

EIN: 311575142

DUNS: 041584173

Thanks in advance!

Rita Ser Voss
NIAID/NIH/OSMO/IAMB/RMS
Budget Analyst
Rocky Mountain Laboratories
903 South 4th Street

Hamilton, MT 59840
Phone: (b) (6)

(b) (6) NIAID / National Institutes of Health / DHHS The information in this e-mail and any of its attachments is confidential and may contain sensitive information. It should not be used by anyone who is not the original intended recipient. If you have received this e-mail in error please inform the sender and delete it from your mailbox or any other storage devices. National Institute of Allergy and Infectious Diseases shall not accept liability for any statements made that are sender's own and not expressly made on behalf of the NIAID by one of its representatives.

From: Plowright, Raina
Sent: Tue, 15 Dec 2020 17:36:29 +0000
To: LaTrielle, Sara
Cc: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

We discussed 75K total. We also have that to (b) (6) in a table. It was very clear.

Sent from my iPhone

On Dec 14, 2020, at 9:32 AM, LaTrielle, Sara <(b) (6)> wrote:

Raina/Vincent,

I have no recollection or knowledge of RML getting any less than expected- aside from the 75k transfer to UCLA. Do either of you have any knowledge to what (b) (6) may be referencing? I am happy to respond but wanted to check with you both.

I have a feeling he is confusing the 200k for Cornell figure with RML?

Sara

Get [Outlook for iOS](#)

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NIAID/NIH/OSMO/IAMB/RMS
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NIAID/NIH

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MAIN 0400

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Thanks in advance!

Rita Ser Voss
NIAID/NIH/OSMO/IAMB/RMS
Budget Analyst
Rocky Mountain Laboratories
903 South 4th Street

Hamilton, MT 59840
Phone: (b) (6)

(b) (6) <[mailto:\(b\) \(6\)](mailto:(b) (6)@niaid.nih.gov)> NIAID / National Institutes of Health / DHHS
The information in this e-mail and any of its attachments is confidential and may contain sensitive information. It should not be used by anyone who is not the original intended recipient. If you have received this e-mail in error please inform the sender and delete it from your mailbox or any other storage devices. National Institute of Allergy and Infectious Diseases shall not accept liability for any statements made that are sender's own and not expressly made on behalf of the NIAID by one of its representatives.

<XAI21001-001-00000 FY21 DARPA to LV Munster NIAID Signed.pdf>

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 14 Dec 2020 16:41:52 +0000
To: LaTrielle, Sara; Plowright, Raina
Subject: RE: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

It's a continuous mess with DARPA, I agree with Sara

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara <(b) (6)>
Sent: Monday, December 14, 2020 9:33 AM
To: Plowright, Raina <(b) (6)> Munster, Vincent (NIH/NIAID) [E]
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To: (b) (6)
Cc: Taggart, Brian (NIH/NIAID) [E] <(b) (6)> Barr, Leona (NIH/NIAID) [E] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> NIAID IAMB RMS BUDGET TEAM <(b) (6)> <(b) (6)> (b) (6)
Subject: RE: DARPA Signature Request: XAI21001 FY21 Funds to LV/Munster

(b) (6)

The attached agreement has been signed by NIAID.

When fully signed can you please return a copy?

Please let us know if there are questions or if you need more information.

Thanks,

Mark Eyron
NIAID/NIH/OSMO/IAMB/RMS
Budget Analyst

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

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, October 2, 2020 10:15 AM
To: Ser Voss, Rita (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Eyron, Mark (NIH/NIAID) [E] <[REDACTED] (b) (6)> Barr, Leona (NIH/NIAID) [E] <[REDACTED] (b) (6)> Taggart, Brian (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: RE: FY21 Funding for IAA - Munster

Hi Rita,

The decrease will be 75157 per year and then 150314 over two years (let me know if you need the exact numbers fully confirmed).

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

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

From: Ser Voss, Rita (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, October 2, 2020 8:11 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Eyron, Mark (NIH/NIAID) [E] <[REDACTED] (b) (6)> Barr, Leona (NIH/NIAID) [E] <[REDACTED] (b) (6)> Taggart, Brian (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: RE: FY21 Funding for IAA - Munster

Hi Vincent - Based on this budget schedule in last year's agreement (page 29 of the attached), we were going to prepare the FY21 IAA to accept 390,843. Maybe it should be reduced by the \$200,000 as noted below though? Please let us know. Thanks.

Rita Ser Voss

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

From: [REDACTED] (b) (6)
Sent: Thursday, October 1, 2020 2:40 PM
To: [REDACTED] (b) (6); Ser Voss, Rita (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: RE: FY21 Funding for IAA - Munster

Hi Rita. Sorry for the delayed response and pleased to make your virtual acquaintance.

I can confirm that the LOA information you provided below is accurate.

Please be sure to confirm with Victor the funding he anticipates for FY21 as this amount has been reduced based upon discussions with Victor and the Prime, Montana State University, and as approved by (b) (6) as the PM for DARPA. I believe they have all agreed that RML would receive \$200K less than originally planned. Please confirm with Vincent.

Thank you.

(b) (6)
Contractor Support to DARPA BTO
Quantitative Scientific Solutions (QS-2)
(b) (6)
Cell: (b) (6)
Work Mobile: (b) (6)

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

From: (b) (6)
Sent: Monday, September 28, 2020 9:30 AM
To: Ser Voss, Rita (NIH/NIAID) [E] <(b) (6)>
Cc: (b) (6)
Subject: FW: FY21 Funding for IAA - Munster

Hi Rita,

Thank you. Good to hear from you and hope you are well. I have cc'd (b) (6), who is taking over the Business Financial Management of (b) (6) programs. He can help you from here.

I hope our paths cross again on future DARPA-NIH collaborations!

Best,
(b) (6)

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

From: Ser Voss, Rita (NIH/NIAID) [E] <(b) (6)>
Sent: Friday, September 25, 2020 2:42 PM
To: (b) (6)
Cc: Eyrond, Mark (NIH/NIAID) [E] <(b) (6)>
Subject: FY21 Funding for IAA - Munster

Hi (b) (6) - We're working on an early start to receive FY21 funding for Dr. Munster. It will be a continuation of the FY20 IAA attached.

Can you please confirm your Funding Information for preparation of the FY21 Documents? Here's what we think:

TAS: 97 2021/2022 0400

AID 97

BPOA 2021

EPOA 2022

MAIN 0400

BPN: DODHR0011

EIN: 311575142

DUNS: 041584173

Thanks in advance!

Rita Ser Voss
NIAID/NIH/OSMO/IAMB/RMS
Budget Analyst
Rocky Mountain Laboratories
903 South 4th Street

Hamilton, MT 59840
Phone: (b) (6)

(b) (6) <[mailto:\(b\) \(6\)](mailto:(b) (6)@niaid.nih.gov)> (b) (6) NIAID / National Institutes of Health / DHHS

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From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 10 Dec 2020 16:52:07 -0700
To: Holloway, Peter; Guitian, Javier
Cc: Punam Mangtani; Cardwell, Jackie; van Doremalen, Neeltje (NIH/NIAID) [E]; Michael Letko; Matthew; Tanja Holloway
Subject: Re: Response form EID regarding MERS camel paper

Hi Peter I'll comment on the questions from my expertise:

1 Another concern is the cross reactivity between various coronaviruses particularly the BCoV and the MERS-CoV in dromedary camels. This making the seroprevalence as a marker is a very complicated parameter to be considered for building correlation with other stress factors

We have tested this, and do not see any cross-reactivity between BCoV and MERS-CoV in our Elisa assay, published here: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5454179/>

2 Based on the these complicated nature of the seroprevalence of MERS-CoV among dromedary camels, I believe it is much more feasible to use the viral detection methods particular the isolation and titration of viable and infectious viral particles through the plaque assay technique or at least the detection of MERS-CoV-RNA in these herds. This is to make sure that these correlations are valid and specific to MERS-CoV. I believe the authors may consider combining the data from virus detection/isolation along with the seroprevalence in their comparison and identification of risk factors.

You might link this a bit more to the specific situation in Jordan, the data suggest a virgin soil state, and rapid seroconversion and clearance of MERS-CoV from the camels in Jordan (that's why we can't find it easily). Obviously, you need to take proper care in discussing this as this is a major limitation of the study.

3 The authors claimed the presence of ticks on animals might be correlated with the high seroprevalence. I do not know how may they do such correlation since their data and others showing that the virus is not transmitted by ticks.

I think you make this clear, but probably carefully rephrase. Obviously, this is the pitfall of looking at too many parameters. I did warn you the the ticks would be under scrutiny as sets people on the wrong foot

4 The authors also failed to discuss the potential roles of male camels in the transmission of MERS-CoV through their semen or seminal plasma as recently published by other group

MERS-CoV is a respiratory tract infection, any connection with semen is BS. Just look at Adney et al, EID. Because you didn't look at this I would not start perpetuating this, unless they found live virus *which they didn't). Again, you can respectfully disagree with the reviewer.

5 The authors showing the bats were seen on the daily basis in some camel herds however they did not elaborate in more detail about these bats and if they tested them for the presence of the virus or not. This could be an interesting point to investigate the presence of MERS-

Take the whole bat link out (should have caught that), MERS-CoV is a camel and not a bat virus. This would give you some much needed word reduction and get back a little focus in the manuscript.

Good luck

Vincent Munster, PhD

Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

On 12/10/20, 3:36 PM, "Holloway, Peter" <[REDACTED] (b) (6)> wrote:

Dear all,

Thank you so much for all your help with the camel MERS paper.

Emerging Infectious Diseases has expressed a potential interest in publishing the paper (which is good news!), although two of the three external reviewers have made several comments that need to be addressed (the third reviewers comments were entirely positive).

I've attached the reviewers comments (with some brief comments) and a revised draft of the paper, in which I have tried to address the key points raised. However this draft is currently 210 words over the 3500 word limit, and so thoughts on where and how to reduce this would be appreciated, as well as other comments. We will need to submit a separate response to the reviewers comment also.

The word count for the paper was already close to the 3500 word limit when submitted, and so finding space to address the (fairly large) number of issues raised by the reviewers, within the 3500 word count, is proving challenging.

Matthew is currently looking at some of the statistical issues that were raised, though I know he would appreciate hearing comments regarding these too.

Apologies, as I have left things rather late (as always!) and so if you can find time to look at this within the next few days (before Monday?) that would be great.

The deadline for resubmission is 16th December.

Thank you so much again!

Peter

[RVC Logo - link to RVC Website]<<http://www.rvc.ac.uk>> [Twitter icon - link to RVC (Official) Twitter]
<<http://twitter.com/RoyalVetCollege>> [Facebook icon - link to RVC (Official) Facebook]
<<http://www.facebook.com/theRVC>> [YouTube icon - link to RVC YouTube]
<<http://www.youtube.com/user/RoyalVetsLondon?feature=mhee>> [Pinterest icon - link to RVC Pinterest]
<<http://pinterest.com/royalvetcollege/>> [Instagram icon - link to RVC Instagram]
<<http://instagram.com/royalvetcollege>>

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From: Plowright, Raina
Sent: Thu, 10 Dec 2020 15:43:52 +0000
To: Munster, Vincent (NIH/NIAID) [E]; Tamika Lunn; Peggy Eby; Kwe Claude, Yinda (NIH/NIAID) [F]; Alison Peel
Cc: 'Jamie Lloyd-Smith'; Hamish McCallum; Hoegh, Andrew; Olivier Restif
Subject: Re: Spatio-temporal Hendra virus manuscript
Attachments: Fig1.pdf

Tamika, very exciting seeing this work unfold! Thanks for keeping us updated with a steady stream of plots; keep it coming!

Vincent, this is good to know about lab comparability. Tamika, look in the methods of Field et al. 2015. I suspect the NSW sites were processed at EMAI and the Qld sites at BQ. Craig Smith developed the PCR and it would be worth reaching out to him as he ran that study after Hume left his position (and Craig is very supportive of our work and will probably be excited to talk about PCR!).

Tamika, and all, here is a plot from (b) (6), (b) (4) that shows the spatial locations of spillovers. Wyatt can give you the spillover locations through the usual data agreement process (the 3-4 decimal place IP locations are sensitive, discuss with Ali to see the spatial resolution needed).

Raina

From: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Date: Thursday, December 10, 2020 at 7:33 AM
To: Tamika Lunn <tamika.lunn@griffithuni.edu.au>, Peggy Eby <(b) (6)>, Plowright, Raina <(b) (6)>, Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>, Alison Peel <(b) (6)>
Cc: 'Jamie Lloyd-Smith' <(b) (6)>, Hamish McCallum <(b) (6)>, Hoegh, Andrew <(b) (6)>, Olivier Restif <(b) (6)>
Subject: RE: Spatio-temporal Hendra virus manuscript

To answer this directly, you can't directly compare Ct values or assays, because different assays and the equipment would have slightly different outcomes (smts varying by 2 – 3 CT values). That's why conversion into genome copies is more useful (as that's quantitative). If Hume would run his qRT-PCR with a standard, and make the conversion from CT to copy numbers this should be done (although not as good as directly running it obviously).

Its also good to realize, that the Ct30 is relatively arbitrary, you will still have infectious virus in some samples with higher CT values and no infectious virus in samples with lower CT values. That said, I think it's the best approximation we can do.

Hope this helps,

Vincent Munster, PhD
Chief Virus Ecology Section

Rocky Mountain Laboratories
NIAID/NIH

From: Tamika Lunn <[REDACTED] (b) (6)>
Sent: Wednesday, December 9, 2020 5:43 PM
To: Peggy Eby <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>
Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Alison Peel
<[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: 'Jamie Lloyd-Smith' <[REDACTED] (b) (6)> Hamish McCallum
<[REDACTED] (b) (6)> 'Hoegh, Andrew' <[REDACTED] (b) (6)> Olivier Restif
<[REDACTED] (b) (6)>
Subject: Re: Spatio-temporal Hendra virus manuscript

Hi all,

These are the Field et al data plotted with no Ct threshold (left plots) and the Ct \leq 30 threshold (right plots), split by region (Central Queensland, Northern Queensland, South East Queensland)

In South East Queensland the Ct threshold makes the peaks clean, as Ali said, only peaks in 2011 and 2013. This also maps to the spillover cases for the region.

The peaks for Northern Queensland and Central Queensland are almost entirely removed, except for Central Queensland in 2011. I think this is interesting, because classically we wouldn't expect to see winter seasonality in these regions. So here, when we remove the 'noise', we only see very very low-level shedding. There are still spillover cases in these regions though.

Of the plots split by site, Boonah is the most interesting, but it has the most data by far. All other sites mostly have very low prevalence with the new threshold.

Question for the group - would it be reasonable to apply the same Ct threshold to these data? Presumably, the laboratory methods have changed over time. Would that have any impact on the Ct value, and would it be reasonable to assume that Field et al might also have seen full genomes around Ct 30, if they had looked into it?

Also for these plots I just pulled case data from the website ([here](#)) and grouped them by region. Would it be possible for me to have the spillover location data? (Ali?) If I had the spatial location of spillover cases I could present just the spillover cases within say, a reasonable foraging radius from each roost.

Thanks!
Tamika

From: (b) (6) <(b) (6)>
Sent: Thursday, December 10, 2020 10:07 AM
To: 'Plowright, Raina' <(b) (6)> 'Kwe Claude, Yinda (NIH/NIAID) [F]' <(b) (6)> 'Alison Peel' <(b) (6)> 'Munster, Vincent (NIH/NIAID) [E]' <(b) (6)>
Cc: Tamika Lunn <(b) (6)> 'Jamie Lloyd-Smith' <(b) (6)> 'Hamish McCallum' <(b) (6)> 'Hoegh, Andrew' <(b) (6)> 'Olivier Restif' <(b) (6)>
Subject: RE: Spatio-temporal Hendra virus manuscript

Thank you for including me in this thread.
A great step forward for clarifying / interpreting patterns of viral shedding. I'm looking forward to the site-specific plots for this work and the Field et al data.
Thanks again for sharing this with me.
Peggy

From: Plowright, Raina <(b) (6)>
Sent: Thursday, 10 December 2020 8:22 AM
To: Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Alison Peel <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: Tamika Lunn <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Hamish McCallum <(b) (6)> Hoegh, Andrew <(b) (6)> Olivier Restif <(b) (6)> Peggy Eby <(b) (6)>
Subject: Re: Spatio-temporal Hendra virus manuscript

Very exciting to see the data plotted like that. And to think that 2011 and 2013 come up on the Field data set as they were the food shortage years.. I'm sure David Jordan is ready to move on and would be happy to hand over that dataset. Let me know if you want me to reach out to him.

From: Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>
Date: Wednesday, December 9, 2020 at 8:39 AM
To: Alison Peel <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: Plowright, Raina <(b) (6)>, Tamika Lunn <(b) (6)>, Jamie Lloyd-Smith <(b) (6)> Hamish McCallum <(b) (6)> Hoegh, Andrew <(b) (6)> Olivier Restif <(b) (6)> Peggy Eby <(b) (6)>
Subject: Re: Spatio-temporal Hendra virus manuscript

There are hopes for getting sequences just from ct<30.
We have been able to get full genomes from some and others we have only got partial sequences.

Thanks
Kwe

From: Alison Peel <[REDACTED] (b) (6)>
Date: Monday, December 7, 2020 at 11:51 PM
To: "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)>
Cc: "Plowright, Raina" <[REDACTED] (b) (6)> Tamika Lunn
<[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)>
Hamish McCallum <[REDACTED] (b) (6)> "Kwe Claude, Yinda
(NIH/NIAID) [F]" <[REDACTED] (b) (6)> "Hoegh, Andrew"
<[REDACTED] (b) (6)> Olivier Restif <[REDACTED] (b) (6)> Peggy Eby
<[REDACTED] (b) (6)>
Subject: Re: Spatio-temporal Hendra virus manuscript

ok, that sounds reasonable Vincent, thanks.
Kwe - what is the Ct threshold for getting genome copies?
thanks
Ali

On Tue, 8 Dec 2020 at 01:10, Munster, Vincent (NIH/NIAID) [E]
<[REDACTED] (b) (6)> wrote:

Hi Ali, that's is currently completely clear, e.g. is not static. E.g. high CT0values in the beginning of an infectious shedding period, are likely to be "more" infectious than the same CT values at the end.

However, I think that we can come-up with some parameter. Kwe can only recover full genomes if the CT-value is below a certain threshold, I think you can use that threshold to tentatively set a (conservative)likelihood threshold of infectiousness.

Does that make sense?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Alison Peel <[REDACTED] (b) (6)>
Sent: Sunday, December 6, 2020 7:25 PM
To: Plowright, Raina <[raina.\[REDACTED\] \(b\) \(6\)@nih.gov](mailto:raina.[REDACTED] (b) (6)@nih.gov)>
Cc: Tamika Lunn <[REDACTED] (b) (6)> Jamie Lloyd-Smith
<[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Hamish McCallum <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]
<[REDACTED] (b) (6)> Hoegh, Andrew <[REDACTED] (b) (6)> Olivier
Restif <[REDACTED] (b) (6)> Peggy Eby <[REDACTED] (b) (6)>
Subject: Re: Spatio-temporal Hendra virus manuscript

Thanks for sending through these additional plots Tamika.

Kwe and Vincent - is there a threshold for what log genome copy value you would consider to be infectious? ballpark?

Ooh this system is such a tease! I've cc'd Peggy here too, as it links to discussions we're currently having re: broader historical trends in spillover, and whether spillover is driven by intensity of shedding (\pm related to health/immunity) or feeding patterns/proximity to horses (or both). What strikes me is the very high mean viral load (and distribution) in winter 2018 (low # spillovers, which could be explained by the very good flowering pulse, meaning flying foxes were feeding well away from horses) and then the much lower mean/distribution of viral load in winter 2020 - a year when we did expect there to be increased spillover risk. The limited number of spillovers this year is potentially explainable because of a very good flowering pulse, but that doesn't explain why the viral loads would be so low. I'll have to think more about the site-specific differences (Toowoomba!), and the broader conditions versus those being experienced by the bats that are remaining in our continuously occupied sites when conditions are better elsewhere. Fascinating stuff though.

I'm relatively free the week that you've proposed meeting.
Cheers

Ali

On Mon, 7 Dec 2020 at 11:08, Plowright, Raina <[REDACTED]> (b) (6) wrote:
Great to see these plots!
14th I'm free until 3pm MT
15th I'm free after 2pm MT
Raina

Sent from my iPhone

On Dec 6, 2020, at 4:30 PM, Tamika Lunn <[REDACTED]> (b) (6) wrote:

Hi all,

Yes - thank you for the extra reflections Jamie!

I've now received the genome copy data from Kwe and have started on some of the initial visualizations. I'll work this week on splitting the prevalence plots by different cut-off values, and start on some of these ideas about FOI, as suggested.

I'll aim to send you all an update on this early next week (week starting the 14th). Shall we set a tentative date to re-group and discuss the new visualizations?

December 14th or 15th at 1pm or 2pm Mountain time (Dec 15th or 16th at 6am or 7am Brisbane time) looks like it could work ok for those who filled in the doodle poll I sent after the last meeting. Alternatively I've made a new doodle poll with later dates that week (here). Please let me know what day/time might work for you, and I'll send around a calendar invite ASAP.

Thanks!
Tamika

P.S. I've attached the updated prevalence/viral load plots, re-made with genome copies instead of Ct values. They show similar patterns, though I do think the seasonal trend in viral load is clearer in these new plots (see the boxplot of all sites combined).

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: Sunday, December 6, 2020 5:01 AM
To: Jamie Lloyd-Smith <[REDACTED]> (b) (6)
Cc: Tamika Lunn <[REDACTED]> (b) (6); Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6); Hamish McCallum <[REDACTED]> (b) (6); Alison Peel <[REDACTED]> (b) (6); Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED]> (b) (6); Hoegh, Andrew <[REDACTED]> (b) (6); Olivier Restif <[REDACTED]> (b) (6)
Subject: Re: Spatio-temporal Hendra virus manuscript

Hi Jamie,
Sorry to take so long to read your email. I think this is a very sensible approach and could lead to some exciting new insights. I look forward to seeing the first iterations of the data visualizations.
Raina

Sent from my iPhone

On Nov 25, 2020, at 12:11 PM, Jamie Lloyd-Smith <[REDACTED]> (b) (6) wrote:

Hi Tamika, and everyone,

Thanks for the follow up and great notes from the call. I was reflecting on the discussion on a post-call dog walk, and really think there's a solid avenue in the direction that Hamish and I were proposing, wrt thresholding the data at a series of Ct values and plotting the spatio-temporal dynamics at those levels. I think this has several virtues: it emphasizes the qPCR data which is the most novel element of the study; it could be a quick and clear way of pulling out the signal of variation in high shedding (while marginalizing but not hiding the low-intensity off-season shedding); and best of all, it's very achievable on the tight timeline you're working under! I'm sure there'd be scope to

do fancier things next, but in my experience you can often get 80% of the insight from a quick-and-dirty chop at the data, if you find the right angle.

I think this approach could also set up interesting analyses of a couple follow-up items, namely:

- identifying pulses -- I'd bet they're much more evident (and putatively more epidemiologically meaningful) once the high-Ct noise is set aside.
- roost-level dose-response aka linking pathogen pressure to spillover -- filtering to med/high shedding and then integrating over the pulses would likely give a cleaner picture of the force of infection at each roost. So doing this at a few plausible Ct cut-offs and investigating the association with spillover events could be fruitful. You could start by visualizing it, then perhaps proceed to a regression approach that takes account of other variables (regarding landscape features, proxies for horse density, etc). Though that begins to grow into a bigger project, and blurs into the bigger spillover prediction efforts.
- [definitely more of a stretch] if Kwe and Vincent can translate Ct to genome copies, then there might be a way to do a kind of weighted integral to get a proxy for the FOI. i.e. work from the data to estimate the prevalence of shedding at various Ct levels, transform to genome copies, and add it up. Or rather than a straight summation of genomes, could include a function that reflects the putative relationship between Ct/genomes and infectious virus. This is certainly asking a lot of the data, but it seems like it might capture the actual underlying process, and it might be fun to see how well it can work with real-world data.

Anyway, great work and very stimulating! Thanks for the opportunity to contribute.

cheers,
jamie

On Tue, Nov 24, 2020 at 6:42 PM Tamika Lunn <[REDACTED]> (b) (6) wrote:
Hi everyone,

Thanks again for the great meeting today!

The link of the recorded meeting is below and I've attached some meeting notes. Please let me know if there is anything in the notes (particularly my 'to-dos') that I've missed.

As mentioned, it would be good to set a tentative time/date for a follow up meeting. I'll aim to make reasonable progress in the coming weeks, so perhaps in ~two weeks time? I've set up a new Doodle Poll with our best time conversions here.

Thanks again!
Tamika

Meeting recording:
Topic: Spatio-temporal Hendra virus manuscript
Start Time : Nov 24, 2020 04:02 PM

Meeting Recording:

(b) (6)

Access Passcode: (b) (6)

From: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Sent: Wednesday, November 25, 2020 10:33 AM
To: Tamika Lunn <(b) (6)> Hamish McCallum
<(b) (6)> Alison Peel <(b) (6)> Plowright, Raina
<(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]
<(b) (6)> Hoegh, Andrew <(b) (6)> Jamie
Lloyd-Smith <(b) (6)> Olivier Restif <(b) (6)>
Subject: RE: Spatio-temporal Hendra virus manuscript

<image001.png>

Flu work

<https://jcm.asm.org/content/47/3/666>

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Tamika Lunn <(b) (6)>
Sent: Tuesday, November 24, 2020 3:45 PM
To: Hamish McCallum <(b) (6)> Alison Peel

< (b) (6) Plowright, Raina < (b) (6)
Munster, Vincent (NIH/NIAID) [E] < (b) (6) Kwe Claude,
Yinda (NIH/NIAID) [F] < (b) (6) Hoegh, Andrew
< (b) (6) Jamie Lloyd-Smith < (b) (6)
Olivier Restif < (b) (6)
Subject: Re: Spatio-temporal Hendra virus manuscript

Hi all,

Just a reminder that we are meeting in ~15 minutes. The zoom link is below, and I'll try and remember to record it for anyone who can't attend.

This is primarily an opportunity to touch base about the manuscript, and discuss our approach and focus for moving forward.

I'd like to focus the meeting on

- 1) Best approaches for our formal analyses (estimating prevalence, spatio-temporal analyses, incorporating viral load)
- 2) Defining a pulse (is this useful/possible?)
- 3) Key focus points to include in the manuscript to separate it from Field et al 2015

See you all soon!

Tamika

PREEMPT is inviting you to a scheduled Zoom meeting.

Topic: Spatio-temporal Hendra virus manuscript

Time: Nov 25, 2020 10:00 AM Hobart

Join Zoom Meeting

[https://us02web.zoom.us/j/██████████\(b\) \(6\)?pwd=eElidFZFU3FBQXc4UCtzRGFFL2tldz09](https://us02web.zoom.us/j/██████████(b) (6)?pwd=eElidFZFU3FBQXc4UCtzRGFFL2tldz09)

Meeting ID: ██████████(b) (6)

Passcode: ██████████(b) (6)

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Passcode: ██████████(b) (6)

Find your local number: [https://us02web.zoom.us/j/██████████\(b\) \(6\)?pwd=eElidFZFU3FBQXc4UCtzRGFFL2tldz09](https://us02web.zoom.us/j/██████████(b) (6)?pwd=eElidFZFU3FBQXc4UCtzRGFFL2tldz09)

From: Tamika Lunn <██████████(b) (6)>

Sent: Friday, November 20, 2020 1:26 PM

To: Hamish McCallum <[REDACTED]> (b) (6) Alison Peel
<[REDACTED]> (b) (6) Plowright, Raina <[REDACTED]> (b) (6)
Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
<[REDACTED]> (b) (6) <[REDACTED]> (b) (6) Hoegh, Andrew
<[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6)
Olivier Restif <[REDACTED]> (b) (6)
Subject: Spatio-temporal Hendra virus manuscript
When: Wednesday, November 25, 2020 10:00 AM-11:00 AM.
Where:

PREEMPT is inviting you to a scheduled Zoom meeting.

Topic: Spatio-temporal Hendra virus manuscript

Time: Nov 25, 2020 10:00 AM Hobart

Join Zoom Meeting

[https://us02web.zoom.us/j/\[REDACTED\]\(b\) \(6\)?pwd=eElidFZFU3FBQXc4UCtzRGFFL2tldz09](https://us02web.zoom.us/j/[REDACTED](b) (6)?pwd=eElidFZFU3FBQXc4UCtzRGFFL2tldz09)

Meeting ID: [REDACTED] (b) (6)

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+1 669 900 9128 US (San Jose)

+1 253 215 8782 US (Tacoma)

Meeting ID: (b) (6)

Passcode: (b) (6)

Find your local number: <https://us02web.zoom.us/j/84422111111>

--

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

Phone: (b) (6)

<https://www.eeb.ucla.edu/Faculty/lloydsmith/>

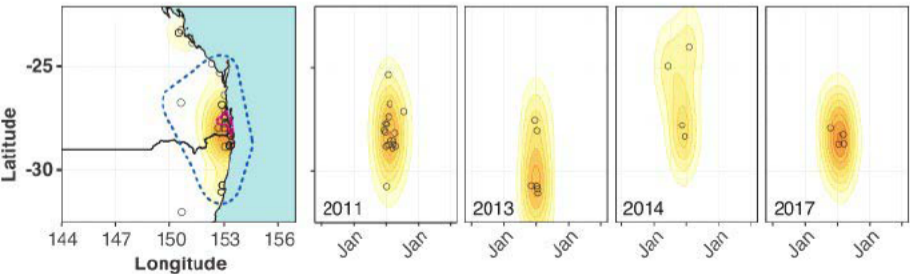
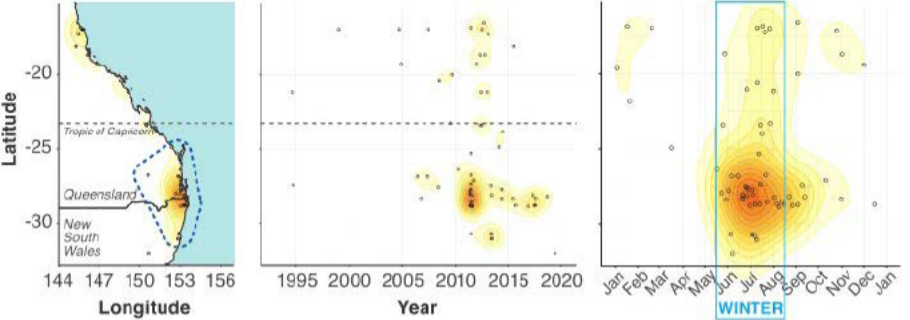
Office: 4135 Terasaki Life Sciences Building
Lab: 4000 Terasaki Life Sciences Building

<Mean genome copies over time_1056 x 619.png>

<Underroost viral load, positive samples by month_800 x 800.png>

<Mean genome copies over time, per site_1056 x 619.png>

<Underroost viral load, positive samples by month per site_800 x 800.png>



- - - Broad Study Area
 - - - SEQ Study Area
 ○ Spillover Events
 HIGH LOW Spillover Density

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 7 Dec 2020 15:59:14 +0000
To: Schountz, Tony
Subject: RE: R24

No, just keep mee at 0, other wise you'll just get a ton of questions.

All I want is the bats 😊

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Schountz, Tony <[REDACTED] (b) (6)>
Sent: Monday, December 7, 2020 8:45 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: R24

Vincent, is it true that you cannot accept any materials support from the R24? I thought it was only salaries for you and your staff? Is there an administrative person at RML that needs to be in the loop for the grant?

Thanks,

T.

—

Tony Schountz, PhD
Associate Professor
Center for Vector-borne Infectious Diseases
Department of Microbiology, Immunology and Pathology
College of Veterinary Medicine
Colorado State University
3185 Rampart Road, Bldg T
Fort Collins, CO 80523-1692

[REDACTED] (b) (6)

[REDACTED] (b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 7 Dec 2020 15:40:02 +0000
To: LaTrielle, Sara; Jamie Lloyd-Smith; Barbara Han; Hector Aguilar-Carreno; Hoegh, Andrew
Cc: Plowright, Raina
Subject: RE: DSD Bullets

<https://www.cell.com/action/showPdf?pii=S0092-8674%2820%2931456-2>

this one got quite a lot of attention

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara <(b) (6)>
Sent: Monday, December 7, 2020 8:37 AM
To: Jamie Lloyd-Smith <(b) (6)> Barbara Han <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Hector Aguilar-Carreno <(b) (6)> Hoegh, Andrew <(b) (6)>
Cc: Plowright, Raina <(b) (6)>
Subject: Fw: DSD Bullets

Morning!

Anyone here has a story/'hot topics' for DARPA this month... they are asking (below) and as we lock down Phase II seems we ought to give them something this week. A publication- media- new results specific to PREEMPT.

I cc'ed PI's whose work will be highlighted in Phase II.

Please forward this morning.

Thank you,
Sara

From: (b) (6)
Sent: Monday, December 7, 2020 7:50 AM
To: LaTrielle, Sara <(b) (6)> Plowright, Raina <(b) (6)>
Cc: (b) (6); (b) (6); (b) (6); (b) (6); (b) (6); (b) (6);
Subject: RE: DSD Bullets

Good Morning Sara,

Thanks again for this! I know we've been keeping you busy lately, but any other new hot topics for the DSD bullet this month?

Thanks!

(b) (6)

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

From: LaTrielle, Sara <(b) (6)>

Sent: Friday, November 13, 2020 7:51 PM

To: (b) (6); Plowright, Raina

<(b) (6)>

Cc: (b) (6); (b) (6);

(b) (6); (b) (6)

(b) (6); (b) (6)

Subject: Re: DSD Bullets

(b) (6)

Our PI, Cara Brook, who oversees our Madagascar field site has these publications:

Published:

Gentles A, Guth S, Rozins C, and Brook CE. 2020. A review of mechanistic models of viral dynamics in bat reservoirs for zoonotic disease. Pathogens and Global Health. doi: 10.1080/20477724.2020.1833161.

Accepted:

Ravelomanantsoa NAF, Guth S, Andrianiana A, Andry S, Gentles A, Ranaivoson HC, and Brook CE. In Press. The zoonotic potential of bat-borne coronaviruses. Emerging Topics in Life Sciences.

I'll let you know if additional PI's report in.

Sara

From: (b) (6)

Sent: Friday, November 13, 2020 2:14:35 PM

To: LaTrielle, Sara <(b) (6)> Plowright, Raina <(b) (6)>

Cc: (b) (6); (b) (6);

(b) (6); (b) (6)

(b) (6); (b) (6)

Subject: RE: DSD Bullets

Thanks very much!!

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

From: LaTrielle, Sara <(b) (6)>
Sent: Friday, November 13, 2020 4:14 PM
To: (b) (6); Plowright, Raina
<(b) (6)>
Cc: (b) (6); (b) (6); (b) (6);
(b) (6); (b) (6); (b) (6);
(b) (6); (b) (6)
Subject: Re: DSD Bullets

(b) (6)

I have just emailed our PI's to see if any have new results- I will get back to you soon if so. Thanks for the reminder.

Best,
Sara

From: (b) (6)
Sent: Friday, November 13, 2020 1:38 PM
To: Plowright, Raina; LaTrielle, Sara
Cc: (b) (6); (b) (6); (b) (6); (b) (6);
(b) (6)
Subject: RE: DSD Bullets

Hi again Raina and Sara,

DSD bullets have shifted from being due Wednesdays to being due Mondays. Does the MSU team have any exciting updates you'd like us to consider for this coming Monday's DSD bullet?

Thanks!

(b) (6)

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

From: (b) (6)
Sent: Monday, August 31, 2020 10:12 AM
To: (b) (6); (b) (6)
Cc: (b) (6); (b) (6); (b) (6);
(b) (6); (b) (6); (b) (6)
(b) (6); (b) (6)
Subject: DSD Bullets

Hi Raina and Sara,

You may recall, I'm a SETA on (b) (6) team supporting the PREEMPT program. As you're probably aware, we try to highlight our PREEMPT performers in our weekly DSD bullet submission for DoD leadership. If in the future (or now if applicable), you have particular accomplishments from your PREEMPT efforts you'd like to highlight, please send us a write up about it. In addition to a summary of

your research and the specific accomplishment, it should include its impact and/or relevance. It's ok if your description is detailed and/or technical, we will edit it for a DoD audience that is not scientifically trained.

These bullets are due from us to our leadership by COB Wednesdays and we have to edit them to fit the length and format before that. So if we receive your paragraph later than noon on Wednesdays, they will likely have to wait for the next week. Also, since these bullet requests are ongoing, we will likely send out reminders to you from time to time to see if there are any highlights that might have been missed.

Thank you in advance,

(b) (6)

(b) (6)

(b) (6)

(b) (6)

Science and Technology Associates, Inc.

(b) (6)

(b) (6)

From: Plowright, Raina
Sent: Sat, 5 Dec 2020 18:01:14 +0000
To: Jamie Lloyd-Smith
Cc: Tamika Lunn; Munster, Vincent (NIH/NIAID) [E]; Hamish McCallum; Alison Peel; Kwe Claude, Yinda (NIH/NIAID) [F]; Hoegh, Andrew; Olivier Restif
Subject: Re: Spatio-temporal Hendra virus manuscript
Attachments: image001.png

Hi Jamie,
Sorry to take so long to read your email. I think this is a very sensible approach and could lead to some exciting new insights. I look forward to seeing the first iterations of the data visualizations.
Raina

Sent from my iPhone

On Nov 25, 2020, at 12:11 PM, Jamie Lloyd-Smith <[REDACTED]> (b) (6) wrote:

Hi Tamika, and everyone,

Thanks for the follow up and great notes from the call. I was reflecting on the discussion on a post-call dog walk, and really think there's a solid avenue in the direction that Hamish and I were proposing, wrt thresholding the data at a series of Ct values and plotting the spatio-temporal dynamics at those levels. I think this has several virtues: it emphasizes the qPCR data which is the most novel element of the study; it could be a quick and clear way of pulling out the signal of variation in high shedding (while marginalizing but not hiding the low-intensity off-season shedding); and best of all, it's very achievable on the tight timeline you're working under! I'm sure there'd be scope to do fancier things next, but in my experience you can often get 80% of the insight from a quick-and-dirty chop at the data, if you find the right angle.

I think this approach could also set up interesting analyses of a couple follow-up items, namely:

- identifying pulses -- I'd bet they're much more evident (and putatively more epidemiologically meaningful) once the high-Ct noise is set aside.
- roost-level dose-response aka linking pathogen pressure to spillover -- filtering to med/high shedding and then integrating over the pulses would likely give a cleaner picture of the force of infection at each roost. So doing this at a few plausible Ct cut-offs and investigating the association with spillover events could be fruitful. You could start by visualizing it, then perhaps proceed to a regression approach that takes account of other variables (regarding landscape features, proxies for horse density, etc). Though that begins to grow into a bigger project, and blurs into the bigger spillover prediction efforts.
- [definitely more of a stretch] if Kwe and Vincent can translate Ct to genome copies, then there might be a way to do a kind of weighted integral to get a proxy for the FOI. i.e. work from the data to estimate the prevalence of shedding at various Ct levels, transform to genome copies, and add it up. Or rather than a straight summation of genomes, could include a function that reflects the putative relationship between Ct/genomes and infectious virus. This is certainly asking a lot

of the data, but it seems like it might capture the actual underlying process, and it might be fun to see how well it can work with real-world data.

Anyway, great work and very stimulating! Thanks for the opportunity to contribute.

cheers,
jamie

On Tue, Nov 24, 2020 at 6:42 PM Tamika Lunn <[REDACTED] (b) (6)> wrote:
Hi everyone,

Thanks again for the great meeting today!

The link of the recorded meeting is below and I've attached some meeting notes. Please let me know if there is anything in the notes (particularly my 'to-dos') that I've missed.

As mentioned, it would be good to set a tentative time/date for a follow up meeting. I'll aim to make reasonable progress in the coming weeks, so perhaps in ~two weeks time? I've set up a new Doodle Poll with our best time conversions [here](#).

Thanks again!
Tamika

Meeting recording:
Topic: Spatio-temporal Hendra virus manuscript
Start Time : Nov 24, 2020 04:02 PM

Meeting Recording:

Access Passcode: [REDACTED] (b) (6)

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

Sent: Wednesday, November 25, 2020 10:33 AM

To: Tamika Lunn <[REDACTED] (b) (6)> Hamish McCallum <[REDACTED] (b) (6)>

Alison Peel <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)> Kwe Claude,

Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Hoegh, Andrew <[REDACTED] (b) (6)>

Jamie Lloyd-Smith <[REDACTED] (b) (6)> Olivier Restif <[REDACTED] (b) (6)>

Subject: RE: Spatio-temporal Hendra virus manuscript

<image001.png>

Flu work

<https://jcm.asm.org/content/47/3/666>

Vincent Munster, PhD

Chief Virus Ecology Section

Rocky Mountain Laboratories

NIAID/NIH

From: Tamika Lunn <[REDACTED] (b) (6)>
Sent: Tuesday, November 24, 2020 3:45 PM
To: Hamish McCallum <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>
Plowright, Raina <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]
<[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]
<[REDACTED] (b) (6)> Hoegh, Andrew <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Olivier Restif <[REDACTED] (b) (6)>
Subject: Re: Spatio-temporal Hendra virus manuscript

Hi all,

Just a reminder that we are meeting in ~15 minutes. The zoom link is below, and I'll try and remember to record it for anyone who can't attend.

This is primarily an opportunity to touch base about the manuscript, and discuss our approach and focus for moving forward.

I'd like to focus the meeting on

1) Best approaches for our formal analyses (estimating prevalence, spatio-temporal analyses, incorporating viral load)

2) Defining a pulse (is this useful/possible?)

3) Key focus points to include in the manuscript to separate it from Field et al 2015

See you all soon!

Tamika

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Topic: Spatio-temporal Hendra virus manuscript

Time: Nov 25, 2020 10:00 AM Hobart

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[https://us02web.zoom.us/j/██████████\(b\) \(6\)?pwd=eElidFZFU3FBQXc4UCtzRGFFL2tldz09](https://us02web.zoom.us/j/██████████(b) (6)?pwd=eElidFZFU3FBQXc4UCtzRGFFL2tldz09)

Meeting ID: ██████████(b) (6)

Passcode: ██████████(b) (6)

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Meeting ID: (b) (6)

Passcode: (b) (6)

Find your local number: <https://us02web.zoom.us/j/64810612000>

From: Tamika Lunn <(b) (6)>
Sent: Friday, November 20, 2020 1:26 PM
To: Hamish McCallum <(b) (6)> Alison Peel <(b) (6)>
Plowright, Raina <(b) (6)> Munster, Vincent (NIH/NIAID) [E]
<(b) (6)> <(b) (6)> <(b) (6)> Hoegh,
Andrew <(b) (6)> Jamie Lloyd-Smith <(b) (6)> Olivier
Restif <(b) (6)>
Subject: Spatio-temporal Hendra virus manuscript
When: Wednesday, November 25, 2020 10:00 AM-11:00 AM.
Where:

PREEMPT is inviting you to a scheduled Zoom meeting.

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+1 253 215 8782 US (Tacoma)

Meeting ID: (b) (6)

Passcode: (b) (6)

Find your local number: <https://us02web.zoom.us/j/kdt2KvzzYr>

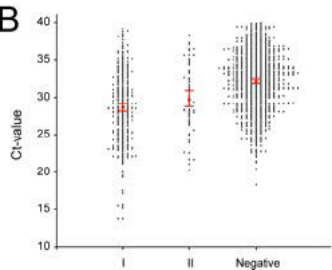
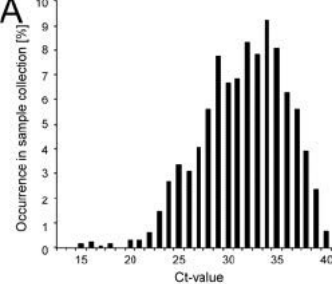
--

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

Phone: (b) (6)

<https://www.ecb.ucla.edu/Faculty/lloydsmith/>
Office: 4135 Terasaki Life Sciences Building
Lab: 4000 Terasaki Life Sciences Building



From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 3 Dec 2020 22:53:40 +0000
To: Olivier Restif; Emily Gurley
Cc: Jamie Lloyd-Smith; Plowright, Raina; Hector Aguilar-Carreno; Barbara Han
Subject: RE: Expression of interest - coronavirus One Health network call

Always happy to contribute as well,

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Olivier Restif <(b) (6)>
Sent: Thursday, December 3, 2020 3:30 PM
To: Emily Gurley <(b) (6)>
Cc: Jamie Lloyd-Smith <(b) (6)> Plowright, Raina <(b) (6)>
Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Hector Aguilar-Carreno
<(b) (6)> Barbara Han <(b) (6)>
Subject: Re: Expression of interest - coronavirus One Health network call

Fantastic, thank you all. I'll keep you updated.

Best wishes,

Olivier

On 3 Dec 2020, at 20:15, Emily Gurley <(b) (6)> wrote:

Here, here – same for me! Anything we can do to support, we're eager to do so.

Best,
Emily

From: Jamie Lloyd-Smith <(b) (6)>
Sent: Thursday, December 3, 2020 3:00 PM
To: Plowright, Raina <(b) (6)>
Cc: Olivier Restif <(b) (6)> Emily Gurley <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Hector Aguilar-Carreno <(b) (6)> Barbara Han

< [REDACTED] (b) (6)

Subject: Re: Expression of interest - coronavirus One Health network call

Yes, sounds great. I am 'in-principle interested'!

cheers

jamie

On Thu, Dec 3, 2020 at 10:05 AM Plowright, Raina < [REDACTED] (b) (6) > wrote:
Great idea Olivier! We need all the support we can get.

From: Olivier Restif < [REDACTED] (b) (6) >
Date: Thursday, December 3, 2020 at 10:24 AM
To: Emily Gurley < [REDACTED] (b) (6) > Munster, Vincent (NIH/NIAID) [E]
< [REDACTED] (b) (6) > Hector Aguilar-Carreno < [REDACTED] (b) (6) > Plowright,
Raina < [REDACTED] (b) (6) > Barbara Han < [REDACTED] (b) (6) > Jamie
Lloyd-Smith < [REDACTED] (b) (6) >
Subject: Expression of interest - coronavirus One Health network call

Hi everyone,

The UK funding body for biology BBSRC has issued a pre-announcement for a call to establish a global coronavirus research and innovation network (<https://www.ukri.org/opportunity/global-coronavirus-research-and-innovation-network/>), specifically to develop and coordinate One Health research in the following areas:

- pathogen biology (including the seasonality, transmission, ecology and evolution of coronaviruses)
- host response
- effective intervention strategies.

This is a relatively small amount of money, enough to pay for the salary of a network coordinator in the UK for 4 years. The geographical scope includes Europe, East Asia and North America, but with no restrictions. The real value of this initiative will be in coordinating existing projects, facilitating exchange of samples and data, and of course coordinate future large bids for funding.

James Wood, Andrew Cunningham and I are intending to submit an application in February and we hope you would be interested in being a part of this. At the moment we are just asking key players in this field for in-principle interest. We'll be in touch with more information in the new year.

Best wishes,

Olivier

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

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, 3 Dec 2020 16:47:43 +0000
To: Wang Linfa; Munster, Vincent (NIH/NIAID) [E]; epstein
Subject: Rhinolophus colony

I just heard back from David Blehert and he tells me they've kept big brown bats for months and have had pups born from females that were pregnant upon capture. They've had less luck with little brown bats. He thinks establishing a colony would not be difficult if the species is amenable to indoor habitation. So, I think this is encouraging, at the least.

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
3185 Rampart Road, Bldg T
Fort Collins, CO 80523-1692

(b) (6)

(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 2 Dec 2020 14:01:08 +0000
To: Sarah Munro
Cc: Jon Epstein; Schountz, Tony; Maria Kaczmarek
Subject: RE: Pteropus Colony - scheduling mistake

Hi Sarah,

Can you send me the link again?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Sarah Munro <[REDACTED] (b) (6)>
Sent: Tuesday, December 1, 2020 11:29 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Jon Epstein <[REDACTED] (b) (6)> Schountz, Tony <[REDACTED] (b) (6)>
Maria Kaczmarek <[REDACTED] (b) (6)>
Subject: Re: Pteropus Colony - scheduling mistake

Thanks to everyone for your understanding and flexibility.

Cheers
Sarah

On Dec 1, 2020, at 1:05 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Agreed, works from my end

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Jon Epstein <[REDACTED] (b) (6)>
Sent: Tuesday, December 1, 2020 10:00 AM
To: Sarah Munro <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Schountz, Tony
<[REDACTED] (b) (6)> Maria Kaczmarek <[REDACTED] (b) (6)>
Subject: Re: Pteropus Colony - scheduling mistake

Vincent, if you can swing 7pm for 30 minutes, it would be good to take advantage of Linfa's availability.

Cheers,
Jon

On Tue, Dec 1, 2020 at 11:46 AM Sarah Munro <[REDACTED]> (b) (6) wrote:
This is Prof. Wang's only window of availability. I apologize for the inconvenience.

Regards,
Sarah

On Dec 1, 2020, at 11:43 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Yes, but half an hour later would be appreciated (given mountain time)

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Jon Epstein <[REDACTED]> (b) (6)
Sent: Tuesday, December 1, 2020 9:39 AM
To: Sarah Munro <[REDACTED]> (b) (6)
Cc: Schountz, Tony <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E]
<[REDACTED]> (b) (6) Maria Kaczmarek <[REDACTED]> (b) (6)
Subject: Re: Pteropus Colony - scheduling mistake

Yes

On Tue, Dec 1, 2020 at 11:32 AM Sarah Munro <[REDACTED]> (b) (6) wrote:
Hello all,

Are you available for the call at the same time if we move it to December 2nd? Just to clarify, it would be 9 PM EST/ 7 PM MST on Wednesday, December 2nd. Once confirmed, I will edit the calendar invite.

Thanks,
Sarah

--

Sarah Munro, MPH
Research Scientist
EcoHealth Alliance
[520 Eighth Avenue, Ste. 1200](#)

[New York, NY 10018](#)

(b) (6) (mobile)

www.ecohealthalliance.org

EcoHealth Alliance develops science-based solutions to prevent pandemics and promote conservation.

--

Jonathan H. Epstein DVM, MPH, PhD

Vice President for Science and Outreach

EcoHealth Alliance

520 Eighth Avenue, Ste. 1200

New York, NY 10018

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(b) (6) (mobile)

web: ecohealthalliance.org

Twitter: [@epsteinjon](https://twitter.com/epsteinjon)

EcoHealth Alliance develops science-based solutions to prevent pandemics and promote conservation

--

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Twitter: [@epsteinjon](https://twitter.com/epsteinjon)

EcoHealth Alliance develops science-based solutions to prevent pandemics and promote conservation

From: Plowright, Raina
Sent: Tue, 1 Dec 2020 04:12:40 +0000
To: Faust, Christina L.
Cc: Peggy Eby; Alison Peel; Munster, Vincent (NIH/NIAID) [E]; Adrienne D; Maureen Kessler; (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]; (b) (6) Baranowski, Kelsee Taylor; Bharti, Nita
Subject: Re: PREEMPT conference abstract for British Ecological Society

Hi Christina, sorry I could not respond at short notice. Monday - Wednesday last week were the last 3 days of the semester and I was completely booked and more. Let me know how to best follow up so I can see your work.

Raina

On Nov 23, 2020, at 3:11 PM, Faust, Christina L. (b) (6) wrote:

Hi All,

I hope this finds you all well.

We have been working on models of black flying fox roost dynamics and shedding data and have some preliminary results to share.

I've prepared a *draft* of the BES talk and it's available in [this box folder](#). The results start at 6:26 minutes. I'd be happy to take feedback, questions, or chat with people about these results. I have to submit the presentation by 16:00 GMT on Wednesday and will upload the polished version to the same folder then (feel free to spare yourself for that one - there's still some visualizations to add).

However, in brief, we find that black flying fox occupation can be predicted by NDVI (normalized vegetation difference index) at the specific roost site and abundance of BFF is significantly positively associated with both extent of winter habitat and average NDVI within a foraging radius.

For Hendra shedding, the probability of detecting Hendra is best predicted by a combination of acute (7 day) and cumulative reflections of weather and an impact of seasonality. We find that average monthly precipitation (climatological 30-year average) is significantly negatively associated with prevalence (drier months = more Hendra). In addition, warmer anomalous temperatures the 7 days prior (calculated from 30-year average temperatures) to the sampling event increases likelihood of detecting Hendra. Lastly, we find that NDVI anomalies increase likelihood of Hendra. NDVI is a lagged metric reflecting several environmental factors and I think this is increasing likelihood of Hendra through recruitment of flying foxes to the roost. This is a slight effect and although highly significant, warrants more work.

Please let me know if you have any questions.

Thanks for all your help and contributions!

Best,

Christina

On Oct 15, 2020, at 12:16 PM, Faust, Christina L. <(b) (6)> wrote:

Hello all,

I hope this finds you all well.

For those I haven't yet met, I'm Christina Faust - I'm postdocing with Nita at Penn State and starting to work on climatological drivers of flying fox distributions (using open access monitoring data) and HeV shedding. You all have collected an incredible amount of data and we're very appreciative of all the work that has gone into generating longitudinal shedding data.

We're planning on submitting an abstract (attached here) to the Annual British Ecological Society meeting. The abstracts aren't published but are used for conference attendees. You'll notice that they are short and [at the moment] are lacking concrete results. I'll share the results as they come available.

If you could let me know if you are **not** okay with being included with the list of authors or if you have any changes to affiliation (sorry, I grabbed these from the internet) by **this Friday at 17:00 BST** (British Summer Time; UTC+01:00). I'm also happy to answer any questions you may have.

I had difficulty tracking down Dr. Yinda's current email address, if someone could forward to him or send me his email, I would be appreciative.

Thanks for your time.

Best,

Christina

<Faust_et_al_BES_v20201011.docx>

Raina Plowright BVSc MSc PhD

Associate Professor,
Department of Microbiology and Immunology
Montana State University,
109 Lewis Hall, Bozeman, MT 59717, USA

E: (b) (6)

W: (b) (6)

@rainamontana

www.batonehealth.org

www.bzndiseaseab.org



From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 26 Nov 2020 15:57:13 +0000
To: Plowright, Raina; Bushmaker, Trenton (NIH/NIAID) [E]
Subject: RE: Master's committee

Great,

Happy turkey day

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: Wednesday, November 25, 2020 4:57 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Re: Master's committee

The dean approved your committee! Reach out to Jayne. Happy thanksgiving.

Sent from my iPhone

On Nov 20, 2020, at 11:26 AM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Thank you!

-Trent

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: Friday, November 20, 2020 11:25 AM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Re: Master's committee

It's with the dean of graduate studies now. Jovanka gave permission to have majority of members outside of the department. Jayne said she would be MORE THAN DELIGHTED to be on your committee. When the dean approves we will be all set.

On Nov 19, 2020, at 10:42 AM, Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Raina,
Have you heard anything back regarding Dr. Jayne Marrow?

I will confirm with Heinz Feldmann he is still available to do this.

-Trent

From: "Plowright, Raina" <[REDACTED]> (b) (6)
Date: Wednesday, November 4, 2020 at 7:16 PM
To: Trenton Bushmaker <[REDACTED]> (b) (6)
Cc: Vincent Munster <[REDACTED]> (b) (6)
Subject: Re: Master's committee

I'll check and get back to you. Jayne would be excellent.

From: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Date: Wednesday, November 4, 2020 at 2:58 PM
To: Plowright, Raina <[REDACTED]> (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Re: Master's committee

Raina,
Do you think this is a good idea and would the graduate group be ok with this?

-Trent

From: Vincent Munster <[REDACTED]> (b) (6)
Date: Tuesday, November 3, 2020 at 4:42 PM
To: Trenton Bushmaker <[REDACTED]> (b) (6) "Plowright, Raina"
<[REDACTED]> (b) (6)
Subject: RE: Master's committee

Having an environmental engineer onboard might not be bad? And some necessary MSU representation?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>
Sent: Tuesday, November 3, 2020 4:24 PM
To: Plowright, Raina (b) (6); Munster, Vincent (NIH/NIAID) [E]
<(b) (6)>
Subject: Re: Master's committee

Hey,

So I am looking into finish my master committee and wanted to see your opinions on these two individuals.

1. Dr. Heinz Feldmann
2. Dr. Jayne Marrow-MSU VP of research. I need a person at MSU and she has experience in aerosol studies.

Please let me know if you have questions

-Trent

From: Alison Peel <(b) (6)>
Date: Friday, February 14, 2020 at 4:54 PM
To: "Plowright, Raina" (b) (6)
Cc: Trenton Bushmaker <(b) (6)> Vincent Munster
<(b) (6)>
Subject: Re: Master's committee

great!

On Sat, 15 Feb 2020 at 09:50, Plowright, Raina (b) (6) wrote:
Yes I can do that. Ali doesn't have to do anything. Just needs to attend your meetings. You have to list her on your committee when u submit program of study. Devin got permission to have Ali on her committee, so that should hold for you too.

Sent from my iPhone

On Feb 14, 2020, at 4:15 PM, Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> wrote:

Raina,
I know you all are very busy currently so I will keep this very short. I have asked Ali to be on my committee, she said yes (because she is awesome) but could you provide her with what she has to do? This is a question I couldn't answer.

-Trent

P.S. Congrats on the Vice news article!

Raina Plowright BVSc MSc PhD

Associate Professor,

Department of Microbiology and Immunology
Montana State University,
109 Lewis Hall, Bozeman, MT 59717, USA

E: [REDACTED] (b) (6)

W: [REDACTED] (b) (6)

@rainamontana

www.batonehealth.org

www.bzndiseaseclab.org

<image001.png>

From: Plowright, Raina
Sent: Tue, 24 Nov 2020 21:32:13 +0000
To: LaTrielle, Sara
Cc: Jamie Lloyd-Smith; Hector Aguilar-Carreno; Munster, Vincent (NIH/NIAID) [E]; Olivier Restif; Hoegh, Andrew; Barbara Han; Peter J. Hudson
Subject: Re: Modeling and prediction challenges for your effort under PREEMPT

Just put this in slack as start of a brainstorm:

Re-reading the emails now to understand what (b) (6) is asking. I think they may redistribute some funds from other teams they are cutting and they want to focus those funds on making our existing programs more successful. Leadership now like modeling. What data could help the modeling be more successful. Here is a brainstorm:

- good age-structured serology on large sample of bats
- sequence data from large number of infected bats with spatial and temporal replication
- more sequences thru the HNV G-P pipeline (@Jamie and @Hector C. Aguilar - some sort of lifeline to the HNV G-P work)
- Semi-captive experiment in Ghana with food restriction and VLP
- More AI work on eco-countermeasures as @AndyHoegh suggested (not sure what the data need would be - do you think more high-res satellite imagery/analysis for spatial risk analysis)?
- Employing AI for bat biomarkers.... not sure what data need is
- More samples for CoV screening for modeling CoV dynamics
- deep sequencing of CoV to see diversity and distribution of CoVs to better understand PCR data

On Nov 24, 2020, at 11:47 AM, LaTrielle, Sara <(b) (6)> wrote:

New Slack channel (phase2prep) link to continue these discussions, with all here included:

(b) (6)

From: Plowright, Raina <(b) (6)>
Sent: Tuesday, November 24, 2020 11:21 AM
To: Jamie Lloyd-Smith <(b) (6)> Hector Aguilar-Carreno <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: LaTrielle, Sara <(b) (6)> Olivier Restif <(b) (6)> Hoegh, Andrew <(b) (6)> Barbara Han <(b) (6)> Peter J. Hudson <(b) (6)>
Subject: Re: Modeling and prediction challenges for your effort under PREEMPT

yes good idea Jamie. The new DARPA director is an AI/modeler and focused on TA1. It's interesting that they may want to boost the modeling. If we give them some concrete ideas within their area of interest, the ideas may get funded. But it's critical that the ideas are within the narrowing focus of our broad efforts (as summarized in the list of statements I sent to them yesterday, pasted below).
Added Hector and Vincent here.

Impact Statements: "If this successful, this is how the world will change."

Developed a pipeline of in situ sampling, data analysis, and modeling **to detect viral shedding events in real time**. Knowing where and when bats are shedding zoonotic pathogens will allow resources to be focused on the highest risk places and times.

Used artificial intelligence to integrate field data and mechanistic models to predict bat-borne viral spillover risk in space and time. If successful, this will allow **development of an early warning system for spillover of zoonotic pathogens from bats** and targeted deployment of countermeasures.

Established an integrated virology-to-modeling pipeline to quantify drivers of human-to-human spread in real time. This will enable rapid prioritization of countermeasures to contain early outbreaks (cf. masks over hand washing for SARS-CoV-2), while laying the foundation for *a priori* assessment of pandemic emergence risk for viruses in nature.

Developed an ecological countermeasure to stop spillover before it happens. Develop the proof-of concept for the countermeasure in areas of Nipah virus endemicity. If successful, the ecological countermeasure will target the root cause of spillover keeping reservoir hosts away from humans and preventing the conditions that cause virus shedding.

Developed a multivalent henipavirus vaccination. Such a vaccination could be deployed early in an outbreak to create a firebreak before pandemic spread. This platform would also be appropriate for a multivalent coronavirus vaccine.

On Nov 24, 2020, at 11:01 AM, Jamie Lloyd-Smith <[REDACTED]> (b) (6) wrote:

Should we loop in the folks who'd actually be generating the data? i.e. Hector for the vaccines, and Vincent for the phenotyping? Seems essential, both in terms of knowledge/perspective and the fact that they're the ones who actually have to get the work done.

Or does [REDACTED] (b) (6) truly just want to hear what's holding back to the modelers, so he can sell that and then we cobble together what we can actually do?

On Tue, Nov 24, 2020 at 9:48 AM Plowright, Raina <[REDACTED]> (b) (6) wrote:

Hey everyone,

Time for a quick call between now and Wednesday around noon?

I am booked out but will cancel and move things to be available.

Sara, would you mind making a doodle poll with times between 1pm MT-4pm MT today, and 8am to 12pm MT tomorrow? And can you create a slack conversation with this group?

Is anyone from our team missing?

Raina

> On Nov 24, 2020, at 10:38 AM, [REDACTED] (b) (6) wrote:

>

> Think about it this way: with more \$, what more could you do in terms of developing the evidence base for 2 countermeasures: Ecocountermeasures and multivalent henipavirus vaccine. Also what more could you do in terms of TA1 prediction information (phenotyping system)? Happy to get thoughts now and then as we move into Dec I hope to be able to get into a bit more weeds with you on where we can 'program' a bit more \$ for you wrt above.

>

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

> From: Plowright, Raina <[REDACTED]> (b) (6)

> Sent: Tuesday, November 24, 2020 12:35 PM

> To: [REDACTED] (b) (6); Olivier Restif <[REDACTED]> (b) (6)

> Cc: Jamie Lloyd-Smith <[REDACTED]> (b) (6) Hoegh, Andrew <[REDACTED]> (b) (6) Barbara Han

> <[REDACTED]> (b) (6) LaTrielle, Sara <[REDACTED]> (b) (6) Peter J. Hudson <[REDACTED]> (b) (6)

> Subject: Re: Modeling and prediction challenges for your effort under PREEMPT

>

> Hi [REDACTED] (b) (6)

> I'm adding Olivier here as well as critical bat modeler in-chief
> Asking all on this email to treat this as highest priority today. (b) (6) is in critical conversations with leadership and needs fast turn-around.
> Thanks,
> Raina
>
>> On Nov 24, 2020, at 10:32 AM, (b) (6) wrote:
>>
>> Dear Jamie, Andrew, Barbara -
>>
>> I hate to ask you these questions with short deadlines. Sorry about that (welcome again to DARPA and PREEMPT). Good news is that I am 'rooting' for the Bat One team and there may be the possibility of more \$ overall, as we discussed yday briefly...
>>
>> For now could you quickly pen down (email) any challenges that you have in model estimation- e.g., lack of human infection data; what else? Data on bats? BSL3/4 challenges? What else is holding you back if you have more or better data? General or specific challenges?
>>
>> Super sorry for the last minute ask...
>>
>> Thanks!
>> (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
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

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 24 Nov 2020 14:41:25 +0000
To: Alison Peel; Plowright, Raina; Mandy Todd
Cc: Kwe Claude, Yinda (NIH/NIAID) [F]
Subject: FW: Executed MTAs with Griffith University
Attachments: 2020-1450 Griffith MTA_Executed Agreement.pdf, 2020-1449 Griffith MTA_executed agreement.pdf

MTAs are in!

Cheers,

Vincent

From: Pitts, Elizabeth (NIH/NIAID) [C] <[REDACTED]> (b) (6)
Sent: Tuesday, November 24, 2020 7:39 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Cc: Thruston, Jeffrey (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Executed MTAs with Griffith University

Dear Vincent,

The attached MTAs with Griffith University have been executed and are now active. Please let me know if you have any questions.

Best Regards,

Liz

Elizabeth G. Pitts, Ph.D.
Technology Transfer and Patent Specialist
 National Institute of
Allergy and
Infectious Diseases
Technology Transfer and Intellectual Property Office
Branch A
5601 Fishers Lane, [REDACTED] (b) (6)
Rockville, MD 20892-9804
[REDACTED] (b) (6)

The information in this e-mail and any of its attachments is confidential and may contain sensitive information. It should not be used by anyone who is not the original intended recipient. If you have received this e-mail in error, please inform the sender and delete it from your mailbox or any other storage devices. National Institute of Allergy and Infectious Diseases shall not accept liability for any statements made that are sender's own and not expressly made on behalf of the NIAID by one of its representatives.

This is an agreement ("Agreement") between Griffith and the Recipient for Griffith to transfer to the Recipient the Original Material in accordance with the terms below, the Schedule, and the Annexure.

THIS AGREEMENT is effective as of the date of last authorised signature below ("Effective Date").

BETWEEN: **GRIFFITH UNIVERSITY** (ABN 78 106 094 461), a body corporate established pursuant to the *Griffith University Act 1998 (Qld)* of 170 Kessels Road, Nathan, QLD 4111 ("**Griffith**")

AND: **NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES, NATIONAL INSTITUTES OF HEALTH ("NIAID")** 5601 Fishers Lane, Suite 6D, MSC 9804, Rockville, MD 20892-9804 ("**Recipient**").

RECITALS:

- A. Griffith has developed the Original Material for use in experimental research.
- B. In consideration for the undertakings of the Recipient set out below Griffith agrees to provide the Original Material to the Recipient.

Definitions

In this Agreement:

"Confidential Information" means any and all information, know-how, and data relating to the Material, whether scientific, technical, commercial, financial or other nature, which is marked "Confidential" and provided by Griffith to Recipient for performance of the Purpose. Oral disclosures must be reduced to writing and marked "Confidential" within thirty (30) days after disclosure to be considered Confidential Information. Confidential Information shall not include information that: (a) is already in the public domain; (b) was, on or before the date of disclosure in the possession of the Recipient; (c) is received by the Recipient from an independent third party who is lawfully in possession and who is entitled to divulge it and is not under any obligation of confidentiality; (d) is hereinafter independently developed by the Recipient without reference to the Confidential Information received from Griffith; (e) Griffith expressly authorises Recipient to disclose, or (f) is required to be disclosed by law.

"Intellectual Property Rights" means all intellectual property rights, including without limitation: (a) all rights in relation to inventions (including patent rights), copyright, trade marks and the right to have confidential information kept confidential; and (b) any application or right to apply for registration of any of those rights.

"Material" means Original Material, Progeny, Unmodified Derivatives and any Original Material contained in Modifications.

"Modifications" means substances created by the Recipient which contain or incorporate any Original Material, and include but are not limited to crosses, breeding varieties, cell fusions, and subclones.

"Original Material" means any of the original material to be transferred as described in an Annexure.

"Progeny" means unmodified descendant from any Material, such as virus from virus, cell from cell, or organism from organism.

"Unmodified Derivatives" means substances created by the Recipient which constitute an unmodified functional subunit or product expressed by any Original Material, and include but are not limited to subclones of unmodified cell lines, purified or fractionated subsets of any Original Material, proteins expressed by DNA/RNA, or monoclonal antibodies secreted by a hybridoma cell line.

IT IS AGREED:

1. The Material shall be used solely for the Purpose by the Recipient only in the Location identified in the Schedule. The Material will not be used for testing in or treatment of humans.
2. The Material shall not be transferred to third parties for any purpose without the prior written consent of Griffith and a written material transfer agreement has been executed with the third party/ies and Griffith.
3. The Recipient may use Confidential Information of Griffith only for the purposes of this Agreement and must keep it confidential for a period of three (3) years from the expiration or termination of this Agreement, whichever occurs first. The Recipient may disclose the Confidential Information to such of its employees, officers, contractors, and agents who have a need to know for the Purpose of this Agreement.
4. The Recipient agrees Original Material, Progeny and Unmodified Derivatives whether produced by the Recipient or others shall always remain the property of Griffith.
5. Recipient shall own any Modifications created under this Agreement. Inventorship of any inventions created under this Agreement shall follow U.S. patent law, and ownership shall follow inventorship. The Recipient will promptly notify Griffith in writing of all inventions and discoveries arising out of the Recipient's use of the Material. Griffith shall treat inventions and discoveries disclosed to it by Recipient as Confidential Information.
6. The Material may have inherent defects or deficiencies and is provided for research purposes only. Such Material is provided without warranty of merchantability or fitness for a particular purpose or any other warranty, express or implied. To the full extent permitted by law, any conditions or warranties imposed by such legislation are hereby excluded.
7. Griffith makes no representation that the Recipient's use of the Material for the Purpose will not infringe any Intellectual Property Rights or other rights of any third party.
8. The Recipient agrees to provide Griffith with a brief report, annually, on the uses to which the Material has been put and to disclose to Griffith a summary of information relating to any Material, including Modifications. Griffith shall treat any report or summary provided by Recipient to Griffith under this provision as Confidential Information. Subject to availability and reasonable request of Griffith, the Recipient may provide viral isolates obtained from the Material to the Commonwealth Scientific and Industrial Research Organisation Australian Animal Health Laboratory, Geelong.
9. The Recipient shall ensure that its employees, officers, contractors, and agents comply

with the obligations imposed upon the Recipient by this Agreement as if personally bound by such obligations.

10. This Agreement shall be effective as of the Effective Date and shall expire after the Term or completion of the Purpose, whichever occurs first. The parties may by mutual agreement in writing extend the Term. Either party may terminate this Agreement by giving thirty (30) days prior written notice to the other party. Expiration or termination shall not prejudice the rights of either party arising under the Agreement prior to expiration or termination. Clauses 2, 3, 5, and 6 shall survive expiration or termination of this Agreement.
11. The Recipient will destroy all the Material upon the expiration or termination of this Agreement, whichever occurs first, unless otherwise agreed to by Griffith. The Recipient will notify Griffith in writing once all the Material has been destroyed.
12. This Agreement may be signed in any number of counterparts (whether in original, scanned, electronic or facsimile form) and all those counterparts together make one instrument.

SCHEDULE

Description	Details
Original Material to be Transferred	Detailed in Annexure
Purpose	Testing of the Material by the Recipient for the Agreed Tests solely as detailed in the Annexure
Location	Hamilton, Montana, USA
Term	Concludes 30 October 2022
Special Conditions	<p>1. Transfer of Original Material</p> <p>The parties agree that:</p> <ul style="list-style-type: none"> (a) supply of the Original Material shall be provided in various shipments; (b) each additional shipment will be subject of a new Annexure, which will be in the same format as the Sample Annexure (see Page 6 of the Agreement) attached to this Agreement; and (c) each Annexure must be accompanied by a written amendment to the Agreement and signed by an authorised signatory of both parties and upon execution will form part of this Agreement. <p>2. Scope of Testing</p> <p>The Recipient must only conduct the Agreed Tests specified in the Annexure for each specimen of the Material. If the Recipient wishes to undertake additional tests, the written permission of Griffith must be obtained prior to the conducting of such additional tests and a summary of all Agreed Test results shall be delivered to Griffith, in accordance with paragraph 3 below.</p> <p>3. Release of Test Data</p> <p>The Recipient shall provide Griffith with a summary of all Agreed Test results arising from the testing of the Material in confidence. Griffith will provide copies of the Agreed Test results to Australian State and Federal Chief Veterinary Officers (“CVOs”) provided that the CVOs only disclose the Agreed Test results to prevent, eliminate or minimise any biosecurity risk identified by the Agreed Test results, as required by Australian law or to satisfy any intergovernmental agreements on biosecurity.</p> <p>Prior to publication or public disclosure of Agreed Test results, Recipient shall provide Griffith with a copy of such publication or public disclosure thirty (30) days in advance for Griffith’s review. Recipient agrees, upon the request of Griffith, to remove Griffith’s Confidential Information from the publication or public disclosure, provided that Griffith supplies Recipient with alternative language to replace the removed Confidential Information.</p> <p>4. Destruction of Material</p>

Description	Details
	Clause 11 shall apply to all Material excluding where an Annexure permits for taxonomic identification of an identified agent which requires subsequent reporting to the Queensland Chief Veterinary Officer or other government agency, as advised by Griffith.
Griffith Contact	Name: Alison Peel Address: Environmental Futures Research Institute Griffith University 170 Kessels Rd, Nathan QLD 4111, Australia Telephone: (b) (6) Fax: N/A Email: (b) (6)
Recipient Contact	Name: Vincent Munster, PhD Position: Chief, Virus Ecology Unit Address: Laboratory of Virology Rocky Mountain Laboratories 903 South 4 th Street Hamilton, MT 59840, USA Telephone: (b) (6) Fax: N/A Email: (b) (6)

SAMPLE ANNEXURE # - Dated



(b) (4)

Authorised Signature for:
Griffith University

.....
Name:
Position: Dean (Research), Griffith
Sciences
Date:

Authorised Signature for:
National Institute of Allergy and Infectious
Diseases

.....
Name:
Position:
Date:

Correct execution of this Annexure forms part of the Material Transfer Agreement – Griffith University Transferring Biological Material between Griffith University and the National Institute of Allergy and Infectious Diseases dated ##

ANNEXURE



(b) (4)

SIGNED AS AN AGREEMENT:

Signed for and on behalf of
GRIFFITH UNIVERSITY
by an authorised officer

Prof. Rebecca Ford
Name of Authorised Officer (print)

Dean (Research) – Griffith Sciences
Position of Authorised Officer (print)

24/11/2020
Date

(b) (6) ←
Signature of Authorised Officer

who warrants by signing they have
authority to sign this Agreement on
behalf of Griffith

Signed for and on behalf of
**National Institute of Allergy and
Infectious Diseases**
by an authorised officer

Maryann T. Puglielli, Ph.D., J.D.
Name of Authorised Officer (print)

Lead TTPS, TTIPO, NIAID
Position of Authorised Officer (print)

October 29, 2020
Date

Maryann T. Puglielli -S Digitally signed by
Maryann T. Puglielli -S
Date: 2020.10.29 10:57:13
-04'00' ←
Signature of Authorised Officer

who agrees by signing they have
authority to sign this Agreement on
behalf of the Recipient

This is an agreement ("Agreement") between Griffith and the Recipient for Griffith to transfer to the Recipient the Original Material in accordance with the terms below, the Schedule, and the Annexure.

THIS AGREEMENT is effective as of the date of last authorised signature below ("Effective Date").

BETWEEN: **GRIFFITH UNIVERSITY** (ABN 78 106 094 461), a body corporate established pursuant to the *Griffith University Act 1998 (Qld)* of 170 Kessels Road, Nathan, QLD 4111 ("**Griffith**")

AND: **NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES, NATIONAL INSTITUTES OF HEALTH ("NIAID")** 5601 Fishers Lane, Suite 6D, MSC 9804, Rockville, MD 20892-9804 ("**Recipient**").

RECITALS:

- A. Griffith has developed the Original Material for use in experimental research.
- B. In consideration for the undertakings of the Recipient set out below Griffith agrees to provide the Original Material to the Recipient.

Definitions

In this Agreement:

"Confidential Information" means any and all information, know-how, and data relating to the Material, whether scientific, technical, commercial, financial or other nature, which is marked "Confidential" and provided by Griffith to Recipient for performance of the Purpose. Oral disclosures must be reduced to writing and marked "Confidential" within thirty (30) days after disclosure to be considered Confidential Information. Confidential Information shall not include information that: (a) is already in the public domain; (b) was, on or before the date of disclosure in the possession of the Recipient; (c) is received by the Recipient from an independent third party who is lawfully in possession and who is entitled to divulge it and is not under any obligation of confidentiality; (d) is hereinafter independently developed by the Recipient without reference to the Confidential Information received from Griffith; (e) Griffith expressly authorises Recipient to disclose, or (f) is required to be disclosed by law.

"Intellectual Property Rights" means all intellectual property rights, including without limitation: (a) all rights in relation to inventions (including patent rights), copyright, trade marks and the right to have confidential information kept confidential; and (b) any application or right to apply for registration of any of those rights.

"Material" means Original Material, Progeny, Unmodified Derivatives and any Original Material contained in Modifications.

"Modifications" means substances created by the Recipient which contain or incorporate any Original Material, and include but are not limited to crosses, breeding varieties, cell fusions, and subclones.

"Original Material" means any of the original material to be transferred as described in an Annexure.

"Progeny" means unmodified descendant from any Material, such as virus from virus, cell from cell, or organism from organism.

"Unmodified Derivatives" means substances created by the Recipient which constitute an unmodified functional subunit or product expressed by any Original Material, and include but are not limited to subclones of unmodified cell lines, purified or fractionated subsets of any Original Material, proteins expressed by DNA/RNA, or monoclonal antibodies secreted by a hybridoma cell line.

IT IS AGREED:

1. The Material shall be used solely for the Purpose by the Recipient only in the Location identified in the Schedule. The Material will not be used for testing in or treatment of humans.
2. The Material shall not be transferred to third parties for any purpose without the prior written consent of Griffith and a written material transfer agreement has been executed with the third party/ies and Griffith.
3. The Recipient may use Confidential Information of Griffith only for the purposes of this Agreement and must keep it confidential for a period of three (3) years from the expiration or termination of this Agreement, whichever occurs first. The Recipient may disclose the Confidential Information to such of its employees, officers, contractors, and agents who have a need to know for the Purpose of this Agreement.
4. The Recipient agrees Original Material, Progeny and Unmodified Derivatives whether produced by the Recipient or others shall always remain the property of Griffith.
5. Recipient shall own any Modifications created under this Agreement. Inventorship of any inventions created under this Agreement shall follow U.S. patent law, and ownership shall follow inventorship. The Recipient will promptly notify Griffith in writing of all inventions and discoveries arising out of the Recipient's use of the Material. Griffith shall treat inventions and discoveries disclosed to it by Recipient as Confidential Information.
6. The Material may have inherent defects or deficiencies and is provided for research purposes only. Such Material is provided without warranty of merchantability or fitness for a particular purpose or any other warranty, express or implied. To the full extent permitted by law, any conditions or warranties imposed by such legislation are hereby excluded.
7. Griffith makes no representation that the Recipient's use of the Material for the Purpose will not infringe any Intellectual Property Rights or other rights of any third party.
8. The Recipient agrees to provide Griffith with a brief report, annually, on the uses to which the Material has been put and to disclose to Griffith a summary of information relating to any Material, including Modifications. Griffith shall treat any report or summary provided by Recipient to Griffith under this provision as Confidential Information. Subject to availability and reasonable request of Griffith, the Recipient may provide viral isolates obtained from the Material to the Commonwealth Scientific and Industrial Research Organisation Australian Animal Health Laboratory, Geelong.
9. The Recipient shall ensure that its employees, officers, contractors, and agents comply

with the obligations imposed upon the Recipient by this Agreement as if personally bound by such obligations.

10. This Agreement shall be effective as of the Effective Date and shall expire after the Term or completion of the Purpose, whichever occurs first. The parties may by mutual agreement in writing extend the Term. Either party may terminate this Agreement by giving thirty (30) days prior written notice to the other party. Expiration or termination shall not prejudice the rights of either party arising under the Agreement prior to expiration or termination. Clauses 2, 3, 5, and 6 shall survive expiration or termination of this Agreement.
11. The Recipient will destroy all the Material upon the expiration or termination of this Agreement, whichever occurs first, unless otherwise agreed to by Griffith. The Recipient will notify Griffith in writing once all the Material has been destroyed.
12. This Agreement may be signed in any number of counterparts (whether in original, scanned, electronic or facsimile form) and all those counterparts together make one instrument.

SCHEDULE

(b) (4)



(b) (4)	
Griffith Contact	<p>Name: Alison Peel</p> <p>Address: Environmental Futures Research Institute Griffith University 170 Kessels Rd, Nathan QLD 4111, Australia</p> <p>Telephone: (b) (6)</p> <p>Fax: N/A</p> <p>Email: (b) (6)</p>
Recipient Contact	<p>Name: Vincent Munster, PhD</p> <p>Position: Chief, Virus Ecology Unit</p> <p>Address: Laboratory of Virology Rocky Mountain Laboratories 903 South 4th Street Hamilton, MT 59840, USA</p> <p>Telephone: (b) (6)</p> <p>Fax: N/A</p> <p>Email: (b) (6)</p>

SAMPLE ANNEXURE # - Dated



(b) (6)

Authorised Signature for:
Griffith University

.....
Name:
Position: Dean (Research), Griffith
Sciences
Date:

Authorised Signature for:
National Institute of Allergy and Infectious
Diseases

.....
Name:
Position:
Date:

Correct execution of this Annexure forms part of the Material Transfer Agreement – Griffith University Transferring Biological Material between Griffith University and the National Institute of Allergy and Infectious Diseases dated ##

ANNEXURE



(b) (4)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 24 Nov 2020 14:05:13 +0000
To: Plowright, Raina
Subject: RE: Bat coronavirus review enquiry

Great news! Lets make it awesome!

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Monday, November 23, 2020 6:31 PM
To: Ashley York <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: Re: Bat coronavirus review enquiry

Hi Ashley,

This is fabulous news. Thanks so much. This article has been a huge team effort (synthesizing over many disparate fields of study). I will ensure that we drop any authors who have not made a substantial contribution. However, we need to ensure that anyone who has made a substantial contribution is acknowledged as a coauthor.

We will submit to the tracking system and aim to have a manuscript prior to the end of the year.
Raina

On Nov 23, 2020, at 8:34 AM, Ashley York <Ashley.York@nature.com> wrote:

Dear Raina and Vincent,

Thank you very much for submitting your proposal to *Nature Reviews Microbiology*. We have now had a chance to consider the synopsis and I am pleased to tell you that we are potentially interested in publishing this review, and invite you to submit the full manuscript for consideration. Please note, this invitation does not guarantee publication; your article will go through the normal editorial assessments before a decision is made. Would a January 2021 submission date work for you and your co-authors?

Please could you upload the synopsis to our manuscript tracking system: <https://mts-nrmicro.nature.com/> (please include all contributing authors in the submission)

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.

I look forward to hearing from you.

Kind regards,

Ashley

Ashley York, D.Phil.
Acting Chief Editor, *Nature Reviews Microbiology*
Nature Research

4 Crinan Street, London, N1 9XW
T: +44 (0)207 418 5903
E: ashley.york@nature.com

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From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: 21 November 2020 01:29
To: Ashley York <Ashley.York@nature.com>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Ursula Hofer <Ursula.Hofer1@nature.com>
Subject: Re: Bat coronavirus review enquiry

[External - Use Caution]

Dear Ashley,
I have attached our synopsis for a review of bats and coronaviruses for Nature Reviews Microbiology. We have a first draft and could be on an accelerated time frame for completion. Please let us know if this is of interest.
Thank you,
Raina and Vincent

On Nov 9, 2020, at 1:47 PM, Ursula Hofer <Ursula.Hofer1@nature.com> wrote:

Dear Raina and Vincent,

Thanks very much for getting in touch! We'd need a bit more information about the scope of the article you have in mind. I've attached our synopsis template as guidance.

I've cc'd my colleague Ashley York, who is acting Chief Editor at Nature Reviews Microbiology at the moment. I'm 'on loan' for the next couple months at Nature to help with the flood of coronavirus papers. Ashley will be in touch about your review proposal. If you have any exciting primary research that might be suitable for Nature, please let me know.

Best wishes,
Ursula

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: 09 November 2020 20:19
To: Ursula Hofer <Ursula.Hofer1@nature.com>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: Bat coronavirus review enquiry

Dear Ursula,

I hope you don't mind us reaching out to you directly; we hope for quick feedback on whether nrmicro is a good fit for a comprehensive review on bat interactions with coronaviruses.

Vincent and I lead a large transdisciplinary team of scientists studying bat viruses, including coronaviruses and henipaviruses. Our group has worked on the role of bats in pathogen spillover for over 15 years and we work across fields as diverse as evolution of coronaviruses in bats, bat immune responses to coronaviruses, and ecological dynamics of coronaviruses in wild bat populations. We have conducted experiments with coronaviruses in live bats and bat cell-lines, we have large-scale field surveys of coronaviruses in bats, and we have modeling studies of the dynamics of coronaviruses in bats. To our knowledge, we are the only transdisciplinary effort to understand coronavirus spillover from bats at scales from landscapes to molecules.

We assembled our teams to write a definitive review on bats and their interactions with emergent coronaviruses. We have developed text, figures, and tables to summarize the state of knowledge of bats as coronavirus reservoirs, covering multiple scales from viral evolution, receptors, tissue tropism, immunology, epidemiology, landscape ecology, and spillover to humans.

Authors include: Vincent Munster (virology; NIAD/NIH), Colin Parris (virology; Cornell), Jamie-Lloyd Smith (epidemiology & cross-species transmission; UCLA), Peter J Hudson (disease ecology; Penn State), Emily Gurley (human-bat interface; Johns Hopkins), Olivier Restif (disease dynamics; Cambridge), Tony Schountz (bat immunology, CSU), Raina K. Plowright (bat virus dynamics & spillover; Montana State).

Please let us know if you are interested in this review for Nature Reviews Microbiology.

Best,

Raina Plowright and Vincent Munster

Raina Plowright BVSc MSc PhD

Associate Professor,
Department of Microbiology and Immunology
Montana State University,
109 Lewis Hall, Bozeman, MT 59717, USA

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[<image002.jpg>](#)

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<Synopsis template Review.doc>

Raina Plowright BVSc MSc PhD

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From: Plowright, Raina
Sent: Sat, 21 Nov 2020 01:29:21 +0000
To: Ashley York
Cc: Munster, Vincent (NIH/NIAID) [E]; Ursula Hofer
Subject: Re: Bat coronavirus review enquiry
Attachments: Synopsis Review Bat Coronaviruses nrmicro Nov 20th 2020.doc

Dear Ashley,
I have attached our synopsis for a review of bats and coronaviruses for Nature Reviews Microbiology. We have a first draft and could be on an accelerated time frame for completion. Please let us know if this is of interest.
Thank you,
Raina and Vincent

On Nov 9, 2020, at 1:47 PM, Ursula Hofer <Ursula.Hofer1@nature.com> wrote:

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Best wishes,
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Sent: 09 November 2020 20:19
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Authors include: Vincent Munster (virology; NIAD/NIH), Colin Parris (virology; Cornell), Jamie-Lloyd Smith (epidemiology & cross-species transmission; UCLA), Peter J Hudson (disease ecology; Penn State), Emily Gurley (human-bat interface; Johns Hopkins), Olivier Restif (disease dynamics; Cambridge), Tony Schountz (bat immunology, CSU), Raina K. Plowright (bat virus dynamics & spillover; Montana State).

Please let us know if you are interested in this review for Nature Reviews Microbiology.

Best,

Raina Plowright and Vincent Munster

Raina Plowright BVSc MSc PhD

Associate Professor,
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<Synopsis template Review.doc>

Working title: Bats as reservoir hosts of coronaviruses

Author(s):

Manuel Ruiz-Aravena^{1*}, Clifton McKee^{2*}, Amandine Gamble³, Peter Hudson⁴, Colin R. Parrish⁵, Nita Bharti⁴, Christina Faust⁴, Tony Schountz⁶, Olivier Restif⁷, Aaron Morris⁷, Elinor Jax⁷, Lauren Dee⁷, Tamika Lunn⁸, Alison Peel⁸, Claude Kwe Yinda⁹, Julia R. Port⁹, Cara E. Brook¹⁰, Hector C. Aguilar¹¹, Yao Yu Yeo¹¹, David William Buchholz¹¹, James O. Lloyd-Smith¹², Celine Snedden¹², Emily S. Gurley², Devin Jones¹, Maureen Kessler¹, Caylee Falvo¹, Daniel Crowley¹, German Botto¹, Agnieszka Rynda-Apple¹, Vincent J. Munster⁹, Raina K. Plowright¹

Author affiliations:

¹Department of Microbiology & Immunology, Montana State University, Bozeman, MT, USA

²Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

³Department of Ecology and Evolution, University of California, Los Angeles, CA, USA

⁴Department of Biology, Center for Infectious Disease Dynamics, Pennsylvania State University, PA, USA

⁵Department of Microbiology and Immunology, College of Veterinary Medicine, Cornell University, Ithaca, NY, USA

⁶Department of Microbiology, Immunology and Pathology, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO, USA

⁷Department of Veterinary Medicine, University of Cambridge, Cambridge, U.K

⁸Environmental Futures Research Institute, Griffith University, Nathan, QLD 4111, Australia

⁹National Institute of Allergy and Infectious Diseases, Hamilton, MT, USA

¹⁰Department of Integrative Biology, University of California, Berkeley, CA, USA

¹¹Department of Microbiology and Immunology, College of Veterinary Medicine, Cornell University, Ithaca, NY, USA

¹²Department of Ecology and Evolution, University of California, Los Angeles, CA, USA

Abstract:

SARS-CoV-2 is the third coronavirus to emerge and cause widespread outbreaks in humans in two decades. These coronavirus outbreaks likely began with a single spillover from a bat. Thousands more coronaviruses circulate in bats and hundreds of these viruses may cause outbreaks similar to SARS-CoV-2. Global efforts are focused on mitigating the effects of the COVID-19 pandemic, but these efforts will soon shift to preempting “SARS-CoV-3” emergence. Here we provide the state of knowledge on bats as hosts of coronaviruses. We integrate the latest transdisciplinary evidence on the drivers of coronavirus circulation and emergence from bat reservoir hosts. The proposed review covers bat-virus interactions across molecular, tissue, host, and population scales, as well as ecological, environmental, and host factors associated with viral shedding and spillover. This information is critical to understanding the causes of spillover to humans and providing early warning signs for the development of preemptive countermeasures to prevent another coronavirus pandemic.

Introduction:

We examine the state of knowledge of coronavirus infections in bats and the key features of bats as reservoir hosts of coronaviruses at multiple scales, from molecules to landscapes. We start at the within-bat scale, including interactions between coronaviruses and bat immune systems and the persistence and distribution of coronaviruses in bat tissues. We then consider transmission of virus among individuals, populations, and landscapes of hosts. We examine the likely effects of co-infections and the possible routes of spillover and emergence in humans. Finally, we examine the likelihood of infection of additional domestic or wild animals from humans (spillback or reverse zoonosis) and the chances that SARS-CoV-2 might

become established in bats or other animals outside of their normal range, creating more serious control problems.

We compiled more than 150 studies of coronavirus infections in bats and other animals; many of these references were published in the past six to 12 months. We created summary figures, for example, a plot of coronavirus prevalence over time for every longitudinal study of coronavirus in bat populations. Seeing the data on one plot illustrates that pulses of coronavirus shedding from bats are common and that seasonal changes in prevalence are expected.

From our perspective as virologists, ecologists, immunologists, evolutionary biologists and mathematical modelers, we synthesize current knowledge on the ecology of bat-coronavirus interactions and present critical questions that must be addressed to stop the emergence of the next pandemic coronavirus.

Main sections and subsections:

The ecological process of coronavirus spillover. We discuss the physiological, ecological, behavioral, and biological processes that are necessary for coronavirus spillover from bats to humans.

Ecology of bat-coronavirus interactions. We summarize the knowledge on bat immune responses, pathology, and histology and assess the evidence for bat-coronavirus interactions from multiple types of studies (field, lab, cell-culture experiments of bats and coronaviruses).

Coronaviruses diversity and distribution in bats. We show the current evidence for patterns of population-level circulation and dynamics of coronaviruses in bats. We describe temporal patterns of coronavirus shedding from bats and find commonalities in seasonal and demographic drivers of infection. We review the evidence that co-circulation of multiple virus genotypes or species within roosts affects the timing, location, and intensity of coronavirus shedding.

Barriers to human infection. We describe the molecular biology of host-coronavirus interactions, the role of host proteases in tissue tropism, and the effects of evolutionary processes on virulence and host range of coronaviruses as well as generation of genetic diversity in coronaviruses.

Exposure and probability of infection in intermediate hosts and humans. We discuss coronaviruses in new hosts (from HCoV-OC43 to SARS-COV-2), the ecological and evolutionary role of intermediate or bridge hosts and spillover to non-human hosts.

The reservoir animal-human interface. We discuss establishment and sustained transmission in new species, pandemic potential in humans, and the emergent risk of reverse zoonoses from humans to other animal species.

Display items:

The article includes the following display items to display data from across many studies in a coherent format:

Figure 1. Mechanistic framework for the spillover of coronaviruses.

Figure 2. Geographic ranges of bat species hosts of coronaviruses and geographic ranges of bat hosts of selected coronavirus subgenera.

Figure 3. Phylogenetic tree of coronavirus subgenera in bats and species within those groups that have spilled over into humans and other animals.

Figure 4. Prevalence of coronavirus over time reported in longitudinal studies in bats.

Box 1. The challenges of detecting coronaviruses in animal reservoirs and humans.

Box 2. Evidence summary across experimental infections, longitudinal surveys, and cross-sectional surveys – Integrating knowledge of bat coronavirus ecology across study types.

Key references:

- Boni, M. F. *et al.* Evolutionary origins of the SARS-CoV-2 sarbecovirus lineage responsible for the COVID-19 pandemic. *Nat. Microbiol.* 2020.03.30.015008 (2020)
doi:10.1101/2020.03.30.015008.
- Huong, N. Q. *et al.* Coronavirus testing indicates transmission risk increases along wildlife supply chains for human consumption in Viet Nam, 2013-2014. *PLoS One* **15**, e0237129 (2020).
- Becker, D. J., Albery, G. F., Sjodin, A. R., Poisot, T. & Dallas, T. A. Predicting wildlife hosts of betacoronaviruses for SARS-CoV-2 sampling prioritization. (2020).
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- Damas, J. *et al.* Broad Host Range of SARS-CoV-2 Predicted by Comparative and Structural Analysis of ACE2 in Vertebrates. *PNAS* (2020) doi.org/10.1073/pnas.2010146117
- Wells, H. . *et al.* The evolutionary history of ACE2 usage within the coronavirus subgenus Sarbecovirus. *bioRxiv Prepr. Serv. Biol.* (2020) doi:10.1101/2020.07.07.190546.
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- Munnink BB, Sikkema RS, Nieuwenhuijse DF, Molenaar RJ, Munger E, Molenkamp R, Van Der Spek A, Tolsma P, Rietveld A, Brouwer M, Bouwmeester-Vincken N. Transmission of SARS-CoV-2 on mink farms between humans and mink and back to humans. *Science*. 2020 Nov 10.
- Cui, J., Li, F. & Shi, Z. L. Origin and evolution of pathogenic coronaviruses. *Nat. Rev. Microbiol.* 17, 181–192 (2019).
- Plowright, R. K. *et al.* Pathways to zoonotic spillover. *Nat. Rev. Microbiol.* 15, 502–510 (2017).
- Wong, A. C. P., Li, X., Lau, S. K. P. & Woo, P. C. Y. Global epidemiology of bat coronaviruses. *Viruses* 11, 1–17 (2019).
- Wacharapluesadee, S. *et al.* Longitudinal study of age-specific pattern of coronavirus infection in Lyle's flying fox (*Pteropus lylei*) in Thailand. *Viol. J.* 15, 1–10 (2018).
- Munster, V. J. *et al.* Replication and shedding of MERS-CoV in Jamaican fruit bats (*Artibeus jamaicensis*). *Sci. Rep.* 6, 1–10 (2016).
- Hu, B. *et al.* Discovery of a rich gene pool of bat SARS-related coronaviruses provides new insights into the origin of SARS coronavirus. *PLoS Pathog.* 13, 1–27 (2017).

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 20 Nov 2020 19:24:30 +0000
To: LaTrielle, Sara; Plowright, Raina
Cc: Peter J. Hudson
Subject: RE: Call in 15 min: reminder

Lol, its good to know that at least we have a refreshingly “normal” team ☐

Stay safe, vaccines are looking good! Hopefully <6 more months of carefulness and then off to funs stuff (maybe a world tour of field sites)

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara <[REDACTED] (b) (6)>
Sent: Friday, November 20, 2020 12:22 PM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>
Cc: Peter J. Hudson <[REDACTED] (b) (6)>
Subject: Re: Call in 15 min: reminder

I head into the weekend... speechless. Much how I entered the week with 'this' partner/relationship now that I think of it. ☐

Keep safe/healthy and hunkered down over the holiday week ahead.

Best,
Cavewoman

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, November 20, 2020 12:16 PM
To: Plowright, Raina <[REDACTED] (b) (6)>; LaTrielle, Sara <[REDACTED] (b) (6)>
Cc: Peter J. Hudson <[REDACTED] (b) (6)>
Subject: RE: Call in 15 min: reminder

That is a really weird bunch of people

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Friday, November 20, 2020 12:10 PM
To: LaTrielle, Sara <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Peter J. Hudson <[REDACTED] (b) (6)>
Subject: Re: Call in 15 min: reminder

Well if they actually DID have the meeting, it would be the first one they HAVE NOT rescheduled... so no surprises here!
Sorry you all had to waste your time.

On Nov 20, 2020, at 11:52 AM, LaTrielle, Sara <[REDACTED] (b) (6)> wrote:

Yepppp- pull up your horse and buggy.

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, November 20, 2020 11:50 AM
To: LaTrielle, Sara <[REDACTED] (b) (6)> Peter Hudson <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>
Subject: RE: Call in 15 min: reminder

Doing the verbal next slide thing then?

Might brake it to DARPA that we can actually do zoom/Skype/webex/teams

Talk to you in 10

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara <[REDACTED] (b) (6)>
Sent: Friday, November 20, 2020 11:46 AM
To: Peter Hudson <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Plowright, Raina <[REDACTED] (b) (6)>
Subject: Call in 15 min: reminder

See ('hear') you on the DARPA call in 15 min. PDF attached.

Call-in details:

Updated Teleconference Info:

Dial: [REDACTED] (b) (6)

PIN: [REDACTED] (b) (6)

Sara LaTrielle
Program Manager
PREEMPT Project
Montana State University

(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 19 Nov 2020 20:57:26 +0000
To: LaTrielle, Sara; Plowright, Raina
Subject: RE: Presenter/s needed for Nov 20 monthly reporting: suggestions please
Attachments: DARPA Munster November.pptx

Hi Sara,

Please find attached the presentation,

Talk to you tomorrow

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara <[REDACTED]> (b) (6)
Sent: Thursday, November 19, 2020 6:53 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6); Plowright, Raina <[REDACTED]> (b) (6)
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

Vincent,

Morning to you. Can you forward your slides this morning so we can pull all together and forward to DARPA?

Thanks a lot- know you are beyond busy!
Sara

From: LaTrielle, Sara <[REDACTED]> (b) (6)
Sent: Monday, November 16, 2020 9:29 AM
To: Munster, Vincent (NIH/NIAID) [E]; Plowright, Raina
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

You can aim for 30 mins- if that works for you.

Wed is just fine for the slides- thank you.

Sara

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Monday, November 16, 2020 9:17 AM
To: LaTrielle, Sara <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>
Subject: RE: Presenter/s needed for Nov 20 monthly reporting: suggestions please

How long would the presentation need to be? Will ret ti get it finished by Wednesday as its not the only thing I need to do,

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara <[REDACTED] (b) (6)>
Sent: Monday, November 16, 2020 9:14 AM
To: Plowright, Raina <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

Vincent,

Can you please send slides for the monthly report by tomorrow COB?

The mtg is this Friday, 12pm MST.

Thanks,

Sara LaTrielle
Program Manager
PREEMPT Project
Montana State University

[REDACTED] (b) (6)

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Tuesday, November 10, 2020 9:38 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: LaTrielle, Sara <[REDACTED] (b) (6)>
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

Thanks for volunteering! That would be excellent.

On Nov 10, 2020, at 9:19 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

I can provide of birds-eye overview of the work at RML?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara <[REDACTED]> (b) (6)
Sent: Monday, November 9, 2020 10:19 AM
To: [REDACTED] (b) (6)
Cc: Plowright, Raina <[REDACTED]> (b) (6)
Subject: Presenter/s needed for Nov 20 monthly reporting: suggestions please

All,

We are in the need of a presenter/s for the Nov 20th (12pm MST) monthly meeting with DARPA.

We had a few PI's tentatively lined up- but they are not ready (results are pending...) to present just yet so..... **please volunteer to present if you have results/analysis that you or your team are excited about. Can be around a new publication, COVID work, PREEMPT work et al.**

FYI Tony and Andy presented last month.

Please do let me know by COB tomorrow if this is something you can do- always great to get your/team's put forth in front of DARPA.

Best,
Sara

A scanning electron micrograph (SEM) showing numerous yellow, spherical SARS-CoV-2 virus particles. The particles are densely packed in some areas and more sparse in others, all resting on a blue, textured surface that represents the cell membrane or a specific protein structure. The background is dark, making the blue and yellow structures stand out.

Research anticipating the (near) future evolution of the pandemic SARS-CoV-2 situation

Genotype-to-phenotype characterization of the ongoing COVID19 pandemic

Vincent Munster, PhD.
NIAID/NIH
Rocky Mountain Laboratories
Laboratory of Virology
Virus Ecology Section

Emergence of SARS-CoV-2

- Past, Present and Future -

The early phase SARS-CoV-2 pandemic has revealed several gaps in our knowledge with regards to:

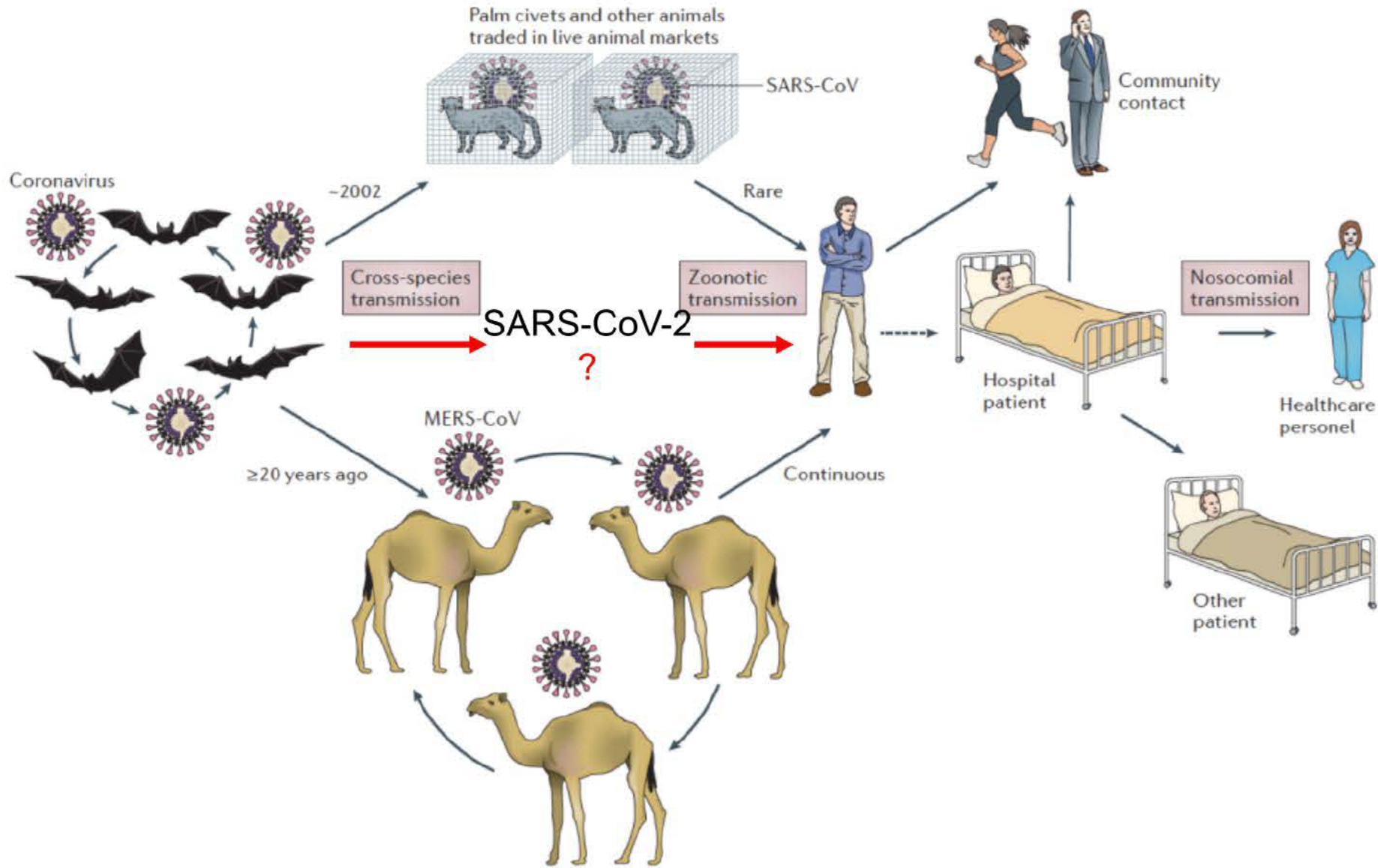
- Transmission
- Diagnostics
- Preemptive countermeasures

The current phase SARS-CoV-2 pandemic (10 months in) continuous to reveal several knowledge gaps :

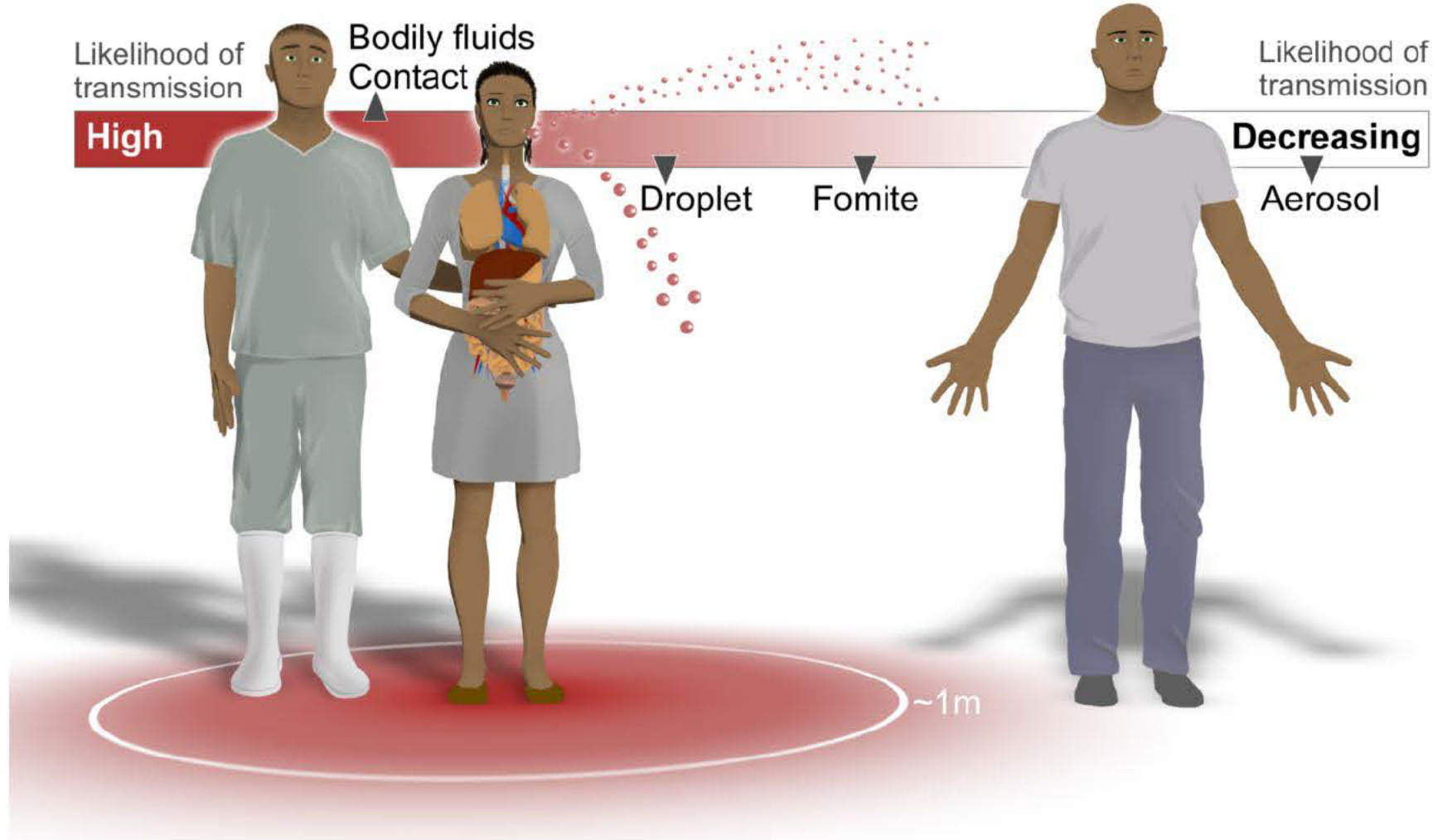
- Transmission
- Diagnostics
- Preemptive countermeasures
- Vaccine efficacy
- SARS-CoV-2 evolution and potential antigenic drift

The Virus Ecology Section focuses on rapid identification on knowledge gaps and provide data to allow science-based policy making.

Strategic partners include WHO, OWS, CDC, NIH, NIAID, VRC, DARPA, BARDA, DoD, USDA, BEI, USFW and multiple academic and healthcare institutions and collaborators.



A Novel Coronavirus Emerging in China — Transmission



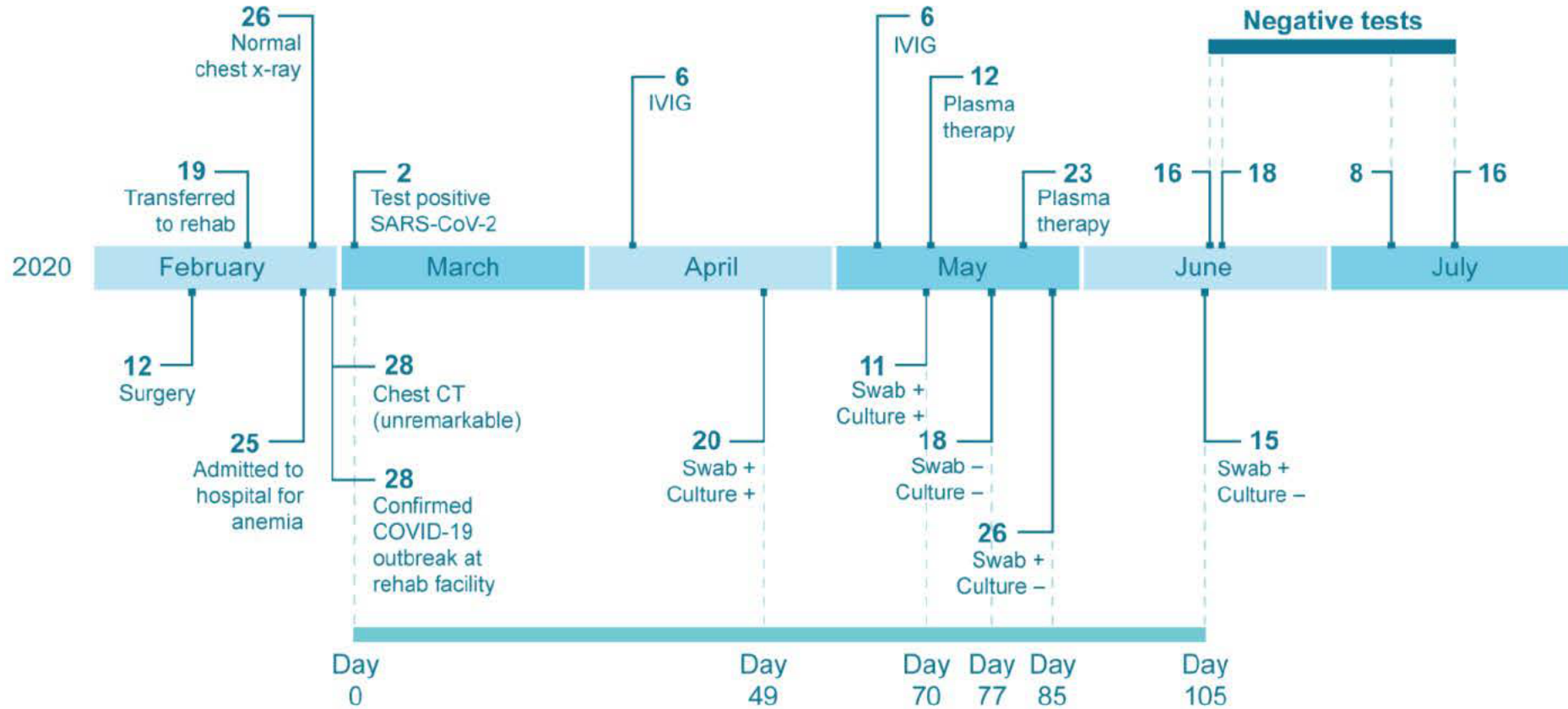
Emergence of SARS-CoV-2

- Actively filling knowledge gaps-

- **Providing guidance for preemptive medical countermeasures**
 1. SARS-CoV-2 receptor identified within 11 days after sequence release (Letko *et al*, Nature Microbiology, Jan 22)
 2. Highlighting knowledge gaps with regards to SARS-CoV-2: nosocomial, asymptomatic transmission (Munster *et al.*, NEJM,
 3. Providing data showing similarities with SARS-CoV-1 and potential for airborne transmission (van Doremalen *et al.*, NEJM,
 4. Providing guidance for re-use of N95 PPE (Fischer *et al.*, EID, April 24)
- **Development of prophylactic countermeasures**
 1. NHP model (Munster *et al*, Nature, March 21)
 2. Remdesivir treatment study (Williamson *et al*, Nature, April 15)
 3. Preclinical development of ChadOx1 COVID19 vaccine (van Doremalen *et al.*, Nature, May 13)
 4. Phase I/II data (Foligatti *et al.*, Lancet, July 20)
- **Understanding SARS-CoV-2 transmission**
 1. Impact environmental conditions (Matson *et al.*, EID, June 8)
 2. Modelling impact of environmental conditions (Morris, Yinda *et al.*, BioRxiv, October 16)
 3. Long-term asymptomatic shedding of infectious SARS-CoV-2 (Avanzato *et al.*, Cell, November 4)
- **Development of and worldwide access to diagnostics**
 1. Cepheid
 2. NIH Clinical Center
 3. Oraquick
 4. WHO Solidarity II trial, Republic of the Congo, PI Professor Ntoumi
 5. WHO Solidarity II trial, Ghana, PI Dr. Offei Owusu (APTI fellow in VES)

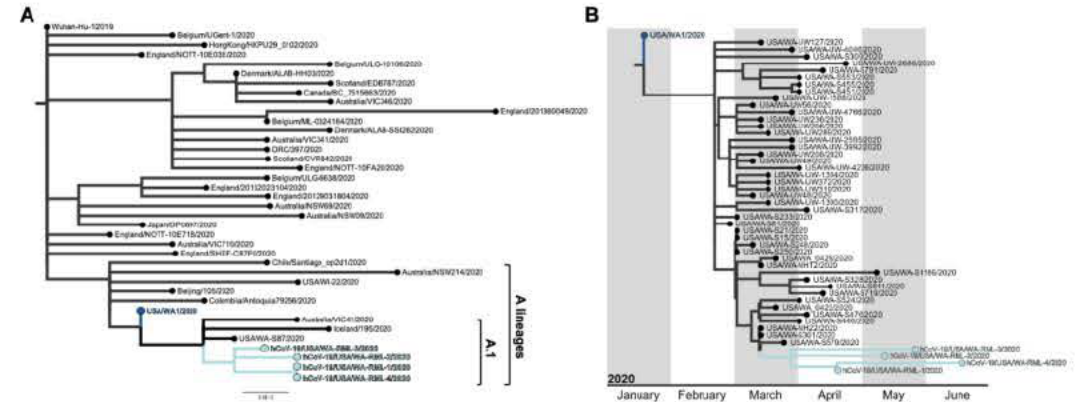
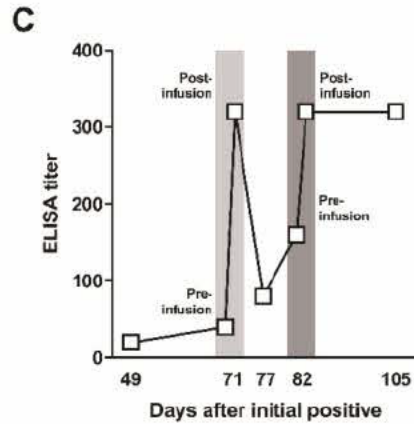
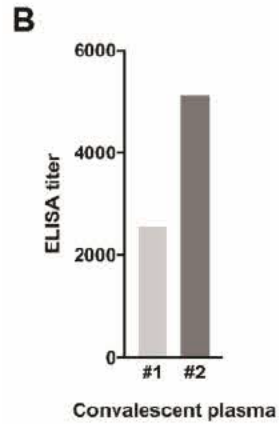
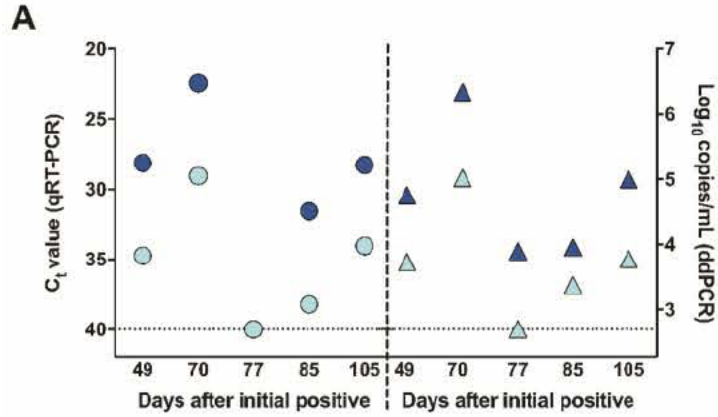
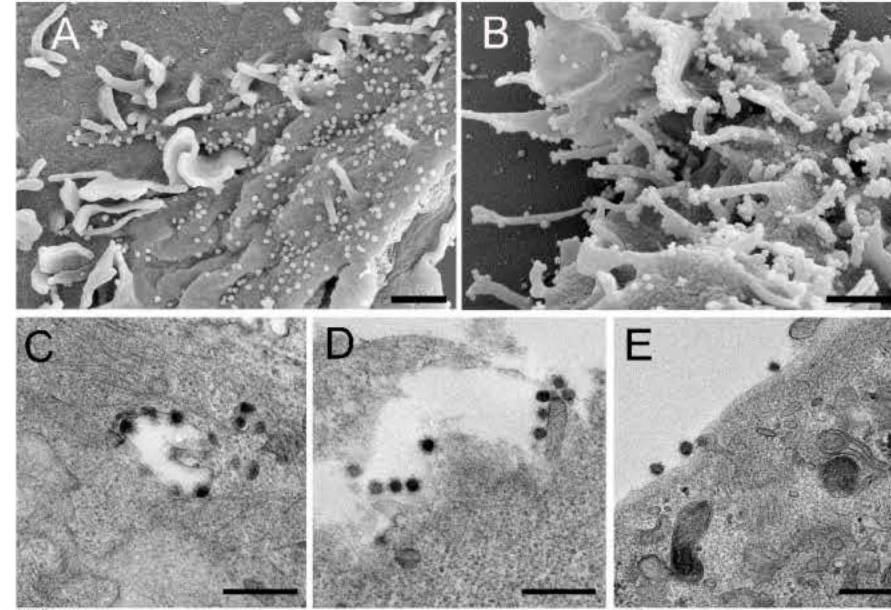
Emergence of SARS-CoV-2

- Long-term SARS-CoV-2 shedding in an immunocompromised patient with chronic lymphocytic leukemia and acquired hypogammaglobulinemia-



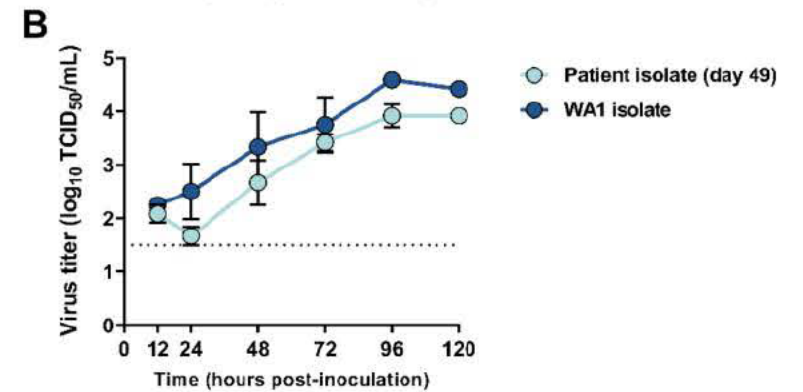
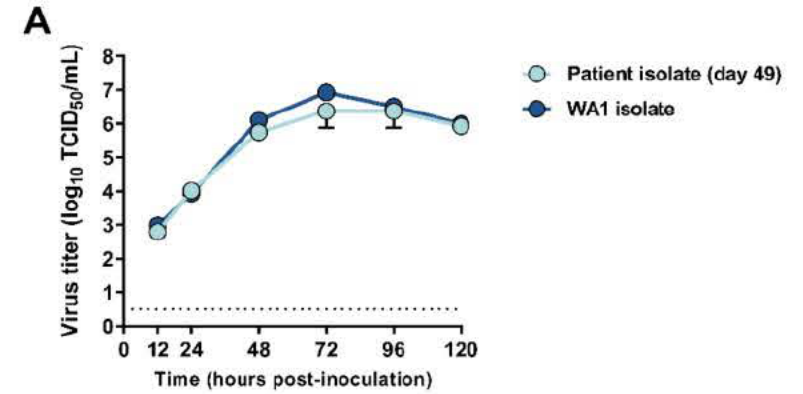
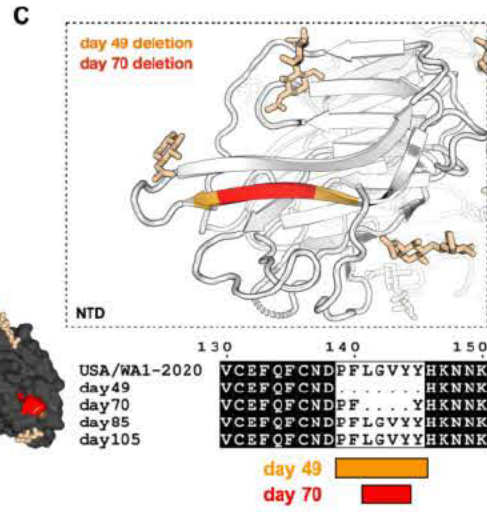
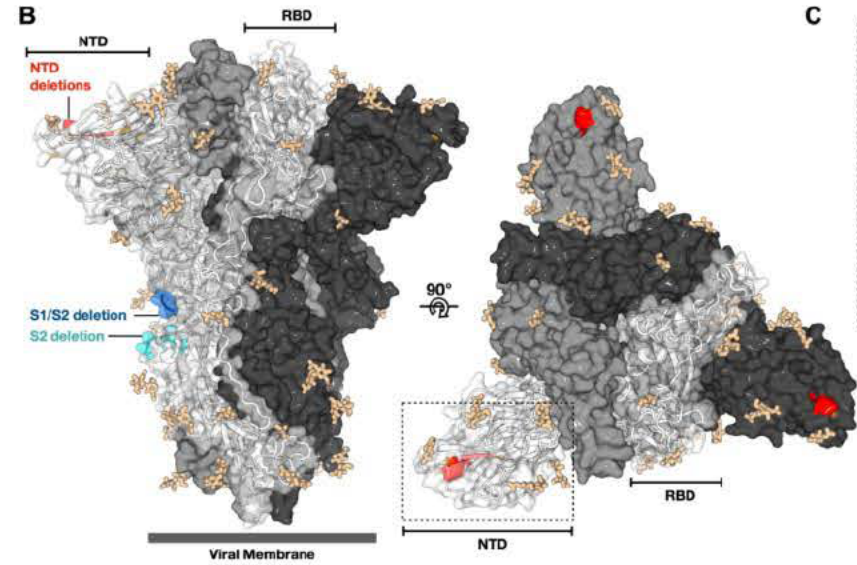
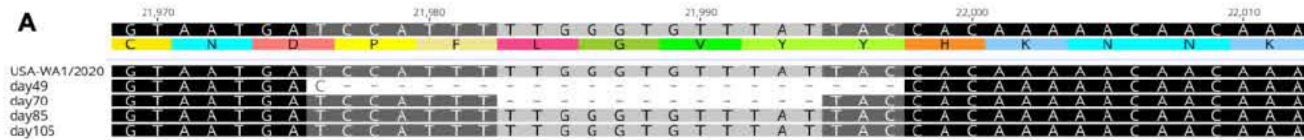
Emergence of SARS-CoV-2

- Long-term patient shedding-

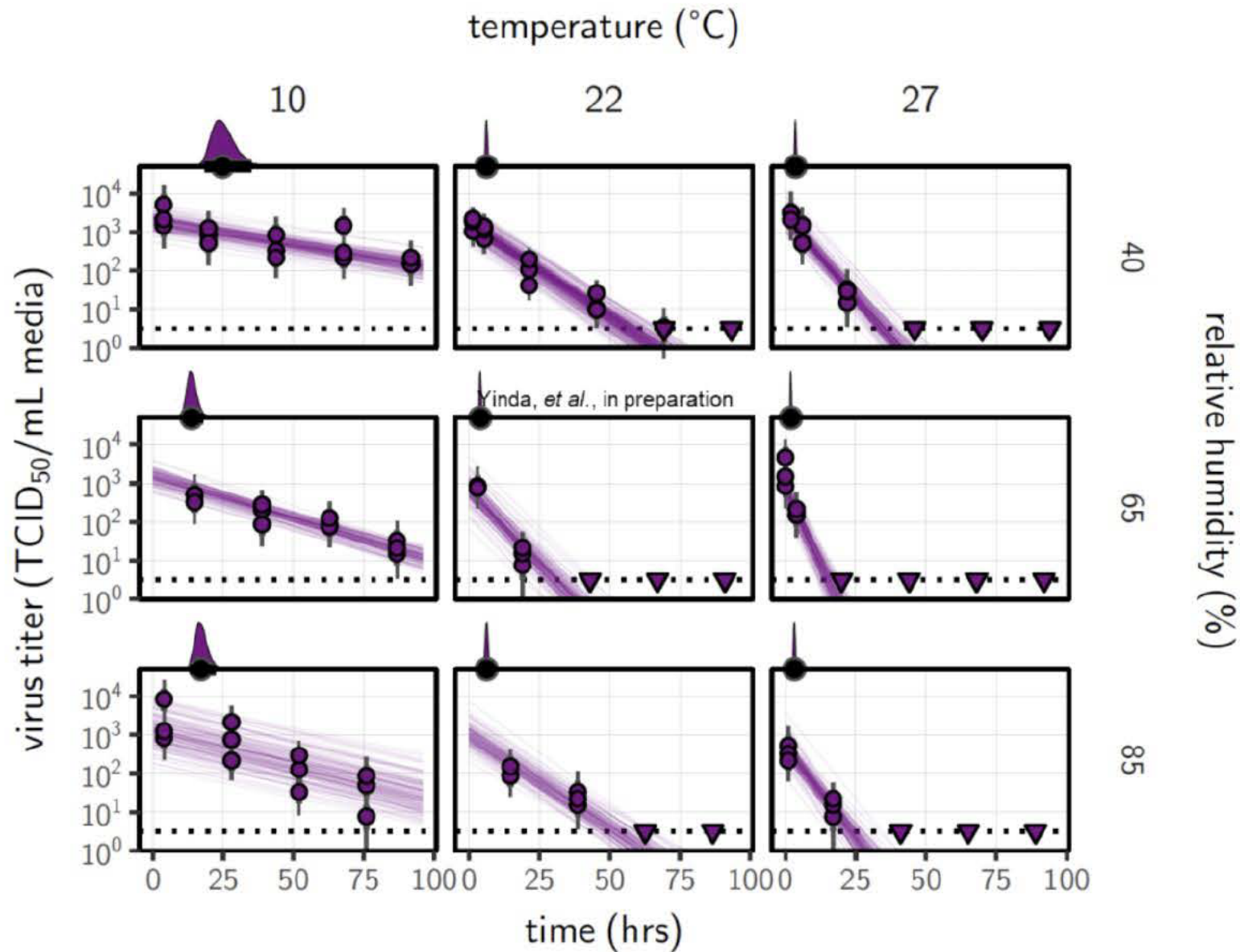


Emergence of SARS-CoV-2

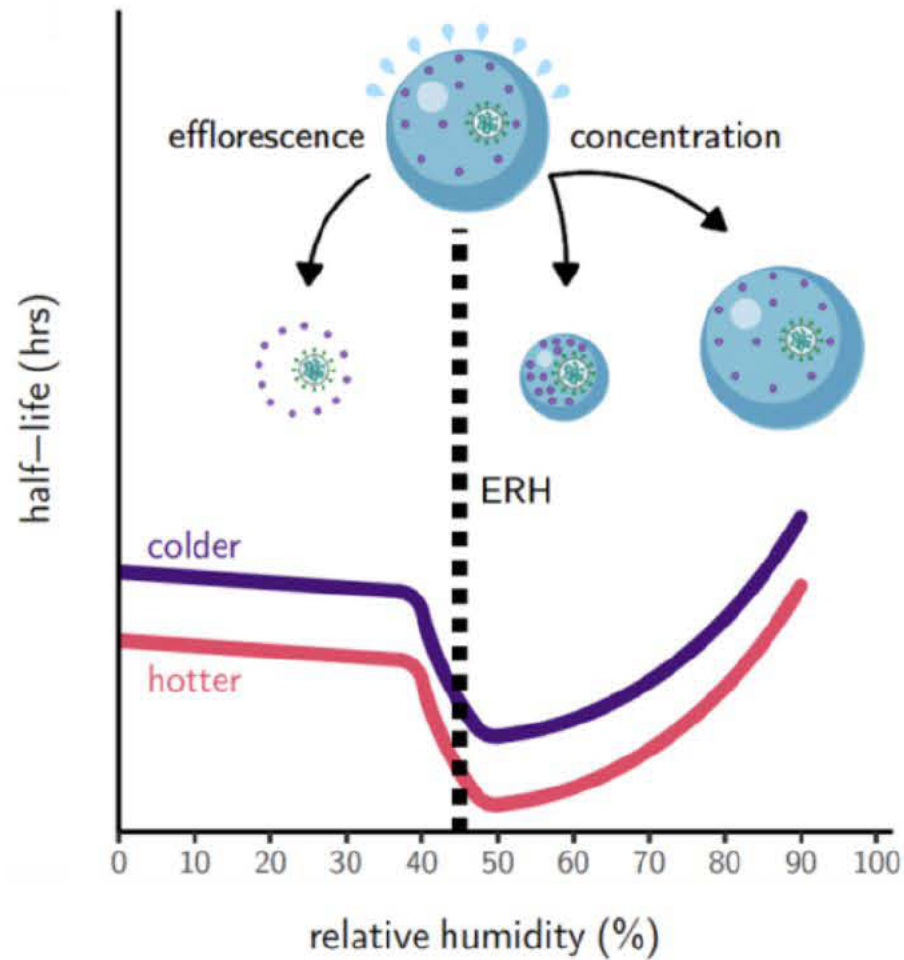
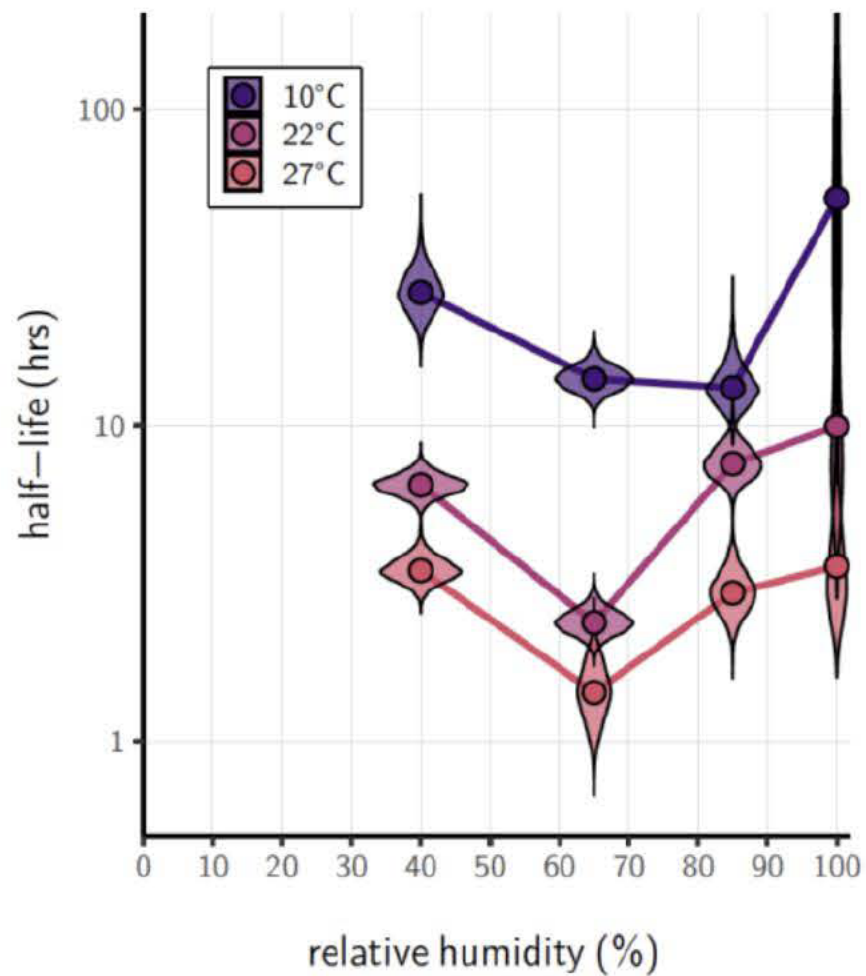
- Long-term patient shedding-



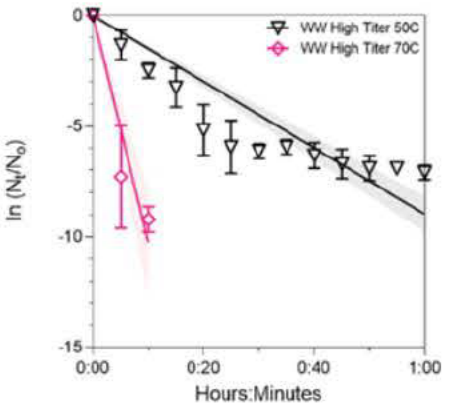
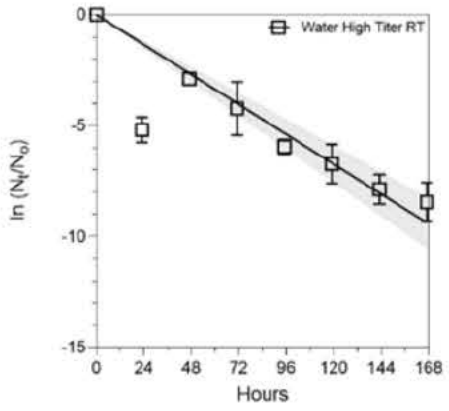
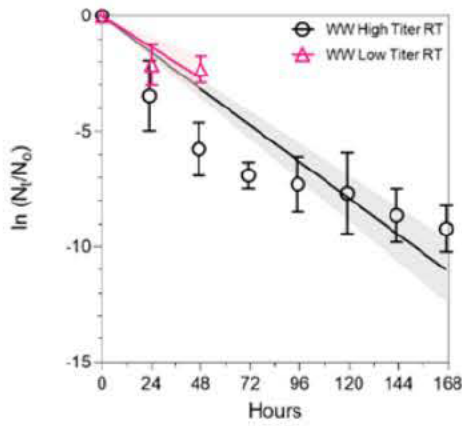
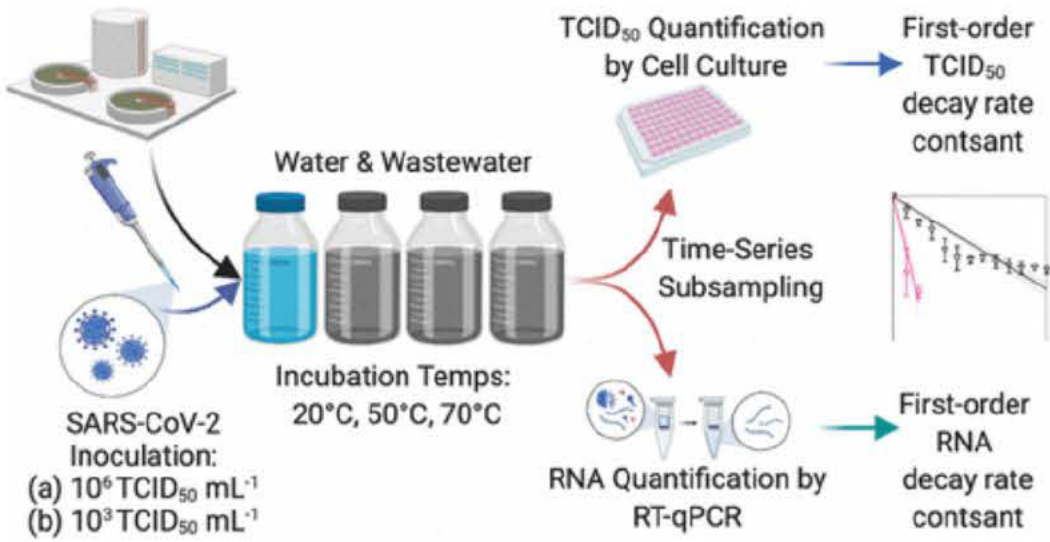
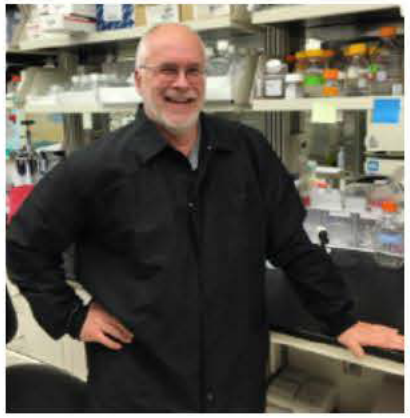
Environmental stability of SARS-CoV-2



Emergence of SARS-CoV-2 - Stability -



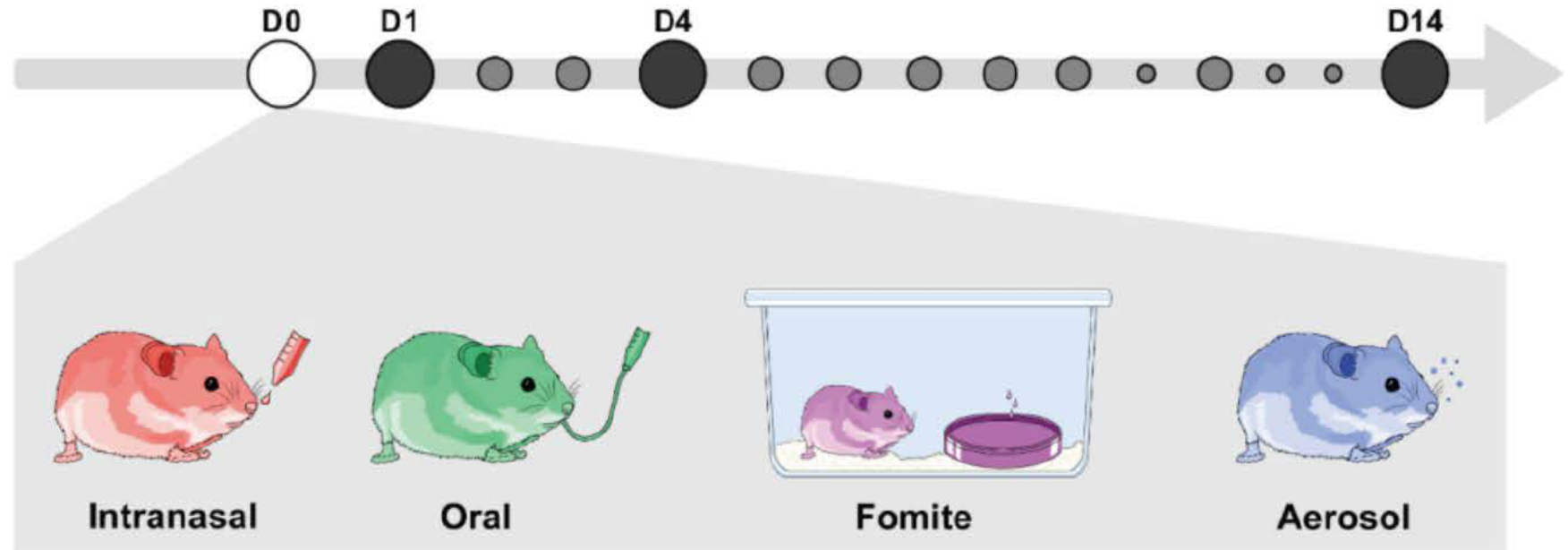
Emergence of SARS-CoV-2 - Wastewater Stability -



Emergence of SARS-CoV-2 - Experimental transmission-



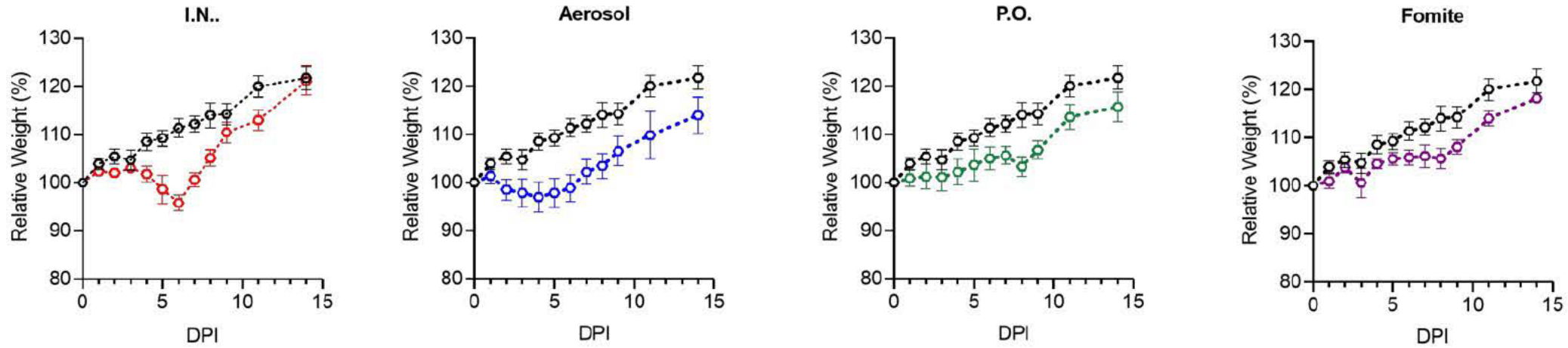
(1) PRIMARY
ROUTES OF
EXPOSURE



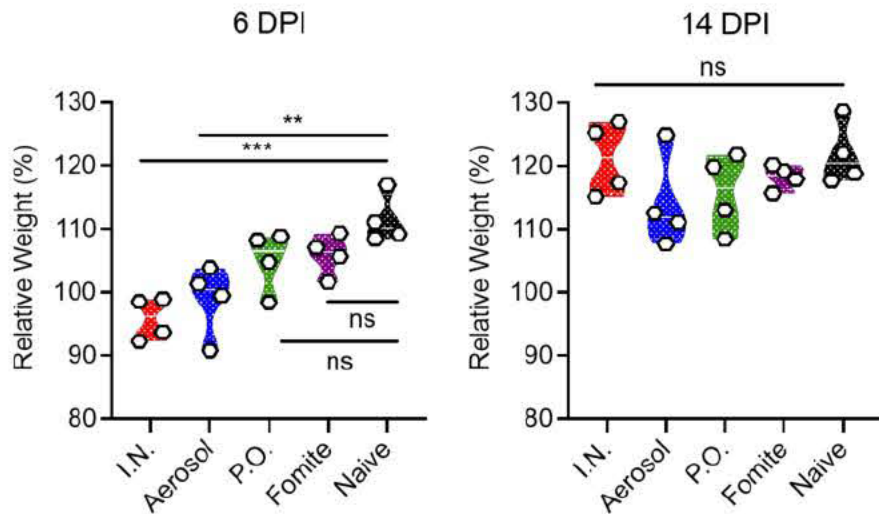
- Infection with 8×10^4 SARS-CoV-2
- Serial necropsies
- Oropharyngeal and rectal sampling

Primary Routes of Exposure: Disease Manifestation

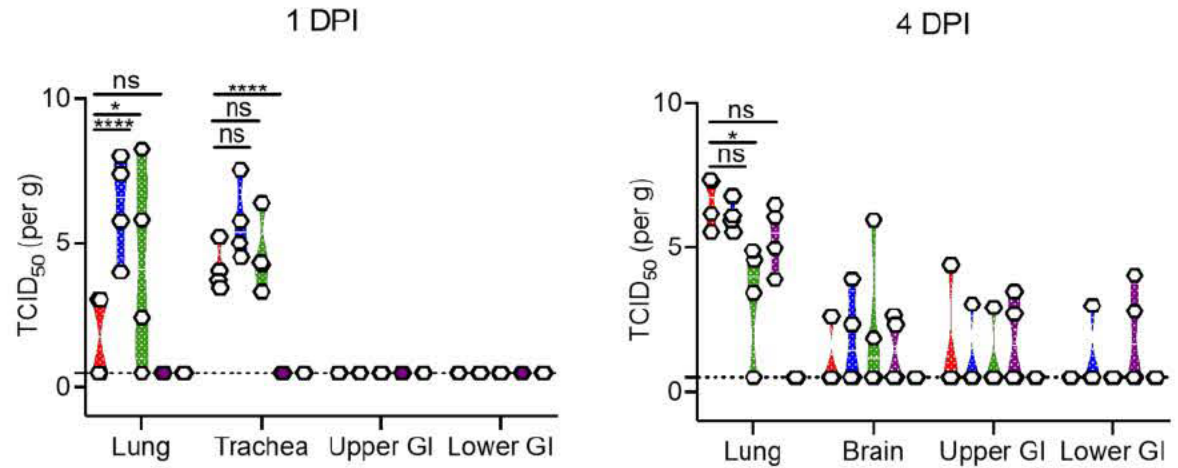
a.



b.

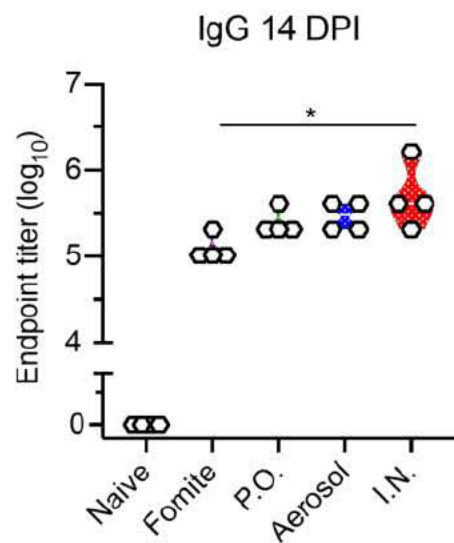


c.

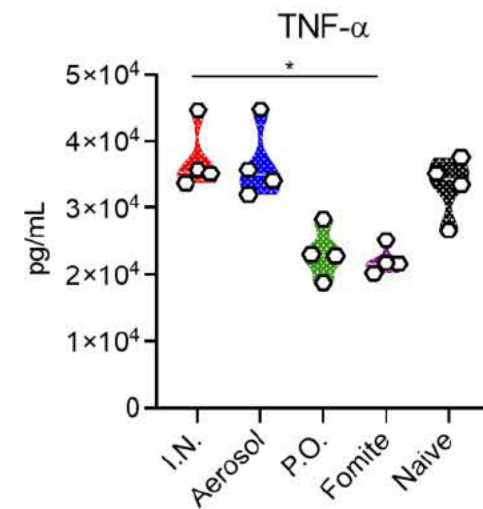
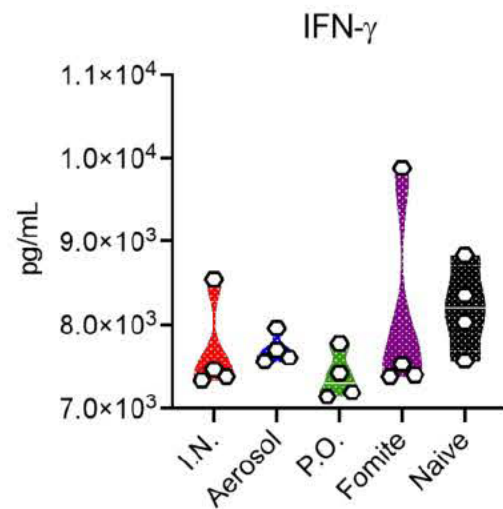


Primary Routes of Exposure: Immune-profile

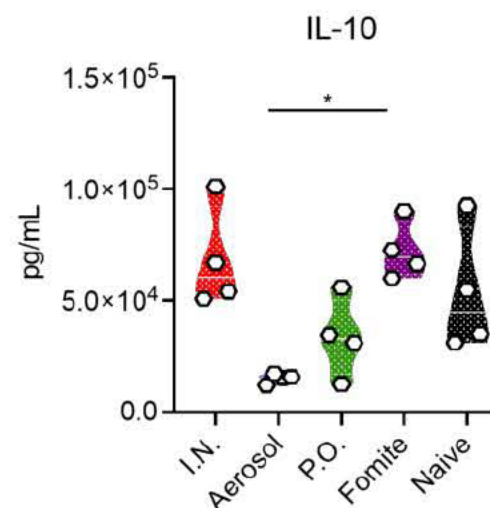
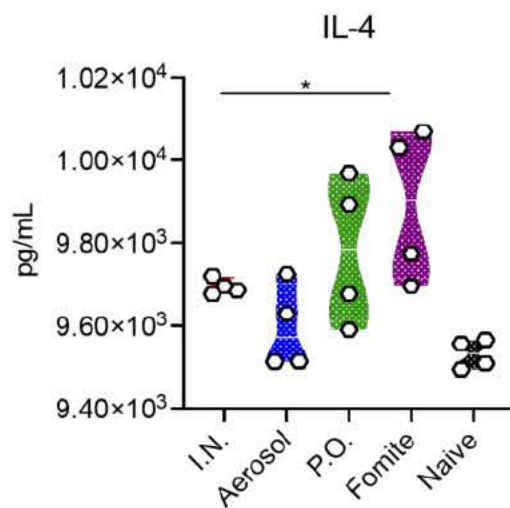
a.



b.

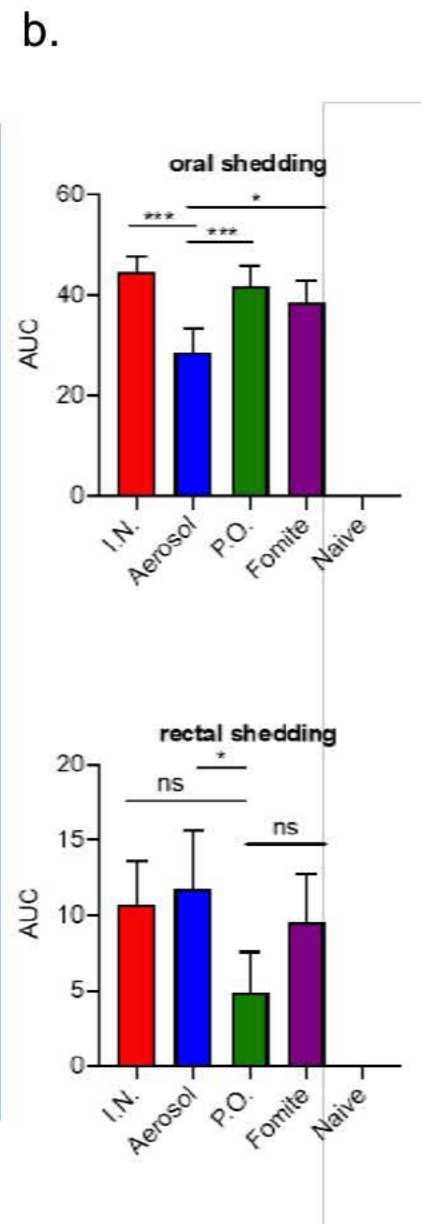
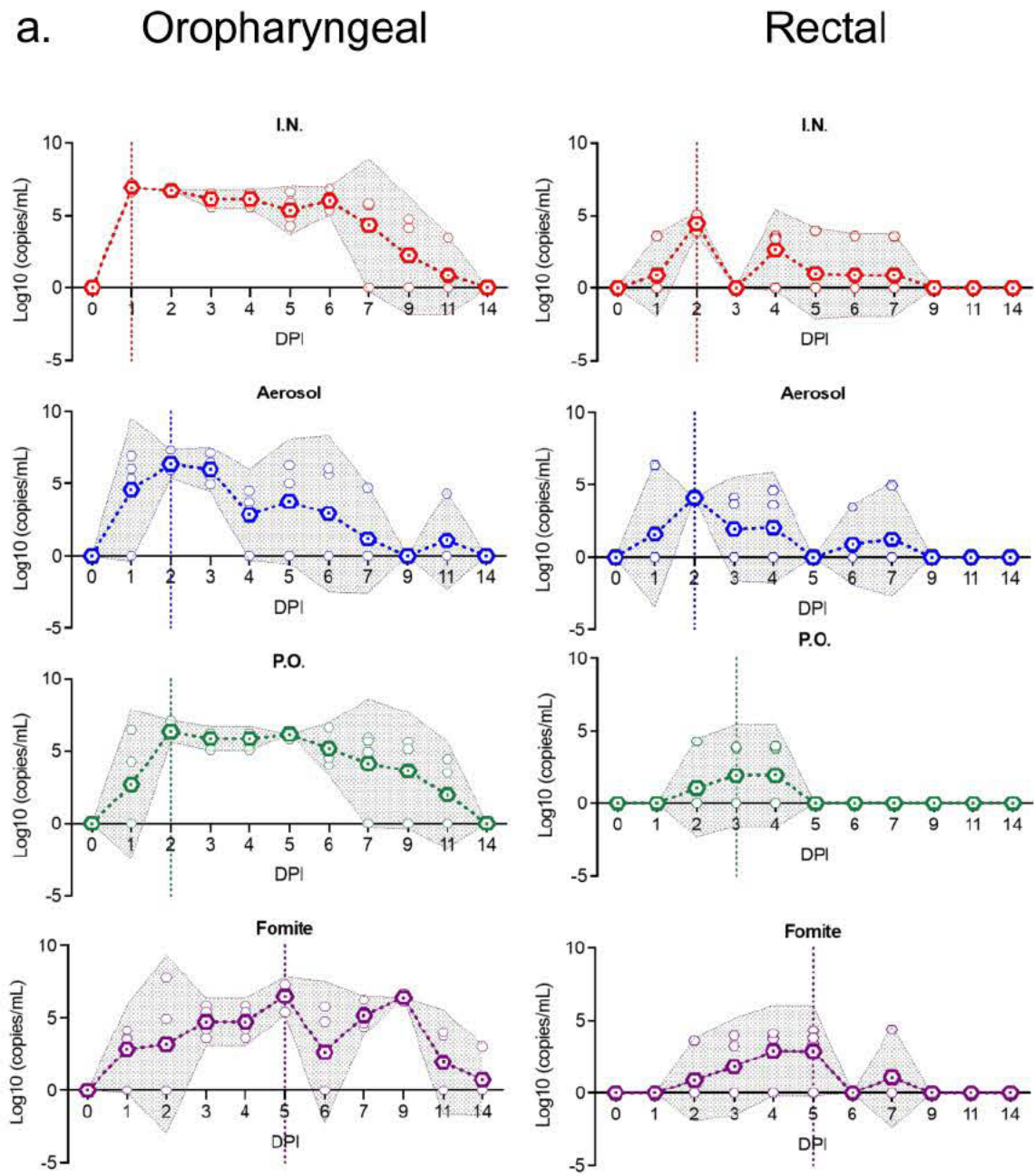


Th1 response



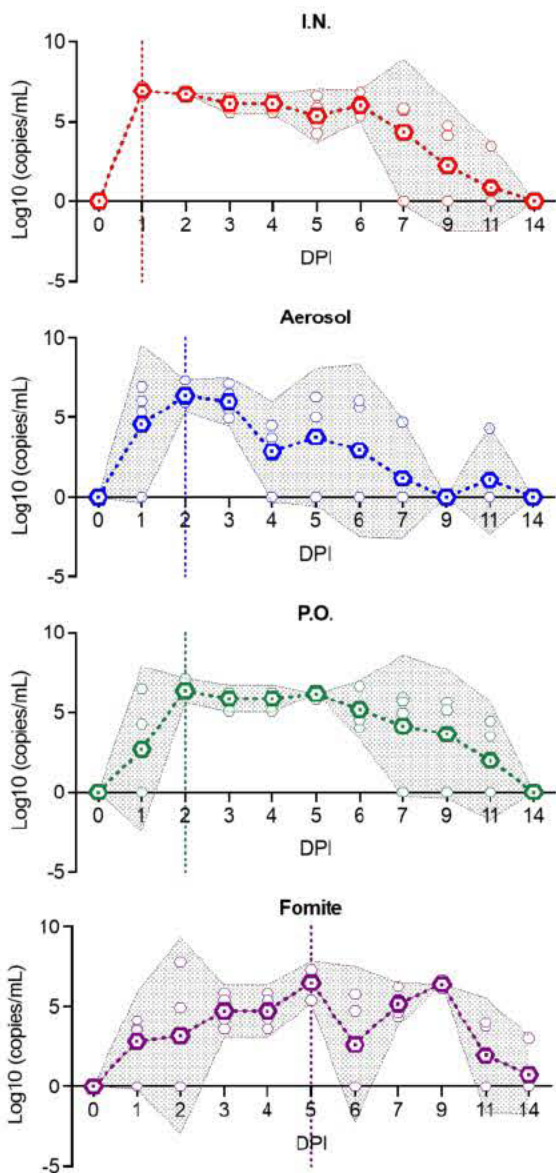
Th2 response

Primary Routes of Exposure: Shedding-profile

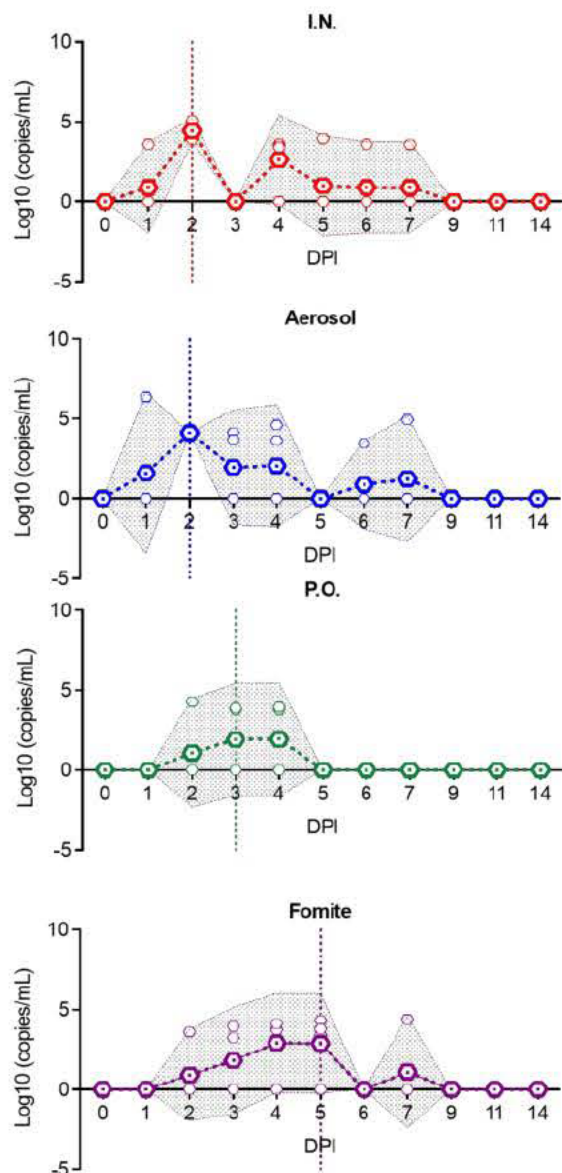


Primary Routes of Exposure: Shedding-profile

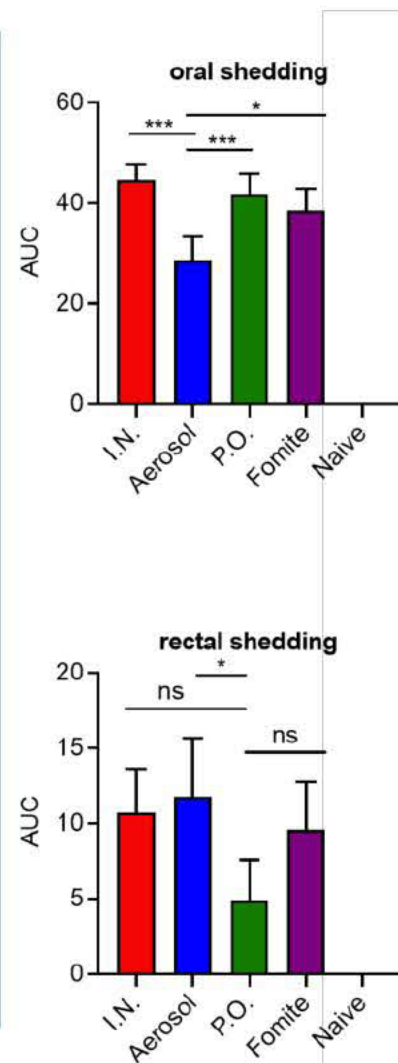
a. Oropharyngeal



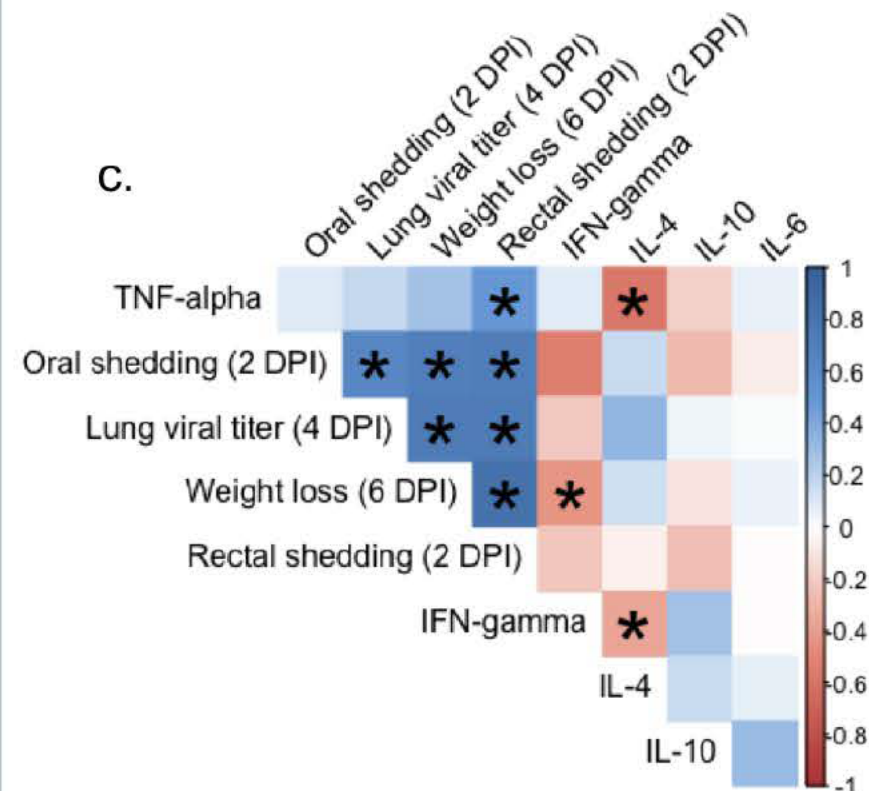
Rectal



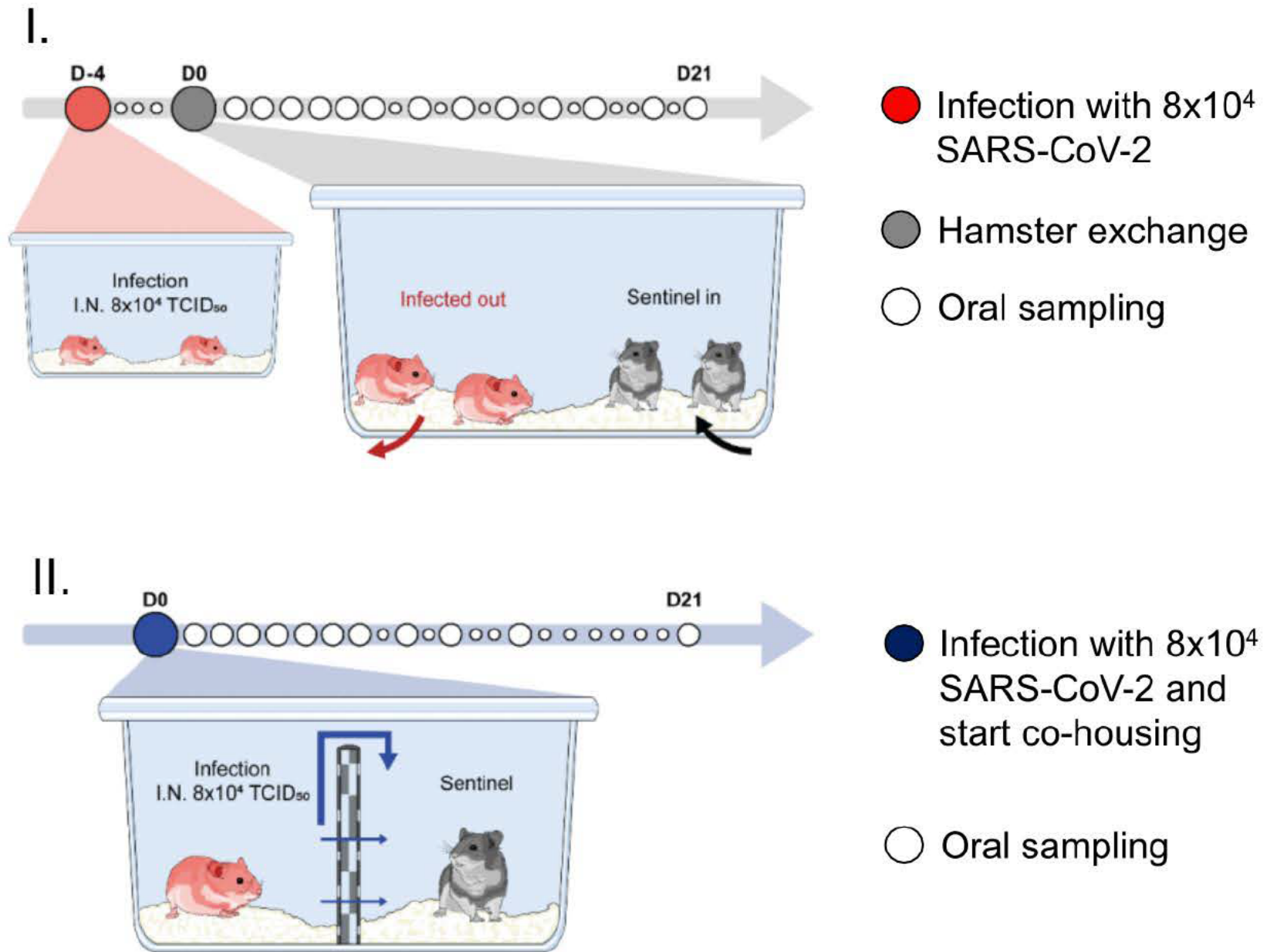
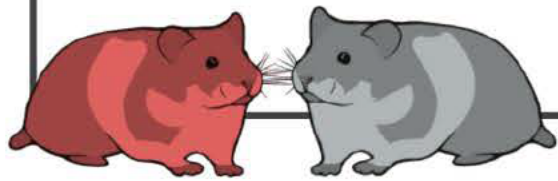
b.



c.



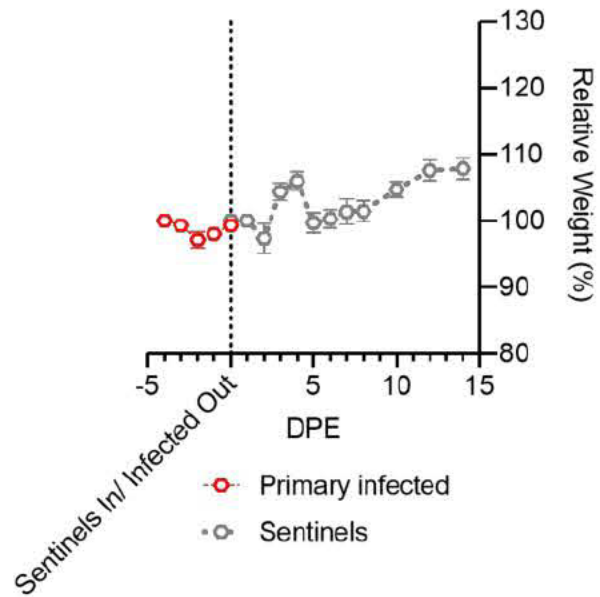
(2) HAMSTER-TO- HAMSTER TRANSMISSION



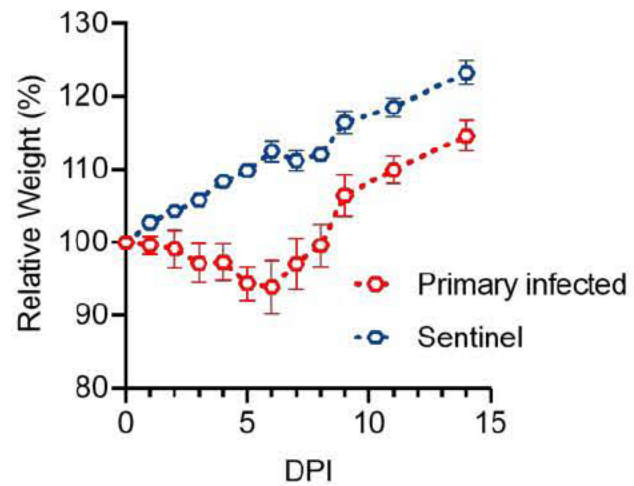
Hamster-to-Hamster Transmission: Disease Manifestation

a.

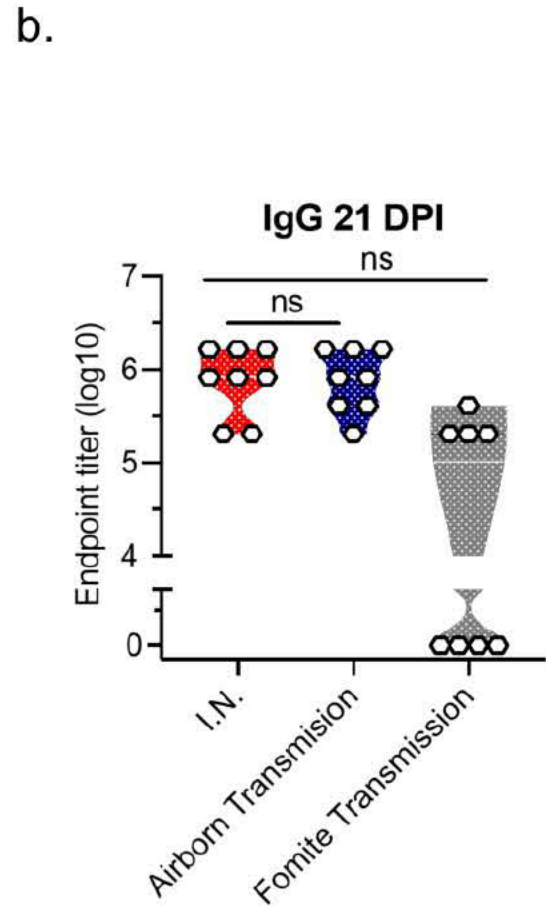
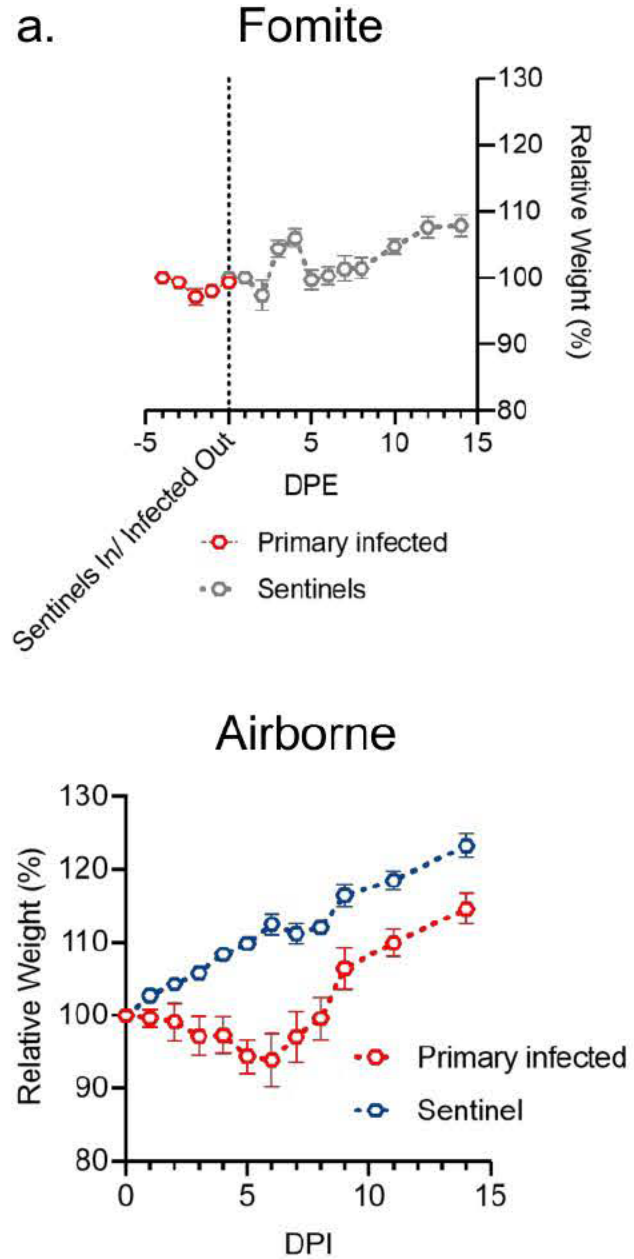
Fomite



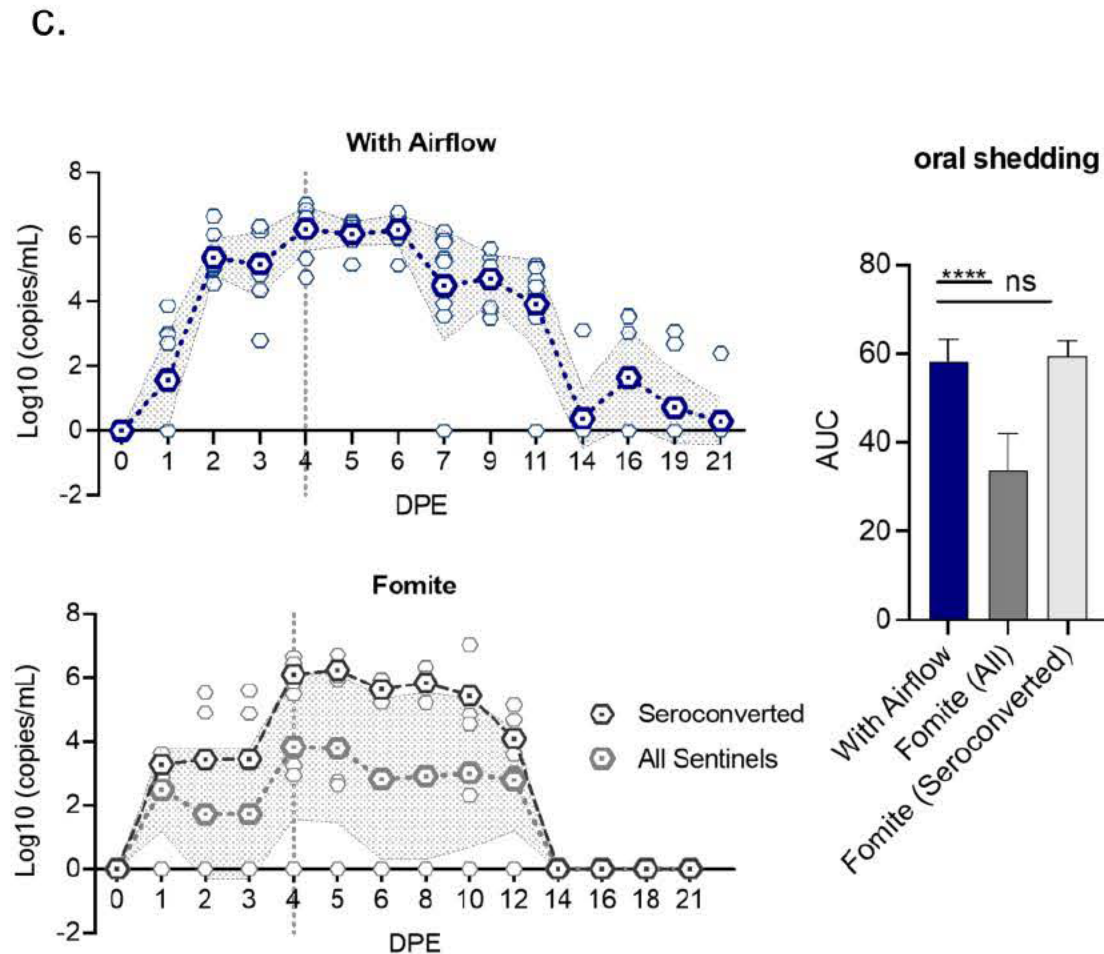
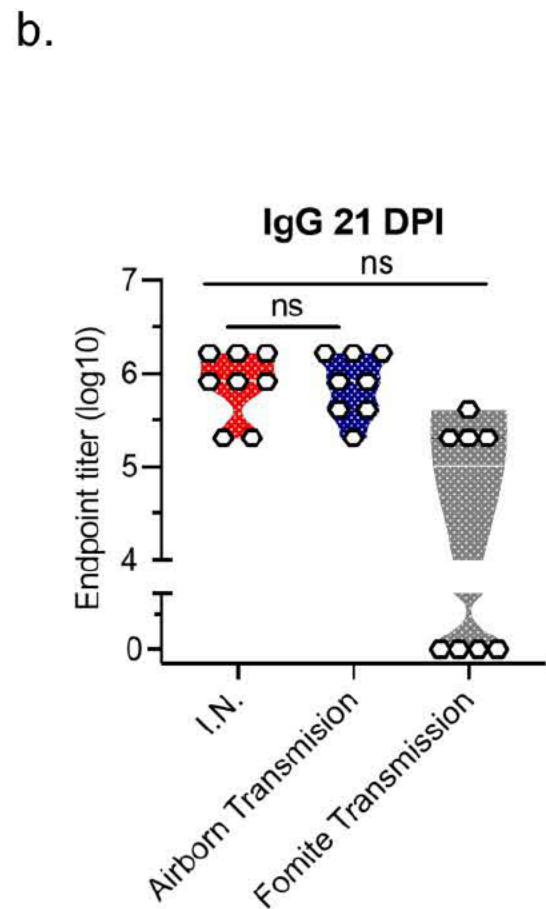
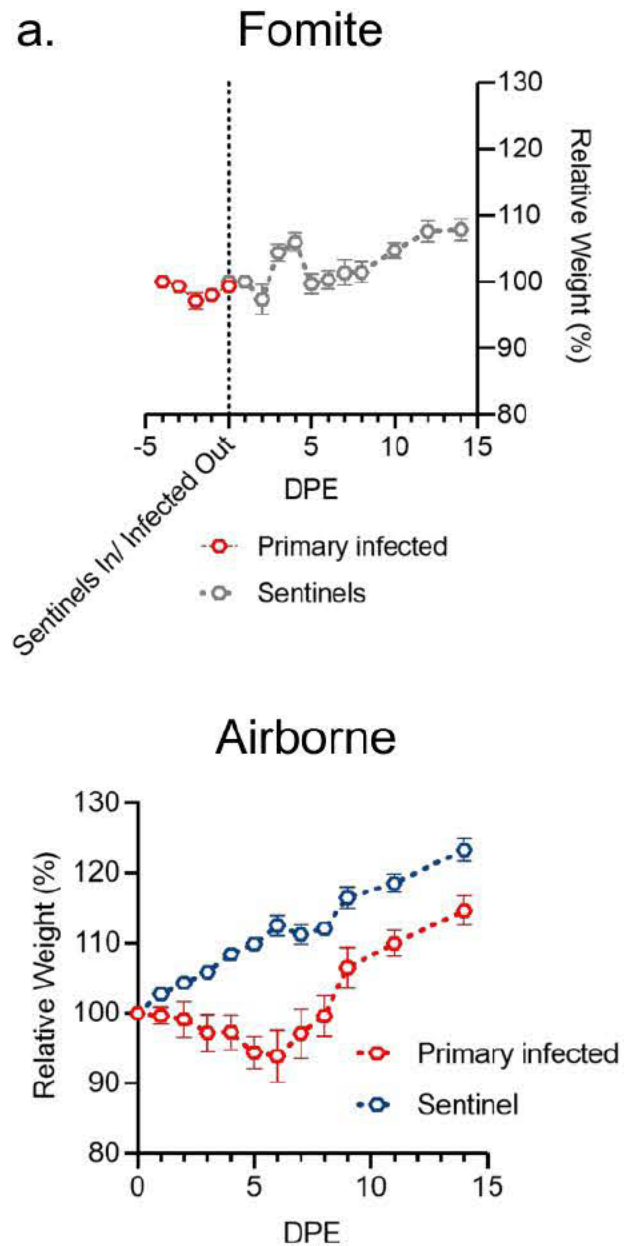
Airborne



Hamster-to-Hamster Transmission: Disease Manifestation



Hamster-to-Hamster Transmission: Disease Manifestation



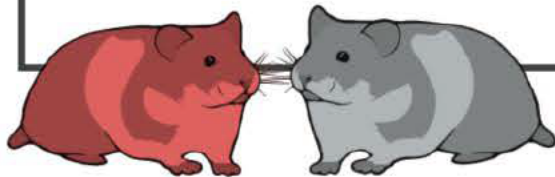
Conclusion

(1) PRIMARY ROUTES OF EXPOSURE



- **100% infection** through intranasal, oral, aerosol and fomite route
- Weight loss, viral replication and shedding profile were **distinct** for each exposure route
- Disease severity is **not indicative** of the duration and amount of virus shed

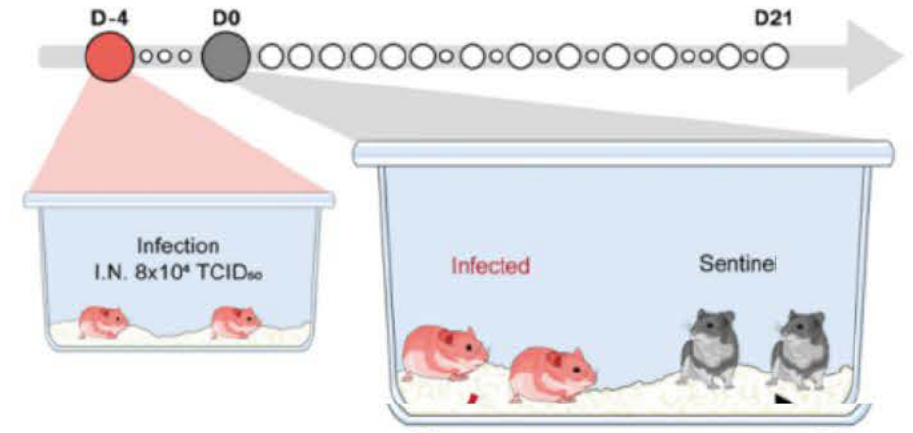
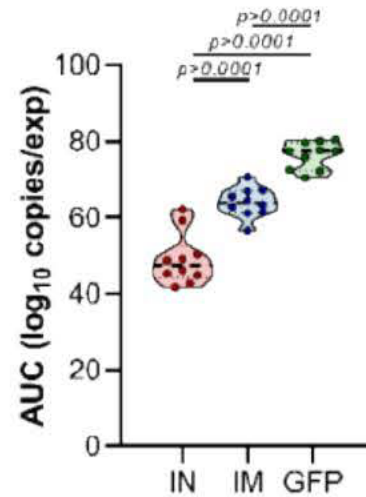
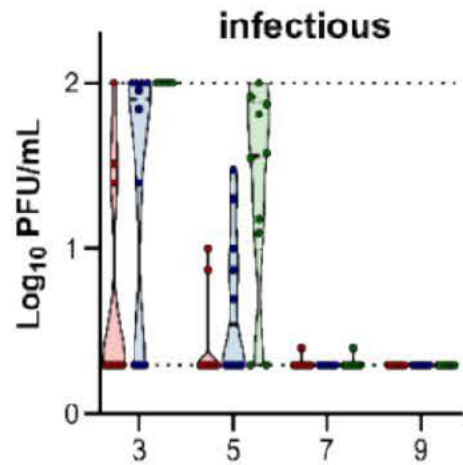
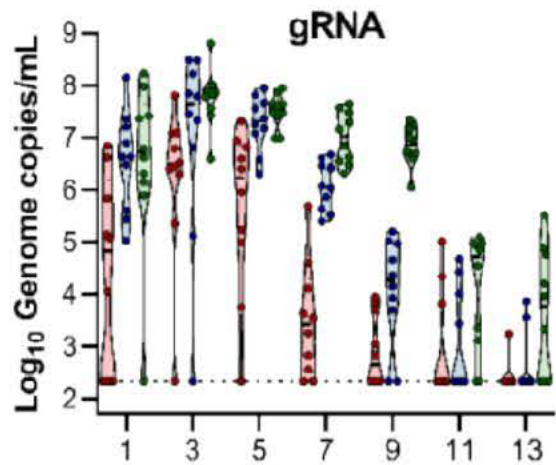
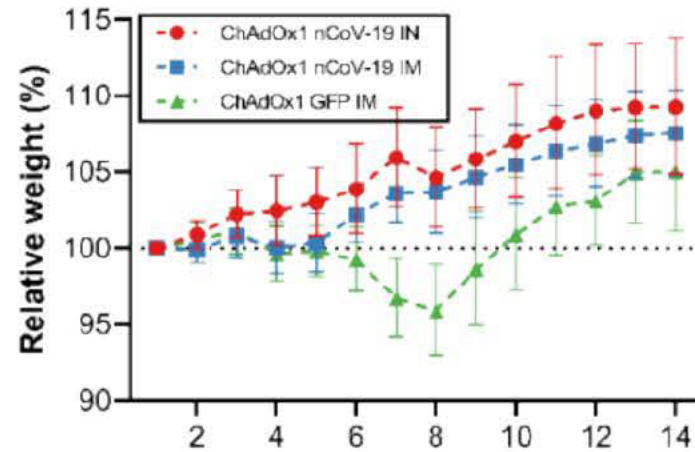
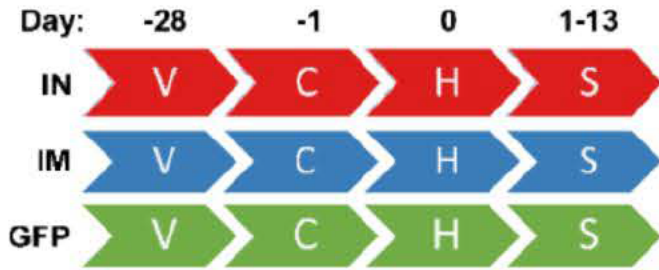
(2) HAMSTER-TO-HAMSTER TRANSMISSION



- Exposure of sentinel hamsters to **contaminated cages** resulted in 50% infection
- 100% of sentinels became infected through **airborne transmission**
- Mild/asymptomatic presentation

→ model for **symptomatic and asymptomatic disease**
→ model for more complex **transmission scenarios**

Application



Emergence of SARS-CoV-2

- Future -

- **Monitoring ongoing evolution of SARS-CoV-2**
 1. Development of mink animal models
 2. Development of natural exposure models
 3. Airborne transmission modelling
 4. **Assessment of genotypic and phenotypic characterization of SARS-CoV-2 (pathogenicity, transmissibility and antigenicity)**
- **Development of second-generation vaccine approaches**
 1. Nasal mucosal delivery of ChadOx1 COVID19 vaccine
 2. Vaccine efficacy after natural exposure (contact and aerosol)
 3. Development of B-cell epitope vaccine focused at the 60+ population
- **Clinical data on SARS-CoV-2 shedding and transmission**
 1. Immunosuppressed population and long-term shedding
 2. Re-infection and shedding of infectious SARS-CoV-2
 3. Cardiac involvement with COVID19 patients (Marshall University)
 4. Genetic analyses of SARS-CoV-2 circulation in Montana

Emergence of SARS-CoV-2

- Conclusions -

- **The SARS-CoV-2 pandemic provides a unique opportunity to assess genotype-to phenotype assessment**
 1. **Understanding transmission**
 2. **Merging experimental and epidemiological data in a modelling framework**
 3. **Fast-track development and assessment of pre-emptive, prophylactic and therapeutic countermeasures**

Acknowledgements



VES

Neeltje van Doremalen
Julia Port
Jyothi Purushotham
Trent Bushmaker
Myndi Holbrook
Vicky Avanzato
Jon Schulz
Bob Fischer
Kwe Claude Yinda
Irene Offei Owusu
Danielle Adney

LV

Brandi Williamson
Lizzette Perez-Perez
Ricki Feldmann
Kimberly Meade-White
Les Shupert
Michael Jones
Julie Callison
Kay Menk
Elaine Haddock
Sonja Best
Andrea Marzi
Emmie de Wit
Heinz Feldmann

RMVB

Greg Saturday
Dana Scott
Patrick Hanley
Jamie Lovaglio
Brian Smith
Chad Clancy
Kathy Cordova
Dan Long
Rebecca Rosenke
Tina Thomas
Caretakers

RML ACUC

RML support staff

RTB

Craig Martens
Kent Barbian
Sarah Anzick
Beth Fischer
Beniah Brumbaugh
Rose Perry
Austin Athman
Ryan Kissinger
Anita Mora

Uniformed Services University

Chris Broder
Eric Liang

University of Washington

Seth Judson
Jesse Bloom
Jason Goldman

Erasmus Medical Center

Marion Koopmans
Debby van Riel

UCLA

Dylan Morris
Amandine Gamble
Jamie Lloyd-Smith

University of Notre Dame

Kyle Bibby

Oxford University

Rhys Pryce
Thomas Bowden

The Jenner Institute

Sarah Gilbert
Teresa Lambe
Sandra Belij-Rammerstorfer
Hannah Sharpe
Ciaran Gilbridge
Susan Morris
Reshma Kailath
Adrian Hill

Marshall University

Jeremiah Matson

Montana State University

Raina Plowright

EvergreenHealth

Francis Riedo

WHO

Cesar Munoz-Fontela
Frank de Koning
Maria van Kerkhove

Washington State University

Michael Letko
Stephanie Seifert

NAMRU 3

Terrel Sanders

Walter Reed

Kayvon Modjarrad

CDC

Sue Gerber
Natalie Thornburg

OWS

John Mascola
Christina Cassetti

NIH

Barney Graham
Bob Seder
Dan Chertow
Karen Frank
Hillary Marston

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 19 Nov 2020 16:55:00 +0000
To: Plowright, Raina
Cc: LaTrielle, Sara
Subject: RE: Presenter/s needed for Nov 20 monthly reporting: suggestions please

Working on the presentation now

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Thursday, November 19, 2020 9:35 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: LaTrielle, Sara <[REDACTED] (b) (6)>
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

its sure to be a focus of our call...

On Nov 19, 2020, at 9:22 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Pfff sorry to hear that

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Thursday, November 19, 2020 9:21 AM
To: LaTrielle, Sara <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

heads up vincent that we had a rollercoaster with DARPA this week... I have a draft email to the team telling them we may all get cut 50% and only haven't sent it bc very busy week. Early this morning [REDACTED] (b) (6) wrote and said he thinks that our team and UC Davis may actually be ok and go into phase II without more cuts... but been a stressful week.

On Nov 19, 2020, at 6:52 AM, LaTrielle, Sara <[REDACTED] (b) (6)> wrote:

Vincent,

Morning to you. Can you forward your slides this morning so we can pull all together and forward to DARPA?

Thanks a lot- know you are beyond busy!
Sara

From: LaTrielle, Sara <[REDACTED] (b) (6)>
Sent: Monday, November 16, 2020 9:29 AM
To: Munster, Vincent (NIH/NIAID) [E]; Plowright, Raina
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

You can aim for 30 mins- if that works for you.

Wed is just fine for the slides- thank you.

Sara

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Monday, November 16, 2020 9:17 AM
To: LaTrielle, Sara <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>
Subject: RE: Presenter/s needed for Nov 20 monthly reporting: suggestions please

How long would the presentation need to be? Will ret ti get it finished by Wednesday as its not the only thing I need to do,

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara <[REDACTED] (b) (6)>
Sent: Monday, November 16, 2020 9:14 AM
To: Plowright, Raina <[raina.\[REDACTED\] \(b\) \(6\)@rockefeller.edu](mailto:raina.[REDACTED] (b) (6)@rockefeller.edu)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

Vincent,

Can you please send slides for the monthly report by tomorrow COB?

The mtg is this Friday, 12pm MST.

Thanks,

Sara LaTrielle
Program Manager
PREEMPT Project
Montana State University

(b) (6)

From: Plowright, Raina <(b) (6)>
Sent: Tuesday, November 10, 2020 9:38 AM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: LaTrielle, Sara <(b) (6)>
Subject: Re: Presenter/s needed for Nov 20 monthly reporting: suggestions please

Thanks for volunteering! That would be excellent.

On Nov 10, 2020, at 9:19 AM, Munster, Vincent (NIH/NIAID) [E] (b) (6) wrote:

I can provide of birds-eye overview of the work at RML?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: LaTrielle, Sara (b) (6)
Sent: Monday, November 9, 2020 10:19 AM
To: (b) (6)
Cc: Plowright, Raina <(b) (6)>
Subject: Presenter/s needed for Nov 20 monthly reporting: suggestions please

All,

We are in the need of a presenter/s for the Nov 20th (12pm MST) monthly meeting with DARPA.

We had a few PI's tentatively lined up- but they are not ready (results are pending...) to present just yet so..... **please volunteer to present if you have results/analysis that you or your team are excited about. Can be around a new publication, COVID work, PREEMPT work et al.**

FYI Tony and Andy presented last month.

Please do let me know by COB tomorrow if this is something you can do- always great to get your/team's put forth in front of DARPA.

Best,
Sara

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 18 Nov 2020 15:29:27 +0000
To: Plowright, Raina; preempt
Subject: RE: [USAID Global Health Security Program] DEEP VZN RFI Posted -- viral discovery and characterization

Yep, because they were so successful in preventing Ebola, Nipah and Sars-cov-2 outbreaks

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: Wednesday, November 18, 2020 8:20 AM
To: preempt <[REDACTED]> (b) (6)
Subject: Fwd: [USAID Global Health Security Program] DEEP VZN RFI Posted -- viral discovery and characterization

Sounds like PREDICT II.

Sent from my iPhone

Begin forwarded message:

From: Andrew Clements <[REDACTED]> (b) (6)
Date: November 18, 2020 at 7:02:28 AM MST
To: Peter Daszak <[REDACTED]> (b) (6) "Wantanee (FAORAP) Kalpravidh"
<[REDACTED]> (b) (6) "VonDobschuetz, Sophie (AGAH)" <[REDACTED]> (b) (6)
"Claes, Filip (AGAH)" <[REDACTED]> (b) (6) "ZHANG, Wenqing" <[REDACTED]> (b) (6) Elizabeth Mumford
<[REDACTED]> (b) (6) [REDACTED] (b) (6) "SHINDO, Nahoko" <[REDACTED]> (b) (6) Gina Samaan
<[REDACTED]> (b) (6) William Karesh <[REDACTED]> (b) (6) Brian Bird
<[REDACTED]> (b) (6) Jonna Mazet <[REDACTED]> (b) (6) "Simon Anthony, D.Phil"
<[REDACTED]> (b) (6) Amanda Fine <[REDACTED]> (b) (6) "Murray, Suzan" <[REDACTED]> (b) (6)
"Pavlin, Julie" <[REDACTED]> (b) (6) "Goodtree, Hannah" <[REDACTED]> (b) (6)
[REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6)
[REDACTED] (b) (6) "Anthony, Simon J." <[REDACTED]> (b) (6) [REDACTED] (b) (6)
Susan Scribner [REDACTED] (b) (6), [REDACTED] (b) (6) [REDACTED] (b) (6) "Plowright, Raina"
<[REDACTED]> (b) (6), [REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6)
[REDACTED] (b) (6) Christine Kreuder Johnson <[REDACTED]> (b) (6) [REDACTED] (b) (6)
[REDACTED] (b) (6) [REDACTED] (b) (6) Karen Saylor <[REDACTED]> (b) (6)
[REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6)
[REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6)
[REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6)
[REDACTED] (b) (6) [REDACTED] (b) (6) [REDACTED] (b) (6)
[REDACTED] (b) (6) [REDACTED] (b) (6), Dawn Zimmerman <[REDACTED]> (b) (6)

(b) (6) (b) (6) (b) (6)
(b) (6) Supaporn Wacharapluesadee < (b) (6) (b) (6)>
(b) (6) (b) (6) (b) (6) (b) (6)
(b) (6) (b) (6) "Kochevar, Deborah T."
< (b) (6) "Griffiths, Jeffrey K" < (b) (6)>
(b) (6) Ian Lipkin < (b) (6) Tracey Goldstein
< (b) (6) Eddy Rubin < (b) (6)>

Subject: [USAID Global Health Security Program] DEEP VZN RFI Posted -- viral discovery and characterization

Dear Colleagues,

The "Request For Information" (RFI) for our new proposed project, DEEP VZN (Discovery & Exploration of Emerging Pathogens – Viral Zoonoses) has been posted online. <https://www.grants.gov/web/grants/search-grants.html?keywords=7200AA21RFA00005>

The goal of the DEEP VZN project is to: Deepen and share knowledge on unknown viruses from wildlife including their zoonotic and pandemic potential. This is to be accomplished through three major objectives, 1) Conduct Sampling for Unknown Viruses in Select Countries, 2) Strengthen Detection of Novel Viruses, and 3) Strengthen Characterization of Novel Viruses. Additional information about what is currently being proposed can be found in the RFI.

As this is now public, please feel free to share with any potential partners who you think may find this RFI of interest and please encourage them to submit comments and to RSVP to attend the virtual pre-application conference (aka the Industry Day) scheduled for December 10, 2020. Please note that the RFI notice includes a list of questions to help USAID shape the future award.

Andrew

Andrew Clements, Ph.D.
Senior Scientific Advisor

Emerging Threats Division/Office of Infectious Diseases/Bureau for Global Health

U.S. Agency for International Development

Mobile phone: (b) (6)

E-mail: (b) (6)

For more information on USAID's Emerging Pandemic Threats program, see: <http://www.usaid.gov/ept2>

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 18 Nov 2020 15:06:19 +0000
To: Tamika Lunn; Kwe Claude, Yinda (NIH/NIAID) [F]
Cc: Alison Peel; Jamie Lloyd-Smith; Olivier Restif; Hamish McCallum; Plowright, Raina; Hoegh, Andrew
Subject: RE: Spatio-temporal Hendra virus manuscript

Hi Tamika,

Thanks for sharing and looping-in Kwe, for the positive sample data we will be able to provide genome copy numbers rather than Ct values (so you'll get smtg like 500 copies/ml), this will likely allow more fine grained analysis's of the positivity data and probably a bit nicer plotting of magnitude of shedding over time as plotted against the prevalence (as opposed to plotting Ct values, which is typically not meant to be plotted like that). We'll work on the technical M&M part as well

Kwe can you make sure (I assume between Tamika and Manual) that she gets the data (maybe just send the file of positives with associated copy numbers).

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Tamika Lunn <[REDACTED] (b) (6)>
Sent: Tuesday, November 17, 2020 9:21 PM
To: Plowright, Raina <[REDACTED] (b) (6)> Hoegh, Andrew <[REDACTED] (b) (6)>
Cc: Alison Peel <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> Olivier Restif <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Hamish McCallum <[REDACTED] (b) (6)>
Subject: Re: Spatio-temporal Hendra virus manuscript

Thanks everyone!

I've set up a Doodle Poll ([here](#)) with a time window that could work for Aus/US/UK, for some of the days already specified. Please let me know your availability and I can set up a Zoom link for us.

Best,
Tamika

P.S. I didn't register that it was Thanksgiving! Sorry about that!

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Wednesday, November 18, 2020 2:56 PM
To: Hoegh, Andrew <[REDACTED] (b) (6)>

Cc: Alison Peel <[REDACTED]> (b) (6) Jamie Lloyd-Smith <[REDACTED]> (b) (6) Olivier Restif
<[REDACTED]> (b) (6) Tamika Lunn <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E]
<[REDACTED]> (b) (6) Hamish McCallum <[REDACTED]> (b) (6)

Subject: Re: Spatio-temporal Hendra virus manuscript

Monday or Tuesday next week could work (this week is not possible). Wednesday-Sunday is Thanksgiving holiday. After thanksgiving (>Sunday 29) is much more flexible.

On Nov 17, 2020, at 8:47 PM, Hoegh, Andrew <[REDACTED]> (b) (6) wrote:

Hi All,

I had originally just replied to Tamika, but will extend the discussion here. I'm excited to think about the spatiotemporal modeling and could find a little time for a meeting in the next week. I have 2 dissertation defenses on Friday, but I'd be fairly available Thursday, Monday, Tuesday.

As Raina mentioned, with our adjusted calendar at Montana State, final exams (and all the associated fun) will take place in the lead up to Thanksgiving. So my time is a bit limited in the next week, but I'll plan to focus my attention on part 2 (methods) and part 3 (ideas for formal analyses).

Andy

On Nov 17, 2020, at 7:39 PM, Alison Peel <[REDACTED]> (b) (6) wrote:

Thanks Jamie!

Tamika - while I'm looking at it again, I'm going to make a couple of further comments here on the new parts of the analyses/explorations that I haven't commented on yet, so that others can also contribute to the discussion

Re defining a pulse

- I think the method needs to take into account the magnitude of the prevalence at that point in time, but also relative to prevalence at points either side of it. i.e. that a pulse has a rise to a peak followed by a decline (to the original baseline?). In our dataset, there seems to be a mix of epidemic-like dynamics followed by apparent local fadeout at our sites (winter 2017) (Note for others: this is also demonstrated across several other sites that are not shown in Tamika's plots, because we stopped sampling from them part way through 2018). Also epidemic like-dynamics (winter 2018) that are followed by endemic-like dynamics (Oct 2018 onwards). With our sampling frequency, I'm not sure whether it's appropriate to attempt to define a pulse during that endemic-like period - though I'd love to hear from others on this, and formal approaches to this.

- I can't remember the details of how David Paez defined pulses (possibly as an output of the wavelet analyses? Might need to dig into the supp info). I also did a quick search for papers that attempt to define pulses, or differentiate epidemic from endemic dynamics and found some which may be helpful

for ideas: eg. [this](#), [this](#), [this](#) and possibly also [this](#) paper - which includes an interesting plot in Fig 1 that combines prevalence with pathogen load.

- Also Olivier - I wondered whether Emma had explored this kind of space with her syndromic surveillance work? i.e. answering the question "how do we know when an outbreak is starting?" (assuming some level of normal baseline detection). The first link I provided in the point above also gets at this.

- Saying all that, given Tamika's short timeline til submission, I think a pragmatic approach may be required for the short term for her thesis submission, but if there are ideas for more detailed analyses prior to manuscript submission, then that would still be good to discuss.

Re: Frequency distribution of Ct values per month and whether it is informative about stage in pulse in our system.

- I arranged your viral load plots in a matrix of year and month to more easily see if there were any discernible patterns over time (attached). I think our data are insufficient to see this, but yep, I'd be interested to hear if anyone else who has a student who may be interested in modelling this (with pooling)

Cheers

Ali

On Wed, 18 Nov 2020 at 12:02, Jamie Lloyd-Smith <[redacted] (b) (6)> wrote:
Hi Tamika, hi Ali (hi everyone)!

Thanks for sharing this. I'm happy to help out if I can. I will look over the document but agree that a Zoom call would probably be a productive/efficient way to get the creative juices flowing. I have some flexibility later this week, a little bit early next week (but Thanksgiving etc will intervene, as all childcare will cease).

Cheers,
Jamie

On Tue, Nov 17, 2020 at 5:25 PM Alison Peel <[redacted] (b) (6)> wrote:

Thanks Raina and Olivier,

Can you suggest a day (or couple of options) when a zoom meeting might be possible with your current schedule? Hopefully we can find a time that works for all/most

As Tamika mentioned, I think one of the main components that we'd like to seek input on is the best spatiotemporal analytical approaches, and I sense that this might be productive as a discussion rather than back and forth via emails. It would be great to lock in a time sooner than later, even if it is after your busy period.

Thanks!

Ali

On Wed, 18 Nov 2020 at 09:41, Plowright, Raina <[redacted] (b) (6)> wrote:

Thanks Tamika,

So appreciate this collaborative approach to this paper. I will dig into this after a short delay to get through the final week of teaching/grading/exam writing...

raina

On Nov 17, 2020, at 1:57 AM, Olivier Restif <[REDACTED] (b) (6)> wrote:

Thanks Tamika and well done for taking the lead. I'll send you some comments next week.

Best wishes,

Olivier

On 17 Nov 2020, at 08:48, Tamika Lunn <[REDACTED] (b) (6)> wrote:

Hi all,

I'm emailing with an update on the spatio-temporal Hendra virus manuscript. I've taken on lead author of this paper again, but building predominantly from initial ideas and analyses developed by Ali, and code from both Wyatt and Ali.

I wanted to reach out to invite your feedback on these initial analyses and plans. In particular, we've come up with some ideas for formal analyses, but I would love to have a collective discussion about the best approach, and what other ideas people have. It would also be great to hear people's thoughts on what we've included to try and differentiate this paper from Field et al 2015, and whether there is anything else people would like to see in the paper (or not see in the paper).

A reminder that this is intended to be an inclusive paper that recognizes the broad contributions from many people to these data and the CNH/PREEMPT data. Its primary aim is to create a foundation that introduces the study and the dataset, upon which to base other associated papers from CNH/PREEMPT.

So, what I've attached is:

An initial paper plan that outlines 1) a possible introduction structure, 2) our methods, 3) ideas for formal analyses, and 4) possible key take-away results and proposed main figures/tables.

An RMarkdown with all of our data visuals so far. This contains a lot of information so don't feel that you need to look through this thoroughly.

I've also started a google doc ([link here](#)) reviewing 'what we think we know about Hendra dynamics and spillover risk'. I was initially thinking this could be an SI for this paper, but Ali has suggested that it could be useful being worked into a separate manuscript. Please feel free to add to this (or use it if it's a useful reference point!)

I'm on a tight deadline for my thesis, so it would be great to hear back from people by the middle to end of next week (~25th-27th November). If people are interested/free I could schedule a zoom for this time to discuss ideas, otherwise I'd be happy for comments via email! Please also let me know if there is anyone key that I've missed from this initial email.

Thanks in advance!

Tamika

<20201112_HeV structural plan.docx><PREEMPT-data-checking_V6.html>

--

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

Phone: (b) (6)

<https://www.eeb.ucla.edu/Faculty/lloydsmith/>

Office: 4135 Terasaki Life Sciences Building

Lab: 4000 Terasaki Life Sciences Building

<Ct distribution by month_landscape.pdf>

From: Plowright, Raina
Sent: Thu, 12 Nov 2020 20:34:38 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Cc: (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]
Subject: Re: Additional samples for isolation - VTM samples of AVL HeV-positives

Count me in on the site visit! Have to have some things to look forward to. 296 cases in our county today and many of my students sick or in quarantine.

Sent from my iPhone

On Nov 12, 2020, at 8:01 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Hi Ali,

Yes we would be very interested. Even though the pandemic puts a bit of a snag in some of the work, we maintain both dedicated as well as very interested in continuing the work. This would actually continue even after CNH or PREEMPT. From our end we would still be able to do screening while covering this from other funding streams.

Montana is pretty crazy right now, and we have the first cases at RML (but fortunately not in my lab_), however the work is impacted with some of my people out being quarantined (being a contact of a positive case) or having to deal with home situations (Trent, as his wife is one of the local hospital techs and the children are now home from daycare).

My estimate is maybe another 4-5 months of these challenging conditions and then hopefully large-scale access to several vaccine and return to normalcy. And hopefully then a site visit with Kwe and Trent to Oz!

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Alison Peel <(b) (6)>
Sent: Wednesday, November 11, 2020 9:10 PM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: Raina Plowright <(b) (6)>
Subject: Additional samples for isolation - VTM samples of AVL HeV-positives

Hi Vincent,

In the next shipment, I'm wondering if you'd be interested in me shipping ~100 VTM samples that are matched aliquots of samples that are HeV-positive in AVL? i.e. this would give you ~100 additional HeV-positive samples to attempt virus isolation from? Some of them have Cts in the low 20's. This is up to you - I know you and your team are exceptionally busy, so if you don't have capacity for this many isolation attempts, that's fine - just thought I'd offer as I know how keen you are on the isolation work and this batch would presumably have a higher success rate.

One caveat is that these are all the last aliquot from those specific individuals/sheets, so I'd need to ask that extracts from those samples (either from the AVL or VTM aliquot) are returned at the same time as the extracted RNA plates for all the other samples (as we've previously agreed).

If you'd like me to include these samples in the next shipment, let me know and I'll update the MTA and resend to Jeffrey. If we are to ship before Christmas, we'll need to hear back from Jeffrey within the next few days. I haven't had a response from him in many months, so I am unsure whether he is receiving my emails.

Thanks
Ali

From: Plowright, Raina
Sent: Mon, 9 Nov 2020 21:04:31 +0000
To: Ursula Hofer
Cc: Munster, Vincent (NIH/NIAID) [E]; Ashley York
Subject: Re: Bat coronavirus review enquiry

Thanks Ursula,
We will send the proposal to Ashley York.
I do have some exciting primary research on bat virus spillover that could be suitable for Nature.
I will send you a separate email about this within a couple of weeks.
Raina

On Nov 9, 2020, at 1:47 PM, Ursula Hofer <Ursula.Hofer1@nature.com> wrote:

Dear Raina and Vincent,

Thanks very much for getting in touch! We'd need a bit more information about the scope of the article you have in mind. I've attached our synopsis template as guidance.

I've cc'd my colleague Ashley York, who is acting Chief Editor at Nature Reviews Microbiology at the moment. I'm 'on loan' for the next couple months at Nature to help with the flood of coronavirus papers. Ashley will be in touch about your review proposal. If you have any exciting primary research that might be suitable for Nature, please let me know.

Best wishes,
Ursula

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: 09 November 2020 20:19
To: Ursula Hofer <Ursula.Hofer1@nature.com>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Bat coronavirus review enquiry

Dear Ursula,

I hope you don't mind us reaching out to you directly; we hope for quick feedback on whether nrmicro is a good fit for a comprehensive review on bat interactions with coronaviruses.

Vincent and I lead a large transdisciplinary team of scientists studying bat viruses, including coronaviruses and henipaviruses. Our group has worked on the role of bats in pathogen spillover for over 15 years and we work across fields as diverse as evolution of coronaviruses in bats, bat immune responses to coronaviruses,

and ecological dynamics of coronaviruses in wild bat populations. We have conducted experiments with coronaviruses in live bats and bat cell-lines, we have large-scale field surveys of coronaviruses in bats, and we have modeling studies of the dynamics of coronaviruses in bats. To our knowledge, we are the only transdisciplinary effort to understand coronavirus spillover from bats at scales from landscapes to molecules.

We assembled our teams to write a definitive review on bats and their interactions with emergent coronaviruses. We have developed text, figures, and tables to summarize the state of knowledge of bats as coronavirus reservoirs, covering multiple scales from viral evolution, receptors, tissue tropism, immunology, epidemiology, landscape ecology, and spillover to humans.

Authors include: Vincent Munster (virology; NIAD/NIH), Colin Parris (virology; Cornell), Jamie-Lloyd Smith (epidemiology & cross-species transmission; UCLA), Peter J Hudson (disease ecology; Penn State), Emily Gurley (human-bat interface; Johns Hopkins), Olivier Restif (disease dynamics; Cambridge), Tony Schountz (bat immunology, CSU), Raina K. Plowright (bat virus dynamics & spillover; Montana State).

Please let us know if you are interested in this review for Nature Reviews Microbiology.

Best,

Raina Plowright and Vincent Munster

Raina Plowright BVSc MSc PhD

Associate Professor,
Department of Microbiology and Immunology
Montana State University,
109 Lewis Hall, Bozeman, MT 59717, USA

E: [REDACTED] (b) (6)

W: + [REDACTED] (b) (6)

@rainamontana

www.batonehealth.org

www.bzndisceslab.org

-

<image002.jpg>

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<Synopsis template Review.doc>

From: Plowright, Raina
Sent: Tue, 3 Nov 2020 02:10:15 +0000
To: (b) (6) Munster, Vincent (NIH/NIAID) [E]
Subject: Re: MTAs - nothing back from Jeff

Yes, lets talk with Manuel and sort the priority list. I think it will be good to get the samples shipped to rml so that you don't have to worry about the sorting and shipping after your staff leave.

V, hope you are not seeing cases at RML. We have 2 students in quarantine in my lab. Faculty talking among themselves suggest very high numbers here (one colleague said that 35% of his class was either in isolation, quarantine, or had cOVID symptoms) but those numbers are not reflected in the county totals.

From: Alison Peel <(b) (6)>
Date: Monday, November 2, 2020 at 4:07 PM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: Plowright, Raina <(b) (6)>
Subject: Re: MTAs - nothing back from Jeff

Thanks Vincent,

Yep, we're all grateful that the Victorians shouldered 4 months of hard lockdown to get on top of the second wave. It was a massive sacrifice that has really benefited the rest of the country. It's hard to imagine what it was like, and similarly, very hard to fully imagine how things are for you all over there from this distance - so ongoing communication is really important to make sure we stay on the same page.

Your email is really helpful, thanks, and we can totally work with whatever is possible at your end - I think we all appreciate that all plans have gone out the window this year, so there is no judgement on my part on when it is feasible for samples to be tested and that your staff will need a break. That's totally understandable! Keeping the lines of communication open so we can continually revise our plans really helps though, so I appreciate your rapid response.

I think Raina understands the priorities from our end as well as MSU and with Bangladesh etc, so I'm happy for her to make a call on different testing/sample handling priorities.

or Raina, did you want to discuss further with myself and Manuel about how the HeV testing fits in with the other priorities?

Thanks!
Ali

On Tue, 3 Nov 2020 at 08:53, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:
Hi Ali,

I'm sorry that the MTAs have been such a hassle (from both ends). Not unexpected, but still a pain. I have high hopes that we will have the MTAs signed soon. It is good to realize that the current situation in the US is very challenging to work in. Especially MT has seen a surge in cases and we have seen several cases within LV.

It will be hard to make any prediction when sample analyses will be performed as there is quite the demand from Raina's group as well with regards to sample material to be shipped to Bozeman which is a big logistic operation which requires a lot of man hours. Typically we have always come through, but it would be good if you talk with Raina and discuss what the priorities between the two groups are, as my team's available time is very limited and they have been working on the pandemic over the last 10 months and likely require a break of some sort. Also in the case of known exposure I will lose these people for a minimum of 14 days, just to point out what challenging circumstances we are dealing with.

At least Oz is looking good in terms of COVID,

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Alison Peel <[REDACTED] (b) (6)>
Sent: Monday, November 2, 2020 3:30 PM
To: Munster, Vincent (NIH/NIAID) [E] [REDACTED] (b) (6); Raina Plowright <[REDACTED] (b) (6)>
Subject: MTAs - nothing back from Jeff

Hi Vincent,

I hope you're well and keeping your head above water! I understand that Jeff is busy too and this would be the reason that I'm not getting anything back from him that acknowledges he's received my emails about MTAs or any indication of what time frame to expect for turnaround.

The new MTAs in question are for samples we're hoping to ship this month (we had been planning for mid-Nov), and also modifications to existing MTAs that would allow you to isolate from existing samples.

If the new MTAs are delayed and we ship later than mid-November, it's likely that the results won't be through in time for Tamika's PhD, which she will be submitting in mid-January. I suspect I have zero power to do anything about it, but it would be really helpful to get some feedback about what timeline is likely so that she can plan accordingly.

Are you able to help push this along or at least get an indication of timing from Jeff?

Thanks
Ali

From: Schountz, Tony
Sent: Fri, 30 Oct 2020 16:31:17 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: AstraZenaca vaccine

Yes, we'd like to do rechallenge studies, and a lot more. The big issue is money to do it all. I sent an NIH proposal in a couple of weeks ago, but I won't hear anything about it until March. I've heard the study sections are favoring therapeutic and vaccine studies, so that will be a negative for us.

We've now moved into our new building (Center for Vector-borne Infectious Diseases) and it's pretty sweet. I have 3 dedicated bat infection rooms (BSL-2). :)

T.

—
Tony Schountz, PhD
Associate Professor
Center for Vector-borne Infectious Diseases
Department of Microbiology, Immunology and Pathology
College of Veterinary Medicine
Colorado State University
3185 Rampart Road, Bldg T
Fort Collins, CO 80523-1692

(b) (6)
(b) (6)

On Oct 30, 2020, at 10:27 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Cool, would be fun to do some field work around the mink farms

Here mostly vaccines and transmission, some human stuff as well. You should do a re-challenge study to see whether day are protected if they survive

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Schountz, Tony <(b) (6)>
Sent: Friday, October 30, 2020 10:17 AM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Subject: Re: AstraZenaca vaccine

I knew you were involved in early testing, which is the main reason I contacted you. :)

We've tested two other peromyscine species and one *P. californicus* developed severe disease and had to be euthanized. We're starting a follow-up study next week with a larger number of them. Trying to get some marsh rice rats and desert woodrats for susceptibility testing - pretty sure woodrats will be susceptible and maybe the rice rats. I tried to pull together a field trip to the two mink farms in Utah to see if the virus had made its way into rodents, but I couldn't get all the permits and approvals in place in time. Trapping season is probably ending in the next week or two. It wouldn't surprise me if the virus has made it into deer mice or other rodents on those farms.

Thanks,

T.

—

Tony Schountz, PhD
Associate Professor
Center for Vector-borne Infectious Diseases
Department of Microbiology, Immunology and Pathology
College of Veterinary Medicine
Colorado State University
3185 Rampart Road, Bldg T
Fort Collins, CO 80523-1692

(b) (6)

(b) (6)

On Oct 30, 2020, at 10:10 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Yes this one looks good:

<https://www.sciencedirect.com/science/article/pii/S0140673620316044>

<https://www.nature.com/articles/s41586-020-2608-y>

I would take it

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Schountz, Tony <(b) (6)>

Sent: Friday, October 30, 2020 8:35 AM

To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>

Subject: AstraZeneca vaccine

Vinnie, I have an opportunity to get the AstraZeneca vaccine as part of the trial. Have you had it? If not, would you take it?

Thanks,

T.

—

Tony Schountz, PhD
Associate Professor
Center for Vector-borne Infectious Diseases
Department of Microbiology, Immunology and Pathology
College of Veterinary Medicine
Colorado State University
3185 Rampart Road, Bldg T
Fort Collins, CO 80523-1692

(b) (6)

(b) (6)

From: Plowright, Raina
Sent: Mon, 26 Oct 2020 22:20:30 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Cc: Manuel Ruiz; Clif McKee
Subject: Re: Ecology and Evolution of Coronaviruses: Implications for Human Health

thats great to know. I've added Manuel and Clif here so they can think about this for any 'left-overs' from the review. We should know in the next couple of weeks if there are chunks of the review that have no home.

As for the cold..... brrrrrr.....

On Oct 26, 2020, at 4:16 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Yes, more than happy to take anything between review, white paper, limited data etc,

How is the cold treating you?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: Friday, October 23, 2020 6:43 PM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Fwd: Ecology and Evolution of Coronaviruses: Implications for Human Health

this from you?

We can discuss — an abridged and modified version of some part of the review?

Begin forwarded message:

From: "Seth Judson (Via FrontiersIn)" <[REDACTED]> (b) (6)
Subject: Ecology and Evolution of Coronaviruses: Implications for Human Health
Date: October 23, 2020 at 12:13:53 PM MDT
To: "Raina Plowright" <[REDACTED]> (b) (6)
Reply-To: "Seth Judson" <[REDACTED]> (b) (6)

<image001.jpg>

Dear Dr Plowright,

We would appreciate your consideration of submitting an article to a new journal topic focusing on the ecology and evolution of coronaviruses with specific implications for human health. We hope to further bridge the gap between ecology and evolutionary studies about coronaviruses to understand direct implications for health, and we have identified you as an expert in this field. We aim to assemble a diverse, interdisciplinary group of articles which will be published across multiple journals (Frontiers in Public Health, Frontiers in Medicine, and Frontiers in Ecology and Evolution). We greatly appreciate your expertise and consideration. Sincerely, Seth Judson MD, University of Washington Vincent Munster PhD, National Institutes of Health

[Frontiers in Public Health](#) has launched a new Research Topic, [Ecology and Evolution of Coronaviruses: Implications for Human Health](#). As a leading expert in your field, we would like you to participate by submitting your research.

This is a great opportunity to have your research published in Frontiers in Public Health, a leading multi-disciplinary journal. With an Impact Factor of 2.483 and CiteScore of 2.0, it aims to overcome fragmentation in research and to meet the fast-moving challenges of public health in the 21st century.

Topic Editors

[<image002.jpg>](#) **Vincent Munster**
National Institutes of
Health (NIH)
Bethesda, United
States

[<image002.jpg>](#) **Seth Judson**
University of
Washington Seattle,
United States

[Visit the homepage for this Research Topic](#) for a full description of the project.

[Yes, I want to participate](#)

Help to make this collection even more successful by alerting other experts in the field who could submit their own article. Simply copy and send the following link to your colleagues:

<https://www.frontiersin.org/research-topics/16973/ecology-and-evolution-of-coronaviruses-implications-for-human-health/participate-in-open-access-research-topic?affilateid=8e406879-f87d-4ab8-bdc8-47200098ff91>

The submission deadline for this Research Topic is 11 June 2021

Click here to let us know if you [don't wish to participate this time](#).

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I look forward to your response.

Kind Regards,

Seth Judson

Topic Editor,

Infectious Diseases – Surveillance, Prevention and Treatment Section,
Frontiers in Public Health

On behalf of the Topic Editors.

Note for all authors: Please check the list of contributing journals/sections at the [homepage](#) and choose the most relevant section for your submission. All contributions to this Research Topic must be within the scope of the section and journal to which they are submitted.

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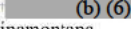
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Raina Plowright BVSc MSc PhD

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W:  (b) (6)

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www.batonehealth.org

www.bzndiseaseab.org



From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 26 Oct 2020 22:16:20 +0000
To: Plowright, Raina
Subject: RE: Ecology and Evolution of Coronaviruses: Implications for Human Health

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Chief Virus Ecology Section
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NIAID/NIH

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To: "Raina Plowright" <[REDACTED]> (b) (6)
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Seth Judson

University of Washington
Seattle, United States

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Seth Judson

Topic Editor,

Infectious Diseases – Surveillance, Prevention and Treatment Section,

Frontiers in Public Health

On behalf of the Topic Editors.

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From: Plowright, Raina
Sent: Thu, 22 Oct 2020 21:15:38 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: RML Enews: Beyond Fauci: Meet the Science Superheroes Leading the U.S. COVID-19 Response

AWESOME! Great to see you getting some well-deserved recognition!

On Oct 22, 2020, at 3:13 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Thought you might like this one

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Pekoc, Ken (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Sent: Thursday, October 22, 2020 2:53 PM
To: NIAID RML Users <rmlusers@niaid.nih.gov>
Subject: RML Enews: Beyond Fauci: Meet the Science Superheroes Leading the U.S. COVID-19 Response

FYI, this article mentions Dr. Vincent Munster.

[Beyond Fauci: Meet the Science Superheroes Leading the U.S. COVID-19 Response](#)

BY: SARAH LARCKER

10/21/2020

[MediFind](#)

The COVID-19 pandemic has been a world-changing event, forcing all of us to spend a lot of time thinking about change. More than ever, we're inquiring about how diseases evolve, how new treatments and procedures are developed and adopted, and how up-and-coming experts are bringing new ideas and new ways of thinking to the medical landscape. We know that 2020 has brought a lot of new changes and concepts to the forefront of life. Words like quarantine and social distancing are part of our everyday lexicon as we

learn to live in the 'new normal.' And one of the most important lessons we have learned is that there are heroes among us. From teachers and nurses to delivery and retail workers, our citizens have stepped up to support the effort.

Given that it's [ID Week](#), we'd like to highlight and honor a few of these heroes that surprisingly few know about – the scientists who are leading the charge against [COVID-19](#).

Ralph Steven Baric, PhD

The Baric Laboratory at UNC in Chapel Hill, NC

<image001.png>

Dr. Baric has been at the forefront of coronavirus research for over 30 years, and is currently the William R. Kenan, Jr. Distinguished Professor in the Department of Epidemiology and Professor in the Department of Microbiology and Immunology at UNC-Chapel Hill. His passion for this previously obscure virus stems from his concern about the coronavirus' ability to rapidly spread and its ability to jump across species. The global dangers present in coronavirus strains were an early warning sign to Dr. Baric, causing him to sound prophetic alarms before the events of late 2019 unfolded. Back in 2002, he predicted the [severe acute respiratory syndrome \(SARS\)](#) outbreak and in 2018, he was already discussing the potential for our current pandemic originating from bats.

Dr. Baric is currently developing antiviral treatments for patients and researching how the virus is replicating and spreading.

Timothy Sheahan, PhD

The Baric Laboratory at UNC in Chapel Hill, NC

<image002.png>

“With the development of broad-spectrum antiviral strategies, we are not only working to address SARS-CoV-2 and COVID-19 but also those in the future...COVID-28!”

– Timothy Sheahan, PhD

Dr. Sheahan is an assistant professor in the Department of Epidemiology at the University of North Carolina at Chapel Hill’s Gillings School of Global Public Health. He is currently working on better understanding how viruses jump to humans, developing new models to study how emerging viruses cause disease and identifying drugs, antibodies and vaccines for the emerging viruses.

Linda Saif, PhD

The Saif Laboratory at Ohio State University in Wooster, OH

<image003.png>

“The real unsung Superheroes of the COVID-19 pandemic are the frontline health care workers and first responders, some of whom have given their own lives in trying to save the lives of COVID-19 patients. We owe them our deepest and enduring gratitude. Masks on to them!”

– Dr. Linda Saif PhD

Dr. Saif is the distinguished university professor at The Ohio State University (OSU) in the Food Animal Health Research Program (CFAES, OARDC) and the Veterinary Preventive Medicine Department (CVM, OSU). She has been researching coronaviruses, immunity and vaccines for over 40 years and is recognized internationally as an expert on enteric viruses (rotaviruses, caliciviruses and coronaviruses) that affect food-producing animals, wildlife, and humans.

In 1995, Dr. Saif’s lab was the first to document the interspecies transmission of coronaviruses from wild ruminants to cattle and from cattle to poultry. Dr.

Saif holds 5 US/foreign patents and has authored or coauthored over 390 journal publications and 77 book chapters.

Vincent Jacobus Munster, PhD

Rocky Mountain Laboratories at NIH in Hamilton,
MT

<image004.png>

Dr. Munster is the Senior Investigator for the Virus Ecology Unit of The National Institute of Allergy and Infectious Diseases (NIAID). Dr. Munster established the Virus Ecology Unit in 2013 with the intention of combining field-acquired data and experimental lab work in a unilateral approach to identify the underlying changes in virus-host ecology that allow emerging viral pathogens to cross the species barrier. His lab leverages the data collected from Africa (the Republic of the Congo, Mali), the Caribbean (Trinidad and Tobago), and the Middle East (Jordan) and partners it with state-of-the-art high and maximum containment facilities to best leverage and investigate the data. His recent work produced much of our current understanding on the transmission and surface persistence of coronavirus.

Currently Dr. Munster is conducting pre-human research on the Oxford SARS-CoV-2 vaccine.

Stanley Perlman, MD, PhD

The Perlman Laboratory at University of Iowa in Iowa
City, IA

<image005.png>

Dr. Perlman is a professor of microbiology and immunology, professor of pediatrics and the Mark Stinski Chair in Virology at the University of Iowa. For over 35 years he has been studying coronaviruses and has been interested in

the pathogenesis of murine (mouse) coronavirus infections. He and his lab have developed reverse genetics system for introducing mutations into the murine coronavirus, SARS-CoV, SARS-CoV-2, and MERS-CoV genomes with the ultimate goal of to understanding the interplay of pro- and anti-inflammatory factors that result in myelin and lung destruction. He often is looked to for insights into the overall landscape and impact of coronavirus epidemics and responses.

Currently Dr. Perlman is conducting research using mice infected with murine-adapted strains of SARS-CoV and SARS-CoV-2 to understand the basis of these severe diseases.

James Earl Crowe Jr., MD

The Crowe Laboratory at Vanderbilt University in Nashville, TN

<image006.png>

“Our team of human immunology and antibody engineering experts is passionate about bringing advances in antibody therapeutics to bear on the world burden of infectious diseases.”

– Dr. James Earl Crowe Jr. MD

Dr. Crowe is the Director of the Vanderbilt Vaccine Center, Professor of Pediatrics and Pathology, Microbiology and Immunology and the Ann Scott Carell Chair at Vanderbilt University Medical Center. Additionally, He is the Founder of IDBiologics, Inc., an early stage biotech company developing human monoclonal antibodies for infectious diseases. His work focuses on viral immunology and antibody sciences, attempting to discover mechanisms of immunity important to developing new therapeutics and vaccines.

Currently Dr. Crowe is conducting research for vaccine and monoclonal antibody development, and biotechnology for COVID-19.

Susan Weiss, PhD

The Weiss Laboratory at Perelman School of Medicine at the University of Pennsylvania in Philadelphia, PA

<image007.png>

Dr. Weiss is a Professor and Vice Chair for the Department of Microbiology and Co-Director, Penn Center for Research on Coronaviruses and Other Emerging Pathogens. She has been focusing on coronaviruses since the 1980's, primarily exploring the emerging pathogens that cause [severe acute respiratory syndrome \(SARS\)](#), [Middle East respiratory syndrome \(MERS\)](#), as well as human coronavirus OC43 and human coronavirus 229E.

Currently Dr. Weiss is conducting research utilizing reverse genetics helps to understand the spread of coronaviruses.

Jennifer Nuzzo, DrPH, SM

Bloomberg School of Public Health at Johns Hopkins University in Baltimore, MD

<image008.png>

Dr. Nuzzo is a Senior Scholar at the Johns Hopkins Center for Health Security and an Associate Professor in the Department of Environmental Health and Engineering and the Department of Epidemiology at the Johns Hopkins Bloomberg School of Public Health. She focuses on outbreak detection and response, health systems as they relate to global health security, international and domestic biosurveillance, and infectious disease diagnostics.

Currently, Dr. Nuzzo is working on the U.S. response to COVID-19.

Dimiter Stanchev Dimitrov, PhD

Center for Antibody Therapeutics (CAT) at University of Pittsburgh School of Medicine in Pittsburgh, PA

<image009.png>

Dr. Dimitrov is senior author of the Cell publication and director of Pitt's Center for Antibody Therapeutics, was one of the first to discover neutralizing antibodies for the original SARS coronavirus in 2003. In the ensuing years, his team discovered potent antibodies against many other infectious diseases, including those caused by MERS-CoV, dengue, Hendra and Nipah viruses. The antibody against Hendra and Nipah viruses has been evaluated in humans and approved for clinical use on a compassionate basis in Australia.

Recently Dr. Dimitrov's lab isolated the smallest biological molecule to date that completely and specifically neutralizes the SARS-CoV-2 virus, which is the cause of COVID-19.

Florian Krammer, PhD

The Krammer Laboratory at the Icahn School of Medicine at Mount Sinai in New York, NY

<image011.jpg>

Dr. Krammer is a Professor of Vaccinology at the Department of Microbiology at the Icahn School of Medicine at Mount Sinai and a member of the Vaccine and Edward Jenner Society Young Investigator Program. In addition, he is a scientific adviser for enGenes and PathSensors. The Krammer Laboratory – which is also part of the NIH-funded Centers for Excellence in Influenza Research and Surveillance (CEIRS) – focuses on understanding broadly-reactive immune responses against the surface glycoproteins of RNA viruses such as influenza, with the goal to develop better vaccines and novel therapeutics.

The Krammer Laboratory is currently working to provide reagents and standardized protocols for COVID-19 testing.

Behind the List:

MediFind is the industry authority on identifying the leading medical experts and latest research in order to help patients facing the most complex and challenging diseases make better health decisions. Leveraging our expertise in natural language processing and machine learning, we applied our world-class models to uncover the researchers leading the United States' response to [COVID-19](#). MediFind identifies leading experts using [world-class models](#) that assess over 2.5 million global doctors based on a range of variables, including research leadership, patient volume, peer standing, and connectedness to other experts. To learn more about MediFind and how it works, visit [MediFind.com](#)

This report serves as a companion piece to a [recently published analysis](#) from MediFind which found:

1. Research into COVID-19 and closely-related conditions now represents 23% of all research output
2. Research into nearly every other condition is down, with particularly steep declines in cancer and infectious disease research.

This “crowding-out effect” has serious potential long-term ramifications. Medical research is a cumulative process, and typically, there’s a significant time lag between most research and improvements in patient outcomes. Consequently, the diversion of resources to COVID-19 will almost certainly lead to a long-term slowdown in advances for these conditions. Additional coverage of these findings was featured in a series on [Contagion Live](#).

Raina Plowright BVSc MSc PhD

Associate Professor,
Department of Microbiology and Immunology
Montana State University,
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@rainamontana

www.batonehealth.org

www.bzndiseaseab.org



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Subject: RML Enews: Beyond Fauci: Meet the Science Superheroes Leading the U.S. COVID-19 Response

FYI, this article mentions Dr. Vincent Munster.

[Beyond Fauci: Meet the Science Superheroes Leading the U.S. COVID-19 Response](#)

BY: SARAH LARCKER

10/21/2020

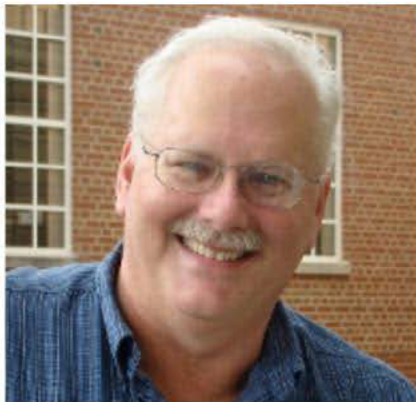
[MediFind](#)

The COVID-19 pandemic has been a world-changing event, forcing all of us to spend a lot of time thinking about change. More than ever, we're inquiring about how diseases evolve, how new treatments and procedures are developed and adopted, and how up-and-coming experts are bringing new ideas and new ways of thinking to the medical landscape. We know that 2020 has brought a lot of new changes and concepts to the forefront of life. Words like quarantine and social distancing are part of our everyday lexicon as we learn to live in the 'new normal.' And one of the most important lessons we have learned is that there are heroes among us. From teachers and nurses to delivery and retail workers, our citizens have stepped up to support the effort.

Given that it's [ID Week](#), we'd like to highlight and honor a few of these heroes that surprisingly few know about – the scientists who are leading the charge against [COVID-19](#).

Ralph Steven Baric, PhD

The Baric Laboratory at UNC in Chapel Hill, NC



Dr. Baric has been at the forefront of coronavirus research for over 30 years, and is currently the William R. Kenan, Jr. Distinguished Professor in the Department of Epidemiology and Professor in the Department of Microbiology and Immunology at UNC-Chapel Hill. His passion for this previously obscure virus stems from his concern about the coronavirus' ability to rapidly spread and its ability to jump across species. The global dangers present in coronavirus strains were an early warning sign to Dr. Baric, causing him to sound prophetic alarms before the events of late 2019 unfolded. Back in 2002, he predicted the [severe acute respiratory syndrome \(SARS\)](#) outbreak and in 2018, he was already discussing the potential for our current pandemic originating from bats.

Dr. Baric is currently developing antiviral treatments for patients and researching how the virus is replicating and spreading.

Timothy Sheahan, PhD

The Baric Laboratory at UNC in Chapel Hill, NC



“With the development of broad-spectrum antiviral strategies, we are not only working to address SARS-CoV-2 and COVID-19 but also those in the future...COVID-28!”

– Timothy Sheahan, PhD

Dr. Sheahan is an assistant professor in the Department of Epidemiology at the University of North Carolina at Chapel Hill’s Gillings School of Global Public Health. He is currently working on better understanding how viruses jump to humans, developing new models to study how emerging viruses cause disease and identifying drugs, antibodies and vaccines for the emerging viruses.

Linda Saif, PhD

The Saif Laboratory at Ohio State University in
Wooster, OH



“The real unsung Superheroes of the COVID-19 pandemic are the frontline health care workers and first responders, some of whom have given their own lives in trying to save the lives of COVID-19 patients. We owe them our deepest and enduring gratitude. Masks on to them!”

– Dr. Linda Saif PhD

Dr. Saif is the distinguished university professor at The Ohio State University (OSU) in the Food Animal Health Research Program (CFAES, OARDC) and the Veterinary Preventive Medicine Department (CVM, OSU). She has been researching coronaviruses, immunity and vaccines for over 40 years and is recognized internationally as an expert on enteric viruses (rotaviruses, caliciviruses and coronaviruses) that affect food-producing animals, wildlife, and humans.

In 1995, Dr. Saif’s lab was the first to document the interspecies transmission of coronaviruses from wild ruminants to cattle and from cattle to poultry. Dr. Saif holds 5 US/foreign patents and has authored or coauthored over 390 journal publications and 77 book chapters.

Vincent Jacobus Munster, PhD

Rocky Mountain Laboratories at NIH in Hamilton,
MT



Dr. Munster is the Senior Investigator for the Virus Ecology Unit of The National Institute of Allergy and Infectious Diseases (NIAID). Dr. Munster established the Virus Ecology Unit in 2013 with the intention of combining field-acquired data and experimental lab work in a unilateral approach to identify the underlying changes in virus-host ecology that allow emerging viral pathogens to cross the species barrier. His lab leverages the data collected from Africa (the Republic of the Congo, Mali), the Caribbean (Trinidad and Tobago), and the Middle East (Jordan) and partners it with state-of-the-art high and maximum containment facilities to best leverage and investigate the data. His recent work produced much of our current understanding on the transmission and surface persistence of coronavirus.

Currently Dr. Munster is conducting pre-human research on the Oxford SARS-CoV-2 vaccine.

Stanley Perlman, MD, PhD

The Perlman Laboratory at University of Iowa in Iowa City, IA



Dr. Perlman is a professor of microbiology and immunology, professor of pediatrics and the Mark Stinski Chair in Virology at the University of Iowa. For over 35 years he has been studying coronaviruses and has been interested in the pathogenesis of murine (mouse) coronavirus infections. He and his lab have developed reverse genetics system for introducing mutations into the murine coronavirus, SARS-CoV, SARS-CoV-2, and MERS-CoV genomes with the ultimate goal of to understanding the interplay of pro- and anti-inflammatory factors that result in myelin and lung destruction. He often is looked to for insights into the overall landscape and impact of coronavirus epidemics and responses.

Currently Dr. Perlman is conducting research using mice infected with murine-adapted strains of SARS-CoV and SARS-CoV-2 to understand the basis of these severe diseases.

James Earl Crowe Jr., MD

The Crowe Laboratory at Vanderbilt University in
Nashville, TN



“Our team of human immunology and antibody engineering experts is passionate about bringing advances in antibody therapeutics to bear on the world burden of infectious diseases.”

– Dr. James Earl Crowe Jr. MD

Dr. Crowe is the Director of the Vanderbilt Vaccine Center, Professor of Pediatrics and Pathology, Microbiology and Immunology and the Ann Scott Carell Chair at Vanderbilt University Medical Center. Additionally, He is the Founder of IDBiologics, Inc., an early stage biotech company developing human monoclonal antibodies for infectious diseases. His work focuses on viral immunology and antibody sciences, attempting to discover mechanisms of immunity important to developing new therapeutics and vaccines.

Currently Dr. Crowe is conducting research for vaccine and monoclonal antibody development, and biotechnology for COVID-19.

Susan Weiss, PhD

The Weiss Laboratory at Perelman School of
Medicine at the University of Pennsylvania in
Philadelphia, PA



Dr. Weiss is a Professor and Vice Chair for the Department of Microbiology and Co-Director, Penn Center for Research on Coronaviruses and Other Emerging Pathogens. She has been focusing on coronaviruses since the 1980's, primarily exploring the emerging pathogens that cause [severe acute respiratory syndrome \(SARS\)](#), [Middle East respiratory syndrome \(MERS\)](#), as well as human coronavirus OC43 and human coronavirus 229E.

Currently Dr. Weiss is conducting research utilizing reverse genetics helps to understand the spread of coronaviruses.

Jennifer Nuzzo, DrPH, SM

Bloomberg School of Public Health at Johns Hopkins
University in Baltimore, MD

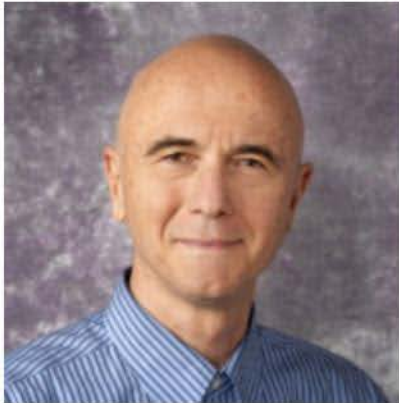


Dr. Nuzzo is a Senior Scholar at the Johns Hopkins Center for Health Security and an Associate Professor in the Department of Environmental Health and Engineering and the Department of Epidemiology at the Johns Hopkins Bloomberg School of Public Health. She focuses on outbreak detection and response, health systems as they relate to global health security, international and domestic biosurveillance, and infectious disease diagnostics.

Currently, Dr. Nuzzo is working on the U.S. response to COVID-19.

Dimiter Stanchev Dimitrov, PhD

Center for Antibody Therapeutics (CAT) at University of Pittsburgh School of Medicine in Pittsburgh, PA



Dr. Dimitrov is senior author of the Cell publication and director of Pitt's Center for Antibody Therapeutics, was one of the first to discover neutralizing antibodies for the original SARS coronavirus in 2003. In the ensuing years, his team discovered potent antibodies against many other infectious diseases, including those caused by MERS-CoV, dengue, Hendra and Nipah viruses. The antibody against Hendra and Nipah viruses has been evaluated in humans and approved for clinical use on a compassionate basis in Australia.

Recently Dr. Dimitrov's lab isolated the smallest biological molecule to date that completely and specifically neutralizes the SARS-CoV-2 virus, which is the cause of COVID-19.

Florian Krammer, PhD

The Krammer Laboratory at the Icahn School of Medicine at Mount Sinai in New York, NY



Dr. Krammer is a Professor of Vaccinology at the Department of Microbiology at the Icahn School of Medicine at Mount Sinai and a member of the Vaccine and Edward Jenner Society Young Investigator Program. In addition, he is a scientific adviser for enGenes and PathSensors. The Krammer Laboratory – which is also part of the NIH-funded Centers for Excellence in Influenza Research and Surveillance (CEIRS) – focuses on understanding broadly-reactive immune responses against the surface glycoproteins of RNA viruses such as influenza, with the goal to develop better vaccines and novel therapeutics.

The Krammer Laboratory is currently working to provide reagents and standardized protocols for COVID-19 testing.

Behind the List:

MediFind is the industry authority on identifying the leading medical experts and latest research in order to help patients facing the most complex and challenging diseases make better health decisions. Leveraging our expertise in natural language processing and machine learning, we applied our world-class models to uncover the researchers leading the United States' response

to [COVID-19](#). MediFind identifies leading experts using [world-class models](#) that assess over 2.5 million global doctors based on a range of variables, including research leadership, patient volume, peer standing, and connectedness to other experts. To learn more about MediFind and how it works, visit [MediFind.com](#)

This report serves as a companion piece to a [recently published analysis](#) from MediFind which found:

1. Research into COVID-19 and closely-related conditions now represents 23% of all research output
2. Research into nearly every other condition is down, with particularly steep declines in cancer and infectious disease research.

This “crowding-out effect” has serious potential long-term ramifications. Medical research is a cumulative process, and typically, there’s a significant time lag between most research and improvements in patient outcomes. Consequently, the diversion of resources to COVID-19 will almost certainly lead to a long-term slowdown in advances for these conditions. Additional coverage of these findings was featured in a series on [Contagion Live](#).

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 21 Oct 2020 19:49:40 +0000
To: Plowright, Raina; preempt
Subject: RE: final SOW approved

Great job Raine, awful lot of work and discussion went into this!

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: Wednesday, October 21, 2020 10:42 AM
To: preempt <[REDACTED]> (b) (6)
Subject: final SOW approved

Hello everyone,

We finally had our SOW approved yesterday. See attached for your records. It is now headed to DOI (Department of Interior) for approval (they take care of contracts and hand out the cash).

They still haven't given us a start date for Phase II.

Raina

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 19 Oct 2020 13:46:38 -0600
To: Broder, Chris (USU-DoD)
Subject: Re:

Thanks that's great to hear! I'm really happy she has a PI position now at Pullmann, WA.

Does mean I have positions to fill, so if you know any good candidates!

Hope all is well in DC,

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: "Broder, Christopher" <[REDACTED] (b) (6)>
Date: Monday, October 19, 2020 at 1:31 PM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Subject: <no subject>

hi Vincent,

hope all is well.
just wanted to tell you Stephanie gave an outstanding seminar
for us today to the dept and EID program..

cheers
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

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Lucille Washington
Administrative Officer

email - [REDACTED] (b) (6)
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fax - 301-295-3773

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From: Plowright, Raina
Sent: Fri, 16 Oct 2020 18:33:49 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Cc: (b) (6) Manuel Ruiz; Bushmaker, Trenton (NIH/NIAID) [E]; Kwe Claude, Yinda (NIH/NIAID) [F]; Liam Chirio; Mandy Todd
Subject: Re: Next sample shipment from Australia - November

Great Vincent. Thanks. When things are less busy we can brainstorm funding options for further work at RML or processing samples to exit RML.

Ali, do you have all the information you need for shipment?

Raina

On Oct 16, 2020, at 12:22 PM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Hi Raina,

That explanation was exactly what I was after. Go ahead and ship them and we'll find a place to store them.

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <(b) (6)>
Sent: Friday, October 16, 2020 11:49 AM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: (b) (6) Manuel Ruiz <(b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Liam Chirio <(b) (6)> Mandy Todd <(b) (6)>
Subject: Re: Next sample shipment from Australia - November

Hi Vincent,

We have had many conversations about how to move forward.

One challenge is that the students are selecting samples based on HeV status. So a big part of the shipment includes ALL samples from a catching session to ensure that when HeV screening is done, we can get the samples from positive bats and select appropriate samples from negative bats. Hence the large numbers. However, only a small proportion of those numbers need to be irradiated and sent to MSU — but selecting those samples isn't possible before screening for HeV.

So while we can consider 400 samples total, there would be many negative samples left over in storage. Do you have storage room for these samples? They may be incredibly valuable in the long term as more questions about bat immunity arise. In the long term we would have to figure out how to get them out of RML. If you have storage capacity, could we find future funding for a person to work on these samples at RML, or irradiate them and pass them to MSU?

Alternatively, we could hold back the serum in Australia and wait until you have screened urine for HeV, then just send the samples we need (this would cost an extra ~\$10K I estimate in labor and shipping, and require Ali employing someone but if that is the only option, it is what we must do).

As we triangulate on which methods are most likely to yield data, we can find ways to do those assay in Australia. We are still working out what assays are relevant and it is a lot of trial and error. We have an immunology tech who can do everything needed here. I can't see any way of doing this in Australia where we have no lab capacity. The PhD students were going to be in the field trying field-based cell-stimulation assays, but all travel was cancelled, so existing samples are all they have. That said, I'll talk to the Australian team about what could possibly be sent to commercial labs or collaborators once we know which assays work. We have been actively seeking out collaborators for immunology in Australia but their interests are more in reagent development than screening.

We fully recognize that this is a big ask. We are all very aware of the enormous time and effort that sample management and processing involves, and we greatly appreciate the work and effort by your team on this.

Raina

On Oct 15, 2020, at 8:15 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Hi Raina,

I'm absolutely fine with the first part of the email. However, I think it's a bit lost on your team that irradiation is not a standard procedure and is specifically designed for small batches of samples coming from the 4. There is a massive work and administrative load regarding irradiation of samples, so I don't really want 1200 serum samples where the only way we can use them is by having them irradiated.

So I would suggest selecting a manageable subset for these sera samples (e.g 400?) to prevent any disappointments and send these to RML?

Alternatively, look into options of shipping directly to MSU or having the work done in Oz.

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <(b) (6)>
Sent: Tuesday, October 13, 2020 2:54 PM
To: (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Manuel Ruiz <(b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>; Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Liam Chirio <(b) (6)> Mandy Todd <(b) (6)>
Subject: Re: Next sample shipment from Australia - November

Ahhh sorry this sat on my desktop for nearly another day. This email is after good conversations with Manuel and he is the one who understands these issues better than anyone else.

Vincent, if you have capacity to store samples, best to get samples from Australia to RML and then trickle them to MSU as you have capacity to process them. This is because Ali will not have the help or budgets for shipping after December.

If you do not have capacity to store the samples, we can plan another shipment next year. This would involve hiring and training a new person to do the sorting/packing/shipping and allocating phase II budget from another project to pay for this and the shipping. Not ideal, but it is doable and I understand this would be the only option if you have limited storage capacity.

Regarding samples from RML to MSU: These can trickle to MSU at a rate commensurate with your capacity to process them. We have a (consistently updated) lists of samples that is prioritized according to PhD students' needs. You know the issues with students and PhDs nearing the end etc. As always, if there is anything we can do on this end to help, please let us know. We are very grateful for the slog work involved in processing these samples and are keen to intellectually engage Trent and Kwe in as many of these projects as possible so that they can be on manuscripts and contributing to the science in ways other than the processing.

Raina

On Oct 13, 2020, at 7:19 AM, Plowright, Raina <(b) (6)> wrote:

Sorry I am sitting on an unsent email that should move this forward. Got left on desktop while meeting deadline late last night. Will send when kids out the door.

Sent from my iPad

On Oct 12, 2020, at 11:22 PM, Alison Peel <(b) (6)> wrote:

Hi Vincent,

Speaking for myself, and I think for everyone in this email chain, I do appreciate (as best I can) all the effort that goes into handling and processing these samples. Without being in the lab day by day, it's difficult to fully understand, but we do our best. I am hopeful that we can try and find a solution that works for everyone.

There are two potential components to the next shipment:

- 1) urine samples to be tested for henipavirus at RML (~2370), with subsequent sequencing and virus isolation.
- 2) various samples to be transferred to MSU because MSU's import permits do not allow direct shipment to them.

If you want to discuss your capacity to test that number of urine samples, then I'm happy to discuss that any time.

I am less involved in the second component, and if there are discussions that need to be had re: numbers of samples that will be shipped to MSU, then that needs to be with Raina and Manuel (and in turn with the students involved). If the numbers of samples (and therefore the time and financial costs for you) can be limited by awaiting results of the urine samples, then perhaps we need to consider two separate shipments (urine only in the first, then a more precise selection of samples in the second, based on the results from the urine testing). That would likely have implications for the students too, so perhaps that isn't feasible - Raina and Manuel can comment on that.

Either way, I'm very keen to move forward towards a solution and agreement so that we can prepare samples while we still have staff around to do so. What is your preference for moving this forward? Would a meeting to discuss help? Let us know what we can do to make this easier for you.

Cheers

Ali

On Tue, 13 Oct 2020 at 00:05, Munster, Vincent (NIH/NIAID) [E] (b) (6) wrote:
We'll have a look at it asap, just as a reminder that we do have samples coming in from different ends, e.g. a 8000 sample shipment from Bangladesh, I hope you guys do appreciate the tremendous effort it takes for organizing and storing these shipment let alone facilitating onward transport to MSU.

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Alison Peel <(b) (6)>

Sent: Sunday, October 11, 2020 6:34 PM

To: Manuel Ruiz <(b) (6)>

Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina
<[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Liam Chirio <[REDACTED] (b) (6)>
Mandy Todd <[REDACTED] (b) (6)>

Subject: Re: Next sample shipment from Australia - November

Hi Vincent, Manuel and Raina,

I just wanted to touch base again to see whether we have a good enough idea of the numbers that we can go ahead with submitting MTAs (or MTA amendments) to RML. Delays in shipping beyond mid-November are problematic from our end.

Thanks
Ali

On Tue, 6 Oct 2020 at 07:36, Manuel Ruiz <[REDACTED] (b) (6)> wrote:
Hi Vincent,

I will revise the numbers and lab capacity here. Those sample numbers are based on the experimental design considered in the projects, lab capacity, but also considering that for some bats we still don't have viral results, so we included those whole sessions to make sure that we won't miss potentially positive bats in future, since this may be the last shipment.

I will check all numbers and come up with a plan soon.

Cheers,
Manuel

Manuel Ruiz Aravena

Postdoctoral Researcher

Department of Microbiology and Immunology | Montana State University, USA

Mobile: [REDACTED] (b) (6)

<https://batonehealth.org/>

<image002.jpg>

<image001.jpg>

On Mon, Oct 5, 2020 at 12:33 PM Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:
Thanks Manuel

So the biggest problem is that we can't transfer samples without proper ensuring that they are inactivated (per our CDC permit). ~1200 would literally take months of time and effort of multiple

people irradiating samples so we need to find a solution for this (just as a reminder, irradiation is not a standard procedure and takes a massive amount of hands-on time prepping the samples and then we still can only do around ~60 per run).

Why don't you come-up with a plan of which samples you actually are truly able to test in the immune assays (unlikely to be the full 1200?). Then these should be packaged in an order that it will not take my people a lot of digging to localize the samples (as with some of the previous shipments).

In addition, even though the extraction by Dan and Caylee sounds labor-neutral, it isn't really. The samples need to be inactivated etc and they have to be escorted during their whole time at RML. That said, I'm all in favor for this but just wanted to make clear that nothing.

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Manuel Ruiz <(b) (6)>
Sent: Friday, October 2, 2020 11:43 AM
To: Munster, Vincent (NIH/NIAID) [E] (b) (6)
Cc: (b) (6) Bushmaker, Trenton (NIH/NIAID) [E] (b) (6); Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Plowright, Raina <(b) (6)> Liam Chirio <(b) (6)> Mandy Todd <(b) (6)>
Subject: Re: Next sample shipment from Australia - November

Hi Vincent,

I think I could help with the questions.

The serum samples are for immune assays that we have to run at MSU, for which we don't have capacity to do them in Australia.

The RNAP samples are blood samples collected in RNA-protect. For those samples Trent and Kwe have coordinated with Dan and Caylee about doing the RNA extractions at RML and then moving the RNA products to MSU.

This shipment involves a large number of samples since it might (hopefully) be the last shipment under the scope of PREEMPT. I am trying to work out a plan for a "supply chain" that we could implement to move samples from RML to MSU in a way that doesn't saturate your capacity but also can allow the students here to continue moving with their projects. For this, we have been in constant communication with Trent, which so far has worked great. Though, the sample movement plans may need to be updated to take into consideration any changes in capacities.

At this stage it might be good to know if you have the available space at RML to receive those sample numbers in the next shipment and store them while we can move them to MSU as availability allows. I think that as long as the samples could be in the US, then we could work out the plans to move them to MSU.

How does this sound?

Cheers,
Manuel

Manuel Ruiz Aravena

Postdoctoral Researcher

Department of Microbiology and Immunology | Montana State University, USA

Mobile: (b) (6)

<https://batonehealth.org/>

<image003.jpg>

<image001.jpg>

On Fri, Oct 2, 2020 at 7:53 AM Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:
Thanks Ali:

Short question, what are the plans for the sera? Given that you are setting-up the Luminex in Oz wouldn't it make more sense to keep them there? I'm largely worried about having samples here which can only come-out of RML after irradiation which is a massive effort (which we don't really have the bandwidth for). Once these samples go through RML, I cannot send them out to MSU without proper inactivation, even if the MSU biosafety would allow this.

In addition, what are the plans for RNA-P? I assume they are samples in a RNAlater? I'm asking because this from our end this is not a certified inactivation method.

Ali: on a separate note, everything which can be achieved by a simple amendment rather than a completely updated MTA would be preferable. Our MTA office is also completely swamped with COVID19, and Kwe's work is currently blocked as direct sequencing on the samples does not work.

Vincent Munster, PhD
Chief Virus Ecology Section

Rocky Mountain Laboratories
NIAID/NIH

From: Alison Peel <[REDACTED]> (b) (6)
Sent: Thursday, October 1, 2020 7:11 PM
To: 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)
Cc: Liam Chirio <[REDACTED]> (b) (6) Mandy Todd <[REDACTED]> (b) (6) Manuel Ruiz Aravena <[REDACTED]> (b) (6)
Subject: Next sample shipment from Australia - November

Hi Vincent, Trent and Kwe,

I hope you're all well and that perhaps things are starting to settle down a bit in the lab after what sounds like an absolutely crazy year.

We have now finished the core PREEMPT fieldwork here in Australia and are planning our next (likely last) shipment of samples to RML and MSU.

Shipments/Samples:

We are planning two separate shipments at the moment:

- To RML with World courier on dry ice, containing:
 - VTM_U (urine) ~2370
 - AVL_SV (saliva) ~41
 - RNA_P ~874
 - Clots ~89
 - Plasma ~2
 - Serum ~1155
 - ETOH_R (rectals) ~354
 - ETOH_R (faecal) ~270
- Direct to MSU with Fedex at room temperature, containing:
 - Blood smears
 - FTA cards
 - NB_F aliquotted into ETOH

I understand that all samples except the urine samples in the RML shipment are for subsequent onward transfer to MSU (and that their CDC permit doesn't allow direct shipment for those sample types.) If there are any issues with sample numbers, then Manuel is the best person to bring this up with for the samples being transferred to MSU (he can discuss directly with the students). If there are any problems with the number of urine samples, then you can discuss that with me.

Permits:

- We currently have CITES export permits for urine, but are waiting on permits for all other sample types. We expect to receive these by ~20th October, but the processing time varies from permit to permit.
- **If you are ok with the numbers above, we will put together the MTAs with estimated sample numbers.** This MTA will include virus isolation for this sample set. We are still awaiting modifications to the existing MTAs from Jeremy to get permissions for isolations on previously shipped samples from NSW and Qld.

- After the CITES permits are received, they then need to be submitted to WC and Fedex to get the shipping paperwork approved. We're not sure if Fedex does this, and how long they take, but WC can take up to 3 weeks for this step.
- We then need to book in a shipment date, taking into account extremely limited flight availabilities in and out of Australia at the moment.
- A reasonable estimate for a WC shipment date, assuming there are no delays in any of these steps, would be in the **week of the 16th November**. How does this work for everyone at RML?

Please let us know how that sounds, and then I will get on with the MTAs

Thanks

Ali

ALISON PEEL BSc(Vet) BVSc MSc PhD

DECRA Senior Research Fellow, Griffith Wildlife Disease Ecology Group

Environmental Futures Research Institute, Sir Samuel Griffith Centre (N78) 2.23
Griffith University, Nathan Campus, 170 Kessels Rd, Nathan, QLD, 4111, Australia

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W: (b) (6)
M: (b) (6)
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www.bat1health.org
www.mccallum-disease-ecology.com/alison-peel
experts.griffith.edu.au/7586-alison-peel

Pronouns: she/her

If you have received an email from me outside of normal working hours, I'm sending it at a time that suits me. I am not expecting you to read or reply to it until normal working hours.

<image002.jpg><image003.jpg><image001.jpg>

Raina Plowright BVSc MSc PhD

Associate Professor,
Department of Microbiology and Immunology
Montana State University,
109 Lewis Hall, Bozeman, MT 59717, USA

E: (b) (6)
W: (b) (6)
@rainamontana
www.batonhealth.org
www.bzndiseaselab.org

<image001.png>

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From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 16 Oct 2020 17:04:07 +0000
To: Plowright, Raina
Cc: Kwe Claude, Yinda (NIH/NIAID) [F]; Port, Julia (NIH/NIAID) [F]
Subject: RE: review

Sounds good, jut making sure from my end that it doesn't fall through the cracks.

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Friday, October 16, 2020 9:49 AM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Port, Julia (NIH/NIAID) [F]
[REDACTED] (b) (6)
Subject: Re: review

Its back with Manuel and Clif. They are supposed to send to you all. I'll check in with them now. Still a bit away. Mostly my fault as I hd heavy admin over last couple of months.

On Oct 16, 2020, at 8:51 AM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Hi Raian,

Whatever happened with the review we were all writing? Just to ensure that we get a (close to) final version to move this through the clearance pipeline (only a couple of days, but we can't submit before clearance)

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina
Sent: Tue, 13 Oct 2020 13:19:09 +0000
To: (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E]; Manuel Ruiz; Bushmaker, Trenton (NIH/NIAID) [E]; Kwe Claude, Yinda (NIH/NIAID) [F]; Liam Chirio; Mandy Todd
Subject: Re: Next sample shipment from Australia - November
Attachments: image001.jpg, image002.jpg, image003.jpg

Sorry I am sitting on an unsent email that should move this forward. Got left on desktop while meeting deadline late last night. Will send when kids out the door.

Sent from my iPad

On Oct 12, 2020, at 11:22 PM, Alison Peel <(b) (6)> wrote:

Hi Vincent,

Speaking for myself, and I think for everyone in this email chain, I do appreciate (as best I can) all the effort that goes into handling and processing these samples. Without being in the lab day by day, it's difficult to fully understand, but we do our best. I am hopeful that we can try and find a solution that works for everyone.

There are two potential components to the next shipment:

- 1) urine samples to be tested for henipias at RML (~2370), with subsequent sequencing and virus isolation.
- 2) various samples to be transferred to MSU because MSU's import permits do not allow direct shipment to them.

If you want to discuss your capacity to test that number of urine samples, then I'm happy to discuss that any time.

I am less involved in the second component, and if there are discussions that need to had re: numbers of samples that will be shipped to MSU, then that needs to be with Raina and Manuel (and in turn with the students involved). If the numbers of samples (and therefore the time and financial costs for you) can be limited by awaiting results of the urine samples, then perhaps we need to consider two separate shipments (urine only in the first, then a more precise selection of samples in the second, based on the results from the urine testing). That would likely have implications for the students too, so perhaps that isn't feasible - Raina and Manuel can comment on that.

Either way, I'm very keen to move forward towards a solution and agreement so that we can prepare samples while we still have staff around to do so. What is your preference for moving this forward? Would a meeting to discuss help? Let us know what we can do to make this easier for you.

Cheers

Ali

On Tue, 13 Oct 2020 at 00:05, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

We'll have a look at it asap, just as a reminder that we do have samples coming in from different ends, e.g. a 8000 sample shipment from Bangladesh, I hope you guys do appreciate the tremendous effort it takes for organizing and storing these shipment let alone facilitating onward transport to MSU.

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Vincent Munster, PhD

Chief Virus Ecology Section

Rocky Mountain Laboratories

NIAID/NIH

From: Alison Peel <[REDACTED]> (b) (6)
Sent: Sunday, October 11, 2020 6:34 PM
To: Manuel Ruiz <[REDACTED]> (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) Plowright, Raina
<[REDACTED]> (b) (6) Bushmaker, Trenton (NIH/NIAID) [E]
<[REDACTED]> (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]
<[REDACTED]> (b) (6) Liam Chirio <[REDACTED]> (b) (6) Mandy Todd
<[REDACTED]> (b) (6)
Subject: Re: Next sample shipment from Australia - November

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I will revise the numbers and lab capacity here. Those sample numbers are based on the experimental design considered in the projects, lab capacity, but also considering that for some bats we still don't have viral results, so we included those whole sessions to make sure that we won't miss potentially positive bats in future, since this may be the last shipment.

I will check all numbers and come up with a plan soon.

Cheers,

Manuel

Manuel Ruiz Aravena

Postdoctoral Researcher

Department of Microbiology and Immunology | Montana State University,
USA

Mobile: [REDACTED] (b) (6)

<https://batonehealth.org/>

<image002.jpg>

<image001.jpg>

On Mon, Oct 5, 2020 at 12:33 PM Munster, Vincent (NIH/NIAID) [E]

<[REDACTED] (b) (6)> wrote:

Thanks Manuel

So the biggest problem is that we can't transfer samples without proper ensuring that they are inactivated (per our CDC permit). ~1200 would literally take months of time and effort of multiple people irradiating samples so we need to find a solution for this (just as a reminder, irradiation is not a standard procedure and takes a massive amount of hands-on time prepping the samples and then we still can only do around ~60 per run).

Why don't you come-up with a plan of which samples you actually are truly able to test in the immune assays (unlikely to be the full 1200?). Then these should be packaged in an order that it will not take my people a lot of digging to localize the samples (as with some of the previous shipments).

In addition, even though the extraction by Dan and Caylee sounds labor-neutral, it isn't really. The samples need to be inactivated etc and they have to be escorted during their whole time at RML. That said, I'm all in favor for this but just wanted to make clear that nothing.

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Chief Virus Ecology Section

Rocky Mountain Laboratories

NIAID/NIH

From: Manuel Ruiz <(b) (6)>
Sent: Friday, October 2, 2020 11:43 AM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Cc: (b) (6) Bushmaker, Trenton (NIH/NIAID) [E]
<(b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]
<(b) (6) Plowright, Raina <(b) (6) Liam Chirio
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This shipment involves a large number of samples since it might (hopefully) be the last shipment under the scope of PREEMPT. I am trying to work out a plan for a "supply chain" that we could implement to move samples from RML to MSU in a way that doesn't saturate your capacity but also can allow the students here to continue moving with their projects. For this, we have been in constant communication with Trent, which so far has worked great. Though, the sample movement plans may need to be updated to take into consideration any changes in capacities.

At this stage it might be good to know if you have the available space at RML to receive those sample numbers in the next shipment and store them while we can move them to MSU as availability allows. I think that as long as the samples could be in the US, then we could work out the plans to move them to MSU.

How does this sound?

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Mobile: [REDACTED] (b) (6)

<https://batonehealth.org/>

<image003.jpg>

<image001.jpg>

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<[REDACTED] (b) (6)> wrote:

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Ali: on a separate note, everything which can be achieved by a simple amendment rather than a completely updated MTA would be preferable. Our MTA office is also completely swamped with COVID19, and Kwe's work is currently blocked as direct sequencing on the samples does not work.

Vincent Munster, PhD

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Rocky Mountain Laboratories

NIAID/NIH

From: Alison Peel <(b) (6)>
Sent: Thursday, October 1, 2020 7:11 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>
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I understand that all samples except the urine samples in the RML shipment are for subsequent onward transfer to MSU (and that their CDC permit doesn't allow direct shipment for those sample types.)

If there are any issues with sample numbers, then Manuel is the best person to bring this up with for the samples being transferred to MSU (he can discuss directly with the students). If there are any problems with the number of urine samples, then you can discuss that with me.

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Please let us know how that sounds, and then I will get on with the MTAs

Thanks

Ali

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DECRA Senior Research Fellow, Griffith Wildlife Disease Ecology Group

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www.bat1health.org

www.mccallum-disease-ecology.com/alison-peel
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From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 12 Oct 2020 14:03:46 +0000
To: (b) (6) Manuel Ruiz
Cc: Plowright, Raina; Bushmaker, Trenton (NIH/NIAID) [E]; Kwe Claude, Yinda (NIH/NIAID) [F]; Liam Chirio; Mandy Todd
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Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Plowright, Raina
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From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 9 Oct 2020 21:09:12 +0000
To: Plowright, Raina
Cc: LaTrielle, Sara; Peter Hudson
Subject: RE: Transition plans/discussions/etc

Yes, with a focus on high risk areas and intervention. Stop eating wildlife in the developed world would be one (still waiting for the first case of human CWD), but it would tie in feed lots, wet markets, bioindustry without proper biosecurity etc etc.

Hopefully, the time will be near to do some of this work a bit more after the second wave of COVID

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Friday, October 9, 2020 3:05 PM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: LaTrielle, Sara <[REDACTED] (b) (6)> Peter Hudson <[REDACTED] (b) (6)>
Subject: Re: Transition plans/discussions/etc

We need to write an authoritative and actionable paper on pandemic prevention. We have a few on our team with intellectual leadership and need a few more (like Steve Luby for e.g., had great conversation with him recently about such matters). Just challenging to get these papers to rise above the crap like the Dobson paper and the loudmouths like f@345ng Billy Karesh ;-).

I'm talking with [REDACTED] (b) (6) next week about trying to get some of the funding we have for eco-countermeasures towards convening a group to write this paper. Let's keep talking about this.

On Oct 9, 2020, at 3:01 PM, Munster, Vincent (NIH/NIAID) [E] [REDACTED] (b) (6) wrote:

Yeah, I had that previously about my work with WCS and ebola and gorilla's and NYT went to f@345ng Billy Karesh.

Well they are largely promoting their own programs, would be good if we have ever have paper tying in exactly those in a single piece.

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED] (b) (6)>
Sent: Friday, October 9, 2020 2:58 PM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: LaTrielle, Sara <[REDACTED] (b) (6)> Peter Hudson <[REDACTED] (b) (6)>
Subject: Re: Transition plans/discussions/etc

Ha... exactly... I'm getting sick of people clamoring to tell the world that we should be doing exactly what we are actually doing.

Haven't read it yet. But Tigga and Dan both know that our groups are doing exactly what they quoted in the NYT. If NYT contacted me about something to do with rabies or vampire bats, I'd immediately send them to Dan and Amy. Can't say what happened there but I can take responsibility for lack of papers. Need to get up at 3am every day to get ahead of this.

On Oct 9, 2020, at 2:53 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Well the science piece was a pretty unsubstantial watered down version of our review, □

We really need to start getting papers out for visibility, with some nice press releases.

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Plowright, Raina <[REDACTED] (b) (6)>
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Cc: [REDACTED] (b) (6) LaTrielle, Sara <[REDACTED] (b) (6)> Peter Hudson <[REDACTED] (b) (6)>
Subject: Re: Transition plans/discussions/etc

regarding "“We need immunologists working next to genomicists, who are working with ecologists, who are working with people who study the physiology of the animal,” she said Until that happens, she added, “we really don’t stand a hope of mitigating these kinds of events.””

PREEMPT BatOneHealth is the ONLY program in the world actually doing this. It is a shame they didn't flag our program as noteworthy here.

Raina

On Oct 9, 2020, at 2:40 PM, Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Hi [REDACTED] (b) (6)

Don't know if you saw this on eye: <https://www.nytimes.com/2020/10/08/science/bats-viruses-vaccines.html>

This is a quote from the article:

<image001.png>

I think it pretty much sums up PREEMPT, might need to get a bit more visibility for our program

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

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

From: [REDACTED] (b) (6)
Sent: Wednesday, October 7, 2020 3:07 PM
To: Plowright, Raina <[REDACTED]> (b) (6)
Cc: LaTrielle, Sara <[REDACTED]> (b) (6) Peter Hudson <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: RE: Transition plans/discussions/etc

Thanks... Vincent, be great to have some details on the activities. E.g. are you getting funding from them? Is there the possibility of tech transition? I assume not really any tech commercialization possibility, but maybe? Any details on these engagements would be great. You can do it later tonight when you have time, no need to drop things right now.

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

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: Wednesday, October 7, 2020 5:04 PM
To: [REDACTED] (b) (6)
Cc: LaTrielle, Sara <[REDACTED]> (b) (6) Peter Hudson <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Re: Transition plans/discussions/etc

Vincent, can you provide more details? I'll let you and [REDACTED] (b) (6) have conversation on this.

On Oct 7, 2020, at 2:39 PM, Plowright, Raina <[REDACTED]> (b) (6) wrote:

From Vincent Munster:

WHO
CDC
DoD
State Department
RoC government
Ghana government
BMGF
CEPI
OWS
Chan – Zuckerberg

On Oct 7, 2020, at 2:29 PM, Plowright, Raina <[REDACTED] (b) (6)>
[REDACTED] (b) (6) > wrote:

The FBI award is a good one here. I know others are working with multiple agencies. I sent an email to PIs and will get back to you with any responses.
I found out that Rob Bull is the point person at FBI.

On Oct 7, 2020, at 12:07 PM, [REDACTED] (b) (6)
[REDACTED] (b) (6) > wrote:

Hi all,

Can you please send me a brief (I leave it to you, longer is OK, too) email with an update on your Transition plans and activities. I am presenting to my leadership again tmrw (!), and need to have the latest and greatest on your transition plans. This is an increasingly important feature of DARPA programs- that is, what happens to the technology after the program ends.

Relationships and engagements with other agencies, other govts, WHO, BMGF, commercial, philanthropy, etc-- all that counts. Awards and grants, great. If you can quickly roster your transition related activities and send to me, that would be great. I do hope that all of you have active discussions in this regard. 1) for the utility of the overall program effort and 2) for the larger understanding of a potential PREEMPT 2.

You can just email this to me (unless you want to copy others). Me and the team will f/u on this and include it as a topic for our monthly calls.

Thanks,
[REDACTED] (b) (6)

From: Schountz, Tony
Sent: Fri, 9 Oct 2020 16:24:02 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Cc: Schountz, Tony
Subject: Re: Dose for humanized mice

Perfect, thanks much, Vincent.

Tony

—
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, Bldg T
Fort Collins, CO 80523-1692

(b) (6)

(b) (6)

On Oct 9, 2020, at 10:23 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

It depends what you want to see, the 104 is still largely lethal (but not always 100%, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7427137/>)

With MERS (also lethal challenge this works really well, <https://www.nature.com/articles/s41541-017-0029-1>)

I think you wouldn't want to go lower than 10E4, otherwise you run the risk in having protection with shitty vaccines. The nat med paper with hamsters also used 10E4-10E5

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Schountz, Tony <(b) (6)>
Sent: Friday, October 9, 2020 10:18 AM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Subject: Dose for humanized mice

Hi Vinnie,

We have a group using the Jackson Lab's human ACE2 mice for vaccine testing with SARS-CoV-2. We've been using 2×10^4 TCID50 for our deer mouse and Syrian hamster work, but were wondering if you have experience with dosing human ACE2 mice from Jackson Labs (or anywhere else). The concern, of course, is that too large of dose may result in vaccine breakthrough. Thoughts?

Hope you're doing well. I'm sure you're swamped with the COVID response.

Thanks,

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, Bldg T

Fort Collins, CO 80523-1692

(b) (6)

(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 8 Oct 2020 17:49:54 +0000
To: 'Cesar Munoz-Fontela'; Adolfo García-Sastre; 'Mariano Esteban Rodriguez'; 'Mela'; (b) (6); 'Addo, Marylyn Martina'; 'Lawrence Banks'; 'Delgado Vazquez.Rafael'; 'McElroy, Anita Katherine'; 'Prof. Dr. med. Egbert Tannich'; 'Michael Ramharter'; (b) (6); 'Diederich, Sandra'; 'Martin Beer'; 'Quim Segales'; 'Anneke Novak-Funk'; 'Thomas Dobner'; 'Geisbert, Thomas W.'; 'Cross, Robert W.'; 'Estefania Bni'; 'Feldmann, Heinrich (NIH/NIAID) [E]'; 'Carroll, Miles'; 'Florian Wurm'; 'Florian Krammer'; 'PETERPALESE'; 'Osterhaus, Albert'; 'Enjuanes_Luis'; 'Rimmelzwaan, Guus'; 'B. Haagmans'; 'Juliana Idoyaga'; 'Francine Ntoumi'; 'Duprex, Paul'; 'Christian Drosten'; (b) (6) marburg.de; R.A.M. Fouchier; (b) (6); (b) (6) 'Hoenen, Thomas'; (b) (6) marburg.de; D.A.J. van Riel; (b) (6) 'Graham, Barney (NIH/VRC) [E]'; 'Corbett, Kizzmekia (NIH/VRC) [E]'; (b) (6) 'Letko, Michael Colin'; 'Baric, Ralph'; 'Alexandra Schaefer'; 'Menachery, Vineet'; 'Kanta Subbarao'; 'Leo Poon'; (b) (6) 'Jon Epstein'; 'Linfa Wang'; 'Leendertz, Fabian'; 'Mettenleiter, Thomas C.'; (b) (6) 'Thornburg, Natalie (CDC/DDID/NCIRD/DVD)'; 'Richard Webby'; 'Stacey Schultz-Cherry'; 'Yoshi Kawaoka'; 'Pekosz, Andrew S.'; 'Lowen, Anice'; 'Ben Cowling'; (b) (6) 'Matthew Frieman'; 'Anthony, Simon J.'; (b) (6) 'Sarah Gilbert'; (b) (6) 'Thomas Bowden'; 'Aartjan te Velthuis'; 'Barouch, Dan (HMFP - Division of Vaccine Research)'; 'Michael Osterholm'; 'Jesse Bloom'; 'Damon, Inger K. (CDC/DDID/NCEZID/DHCPP)'; 'Racaniello, Vincent R.'; 'Perlman, Stanley'; 'Seth Judson'; 'David Veessler'; 'Jason McLellan'; 'Weiss, Susan'; 'Pierson, Theodore (NIH/NIAID) [E]'; 'from: (b) (6) (b) (6) (b) (6) (b) (6) Diamond, Jeffrey (NIH/NINDS) [E]'; 'Stagliano, Katie (NIH/NIAID) [E]'; 'Geisbert, Thomas W.'; 'Kilmarx, Peter (NIH/FIC) [E]'; 'Falzarano, Darryl (NIH/NIAID) [F]'; 'Kobinger, Gary (Public Health Agency of Canada)'; 'Bethany Hoyer (b) (6) Marston, Hilary (NIH/NIAID) [E]'; 'Edward Holmes'; 'Nason, Martha (NIH/NIAID) [E]'; (b) (6) 'Broder, Chris (USU-DoD)'; 'from: (b) (6) 'Crowe, James'; (b) (6) 'Manning, Jessica (NIH/NIAID) [E]'; 'William Karesh'; 'Jonna A. K. Mazet'
Subject: SARS-CoV-2 and other emerging virus postdoc positions at NIAID
Attachments: DIR_RML_Postdoc_VEU_08-14-15_cb_ReAd_8-25-20_cc1.docx

Dear colleagues,

Please find attached an advertisement for several postdoctoral positions within the NIAID's Virus Ecology Section. Feel free to distribute widely.

The research spans from the identification and understanding of the drivers of zoonotic transmission for emerging viruses towards the development of countermeasures. The focus of the lab is largely on emerging coronaviruses, henipaviruses and filoviruses, but recent projects have included work on monkeypox and Lassa virus.

Kind regards,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

Department of Health and Human Services
National Institutes of Health
National Institute of Allergy and Infectious Diseases

With nationwide responsibility for improving health and well-being, the Department of Health and Human Services (HHS) oversees the biomedical research programs of the National Institutes of Health (NIH) and those of NIH's research Institutes. The National Institute of Allergy and Infectious Diseases (NIAID)—a major research component of NIH and HHS—is recruiting for the following positions:

Postdoctoral intramural research training awards (IRTAs)

Rocky Mountain Laboratories (RML), Hamilton, MT

Several postdoctoral IRTA positions are available in the Virus Ecology Unit within the Laboratory of Virology at the RML campus of NIAID in Hamilton, Montana. The laboratory studies the ecology of high- and maximum-containment RNA viruses and is currently focused on the ongoing COVID-19 pandemic.

The [Virus Ecology Section](#) is interested in the identification and understanding of the drivers of zoonotic transmission for emerging viruses. The laboratory uses a combined field ecological and experimental laboratory approach to understand the emergence of novel viruses and develop successful medical countermeasures against these viruses. Fundamental experimental approaches of the laboratory include molecular-, cellular-, and immunological-based techniques along with animal models of pathogenesis and transmission. Studies are carried out in biosafety level (BSL) 2, BSL-3, and BSL-4 laboratories. The Virus Ecology Section considers diversity and inclusion the centerpiece of the team's culture.

Successful applicants will be part of a diverse and multidisciplinary team focused on understanding the molecular and ecological determinants of spillover from bats to humans and the determinants for onward human-to-human transmission. Candidates are expected to study the underlying molecular and structural determinants involved in zoonotic and human-to-human transmission of COVID-19 and newly identified emerging viruses (including filoviruses and henipaviruses).

An overview of the Virus Ecology Section's most recent SARS-CoV-2/COVID-19 research includes:

- Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1, NEJM 2020, DOI: 10.1056/NEJMc2004973
- Respiratory disease in rhesus macaques inoculated with SARS-CoV-2, Nature 2020, DOI: 10.1038/s41586-020-2324-7
- Functional assessment of cell entry and receptor usage for SARS-CoV-2 and other lineage B betacoronaviruses, Nature Microbiology 2020, DOI: 10.1038/s41564-020-0688-y
- A Novel Coronavirus Emerging in China — Key Questions for Impact Assessment,

NEJM 2020, DOI: 10.1056/NEJMp2000929

- ChAdOx1 nCoV-19 vaccine prevents SARS-CoV-2 pneumonia in rhesus macaques, Nature 2020

Requirements

Highly motivated candidates who have a strong background in molecular biology, genomics, computational biology, disease ecology field research, and infectious disease animal modeling are encouraged to apply. Experience working in high biological containment laboratories (BSL-3 or BSL-4) and experience with molecular biology—particularly reverse genetics or field ecology experience in infectious disease (including mathematical modeling)—would be considered an advantage.

Well-developed oral and written communication skills are essential. Candidates must hold a Ph.D. in virology, molecular biology, or another appropriate discipline and have less than three years of postdoctoral experience. Applicants may be U.S. citizens, permanent residents, or international citizens (for an IRTA, visa requirements apply). Trainees will receive health insurance as well as a stipend (commensurate with experience).

To Apply

Applicants should send their curriculum vitae (CV), a letter expressing career goals and interests, and three letters of reference with contact information no later than December 30, 2020, to Kay Menk, Laboratory Operations Specialist, Laboratory of Virology, Rocky Mountain Laboratories, NIAID, NIH, 903 S 4th Street, Hamilton, MT 59840, (b) (6) (phone), 406-375-9620 (fax), or email (b) (6)

[RML](#) is a NIAID campus with excellent genomic, electron microscopic, and veterinary core support that enables scientists to completely focus on their research. Located in the scenic Bitterroot valley of western Montana, RML is surrounded by some of the best hiking, skiing, kayaking, mountain biking, and trout fishing in North America.

Visit [NIAID Careers](#) for more information about working in NIAID's dynamic atmosphere!

HHS, NIH, and NIAID are equal opportunity employers dedicated to equity, diversity, and inclusion.

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 8 Oct 2020 13:41:46 +0000
To: (b) (6); Plowright, Raina
Cc: LaTrielle, Sara; Peter Hudson
Subject: RE: Transition plans/discussions/etc

Good catch, that should be 2 (obviously)

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

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

From: (b) (6)
Sent: Wednesday, October 7, 2020 6:55 PM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Plowright, Raina <(b) (6)>
Cc: LaTrielle, Sara <(b) (6)> Peter Hudson <(b) (6)>
Subject: RE: Transition plans/discussions/etc

Thanks, Vincent. Good context, great to see these collaborations, etc. For CZI, did you mean SARS3, or SARS2? If the former, what are you doing in that regard?

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

From: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Sent: Wednesday, October 7, 2020 7:04 PM
To: (b) (6); Plowright, Raina <(b) (6)>
Cc: LaTrielle, Sara <(b) (6)> Peter Hudson <pjh1 (b) (6)>
Subject: Re: Transition plans/discussions/etc

Hi (b) (6)

WHO: several working groups focused at emerging diseases and diagnostics (e.g. GOARN). Currently epidemiology and animal models for SARS-CoV-2 as well. Part of NIAID's WHO reference center

CDC: working together with the respiratory diseases and the special pathogens branch (SARS-CoV-2, MERS-CoV and Ebola, MPX)

DoD: largely directly informing leadership on environmental persistence studies with SARS-CoV-2. Working with NAMRU in Ghana

State Department: working together with the embassies in Ghana (ambassador Sullivan) and Roc (Ambassador Haskel)

RoC government: working with MoH, capacity building for diagnostics and emerging infectious diseases

Ghana government: working with MoH, capacity building for diagnostics and emerging infectious diseases

BMGF: working on vaccine development and clinical trials (projects in Ghana are supported by them)

CEPI: vaccine development for SARS-CoV-2, MERS-CoV, Nipah and Lassa virus (funded ~ 5,000,000)

OWS: USG led effort to fast-track SARS-CoV vaccine development, part of the pre-clinical development group

Chan – Zuckerberg: collaboration on SARS-CoV-3

African CDC: providing input and training for emerging infectious disease

Walter Reed: working on vaccine development and clinical trials

US armed Forces University: working on bead-based serology

Hope this clarifies matters,

Cheers,

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

On 10/7/20, 3:07 PM, [REDACTED] (b) (6) wrote:

Thanks... Vincent, be great to have some details on the activities. E.g. are you getting funding from them? Is there the possibility of tech transition? I assume not really any tech commercialization possibility, but maybe? Any details on these engagements would be great. You can do it later tonight when you have time, no need to drop things right now.

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To: [REDACTED] (b) (6)
Cc: LaTrielle, Sara <[REDACTED] (b) (6)> Peter Hudson <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: Re: Transition plans/discussions/etc

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Thanks,
[REDACTED] (b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 7 Oct 2020 14:37:21 -0600
To: Plowright, Raina
Subject: Re: Transition plans/discussions/etc

WHO
CDC
DoD
State Department
RoC government
Ghana government
BMGF
CEPI
OWS
Chan – Zuckerberg

Cheers,

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: "Plowright, Raina" <[REDACTED]> (b) (6)
Reply-To: "Plowright, Raina" <[REDACTED]> (b) (6)
Date: Wednesday, October 7, 2020 at 2:28 PM
To: preempt <[REDACTED]> (b) (6)
Subject: Fwd: Transition plans/discussions/etc

Anyone engaging with other agencies — governments, WHO etc. Grants count. Let me know and I'll pass to [REDACTED] (b) (6)

Begin forwarded message:

From: [REDACTED] (b) (6)
Subject: Transition plans/discussions/etc
Date: October 7, 2020 at 12:07:11 PM MDT
To: Brian Bird <[REDACTED]> (b) (6) David J Wolking <[REDACTED]> (b) (6) Peter A Barry <[REDACTED]> (b) (6) "Plowright, Raina" <[REDACTED]> (b) (6) "LaTrielle, Sara" <[REDACTED]> (b) (6) Peter Hudson <[REDACTED]> (b) (6) "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Vincent, Amy - ARS" <[REDACTED]> (b) (6) "Gauger, Phillip C [VDPAM]" <[REDACTED]> (b) (6) Luke Alphey <[REDACTED]> (b) (6) "Carla SALEH" <[REDACTED]> (b) (6)

< (b) (6) Russell Newton < (b) (6) Ariel Weinberger
< (b) (6) Timothy Notton < (b) (6)

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Thanks,
(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 2 Oct 2020 13:53:58 +0000
To: (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]; Bushmaker, Trenton (NIH/NIAID) [E]
Cc: Plowright, Raina
Subject: RE: Next sample shipment from Australia - November

Kwe/Trent: How are we with storage capacity?

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Alison Peel <(b) (6)>
Sent: Thursday, October 1, 2020 7:11 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)>
Cc: Liam Chirio <(b) (6)> Mandy Todd <(b) (6)> Manuel Ruiz Aravena <(b) (6)>
Subject: Next sample shipment from Australia - November

Hi Vincent, Trent and Kwe,

I hope you're all well and that perhaps things are starting to settle down a bit in the lab after what sounds like an absolutely crazy year.

We have now finished the core PREEMPT fieldwork here in Australia and are planning our next (likely last) shipment of samples to RML and MSU.

Shipments/Samples:

We are planning two separate shipments at the moment:

- To RML with World courier on dry ice, containing:
 - VTM_U (urine) ~2370
 - AVL_SV (saliva) ~41
 - RNA_P ~874
 - Clots ~89
 - Plasma ~2
 - Serum ~1155
 - ETOH_R (rectals) ~354
 - ETOH_R (faecal) ~270

- Direct to MSU with Fedex at room temperature, containing:
 - Blood smears

- FTA cards
- NB_F aliquotted into ETOH

I understand that all samples except the urine samples in the RML shipment are for subsequent onward transfer to MSU (and that their CDC permit doesn't allow direct shipment for those sample types.) If there are any issues with sample numbers, then Manuel is the best person to bring this up with for the samples being transferred to MSU (he can discuss directly with the students). If there are any problems with the number of urine samples, then you can discuss that with me.

Permits:

- We currently have CITES export permits for urine, but are waiting on permits for all other sample types. We expect to receive these by ~20th October, but the processing time varies from permit to permit.
- **If you are ok with the numbers above, we will put together the MTAs with estimated sample numbers.** This MTA will include virus isolation for this sample set. We are still awaiting modifications to the existing MTAs from Jeremy to get permissions for isolations on previously shipped samples from NSW and Qld.
- After the CITES permits are received, they then need to be submitted to WC and Fedex to get the shipping paperwork approved. We're not sure if Fedex does this, and how long they take, but WC can take up to 3 weeks for this step.
- We then need to book in a shipment date, taking into account extremely limited flight availabilities in and out of Australia at the moment.
- A reasonable estimate for a WC shipment date, assuming there are no delays in any of these steps, would be in the **week of the 16th November**. How does this work for everyone at RML?

Please let us know how that sounds, and then I will get on with the MTAs

Thanks
Ali

ALISON PEEL BSc(Vet) BVSc MSc PhD

DECRA Senior Research Fellow, Griffith Wildlife Disease Ecology Group

Environmental Futures Research Institute, Sir Samuel Griffith Centre (N78) 2.23
Griffith University, Nathan Campus, 170 Kessels Rd, Nathan, QLD, 4111, Australia

E: [REDACTED] (b) (6) [REDACTED] (b) (6)

W: [REDACTED] (b) (6)

M: [REDACTED] (b) (6)

@ali_bat

www.bat1health.org

www.mccallum-disease-ecology.com/alison-peel

experts.griffith.edu.au/7586-alison-peel

Pronouns: she/her

If you have received an email from me outside of normal working hours, I'm sending it at a time that suits me. I am not expecting you to read or reply to it until normal working hours.

From: Plowright, Raina
Sent: Wed, 30 Sep 2020 03:23:50 +0000
To: (b) (6); Peter A Barry; David J Wolking; Gmail; Jarvis, Michael; LaTrielle, Sara; Peter Hudson; Hector Aguilar-Carreno; Ariel Weinberger; Timothy Notton; Munster, Vincent (NIH/NIAID) [E]; Luke Alphey; (b) (6) (b) (6)
Subject: Re: quick touch base on CDC Select Agents

Hi (b) (6)

Correct for MSU -- Hendra and Nipah at RML. However Cornell does not have BsL4 and is not handling live Hendra and Nipah.

Raina

On 9/29/20, 9:21 PM, (b) (6) wrote:

Hi PREEMPT colleagues (and (b) (6) for (b) (6) institutional memory) -

I need to do a quick check with you all. Can you tell me if you are working with any live, dead or modified CDC Select Agents?

https://www.selectagents.gov/sat/list.htm?CDC_AA_refVal=https%3A%2F%2Fwww.selectagents.gov%2FSelectAgentsandToxinsList.html

If I am not mistaken, here is what I recall:

UC Davis: Lassa virus; Ebola (at RML?)
MSU: Hendra/Nipah at RML; multivalent vaccines (henipa/Ebola (at Cornell?))
ATI: Avian influenza (Duke; Kansas)
Pirbright: RVF (?)

Can you tell me if you are working with live virus, killed virus, or something derived from these (e.g., VLPs, pseudotyped, inactivated, other). Also, where you are working with these agents: RML, Cornell, Duke, Kansas, other; and at what BSL? I need to know so I can do my due diligence in reporting for BWC purposes (a yearly requirement). You all can reply all or just to me, either way....

Thanks!
(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 29 Sep 2020 19:08:47 +0000
To: Laing, Eric; Simon Pollett; Agan, Brian (IDCRP); Caroline English
Cc: Broder, Chris (USU-DoD); De wit, Emmie (NIH/NIAID) [E]
Subject: RE: nhps and CoV-2 question

Thanks Eric,

Sounds good, would be easy to determine any neutralizing cross-reactivity with MERS, SARS-2/2

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Laing, Eric <(b) (6)>
Sent: Tuesday, September 29, 2020 12:42 PM
To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Simon Pollett <(b) (6)>
Agan, Brian (IDCRP) <(b) (6)> Caroline English <(b) (6)>
Cc: Broder, Chris (USU-DoD) <(b) (6)> De wit, Emmie (NIH/NIAID) [E]
<(b) (6)>
Subject: Re: nhps and CoV-2 question

Hi Vincent,

Looping back to this topic regarding MERS/SARS-CoV VNs/PRNTs and bringing in the IDCRP leadership that can begin an approval process for non-human research determination.

We have a handful of SARS-CoV-2 IgG positive serum samples (~15 - 20) with fairly high cross-reactivity to SARS-CoV-1 and MERS-CoV. Some of these serum samples are longitudinal collections from the same subject; over time, the cross-reactivity decreases as the IgG response matures and becomes monotypic for SARS-CoV-2. It would be interesting to write a short letter about cross-reactivity and cross-neutralization between SARS-CoV-2 IgG antibodies and high priority zoonotic bCoVs.

- Eric

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 Thu, Sep 10, 2020 at 9:47 AM Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:
Hi Chris,

Would be easy to do some MERS and SARS-CoV-2 VNs or prnts.

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Laing, Eric <(b) (6)>

Sent: Wednesday, September 9, 2020 8:34 PM

To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>

Cc: Broder, Chris (USU-DoD) <(b) (6)> De wit, Emmie (NIH/NIAID) [E]
<(b) (6)>

Subject: Re: nhps and CoV-2 question

Hi Vincent and Emmie,

Any interest or bandwidth for testing SARS-CoV-2 patient serum samples that are highly cross-reactive with MERS-CoV and SARS-CoV-1 spike proteins to assess cross-neutralization potential? We have a handful of SARS-CoV-2 seroconverts that have a strong polyclonal response to SARS-CoV-1 and MERS-CoV, could be an interesting short translational letter if the antisera retains neutralizing antibodies.

- Eric

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, Sep 4, 2020 at 9:42 AM Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:
Hi Chris no plans for that,

Housing the animals for 6 months after challenge into high containment would make it unfeasible. There are reports of back challenge after a month or so, but I think we should start getting data from humans soon,

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: "Broder, Christopher" <[REDACTED] (b) (6)>
Date: Thursday, September 3, 2020 at 10:01 AM
To: "[REDACTED] (b) (6)" <[REDACTED] (b) (6)> Emmie De wit
<[REDACTED] (b) (6)>
Cc: Eric Laing <[REDACTED] (b) (6)>
Subject: nhps and CoV-2 question

hi Vincent / Emmie.

hope all is continuing to go so great.

are you all going to try an NHP SARS-2 back challenge exp after waiting 6 or more months after primary infection and recovery? so expensive i know, might provide very informative data on the ab response / longevity / anamnestic response ect..

chris

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 22 Sep 2020 17:43:15 +0000
To: Kevin Olival; Jon Epstein
Cc: Peter Daszak; Noam Ross; Mahmudur Rahman; Broder, Chris (USU-DoD); Ariful Islam; Dr.Mohammad Ziaur Rahman; Shariful Islam; Eric Laing; Meerjady Sabrina Flora , PhD; Linfa Wang; Emily Hagan; Alison Andre; Dr. Tahmina Shirin IEDCR
Subject: RE: NIAID Nipah virus grant awarded!

Well deserved!

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Kevin Olival <[REDACTED] (b) (6)>
Sent: Tuesday, September 22, 2020 11:21 AM
To: Jon Epstein <[REDACTED] (b) (6)>
Cc: Peter Daszak <[REDACTED] (b) (6)> Noam Ross <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Mahmudur Rahman <[REDACTED] (b) (6)> Broder, Chris (USU-DoD) <[REDACTED] (b) (6)> Ariful Islam <[REDACTED] (b) (6)> Dr.Mohammad Ziaur Rahman <[REDACTED] (b) (6)> Shariful Islam <[REDACTED] (b) (6)> Eric Laing <[REDACTED] (b) (6)> Meerjady Sabrina Flora , PhD <[REDACTED] (b) (6)> Linfa Wang <[REDACTED] (b) (6)> Emily Hagan <[REDACTED] (b) (6)> Alison Andre <[REDACTED] (b) (6)> Dr. Tahmina Shirin IEDCR <[REDACTED] (b) (6)>
Subject: Re: NIAID Nipah virus grant awarded!

Congratulations Jon!! So very excited to continue working on Nipah virus research with you and this team!

Best regards,
Kevin

Kevin J. Olival, PhD
Vice President for Research

EcoHealth Alliance
520 Eighth Avenue, Suite 1201
New York, NY 10018

[REDACTED] (b) (6) (direct)

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

1.212.380.4465 (fax)

www.ecohealthalliance.org

EcoHealth Alliance develops science-based solutions to prevent pandemics and promote conservation.

On Sep 21, 2020, at 1:07 PM, Jon Epstein <[REDACTED]> (b) (6) wrote:

Dear Colleagues,

I hope that you are all safe and doing well. I am thrilled to share the good news that our NIH proposal to study Nipah virus has been awarded! Thank you all for helping develop such a terrific project that will go a long way to improve our understanding of why Nipah virus outbreaks happen in some places and not others. This research has high relevance given the current pandemic and I'm excited to begin working with you all.

I'll be reaching out soon to schedule our first video conference so that we can all get together to meet each other, review the aims of the grant, discuss a timeline for the work and set up a communications plan.

Again, well done everyone! I look forward to speaking with you all soon.

Cheers,
Jon

--

Jonathan H. Epstein DVM, MPH, PhD
Vice President for Science and Outreach
EcoHealth Alliance
520 Eighth Avenue, Ste. 1200
New York, NY 10018

[REDACTED] (b) (6) (direct)

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

web: ecohealthalliance.org

Twitter: [@epsteinjon](https://twitter.com/epsteinjon)

EcoHealth Alliance develops science-based solutions to prevent pandemics and promote conservation

From: Wang Linfa
Sent: Tue, 22 Sep 2020 02:24:14 +0000
To: Jon Epstein; Peter Daszak; Noam Ross; Munster, Vincent (NIH/NIAID) [E]; Mahmud Rahman; Broder, Chris (USU-DoD); Kevin Olival, PhD; Ariful Islam; Dr.Mohammad Ziaur Rahman; Shariful Islam; Eric Laing; Meerjady Sabrina Flora , PhD; Emily Hagan
Cc: Alison Andre; Dr. Tahmina Shirin IEDCR
Subject: RE: NIAID Nipah virus grant awarded!

Thanks and congrats Jon.

A long journey, but worth it!

LF

Linfa (Lin-Fa) WANG, PhD FTSE
Professor
Programme in Emerging Infectious Disease
Duke-NUS Medical School,
8 College Road, Singapore 169857
Tel: (b) (6)

From: Jon Epstein <(b) (6)>
Sent: Tuesday, 22 September 2020 7:07 AM
To: Peter Daszak <(b) (6)> Noam Ross <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Mahmud Rahman <(b) (6)> Christopher Broder <(b) (6)> Kevin Olival, PhD <(b) (6)> Ariful Islam <(b) (6)> Dr.Mohammad Ziaur Rahman <(b) (6)> Shariful Islam <(b) (6)> Eric Laing <(b) (6)> Meerjady Sabrina Flora , PhD <(b) (6)> Wang Linfa <(b) (6)> Emily Hagan <(b) (6)>
Cc: Alison Andre <(b) (6)> Dr. Tahmina Shirin IEDCR <(b) (6)>
Subject: NIAID Nipah virus grant awarded!

- External Email -

Dear Colleagues,

I hope that you are all safe and doing well. I am thrilled to share the good news that our NIH proposal to study Nipah virus has been awarded! Thank you all for helping develop such a terrific project that will go a long way to improve our understanding of why Nipah virus outbreaks happen in some places and not others. This research has high relevance given the current pandemic and I'm excited to begin working with you all.

I'll be reaching out soon to schedule our first video conference so that we can all get together to meet each other, review the aims of the grant, discuss a timeline for the work and set up a communications plan.

Again, well done everyone! I look forward to speaking with you all soon.

Cheers,
Jon

--

Jonathan H. Epstein DVM, MPH, PhD
Vice President for Science and Outreach
EcoHealth Alliance
520 Eighth Avenue, Ste. 1200
New York, NY 10018

(b) (6) (direct)

(b) (6) (mobile)

web: ecohealthalliance.org

Twitter: [@epsteinjon](https://twitter.com/epsteinjon)

EcoHealth Alliance develops science-based solutions to prevent pandemics and promote conservation

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.

discussion with Hector and the coronavirus vaccine- next week. Thanks for your flexibility.

>

> Best wishes,

> (b) (6)

>

From: Plowright, Raina
Sent: Thu, 17 Sep 2020 18:47:49 +0000
To: (b) (6)
Cc: Hector Aguilar-Carreno; LaTrielle, Sara; Munster, Vincent (NIH/NIAID) [E]; (b) (6)
(b) (6); (b) (6); (b) (6); (b) (6)
(b) (6); (b) (6)
Subject: Re: documents to discuss on Monday Sept 21

No problems (b) (6) We are working on the task by task budgets right now. Hoping to find out about the filovirus project before we make final decisions. Is there anything we can do to help with the logistics of the filovirus money being re-allocated to help with the COVID work, given no back-fill (happy to jump on a call if needed)? We look forward to talking next week.

> On Sep 17, 2020, at 10:36 AM, (b) (6) wrote:

>

> Hi all,

>

> To make sure we are ready for the Monday meeting, if Raina and Vincent could please send out their respective PREEMPT SOWs (MSU's with planned modifications- i.e., redlined), we can look at those before and during the meeting. If you can send NLT end of the weekend, that would be best.

>

> Thanks!

> (b) (6)

>

>

>

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

> From: (b) (6)

> Sent: Thursday, September 17, 2020 12:29 AM

> To: 'Plowright, Raina' <(b) (6)>

> Cc: (b) (6); (b) (6); (b) (6)

> (b) (6); LaTrielle, Sara <(b) (6)> Hector Aguilar-Carreno

> (b) (6) Munster, Vincent (NIH/NIAID) [E] <(b) (6)> (b) (6) (b) (6)

> (b) (6); (b) (6); (b) (6)

> Subject: RE: coronavirus discussion of tmrw

>

> Great, thanks!

>

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

> From: Plowright, Raina <(b) (6)>

> Sent: Thursday, September 17, 2020 12:28 AM

> To: (b) (6)

> Cc: (b) (6); (b) (6); (b) (6)

> (b) (6); LaTrielle, Sara <(b) (6)> Hector Aguilar-Carreno

> (b) (6) Munster, Vincent (NIH/NIAID) [E] <(b) (6)> (b) (6) (b) (6)

> (b) (6); (b) (6); (b) (6)

> Subject: Re: coronavirus discussion of tmrw

>

> No problems. Talk next week.

>

>> On Sep 16, 2020, at 9:57 PM, (b) (6) wrote:

>>

>> Hi all -

>>

>> I just sent an email re the SOWs and some specifics wrt MSU and RML. Let's iron all that out and then have the discussion with Hector and the coronavirus vaccine- next week. Thanks for your flexibility.

>>

>> Best wishes,

>> (b) (6)

>>

>>

>

From: Plowright, Raina
Sent: Thu, 17 Sep 2020 04:29:44 +0000
To: (b) (6)
Cc: LaTrielle, Sara; Munster, Vincent (NIH/NIAID) [E]; (b) (6)
(b) (6) (b) (6) (b) (6) (b) (6)
Subject: Re: Monday Sept 21 call: MSU and RML and our way forward together

Dear (b) (6)

That sounds like a good idea. Vincent has been engaged in all of our discussions about SOWs and RML is reflected in the SOW that we sent.

We look forward to discussing further.

Raina

> On Sep 16, 2020, at 9:54 PM, (b) (6) wrote:

>

> Dear Raina, Sara, and Vincent -

>

> As you know my team has been discussing SOW modifications based on funding cuts and pivots with all performers; one omission to this process was RML. I am glad that MSU and RML are aligned, but I'd like to have a call this coming Monday with the three of you and my team and go through the MSU SOW as we have done already a couple times, but now with a crosswalk with RML's SOW. I really liked the modifications made to the MSU SOW to meet the DARPA desired modifications. But thusfar, we have not done a crosswalk with the MSU SOW and the RML SOW. So I want to look at where RML is supporting MSU, and where we can find budget to pivot accordingly (e.g., the UCLA postdoc for Jamie).

>

> The topics on my list to discuss include:

>

> 1) 60K "de obligation" / internal realignment (from Sara's email today, which I think is not RML related)

> 2) MSU and RML SOW - alignment

> 2a) RML phase 2 funding mods (post doc at UCLA; what else?)

> 3) MSU and RML - DOI engagement generally

>

> For the meeting we should all have in front of us 1) the proposed revised SOW from MSU (sent out and discussed a few weeks ago), and the original (current) SOW from RML. We can then work to modify the MSU SOW and get that signed off on and accordingly reduce RML budget (which does not require new paperwork as they are USG).

>

> For transparency: as it stands now and after my 5% across the board cut for PREEMPT performers moving into Phase II, MSU's Phase II (Option period) budget is \$1.85M and RML's Phase II (Option period) budget is \$686K. Hope that is concordant between all of us (MSU, RML and DARPA).

>

> If others have items to add to discussion list above, please add them. Look forward to chatting further on Monday.

>

> Thanks,

> (b) (6)

>

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 15 Sep 2020 13:20:09 +0000
To: Segales, Joaquim; Cesar Munoz-Fontela; Randy Albrecht; Andersen, Hanne; Baric, Ralph; Carroll, Miles; Cavaleri Marco; 秦川; Crozier, Ian (NIH) [C]; Kai Dallmeier; Leon de Waal; De wit, Emmie (NIH/NIAID) [E]; Leen Delang; Erik Dohm; Duprex, Paul; Darryl Falzarano; Finch, Courtney (NIH/NIAID) [C]; Matthew Frieman; Graham, Barney (NIH/VRC) [E]; Lisa E Gralinski; (b) (6) B. Haagmans; Geraldine Hamilton; Hartman, Amy Lynn; S. Herfst; Suzanne Kaptein; Klimstra, William Brown; KNEZEVIC, Ivana; Krause, Philip (FDA/CBER); Kuhn, Jens (NIH/NIAID) [C]; Roger Le; Lewis, Mark; Wen-chun Liu; Pauline Maisonnasse; McElroy, Anita Katherine; Nadia Oreshkova; Angela Rasmussen; Joana Duarte Da Rocha Pereira; B. Rockx; Estefania Bni; Thomas Rogers; Javier Salguero; Michael Schotsaert; Koert Stittelaar; Hendrik Jan Thibaut; (b) (6) Vergara, Julia; Martin Beer; Trevor Brasel; jfwchan; Adolfo García-Sastre; Johan Neyts; Stanley Perlman; Douglas Reed; Richt, Juergen; Chad Roy; Vasan Vasan
Cc: William Dowling; Simon Funnell; Pierre Gsell; RIVEROS BALTA, Alina Ximena; HENAO RESTREPO, Ana Maria; Dan Barouch
Subject: RE: Nature review accepted

Great job Cesar!

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Segales, Joaquim <(b) (6)>
Sent: Tuesday, September 15, 2020 6:29 AM
To: Cesar Munoz-Fontela <(b) (6)> Randy Albrecht
<(b) (6)> Andersen, Hanne <(b) (6)> Baric, Ralph
<(b) (6)> Carroll, Miles <(b) (6)> Cavaleri
Marco <(b) (6)> 秦川 <(b) (6)> Crozier, Ian (NIH) [C]
<(b) (6)> Kai Dallmeier <(b) (6)> Leon de Waal
<(b) (6)> De wit, Emmie (NIH/NIAID) [E] <(b) (6)> Leen Delang
<(b) (6)> Erik Dohm <(b) (6)> Duprex, Paul <(b) (6)
Darryl Falzarano <(b) (6)> Finch, Courtney (NIH/NIAID) [C]
<(b) (6)> Matthew Frieman <(b) (6)> Graham, Barney
(NIH/VRC) [E] <(b) (6)> Lisa E Gralinski <(b) (6)
<(b) (6)> B. Haagmans <(b) (6)> Geraldine Hamilton
<(b) (6)> Hartman, Amy Lynn <(b) (6)> S. Herfst
<(b) (6)> Suzanne Kaptein <(b) (6)> Klimstra, William
Brown <(b) (6)> KNEZEVIC, Ivana <(b) (6)> Krause, Philip (FDA/CBER)
<(b) (6)> Kuhn, Jens (NIH/NIAID) [C] <(b) (6)> Roger Le
<(b) (6)> Lewis, Mark <(b) (6)> Wen-chun Liu <wen-
chun <(b) (6)> Pauline Maisonnasse <(b) (6)> McElroy, Anita
Katherine <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)
Nadia Oreshkova <(b) (6)> Angela Rasmussen <(b) (6)
Joana Duarte Da Rocha Pereira <(b) (6)> B. Rockx

< (b) (6) Estefania Bni < (b) (6) Thomas Rogers
< (b) (6) Javier Salguero < (b) (6) Michael Schotsaert
< (b) (6) Koert Stittelaar < (b) (6) Hendrik Jan
Thibaut < (b) (6) (b) (6) Vergara, Julia
< (b) (6) Martin Beer < (b) (6) Trevor Brasel < (b) (6)
jfwchan < (b) (6) Adolfo García-Sastre < (b) (6) Johan Neyts
< (b) (6) Stanley Perlman < (b) (6) Douglas Reed
< (b) (6) Richt, Juergen (b) (6); Chad Roy < (b) (6) Vasan
Vasan < (b) (6)
Cc: William Dowling < (b) (6) Simon Funnell < (b) (6)
Pierre Gsell < (b) (6) RIVEROS BALTA, Alina Ximena < (b) (6) HENAO
RESTREPO, Ana Maria < (b) (6) Dan Barouch < (b) (6)
Subject: RE: Nature review accepted

Congratulations to everybody and especially to César, for his great efforts to get there. It has been a real pleasure to contribute... and definitively a great pleasure to be part of the team of Thursday meetings.

Very best regards,

Quim

De: Cesar Munoz-Fontela < (b) (6)
Enviado el: dimarts, 15 de setembre de 2020 14:20
Para: Randy Albrecht < (b) (6) Dr. Hanne Andersen
< (b) (6) Ralph Baric < (b) (6) Miles Carroll
< (b) (6) Cavaleri Marco < (b) (6) 秦川
< (b) (6) Crozier, Ian (NIH) [C] < (b) (6) Kai Dallmeier
< (b) (6) Leon de Waal < (b) (6) De wit, Emmie
(NIH/NIAID) [E] < (b) (6) Leen Delang < (b) (6) Erik Dohm
< (b) (6) Duprex, Paul < (b) (6) Darryl Falzarano
< (b) (6) Finch, Courtney (NIH/NIAID) [C] < (b) (6)
Matthew Frieman < (b) (6) Barney Graham < (b) (6)
Lisa E Gralinski < (b) (6) (b) (6) B. Haagmans
< (b) (6) Geraldine Hamilton < (b) (6)
Hartman, Amy Lynn < (b) (6) S. Herfst < (b) (6) Suzanne Kaptein
< (b) (6) Klimstra, William Brown < (b) (6) KNEZEVIC, Ivana
< (b) (6) Krause, Philip < (b) (6) Kuhn, Jens (NIH/NIAID) [C]
< (b) (6) Roger Le < (b) (6) Dr. Mark Lewis
< (b) (6) Wen-chun Liu < (b) (6) Pauline Maisonnasse
< (b) (6) McElroy, Anita Katherine < (b) (6) Munster,
Vincent (NIH/NIAID) [E] < (b) (6) Nadia Oreshkova
< (b) (6) Angela Rasmussen < (b) (6) Joana Duarte Da
Rocha Pereira < (b) (6) B. Rockx < (b) (6) Estefania
Bni < (b) (6) Thomas Rogers <trogers@scripps.edu>; Javier Salguero
< (b) (6) Michael Schotsaert < (b) (6) Koert
Stittelaar < (b) (6) Hendrik Jan Thibaut (b) (6);
(b) (6) Vergara, Julia (b) (6) Martin Beer (b) (6)

Trevor Brasel < (b) (6) jfwchan < (b) (6) Adolfo Garcia-Sastre
< (b) (6) Johan Neyts < (b) (6) Stanley Perlman
< (b) (6) Douglas Reed < (b) (6) Juergen Richt (b) (6)
< (b) (6); Chad Roy < (b) (6) Segales, Joaquim < (b) (6) Vasan
Vasan < (b) (6)
CC: William Dowling < (b) (6) Simon Funnell < (b) (6)
Pierre Gsell < (b) (6) RIVEROS BALTA, Alina Ximena < (b) (6) HENAO
RESTREPO, Ana Maria < (b) (6) Dan Barouch < (b) (6)
Asunto: Nature review accepted

Dear all,

As you may know by now our COVID-19 Animal Models review paper has been accepted in Nature.

Thank you all so much for the great work, the openness and the contribution to this study. Special thanks to Ana María for the initiative, to Dan for leading the process and to Bill, Simon, Pierre and Ximena for the great teamwork.

Congrats to all

César

--

Subject: Decision on Nature manuscript 2020-06-10271C

15th September 2020

Dear Dr Barouch

We are happy to say that your review entitled "Animal Models for COVID-19" has been accepted for publication.

Before the manuscript is sent to the printers, we shall make any detailed changes in the text that may be necessary either to make it conform with house style or to make it intelligible to a wider readership. If the changes are extensive, we shall draw your attention to them, but in any case please read proofs with great care to make sure that the sense has not been altered. Please pay particular attention to any figures which have been re-drawn.

To assist our authors in disseminating their research to the broader community, our SharedIt initiative provides you with a unique shareable link that will allow anyone (with or without a subscription) to read the published article. Recipients of the link with a subscription will also be able to download and print the PDF.

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Thank you very much for your contribution.

Yours sincerely

Lyaina Vitalis Abimbola
Senior Editorial Assistant
Nature

On behalf of Clare Thomas
Senior Editor
Nature

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opportunities. If you have any questions please click [here](#)**

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 2 Sep 2020 15:06:59 -0600
To: Sara LaTrielle; Raina Plowright
Subject: Comp problems

Can you resend the link, problems with my computer

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 1 Sep 2020 10:48:50 -0600
To: LaTrielle, Sara; Plowright, Raina
Subject: Re: PREEMPT P2 budget chat

Let's do 3, do you have the last up to date budget version for TA2 for me?

Talk to you tomorrow,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: "LaTrielle, Sara" <[REDACTED]> (b) (6)
Date: Tuesday, September 1, 2020 at 10:02 AM
To: "Plowright, Raina" <[REDACTED]> (b) (6)
Cc: "[REDACTED]" <[REDACTED]> (b) (6); [REDACTED] <[REDACTED]> (b) (6)
Subject: Re: PREEMPT P2 budget chat

Vincent,

Anytime tomorrow 2-5pm work for you?

Sara

From: Plowright, Raina <[REDACTED]> (b) (6)
Sent: Tuesday, September 1, 2020 9:57 AM
To: LaTrielle, Sara <[REDACTED]> (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Re: PREEMPT P2 budget chat

Wednesday good for me after 2pm.

On Sep 1, 2020, at 9:56 AM, LaTrielle, Sara <[REDACTED]> (b) (6) wrote:

This Wed or Thurs work for both of you?

Sara

From: LaTrielle, Sara

Sent: Tuesday, August 25, 2020 8:04 PM

To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)

Cc: Plowright, Raina <[REDACTED]> (b) (6)

Subject: PREEMPT P2 budget chat

Vincent,

Please let me know when you have 30 mins this or next week for a budget chat for Phase II- to run through your budget as DARPA has started discussions with me in this area.

Can you propose a few dates/times that work for you this or next week?

Best,
Sara

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 26 Aug 2020 17:01:54 -0600
To: Liam Chirio; Bushmaker, Trenton (NIH/NIAID) [E]; Alison Peel;
(b) (6)
Cc: Plowright, Raina
Subject: Re: VTM

Good luck sampling Liam,

Stay safe!

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Liam Chirio <(b) (6)>
Date: Wednesday, August 26, 2020 at 4:59 PM
To: Trenton Bushmaker <(b) (6)> Alison Peel <(b) (6)>
(b) (6) <(b) (6)>
Cc: (b) (6) <(b) (6)> "Plowright, Raina"
<(b) (6)>
Subject: Re: VTM

Hi Trent,

The VTM tubes have arrived at Griffith.

Thanks again,

Liam Chirio

Research Assistant

Environmental Futures Research Institute

Griffith University

Nathan, QLD 4111

Mobile: (b) (6)

From: Liam Chirio <[REDACTED] (b) (6)>
Sent: Wednesday, August 19, 2020 10:53 AM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)> [REDACTED] (b) (6) <[REDACTED] (b) (6)> <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>
Subject: Re: VTM

Thanks Trent. Will do.

Kind regards,

Liam Chirio

Research Assistant

Environmental Futures Research Institute

Griffith University

Nathan, QLD 4111

Mobile: [REDACTED] (b) (6)

From: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Wednesday, August 19, 2020 5:09 AM
To: Liam Chirio <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)> [REDACTED] (b) (6) <[REDACTED] (b) (6)> <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Plowright, Raina <[REDACTED] (b) (6)>
Subject: FW: VTM

Liam,
3,500 tubes of VTM has been shipped to you. Please let me know all is well when it arrives.

-Trent

From: Callison, Julie (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Tuesday, August 18, 2020 12:29 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Shupert, W. Lesley (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Menk, Kay (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: RE: VTM

Hey Trent,

Les sent this out, and here is the label with the tracking info.

You and Liam are also on the Fed Ex alert emails.

Thanks!

Julie

From: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Tuesday, August 11, 2020 2:19 PM
To: Callison, Julie (NIH/NIAID) [E] <[REDACTED] (b) (6)> Shupert, W. Lesley (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Menk, Kay (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: FW: VTM

Julie,

I would like to send out a box at room temperature, non-infectious media to this address. It will be 3,500 tubes of VTM.

Shipping address:

Attention: Liam Chirio
Science 2 (N34) -1.02A Science Road,
Nathan, Queensland 4111.
Phone: [REDACTED] (b) (6)
Email: [REDACTED] (b) (6)

VEU will be paying for this shipment. Let me know when would be a good day to send them out.

-Trent

From: Liam Chirio <[REDACTED] (b) (6)>
Sent: Tuesday, August 11, 2020 11:20 AM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>
Subject: Re: VTM

Hi Trent,

Great thanks for that.

Shipping address: Science 2 (N34) -1.02A Science Road, Nathan, Queensland 4111.

Liam Chirio

(b) (6)

(b) (6)

Yep that's fine about the boxes.

Cheers

Liam

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From: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>

Sent: Wednesday, August 12, 2020 1:24:05 AM

To: Liam Chirio <(b) (6)>

Cc: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Alison Peel <(b) (6)>

Subject: RE: VTM

Liam,

I have 3,500 VTM samples for your crew. Could you send me your shipping address?

Just an heads up, all the tubes will be in large plastic bags. You will need boxes for the tubes once they arrive.

-Trent

From: Liam Chirio <(b) (6)>

Sent: Wednesday, June 17, 2020 2:50 PM

To: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>

Cc: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Alison Peel <(b) (6)>

Subject: Re: VTM

Yeah mid August should be perfect. Thanks Trent

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From: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>

Sent: Thursday, June 18, 2020 1:32:21 AM

To: Liam Chirio <(b) (6)>

Cc: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Alison Peel <(b) (6)>

Subject: RE: VTM

Ok sounds good. Mid- August would be good then. Just so I can have a timeframe?

-Trent

From: Liam Chirio <(b) (6)>

Sent: Tuesday, June 16, 2020 9:33 PM

To: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>

Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>
Subject: Re: VTM

We should have enough at the moment to see us through August, as long as there aren't an absurd number of spillover events between now and then.

Kind regards,

Liam Chirio

Research Assistant

Environmental Futures Research Institute

Griffith University

Nathan, QLD 4111

Mobile: [REDACTED] (b) (6)

From: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Wednesday, June 17, 2020 12:38 AM
To: Liam Chirio <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6).au>
Subject: RE: VTM

When do you need them? We are on skeleton staffing right now.

-Trent

From: Liam Chirio [REDACTED] (b) (6)
Sent: Monday, June 15, 2020 11:51 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>
Subject: Re: VTM

Hi Trent,

I am ordering supplies to hopefully get us through to the end of the year.

Can request some more VTM tubes from you guys? We will need approximately another 3200 tubes to last until the end of December.

Kind regards,

Liam Chirio

Research Assistant

Environmental Futures Research Institute

Griffith University

Nathan, QLD 4111

Mobile: (b) (6)

From: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>
Sent: Saturday, November 9, 2019 2:52 AM
To: Liam Chirio <(b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Alison Peel <(b) (6)>
Subject: RE: VTM

Liam,

I have (52) boxes that I would like to send you Wednesday or Thursday next week. I few of the boxes that are 9x9 inserts but not many. They will be at room temperature during shipment. Do you see any issues with sending them next week?

This shipping address is still good?

Attention: Amanda Todd

Science 2 (N34) -1.02A Science Road, Nathan, Queensland 4111.

(b) (6)

(b) (6)

Hope you are well.

-Trent

From: Bushmaker, Trenton (NIH/NIAID) [E]
Sent: Thursday, October 17, 2019 3:08 PM
To: Liam Chirio <(b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Alison Peel <(b) (6)>
Subject: RE: VTM

My guess is I will ship(at the latest) November 19th. I bet you will get it by the 25th.

Your teeth shipment only took ~4 days to come in. That was room temperature and was a little more special.

Will that work?

In truth I bet it will be done & shipped before that. However, I need to order a few media components so I can promise anything. We will work hard to get it to you sooner.

-Trent

From: Liam Chirio <[REDACTED] (b) (6)>
Sent: Thursday, October 17, 2019 2:55 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>
Subject: Re: VTM

Hi Trent,

Do you think it will arrive before the end of November? Perhaps if it is express posted?

Liam

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From: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, October 18, 2019 2:50:50 AM
To: Liam Chirio <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>
Subject: RE: VTM

Liam,

We will get these 45 boxes done by November 15th and send them out the following week. Will that work?

-Trent

From: Liam Chirio <[REDACTED] (b) (6)>
Sent: Wednesday, October 16, 2019 4:14 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)>
Subject: Re: VTM

We should have enough VTM tubes to last us for October and November under roosting sessions, but we would need them by the end of November to enable preparation for December catching (first week of December).

45 boxes would be optimal, that should be enough to get us through until the end of March at least.

Shipping address: Science 2 (N34) -1.02A Science Road, Nathan, Queensland 4111.
Mandy's contact details would be best as I will be on leave during November.

(b) (6)

(b) (6)

Kind regards,

Liam Chirio

Research Assistant

Environmental Futures Research Institute

Griffith University

Nathan, QLD 4111

Mobile: (b) (6)

From: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>

Sent: Thursday, October 17, 2019 8:02 AM

To: Liam Chirio <(b) (6)>

Cc: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Alison Peel <(b) (6)>

Subject: RE: VTM

Liam,

We will need to make VTM tubes for you because all our stocks will be used for a upcoming project in Congo. So we will not be able to send them with Ali + crew.

So few questions:

1. When do you need them by?
2. What is your optimal amount? 45 boxes?
3. Shipping address(email and phone number)

I will send them at room temperature but you will need to freezer at -20 for long term storage if not being used.

-Trent

From: Liam Chirio <[REDACTED] (b) (6)>
Sent: Monday, October 14, 2019 7:33 PM
To: Alison Peel <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E]
[REDACTED] (b) (6)
Subject: VTM

Hi Trent,

Our VTM reserves are starting to run a little low here in Australia. Is there any particular process that I will need to go through to order some more stock?

I am trying to stock up with supplies to get us through until the end of March 2020, which would require approximately another 4200 tubes (42 boxes), however, if this is too big of an ask then we would be happy to grab as many as possible for now. Or, if you are able to send that amount and there would be extra room in the shipping box, we would also be happy to take a few extra as spares.

We should have ample freezer space to store the spare VTM soon as we have purchased another freezer.

I'm not sure what time frame is required to prepare all of this, but if it is relatively quick could sending it home with one of the Australian team be an option?

Ali could this be an option? Or would you prefer to have it sent via post?

Kind regards,

Liam Chirio

Research Assistant

Environmental Futures Research Institute

Griffith University

Nathan, QLD 4111

Mobile: [REDACTED] (b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 26 Aug 2020 15:43:33 -0600
To: LaTrielle, Sara
Cc: Plowright, Raina
Subject: Re: PREEMPT P2 budget chat

How about Monday?

Trying to get some stuff of my plate and have to do NHPs on Thursday and Friday in 4

From: "LaTrielle, Sara" <(b) (6)>
Date: Tuesday, August 25, 2020 at 8:04 PM
To: '(b) (6)' <(b) (6)>
Cc: "Plowright, Raina" <(b) (6)>
Subject: PREEMPT P2 budget chat

Vincent,

Please let me know when you have 30 mins this or next week for a budget chat for Phase II- to run through your budget as DARPA has started discussions with me in this area.

Can you propose a few dates/times that work for you this or next week?

Best,
Sara

From: Plowright, Raina
Sent: Fri, 21 Aug 2020 12:00:23 +0000
To: Jamie Lloyd-Smith
Cc: Hector Aguilar-Carreno; Munster, Vincent (NIH/NIAID) [E]; Schountz, Tony
Subject: Re: US based transition partner and MSU's transition plans

thanks Jamie.

On Aug 20, 2020, at 10:42 AM, Jamie Lloyd-Smith <[REDACTED] (b) (6)> wrote:

Hi, sorry, looks like we missed the useful window to respond on this. To be honest, I haven't had any concrete traction on transition partners. We did a bit of speed dating at the PI meeting, and had some congenial conversations, but nothing really came of it. Seems like Vincent has the best grasp of partners for actual countermeasures. As for G-to-P and risk prediction, maybe CDC, NAMRU, possibly also DTRA? (Pete would know best about that.)

cheers
jamie

On Wed, Aug 19, 2020 at 9:00 PM Plowright, Raina <[REDACTED] (b) (6)> wrote:
I will write about ecological stuff, but if you have any ideas or names for your work, let me know... thank you!

Begin forwarded message:

From: [REDACTED] (b) (6)
Subject: US based transition partner and MSU's transition plans
Date: August 19, 2020 at 9:49:44 PM MDT
To: "Plowright, Raina" <[REDACTED] (b) (6)> "LaTrielle, Sara" <[REDACTED] (b) (6)>
<[REDACTED] (b) (6)> Peter Hudson <[REDACTED] (b) (6)>

Hi Raina,

Can you tell me a bit (via email) about your transition partner discussions and approach? I am having a chat at 10am EDT with a colleague at NGA (<https://www.nga.mil/Pages/Default.aspx>), where our current BTO Deputy Director (currently she's BTO Acting Director) used to work, about transition and PREEMPT. So it would be good for me to get an update on this from your perspective.

Many thanks!
[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
Box 723905
Los Angeles, CA 90095-7239

Phone: [REDACTED] (b) (6)

<https://www.eeb.ucla.edu/Faculty/lloydsmith/>
Office: 4135 Terasaki Life Sciences Building
Lab: 4000 Terasaki Life Sciences Building

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 6 Aug 2020 15:49:21 -0600
To: Emily Gurley; Kwe Claude, Yinda (NIH/NIAID) [F]; Bushmaker, Trenton (NIH/NIAID) [E]
Cc: (b) (6) Clif McKee; Plowright, Raina
Subject: Re: shipment from Bangladesh

Hi Emily,

I think we should be able to manage this,

Cheers,

Vincent

From: Emily Gurley <(b) (6)>
Date: Thursday, August 6, 2020 at 3:32 PM
To: "(b) (6) <(b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <(b) (6) Trenton Bushmaker <(b) (6)>
Cc: "(b) (6) <(b) (6)> Clif McKee <(b) (6) "Plowright, Raina" <(b) (6)>
Subject: shipment from Bangladesh

Vincent, Kwe, and Trent,

I know you all are totally occupied with COVID. But, I'm writing with some good news. We can now get shipments of samples out of Bangladesh again. Any chance we might be able to send you some? Even if you're not able to do any testing, there are still benefits with getting some samples out. But, realize there's also plenty of time required for receiving samples, too.

Let us know. It would take a couple of weeks (approx.) to set up.
Emily

From: Plowright, Raina
Sent: Tue, 4 Aug 2020 03:23:37 +0000
To: Smith, Ina (H&B, Black Mountain)
Cc: Edward Annand; Laing, Eric; Broder, Chris (USU-DoD); Munster, Vincent (NIH/NIAID) [E]; Alison Peel; Peter Reid
Subject: Re: Congrats!

Thanks for sharing! Maybe we don't have to travel so far to find henipas after all!

On Aug 3, 2020, at 6:52 PM, Smith, Ina (H&B, Black Mountain) <[REDACTED] (b) (6)> wrote:

Congratulations all

Cheers
Ina

Ina Smith, PhD
Senior Research Scientist | Risk Evaluation and Preparedness Program | Health and Biosecurity | CSIRO,
Clunies Ross St, Black Mountain ACT 2601 Ph. [REDACTED] (b) (6)

From: Edward Annand <[REDACTED] (b) (6)>
Sent: Monday, 3 August 2020 11:57 PM
To: Laing, Eric <[REDACTED] (b) (6)> Broder, Christopher <[REDACTED] (b) (6)> Vincent Munster <[REDACTED] (b) (6)>
Cc: Smith, Ina (H&B, Black Mountain) <[REDACTED] (b) (6)> Alison Peel <[REDACTED] (b) (6)> Raina Plowright <[REDACTED] (b) (6)> Peter Reid <[REDACTED] (b) (6)>
Subject: Congrats!

“Serological Evidence for Henipa-like and Filo-like Viruses in Trinidad Bats <https://doi.org.ezproxy1.library.usyd.edu.au/10.1093/infdis/jiz648>”

A Superb paper – congratulations!

Ed Annand

BVSc(Hons) MANZCVS (Equine Surgery) & (Epidemiology) CertAVP (Equine Stud Medicine) PgCertVPS MRCVS
Research Associate and PhD candidate
One Health Epidemiology and Virology
University of Sydney | Sydney School of Veterinary Science
Marie Bashir Institute for Infectious Diseases and Biosecurity (Zoonoses Node)
CSIRO | Health and Biosecurity

E [REDACTED] (b) (6) T [REDACTED] (b) (6)

From: Plowright, Raina
Sent: Fri, 31 Jul 2020 19:40:31 +0000
To: Jennifer O'Mahony; Vanessa Hudson
Cc: Peggy Eby; Alison Peel; Emily Gurley; Hector Aguilar-Carreno; Munster, Vincent (NIH/NIAID) [E]; Jamie Lloyd-Smith
Subject: Re: Zoonotic diseases - VICE TV enquiry

Hi Jennifer and Vanessa,
It was great to talk to you today. I've cc'd members of our team who may be able to tell different parts of the story.
Peggy is the bat biologist in Australia
Ali leads the Australian work
Emily leads the Bangladesh work
Hector is involved in the genotype-to-phenotype work (G-P)
Vincent runs field studies in the Congo and is also doing the G-P work
Jamie is modeling the G-P work and much else
Raina

On Jul 29, 2020, at 10:47 AM, Plowright, Raina <[REDACTED]> (b) (6) wrote:

Friday works. Noon MT? I may end up having to cancel because of a Governor's COVID meeting but we can start with this time and adjust last minute if needed.

On Jul 29, 2020, at 10:30 AM, Jennifer O'Mahony <jennifer.omahony@vice.com> wrote:

Hi Raina,

Just checking to see if tomorrow or Friday might be good for a call, though I understand you're super busy.

All best,

Jennifer O'Mahony
Journalist and producer
jenniferomahony.com
(+34) 626 299 672
(+44) 7557 983 498
@jaomahony

On 28 Jul 2020, 20:47 +0200, Jennifer O'Mahony <jennifer.omahony@vice.com>, wrote:
Hi Raina,

Just copying my colleague Vanessa here as she is New York-based and can pick up any email

from this afternoon/evening.

All best

Jennifer O'Mahony

Journalist and producer

jenniferomahony.com

(+34) 626 299 672

(+44) 7557 983 498

[@jaomahony](https://twitter.com/jaomahony)

On 28 Jul 2020, 17:00 +0200, Jennifer O'Mahony <jennifer.omahony@vice.com>, wrote:

Hi Raina,

Would tomorrow morning work for you? I am based in Madrid so GMT+2 time. All of this sounds very interesting for us and I would like to speak as soon as you can to get more details.

All best,

Jennifer O'Mahony

Journalist and producer

jenniferomahony.com

(+34) 626 299 672

(+44) 7557 983 498

[@jaomahony](https://twitter.com/jaomahony)

On 28 Jul 2020, 00:38 +0200, Plowright, Raina <[REDACTED] (b) (6)> wrote:

Hi Jennifer,

Flat out right now but could chat later this week. We have field teams in Australia, Ghana, and Bangladesh all working now. Madagascar is still shut down.

Raina

On Jul 23, 2020, at 6:50 AM, Jennifer O'Mahony <jennifer.omahony@vice.com> wrote:

Dear Dr Plowright,

I am a journalist currently researching an upcoming episode of a VICE News TV show about zoonotic diseases. We are keen to explain to our young audience the complexities of how pandemics happen, and how zoonotic diseases are made and transmitted to humans via intermediary species.

I was speaking yesterday with David Quammen and he said you might have some good leads for potential field work we could film in Australia, as so much research is currently in limbo right now.

If you are free for a chat today or tomorrow about your own work and any leads on field work we might film anywhere in the world right now, do let me know.

All best,

Jennifer O'Mahony

Journalist and producer

jenniferomahony.com

(+34) 626 299 672

(+44) 7557 983 498

@jaomahony

From: Schountz, Tony
Sent: Wed, 29 Jul 2020 16:02:42 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: Spike insert in BEI stock

Yes, I saw that. I figured they'd be doing it since they have a hantavirus group and a large deer mouse colony. We have quite a bit more data than theirs, including virus in the olfactory bulb and inflammation in the tongue that appears to put pressure on nerves. Our manuscript should go out this week.

Peculiar about the insert. The BEI virus is also a Washington state isolate (<https://www.ncbi.nlm.nih.gov/nuccore/MT020881.1>, Severe acute respiratory syndrome coronavirus 2 isolate 2019-nCoV/USA-WA1-F6/2020). We'll be checking the virus from the hamsters to see if it's also selected during infection.

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: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Sent: Wednesday, July 29, 2020 9:47 AM
To: Schountz, Tony <(b) (6)>
Subject: Re: Spike insert in BEI stock

We don't see that with our virus p4, WA isolate.

Saw that the Canadians pushed out a deer mouse manuscript

On 7/29/20, 9:02 AM, "Schountz, Tony" <(b) (6)> wrote:

Vinnie, do you have the BEI SARS2 virus? We have found a low frequency insert of 4 residues in the NTD of the spike that goes to fixation after passage in deer mice. I can send sequence and primers if you're interested in testing it.

Sent from my iPhone

From: Plowright, Raina
Sent: Wed, 29 Jul 2020 04:06:41 +0000
To: Amandine Gamble
Cc: Jamie Lloyd-Smith; David William Buchholz; Hector Aguilar-Carreno; LaTrielle, Sara; Munster, Vincent (NIH/NIAID) [E]
Subject: Re: short turnaround: MSU's performance status update

Fabulous, thanks, as always, Amandine!

On Jul 28, 2020, at 10:05 PM, Amandine Gamble <[REDACTED]> (b) (6) wrote:

Hi,

I wrote that thinking that RML (or Cornell if they have the info at the top of their head) would complet with the numbers of new sequences obtained from field samples. Sorry I did not follow up.

I checked an old presentation (January 2020) and I could count 35 new Hendra G sequences and 37 new Hendra F sequences (I counted them from a tree that Kwe did so I am not sure they are all there). See slides 36 and 38 of the attached presentation.

Agree with you Raina that there is probably no need to go too deep into the details anyway.

Amandine

Le mar. 28 juil. 2020 à 23:42, Plowright, Raina <[REDACTED]> (b) (6) a écrit :
No worries! I did check there but not mentioned specifically. Although 10 mutations are listed for both F and G but I suspect that not all are expected to have phenotypic consequences. I'll keep it very general so I don't get myself into virological deep water!
Raina

On Jul 28, 2020, at 9:36 PM, Jamie Lloyd-Smith <[REDACTED]> (b) (6) wrote:

I'm juggling kids at the moment, and Hector is the best to answer this question. But if you need an answer quickly I think it can be plucked from the PI mtg PowerPoint.

J

On Tue, Jul 28, 2020 at 8:27 PM Plowright, Raina <[REDACTED]> (b) (6) wrote:
Hector, was someone supposed to fill in the X and Y? Described **X** novel G and **Y** novel F..
Anyhow, your test is really great. thanks all.

On Jul 28, 2020, at 5:58 AM, Hector Aguilar-Carreno <[REDACTED]> (b) (6) wrote:

Amandine and Jamie,

Thank you so much for taking the lead. Amazing job, as usual. I revised the document by changing the language a bit in several parts, completing others, and adding a bit of text for phase II for the Cornell side of things. I feel that this needs to be integrated a bit with what UCLA and RML will do for phase II. I added estimates of % effort throughout, but please feel free to change those % efforts or any of my language, obviously.

I hope this helps, and please let me know how else I can help. BTW, my PhD student defends her thesis today from 11am-1 pm EST, so I will be unavailable during that time window.

All the best,

Hector

Hector Aguilar-Carreno
Associate Professor
Microbiology and Immunology
College of Veterinary Medicine
Cornell University

Office: (b) (6)

From: Jamie Lloyd-Smith (b) (6)

Sent: Tuesday, July 28, 2020 3:53 AM

To: Amandine Gamble <(b) (6)> Plowright, Raina

<(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)>

Hector Aguilar-Carreno <(b) (6)> LaTrielle, Sara <(b) (6)>

Subject: Re: short turnaround: MSU's performance status update

Hi Raina, Vincent, Hector and Amandine,

OK Amandine and I have had a go at filling in content for the middle three rows, which all touch on G-to-P or virology-meets-modeling work. Actually Amandine did the big lift (and over-performed as usual!) then I have made some edits and additions. We have strayed into the lab-driven topics because everything is so intertwined, but of course Hector and Vincent know much better what is going on, so I'm copying everyone here in the hope that our draft text helps reduce workload. If you've already written your own versions, or if our text is way off-base, please just replace. I put in some comments with question marks, where I wasn't sure what exactly was planned in the lab-work, or what was actually slated for phase 2. Same is true for some of our modeling aims -- I have listed work that we hope to have done by early next year, but some of it (esp related to the transmission experiments?) might be better for phase 2. Whatever you think is best, Raina!

Also, I expect this is a fair bit more detail than you need, but we erred on the side of including more information, and didn't want to draft summary statements since I'm sure many others will be sending input. Feel free to cut/condense/summarize as needed, obviously. Or we can suggest succinct phrases for our boxes once the key info is assembled (and given a target/example for tone and level of detail).

Cheers, thanks, much strength to you!
Jamie

On Mon, Jul 27, 2020 at 5:21 PM Amandine Gamble <(b) (6)> wrote:
Hi Jamie, here is a first draft.

- I have put "UCLA" at the beginning so Raina knows we added those elements (so they might be inaccurate for some lab aspects), not to say they are ours (lots of Cornell and RML work).
- I have put comments but realized they don't follow the text so if you add/remove text, it's hard to know what they refer to so I made them quite long and put the reference text in bold on the slide
- The text can probably be condensed but I went for the "longer" version so you (or Raina) have all the elements
- I am struggling to know what goes into the 4th row (I'm familiar with the task structure but not much with this more global one), but it's probably things I've put in the 2nd one. For instance dose-response experiments on mice and hamsters, measuring environmental stability in the environment and linking it to infection risk, developing the controlled receptor expression and F:G ratio expression platforms are all part of developing a pipeline linking "lower trait" functional characterisation to spillover and pandemic risk.

I can work on it again later tonight/tomorrow morning so don't hesitate to send it back.

Amandine

Le lun. 27 juil. 2020 à 16:00, Jamie Lloyd-Smith <[REDACTED] (b) (6)> a écrit :
FYI

----- Forwarded message -----

From: Plowright, Raina <[REDACTED] (b) (6)>
Date: Mon, Jul 27, 2020 at 3:49 PM
Subject: Re: short turnaround: MSU's performance status update
To: Jamie Lloyd-Smith <[REDACTED] (b) (6)>
CC: [REDACTED] (b) (6) <[REDACTED] (b) (6)>

Good questions. I can only guess but I think we should include COVID work as our SOW was revised to say 'various pathogens' so every time henipaviruses are mentioned it was changed to 'various pathogens' or something like this. I think this document is creating the reality of our work for the new office leader and so we can be creative and do what works best to make us look great.

For status I'd say on track (given COVID-related NCE) etc.

I'm not tracking this as carefully as I should because I was asked (on Friday) to come up with a COVID testing plan for the Montana University System (UM & MSU) with first draft tomorrow (shocking I know)... so head not above water.

Raina

From: Jamie Lloyd-Smith <[REDACTED] (b) (6)>
Date: Monday, July 27, 2020 at 4:40 PM
To: Raina Plowright <[REDACTED] (b) (6)>
Cc: "[REDACTED] (b) (6) <[REDACTED] (b) (6)>"
Subject: Re: FW: short turnaround: MSU's performance status update

Hi Raina,

Good news about phase 2. And many thanks to you and Pete for all the efforts at communicating with yet another set of DARPA leadership. (the mind reels)

For this new exercise, are we reporting (and setting new metrics) for henipas only? And are the new metrics what we plan to achieve (for henipas) by the end of phase 1? Is the no-cost extension official, so we're talking about Mar 2021?

thanks
Jamie

On Mon, Jul 27, 2020 at 1:49 PM Plowright, Raina <(b) (6)> wrote:
Hi all,

Pete and I are just off a call with (b) (6) and team. I'll email details later. But in short, we are certainly going to Phase II (yay, but old news now). There is a change of leadership in the BTO, there is a need to justify PREEMPT and the new leader wants as many details as possible to understand the program. They don't get field work and they don't get modeling and they don't get anything that isn't human-drug delivery type intervention. (b) (6) said that leadership is having trouble understanding why we needed Phase I/TA1 to get to TA2. Pete and I have done a lot of talking and explaining and (b) (6) gets it but his leadership are lab folks and are struggling.

Can you contribute to this doc. They allow a 'proposed metrics revision' which is a nice opportunity.

I'll compile the work tomorrow. As usual, they give a 24 hr turn around but I need lead time to assemble, so by mid-morning tomorrow please.

Raina

On 7/27/20, 12:34 PM, (b) (6) wrote:

Hi team,

As many of you know, the BTO Front Office had a leadership change in July, which created a new interest in examining the work done by each PREEMPT performer. With this enthusiasm to understand MSU's research efforts, comes a short turnaround tasker on your team's performance highlights.

Please complete the attached slide by end of day on Tuesday, July 28th so we can debrief on your most recent status at this week's leadership meeting. Completing the slide should be quite straightforward and we are here if you have any questions.

Thanks in advance,
(b) (6)

(b) (6)
DARPA/BTO SETA
Booz|Allen|Hamilton
(b) (6)
office (b) (6)
cell: (b) (6)

--
James O. Lloyd-Smith

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--

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<MSU Performance Status Update_28JUL20_ag_jls_hac.pptx>

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<PREEMPT_202001_report_G-to-P_DARPA_call.pptx>

From: Plowright, Raina
Sent: Fri, 24 Jul 2020 18:46:40 +0000
To: Barbara Han
Cc: Colin Parrish; Munster, Vincent (NIH/NIAID) [E]; Olivier Restif; Peter Hudson;
(b) (6)
Subject: Re: no news yet from DARPA

Thanks everyone. I was busy with a 5-hour Board of Health meeting this morning but just wrote to (b) (6) for more clarification and your emails below were very helpful.

On Jul 24, 2020, at 8:51 AM, Barbara Han <(b) (6)> wrote:

Raina, would it be possible to reach back out to (b) (6) and ask what DARPA front office are seeking (or what they would be happy with) in terms of deliverables for COVID work and for henipa work? It's hard to answer their question well without understanding the motivation behind it. (b) (6) may not have a 100% clear picture of this either, but he'd have more clarity than we do and might be able to guide us there.

Barbara

On Fri, Jul 24, 2020 at 10:44 AM Colin Ross Parrish <(b) (6)> wrote:
Agree with Pete and others, but trying to understand the DARPA managers mindset is the challenge. (I felt that the previous communications were not "no news" but provided some fairly clear but indirect information about what DARPA was thinking and that in general it is looking good for your program).

The hardest part is how the "pivot to COVID" plays into this - and they really need to figure out what they are trying to accomplish there....it all seems to be quite confusing and they seem to want to do two things at the same time but with no extra support or guidance.

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); Skype: colinparrish

From: Hudson, P <(b) (6)>

Sent: Friday, July 24, 2020 10:38 AM

To: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Olivier Restif <(b) (6)>

Raina Plowright <(b) (6)>

Cc: (b) (6) <(b) (6)>

Subject: Re: no news yet from DARPA

I always think this is a silly question to ask

The first answer is “until we have the power to answer the questions we address”

But then second, as Vincent says you need to go deeper to reveal the mechanisms that will need more power more samples

And third, if you are running a longitudinal study with large scale variation then this is the foundation that everything else is built on – so until we have no more interesting questions

The answer is therefore – until we have revealed the important non-linearities that drive spillover

Pete

Peter Hudson FRS

Willaman Professor of Biology

Adjunct Professor at Nelson Mandela African Institute – Arusha

A co-hire of The Huck institutes & The Institutes of Energy & The Environment

229C Millennium Science Complex

Penn State University

(O) [REDACTED] (b) (6)

(C) [REDACTED] (b) (6)

Websites:

Science: <https://www.huck.psu.edu/people/peter-hudson>

Photography: <https://www.peterhudsonphotos.com>

Conservation: <http://www.pawstrails.com>

Instagram: https://www.instagram.com/peter_hudson018/

From: Vincent Munster <[REDACTED] (b) (6)>
Reply-To: Vincent Munster <[REDACTED] (b) (6)>
Date: Friday, July 24, 2020 at 9:40 AM
To: Olivier Restif <[REDACTED] (b) (6)> Raina Plowright <[REDACTED] (b) (6)>
Cc: "[REDACTED] (b) (6)" <[REDACTED] (b) (6)>
Subject: Re: no news yet from DARPA

I would think that that is exactly what they would need,

How much sampling is enough?: in truth it's never enough as the questions will keep on progressing and get more detailed.

From: Olivier Restif <[REDACTED] (b) (6)>
Reply-To: Olivier Restif <[REDACTED] (b) (6)>
Date: Friday, July 24, 2020 at 2:15 AM
To: Raina Plowright <[REDACTED] (b) (6)>
Cc: "[REDACTED] (b) (6)" <[REDACTED] (b) (6)>
Subject: Re: no news yet from DARPA

Hi Raina,

Thank you for the update. I'm not sure either how to answer their question. As you've been reminding them repeatedly, the plan for field work was always to limit it to Phase I (because that's what DARPA's original programme requested). We had two main goals: one was qualitative -- collect a diverse set of virus sequences to feed into the G2P pipeline -- and the other was more quantitative -- detect seasonal variations in virus shedding in the field, with a focus on Australia. Looking at the Australian dataset, the latter goal has been achieved. The bottleneck for the first goal is now the sequencing, but we already have a number of sequences

from all sites (including partial sequences from Ghana). As far as Ghana is concerned, our focus for Phase II combines monitoring of the captive colony and isolated bats to measure drivers of virus shedding. Because of pandemic-related delays with sample processing and shipping, we're only just starting to get results from the past year of sample collection. As the results of serology and sequencing become available, we will look for trends and associations, which we will then use to design targeted sample collection and experiments in the captive facilities. Key questions we want to address include:

- is serology predictive of infection and shedding? (using two quantitative serological assays for binding and neutralisation)
- are shedding and transmission driven by reproductive cycle (mating, pregnancy, births)?

I don't know if that's helpful but that's my current rule of thumb.

Cheers

Olivier

On 24 Jul 2020, at 03:09, Plowright, Raina <[REDACTED] (b) (6)> wrote:

Well I just heard something. This is from [REDACTED] (b) (6) new technical assistant.

I'll let you all think about the question they ask. Please send any thoughts overnight or early AM and I'll respond to DARPA tomorrow.

Raina

Hi Raina and Sara,

Thank you again for all of your help in compiling the thorough status report slides for the PREEMPT program meeting with BTO Front Office (FO) leadership. We had a very insightful dialogue and are excited about seeing PREEMPT move on to Phase II.

One of the questions that came out of this discussion is the BTO FO wanting to hear a more detailed assessment of how MSU intends to decide on when data collection can stop from a perspective of collecting sufficient scientific input. The inquiry is stemming from the new director attempting to understand your goalposts and future directions.

Please also provide some insights as to what is the general rule of thumb or gold standard for quantifying data collection and guidance for determining when sufficient insights have been gleaned.

Thanks in advance for your insights,

(b) (6)

(b) (6)

DARPA/BTO SETA
Booz|Allen|Hamilton

(b) (6)

office: (b) (6)
cell: (b) (6)

From: Raina Plowright <(b) (6)>
Date: Thursday, July 23, 2020 at 11:39 AM
To: "(b) (6)"
Subject: no news yet from DARPA

Hi everyone,

We have been waiting for word from DARPA but have no clear news yet. I had a long email conversation with (b) (6) over the past few days about the regeneration project. He asked for details on our engagement with the Australian Government and stated that they are trying to develop a bilateral agreement between DoD and the Australian equivalent. This is good news as it demonstrates that they are invested in the work.

(b) (6) says "we will be scheduling some time with your team in August to discuss the outcomes of our internal review and ways forward for MSU and the Bat One team. We will need to now further modify the SOW to reflect these outcomes."

I followed up with (b) (6) for specifics but he did not reply.

That's all I can say for now.

Raina

Raina Plowright BVSc MSc PhD

Associate Professor,

Department of Microbiology and Immunology

Montana State University,

109 Lewis Hall, Bozeman, MT 59717, USA

E: [REDACTED] (b) (6).

W: + [REDACTED] (b) (6)

@rainamontana

www.batonehealth.org

www.bzndisceslab.org

[<image001.png>](#)

--

Dr. Barbara A. Han
Disease Ecologist
Cary Institute of Ecosystem Studies
Tel: [REDACTED] (b) (6)

From: Plowright, Raina
Sent: Tue, 14 Jul 2020 21:11:05 +0000
To: (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: HeV testing

I think phase 2 already decided so it's ok. Good to have a paper well along when we send the samples.

Sent from my iPhone

On Jul 14, 2020, at 3:07 PM, Alison Peel <(b) (6)> wrote:

Ok, thanks Vincent!! Glad to hear we're back on!

Raina- just checking that that works for DARPA? Sending in mid Oct means results in early Dec or thereabouts I guess?

On Wed, 15 Jul 2020 at 12:06 am, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Hi Ali,

We should be able to screen these (and obviously want to). I would send them all in one batch, but indeed keep the ones for MSU separate.

Cheers,

Vincent

From: Alison Peel <(b) (6)>
Reply-To: "(b) (6)" <(b) (6)>
Date: Monday, July 13, 2020 at 7:25 PM
To: "(b) (6)" <(b) (6)> Raina Plowright <(b) (6)>
Subject: HeV testing

Hi Vincent,

I wanted to touch base and hear your thoughts about how we should plan for screening the remaining urine samples under PREEMPT Phase 1.

Our last shipment on 11th February. I'd have to do a detailed analyses to get exact numbers, but roughly, it seems like there are 1130 urine samples currently in storage at Griffith but untested. We expect to collect ~1000 or less over the remainder of Phase 1 (end of September). So, I anticipate a total of ~2100 or so remaining.

Is it feasible to ship these or are you still entirely CoV focussed?

If you can test them, would you prefer them in two batches to spread the load, or all at once? Our permits have lapsed, so we have reapplied. Depending on when these come through, the earliest we could ship would likely be late August/early September. The alternative would be sending everything all at once in mid/late October after sampling has finished.

I'm going to assume that we should also not ship any samples that need to go elsewhere, and that these should all be sent directly (e.g. to MSU) from now on, once their CDC permits are in place. Let me know if otherwise.

If you don't think you can test them in the near future, then let's discuss what the plan might be.

Thanks!

Ali

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 25 Jun 2020 13:28:38 -0600
To: LaTrielle, Sara; Jamie Lloyd-Smith
Cc: Plowright, Raina
Subject: Re: 30 min chat today/tomorrow: Phase 2 planning for DARPA

Tomorrow afternoon would work,

Vincent

From: "LaTrielle, Sara" <(b) (6)>
Date: Thursday, June 25, 2020 at 12:46 PM
To: Jamie Lloyd-Smith <(b) (6)>
Cc: '(b) (6) <(b) (6)> "Plowright, Raina"
<(b) (6)>
Subject: Re: 30 min chat today/tomorrow: Phase 2 planning for DARPA

Thanks Jamie- We will wait to hear from Vincent for the 'chat'.

Duly noted with the budget constraints- thanks for mentioning. Important+ work at the end of the day needs to be supported financially. We will do our best to strongly advocate on this front (along with a few other 'fronts').

Sara

From: Jamie Lloyd-Smith <(b) (6)>
Sent: Thursday, June 25, 2020 12:40 PM
To: LaTrielle, Sara <(b) (6)>
Cc: (b) (6) <(b) (6)> Plowright, Raina
<(b) (6)>
Subject: Re: 30 min chat today/tomorrow: Phase 2 planning for DARPA

Hi

I could do today 3-5, tomorrow 2-5 (all MST); earlier is better in both cases. 8-10 am tomorrow do-able if necessary but would prefer to avoid. We have a call with Hector's team later tomorrow morning, so if we do the Fri afternoon slot then I'll have better perspective on Cornell work (wrt henipav and CoVs).

As I said earlier, I'm not going to be able to commit to all the high-impact work at the current funding level. I've been getting by on the cheap with Dylan funded by Princeton up to now, but he starts as postdoc soon. I will struggle to keep him and Amandine going in parallel for the duration of phase 2, and I would likely need to bring in other people if we're trying to do G-P and h-h transmission for SARS-CoV-2 and carrying forward some of the henipavirus stuff (i.e. some G-P and the multiscale spillover model). So there may need to be some contingencies in what is presented to DARPA.

Cheers,
Jamie

On Thu, Jun 25, 2020 at 11:10 AM LaTrielle, Sara <[REDACTED] (b) (6)> wrote:
Vincent and Jamie,

Are you both available for a quick 30 min chat with Raina and perhaps a few others today anytime 2-5pm, or tomorrow/Friday 8-10am or 2-5pm- (all MST times)?

Purpose: re-design Phase II around modeling-virology interface and human-2-human transmission. DARPA is asking for bullet points this week and we have some ideas but need your thoughts/input/feedback prior.

Thanks,
Sara (on behalf of Raina)

--

James O. Lloyd-Smith

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University of California, Los Angeles
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From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 22 Jun 2020 09:15:08 -0600
To: LaTrielle, Sara; Schountz, Tony; (b) (6)
Cc: Amandine Gamble
Subject: Re: COVID weekly update for darpa?

Short updates:

- Functional analyses of sarbecoviruses from Uganda and Rwanda (manuscript submitted)
- SARS-CoV-2 lethal ARDS mouse model (manuscript in prep)
- WHO review animal models (submitted)
- Ongoing environmental stability (with Jamie), data in finalizing phase
- SARS-CoV-2 Transmission studies in hamsters (ongoing)
- Evaluation of long-term shedding of immunocompromised patients (data analyses stage)
- Stability of SARS-CoV-2 in stool and waste water, and disinfection (data in finalizing stage)
- SARS-CoV-2 stability on PPE (in progress)
- Ongoing ChadOX vaccine development (operation warp speed)

From: "LaTrielle, Sara" <(b) (6)>
Date: Monday, June 22, 2020 at 8:51 AM
To: '(b) (6) <(b) (6)> Tony Schountz
<(b) (6) Jamie Lloyd-Smith <(b) (6)>
Cc: Amandine Gamble <(b) (6)>
Subject: COVID weekly update for darpa?

Greetings and good morning. Just checking if you have updates on your covid work from the past week or two?

I am aware that when we have/report 'news' it is rather cumbersome and time-consuming to report on (to DARPA) - but it is our saving grace for Phase 2 in many ways- so please do keep the updates coming when available.

Many thanks,
Sara

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 18 Jun 2020 15:40:38 -0600
To: Adney, Danielle; Seifert, Stephanie (NIH/NIAID) [E]; Purushotham, Jyothi (NIH/NIAID) [F]; Adney, Danielle (NIH/NIAID) [F]
Cc: Bushmaker, Trenton (NIH/NIAID) [E]; van Doremalen, Neeltje (NIH/NIAID) [E]; Schulz, Jonathan (NIH/NIAID) [F]; Letko, Michael (NIH/NIAID) [F]; Fischer, Robert (NIH/NIAID) [F]; Matson, Jeremiah (NIH/NIAID) [F]; Kwe Claude, Yinda (NIH/NIAID) [F]; Offei Owusu, Irene (NIH/NIAID) [F]; Hebner, Madison (NIH/NIAID) [F]; Holbrook, Myndi (NIH/NIAID) [C]; Port, Julia (NIH/NIAID) [F]; Avanzato, Victoria (NIH/NIAID) [F]
Subject: Re: LoVE Lab Diversity and Inclusion Vision Statement

The diversity statement would be added to the LoVE welcome doc, to show our dedication towards inclusivity in science and life in general,

Cheers,

vincent

From: Danielle Adney <[REDACTED]> (b) (6)
Date: Thursday, June 18, 2020 at 3:00 PM
To: "Seifert, Stephanie (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Purushotham, Jyothi (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Adney, Danielle (NIH/NIAID) [F]" <[REDACTED]> (b) (6)
Cc: Trenton Bushmaker <[REDACTED]> (b) (6) Neeltje van Doremalen <[REDACTED]> (b) (6) "Jonathan Schulz <[REDACTED]> (b) (6) Michael Letko <[REDACTED]> (b) (6) Robert Fischer <[REDACTED]> (b) (6) "Matson, Jeremiah (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Offei Owusu, Irene (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Hebner, Madison (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED]> (b) (6) "Port, Julia (NIH/NIAID) [F]" <[REDACTED]> (b) (6) Victoria Avanzato <[REDACTED]> (b) (6)
Subject: LoVE Lab Diversity and Inclusion Vision Statement

Hi all!

Steph, Jon and I wanted to make you aware of some very good additional diversity and inclusion training as well as invite anyone interested to help write a LoVE specific Diversity and Inclusion Vision Statement. This statement would be a document anyone who wants to sign agrees on that explicitly states our commitment to promoting diversity and inclusion and a commitment to continuing to learn about and fighting inequities.

Please let us know if you would be interested in helping craft (or just editing) a statement!

Examples of other lab or company vision statements include:

<https://saraheevanslab.weebly.com/diversity-equity-and-inclusion.html>

<https://sites.duke.edu/silvalab/diversity-inclusion/>

Genentech: We're on a Journey

We are inclusive. We celebrate multiple approaches and points of view. We believe diversity drives innovation. So we're building a culture where difference is valued. We take a holistic approach. We're always growing our network of people, programs and tools all designed to help employees grow and manage their careers. We foster both a top-down and grassroots approach. This gives us the freedom to address the broadest set of initiatives

Johnson&Johnson:

Diversity is a central part of the cultures across the Johnson & Johnson Family of Companies. It's a key to our people's passion for improving the health and well-being of people the world over. Furthermore, our commitment to diversity and inclusion is deeply rooted in the values instilled by Our Credo and is exemplified in a number of our companies' programs and activities. We recognize that differences in age, race, gender, nationality, sexual orientation, physical ability, thinking style and background bring richness to our work environments. Such differences help us connect better with the health needs of people in communities around the world. We believe that attracting, developing and retaining a base of employees that reflects the diversity of our customers is essential to our success. We also believe success hinges on relationships with diverse professional and patient organizations, civic groups and suppliers.

Finally, the AVMA just made a few training sessions by my absolute favorite D&I speaker freely available – Dr. Greenhill is a senior director for institutional research and diversity for the American Association of American Veterinary Colleges and is phenomenal. The links to the training are below.

[Diversity, Marginalization, and Intersectionality](#)

[Unconscious bias](#) (combating its harmful effects)

[Unconscious bias: How it affects us and our teams](#)

Thanks,
Danielle, Steph, and Jonathan

--

Danielle Adney, DVM, PhD

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 18 Jun 2020 13:52:44 -0600
To: Bushmaker, Trenton (NIH/NIAID) [E]; Maureen Kessler
Cc: Raina Plowright; Devin Jones
Subject: Re: Dividing bagged fecal samples

Thanks guys!

From: Trenton Bushmaker <[REDACTED] (b) (6)>
Date: Thursday, June 18, 2020 at 11:58 AM
To: Maureen Kessler <[REDACTED] (b) (6)>
Cc: Raina Plowright <[REDACTED] (b) (6)> "[REDACTED] (b) (6)"
<[REDACTED] (b) (6)> Devin Jones <[REDACTED] (b) (6)>
Subject: RE: Dividing bagged fecal samples

Great thank you.

Is it Adrienne Arnold?

-Trent

From: Maureen Kessler <[REDACTED] (b) (6)>
Sent: Thursday, June 18, 2020 11:47 AM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Raina Plowright <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]
<[REDACTED] (b) (6)> Devin Jones <[REDACTED] (b) (6)>
Subject: Re: Dividing bagged fecal samples

Hi Trent,

Just replying to this message to keep all the fecal sample conversations in one place.

I wanted to let you know that I managed to get a PhD student in Australia (Adrienne) to help with assessing the fecal water weight, so that's no longer something I need RML's help with. Hopefully that helps ease everyone's minds! It will certainly make things easier when thinking about aliquoting the bagged fecal samples.

Manuel is working on a prioritized sample request (pending input from Dan and Caylee right now), so you guys should hear from us soon.

Cheers,
Maureen

On Sat, Apr 25, 2020 at 6:22 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Maureen,

AVL is approved, we use it a lot for inactivation. I really think you should try RLT for DNA extractions (if you analysis allows).

Currently my hands are tied regarding doing any other work beside mission critical work on COVID. This comes from WAY above Vincent's head.

Are you looking for COVID in these samples?

-Trent

From: Maureen Kessler <[REDACTED] (b) (6)>
Sent: Thursday, April 23, 2020 11:58 AM
To: Bushmaker, Trenton (NIH/NIAID) [E] [REDACTED] (b) (6)
Cc: Devin Jones <[REDACTED] (b) (6)>
Subject: Re: Dividing bagged fecal samples

Hi Trent,

I wanted to touch base with you about a few things, if you have some time.

Can you remind me which media are approved for viral inactivation? I know you've told us a million times before. I remember that 70% and 95% EtOH, RLT buffer, trizol, and formalin are fine. What about AVL?

Devin and I are getting very low yields from our DNA extractions from the 70% ethanol. We'd like to trial getting some feces shipped over in different media to see if they'll improve the extraction. Would it be possible to get some bagged feces divided up and shipped in different medias? I can send a sample list; we wouldn't need many samples for this. I know you guys are swamped, so whenever you have time!

Cheers,
Maureen

Maureen Kessler, ScM
Ph.D. Student, [Bozeman Disease Ecology Lab](#)
Montana State University | Department of Ecology
Mob: [REDACTED] (b) (6)
www.bat1health.org

On Thu, Feb 20, 2020 at 4:57 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
wrote:

Maureen,

I will actually look at this tomorrow in detail but here is the address. Send me the tracking once you get it or it might be sent back to you!

Attention: Trenton Bushmaker
Rocky Mountain Laboratories

903 South 4th Street
Hamilton, MT 59840

Phone: (b) (6)

Email: (b) (6)

-Trent

From: Maureen Kessler <(b) (6)>
Sent: Thursday, February 20, 2020 12:30 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)>
Cc: Devin Jones <(b) (6)>
Subject: Re: Dividing bagged fecal samples

Oh, and as a follow-up about shipping the labeled tubes over:
Attached is the full list of NB-F samples we'll be dividing up this round, after the drying results are in.
The second tab will give you a sense for how many tubes are coming.

As we discussed, these will NOT be pre-filled with formalin and ethanol.

On Thu, Feb 20, 2020 at 12:22 PM Maureen Kessler <(b) (6)> wrote:
Hi Trent,

Attached is a list of the fecal samples I'm happy to have dried out for that estimated water weight trial that we talked about. If possible, we'd love to have a bit put into formalin and ethanol, but if that's too difficult to do right now don't worry about it. These are all from GHFF, anyway.

First tab: tube details

- the samples to use & storage details at RML (according to our inventory, at least)
- details of the data to record for the drying trial.

Second tab: basic instructions

- Would love to have tiny bit aliquoted into formalin and EtOH, if fecal amount allows
- Happy for you to change these however you see fit. The biggest thing that I need is the wet weight and corresponding dry weight for that sample.
- Let me know if all the feces look pretty identical...that's not super helpful to me because it won't give a real average, so I'll pick new ones for you.
- Other bonus is photos and/or descriptions of the feces, which will let me know if there are huge discrepancies in water weight depending on the fecal sample

Third tab: fecal texture and color descriptive words

Other things to note:

- We'll be ready to ship the labeled and weighed tubes to you today or tomorrow. What address is best?
- Included in this shipment will be tubes labeled for ethanol & formalin aliquots of the trial samples, and a tube for putting the dried feces into ethanol afterwards (obviously, if too much in a time crunch don't worry about these)

Give me a call if none of this makes sense...

Thanks again!
Maureen

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Mon, Feb 3, 2020 at 2:45 PM Maureen Kessler <[REDACTED]> (b) (6) wrote:
Hi Trent,

Sorry for the delay. Devin and I will be trialing the extraction on a few samples tomorrow, so we'll keep you updated.

I've had Lauren and one of our undergrads weigh and label tubes for samples I'd like divided. What is the best way to mail these to you? There will be more to divide from the future shipment, but hopefully we'll have more tubes weighed and labeled for you before then.

One small issue. My committee member wants me to figure out an approximate average water content of the fecal samples before deciding how much to have you add to each tube. I'd been planning to calculate this after the assay, but my committee member is worried because we really have no idea what that will be like - it would be a bummer to end up with too little sample for the assay. Do you have a way to dry a few of the bagged fecal samples at RML? If not, I think I may have to have a few samples shipped over to MSU asap (in ethanol, of course) so that I can dry and weigh them here. Let me know either way, and I can suggest a few samples to use for that.

Cheers,
Maureen

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Wed, Jan 29, 2020 at 4:24 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Hello,

Could you give me an update of how things are going?

Do you have a sample list? Do we need to revisit the extraction? Etc.

FYI, I will not be going to Congo in March. Coronavirus outbreak go in the way.

Hope you both are good.

-Trent

From: Devin Jones <[REDACTED]> (b) (6)
Sent: Tuesday, January 7, 2020 12:32 PM
To: Maureen Kessler <[REDACTED]> (b) (6)
Cc: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Re: Dividing bagged fecal samples

Haha, thanks so much Trent! Let me know if you need a ride any time or anything at all while you're here!

On Mon, Jan 6, 2020 at 6:04 PM Maureen Kessler <[REDACTED]> (b) (6) wrote:
Sounds good! Thanks again

On Mon, Jan 6, 2020 at 4:08 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Hey,

The (36) samples are done and re-frozen. Took about 1 hr and 30 minutes and I did take the weights just in case (most of the time). It wasn't that hard but most of the samples are like cold caramel so it is going to be hard to be consistent on size. Those scoops might help.

I will pull all the samples mid-day on Wednesday and keep them on dry ice till Thursday when I am there. I will be biking from a buddies house to campus but I "might" need one of you to come pick it up later in the day. Sound ok?

-Trent

From: Maureen Kessler <[REDACTED]> (b) (6)
Sent: Monday, January 6, 2020 12:00 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Cc: Devin Jones <[REDACTED]> (b) (6)
Subject: Re: Dividing bagged fecal samples

Sure! Doesn't hurt. Might be useful having a second set.

On Mon, Jan 6, 2020 at 11:42 AM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Maureen,

It will not be much more work if you want a EtOH set for yourself. Let me know.

-Trent

From: Maureen Kessler <[REDACTED]> (b) (6)
Sent: Monday, January 6, 2020 11:19 AM
To: Devin Jones <[REDACTED]> (b) (6)
Cc: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: Re: Dividing bagged fecal samples

Scratch that. I forgot we were doing the trial here.

for the 12 samples, an aliquot into 95% EtOH (one set, instead of one for me and Devin) and an aliquot into formalin is totally fine.

On Mon, Jan 6, 2020 at 11:16 AM Maureen Kessler <[REDACTED]> (b) (6) wrote:

Oh geez. I totally missed this email. I always try my best to stay on top of things over the holidays, and always inevitably fail...

No. Remember that we're hoping to get all 12 samples into all the types so that we can trial a few other things? I need the undergrads to get started on microscopy, and I need to trial my sequencing methods.

Ideally, a bit will be put into EtOH for Devin, EtOH for me, and formalin for me. If there is not enough sample to do that. Devin's takes priority, followed by EtOH for me. It would be awesome to get a few NB-F samples into formalin regardless...doesn't really matter which ones, to be honest.

For all of these, no weighing is necessary! Totally makes things a bit easier.

Thanks so much Trent.

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Fri, Jan 3, 2020 at 8:17 AM Devin Jones <[REDACTED]> (b) (6) wrote:

Hi Trent,

Sorry for the delay. Been on a much needed holiday.

The 12 NB-F samples that I specified will only need to be put into 95% EtOH. I'm using these for my microbiome trial only. I don't think Maureen is using them for any thing else (but correct me if I'm wrong, Maureen).

Thanks!
Devin

On Mon, Dec 23, 2019 at 11:53 AM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Just to confirm for the (12) NB-F samples:

- (12) dry tubes will be weighted, samples of poop will be scooped into tube and weighted, and then 1mL of 95% EtOH will be added, then the tube will be weighted for a final weight.
- (12) dry tubes will be weighted, samples of poop will be scooped into tube and weighted, and then 1mL of 10% buffered Formalin will be added, then the tube will be weighted for a final weight.

Does this all sound correct? I will try to get all the poop the same weight.

-Trent

From: Devin Jones <[REDACTED]> (b) (6)
Sent: Friday, December 20, 2019 2:20 PM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Cc: Maureen Kessler <[REDACTED]> (b) (6)
Subject: Re: Dividing bagged fecal samples

Hi Trent,

I've attached a copy of the sample list for you. It includes all of the samples in EtOH that we'd like to have here as well as the 12 NB-F samples from ACTOW004 that need to be aliquoted into 95% EtOH.

Please let us know if you have any questions about the samples!

Thanks,
Devin

On Fri, Dec 20, 2019 at 12:25 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

This is what I think we will need:

1. 95% EtOH- I will just get this at RML.

2. Tube labels- Avery #5667 : https://www.amazon.com/Avery-Frosted-Return-Address-Printers/dp/B00004Z6JZ/ref=asc_df_B00004Z6JZ/?tag=hyprod-20&linkCode=df0&hvadid=167136834874&hvpos=1o5&hvnetw=g&hvrnd=205695646230689967&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmld=&hvlocint=&hvlocphy=9021375&hvtargid=aud-864832253277:pla-275421867348&pssc=1
3. 2mL tubes-Sarstedt cat# 72.694.006: <https://www.sarstedt.com/en/products/laboratory/screw-cap-micro-tubes-reaction-tubes/screw-cap-micro-tubes/product/72.694.006/>
4. Stainless steel beads(5mm)- Qiagen# 69989 : <http://www.qiagen.com/products/accessories/tissuelyser/beads.aspx>
5. Poop Scoops- What size do you want? You will have to choose these.

What am I missing? We have boxes that we can use to send to you ladies.

-Trent

From: Maureen Kessler <[REDACTED] (b) (6)>
Sent: Thursday, December 19, 2019 3:03 PM
To: Devin Jones <[REDACTED] (b) (6)>
Cc: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: Re: Dividing bagged fecal samples

new meeting!!!

Maureen Kessler is inviting you to a scheduled Zoom meeting.

Topic: My Meeting
Time: Dec 19, 2019 03:00 PM Mountain Time (US and Canada)

Join Zoom Meeting
[https://us04web.zoom.us/j/\[REDACTED\] \(b\) \(6\)](https://us04web.zoom.us/j/[REDACTED] (b) (6))

Meeting ID: [REDACTED] (b) (6)

One tap mobile
+61370182005, [REDACTED] (b) (6) Australia
+61871501149, [REDACTED] (b) (6) Australia

Dial by your location
+61 3 7018 2005 Australia
+61 8 7150 1149 Australia
+61 2 8015 6011 Australia
+1 408 638 0968 US (San Jose)
+1 646 558 8656 US (New York)

Meeting ID: [REDACTED] (b) (6)
Find your local number: [https://us04web.zoom.us/j/\[REDACTED\] \(b\) \(6\)](https://us04web.zoom.us/j/[REDACTED] (b) (6))

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Thu, Dec 19, 2019 at 11:16 AM Devin Jones <[REDACTED] (b) (6)> wrote:
Works for me!

On Thu, Dec 19, 2019 at 11:15 AM Maureen Kessler <[REDACTED] (b) (6)> wrote:
Great. Let's Zoom at ~3 pm? It's also super easy to Zoom from a smartphone, if you want to see our smiling faces! There's an app.

PREEMPT is inviting you to a scheduled Zoom meeting.

Topic: What do we do with the poops?
Time: Dec 19, 2019 03:00 PM Mountain Time (US and Canada)

Join Zoom Meeting
[https://zoom.us/j/\[REDACTED\] \(b\) \(6\)](https://zoom.us/j/[REDACTED] (b) (6))

Meeting ID: [REDACTED] (b) (6)

One tap mobile
+17207072699,, [REDACTED] (b) (6) US (Denver)
+16465588656,, [REDACTED] (b) (6) US (New York)

Dial by your location
+1 720 707 2699 US (Denver)
+1 646 558 8656 US (New York)

Meeting ID: [REDACTED] (b) (6)
Find your local number: [https://zoom.us/j/\[REDACTED\] \(b\) \(6\)](https://zoom.us/j/[REDACTED] (b) (6))

On Thu, Dec 19, 2019 at 10:56 AM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:
It will have to be voice only, my camera hasn't come in yet.

-Trent

From: Bushmaker, Trenton (NIH/NIAID) [E]
Sent: Thursday, December 19, 2019 10:55 AM
To: Maureen Kessler <[REDACTED] (b) (6)>
Cc: Devin Jones <[REDACTED] (b) (6)> Raina Plowright <[REDACTED] (b) (6)> Lauren Warner <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: RE: Dividing bagged fecal samples

Yes, 3pm or later?

-Trent

From: Maureen Kessler <[REDACTED] (b) (6)>
Sent: Thursday, December 19, 2019 10:42 AM
To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Cc: Devin Jones <[REDACTED] (b) (6)> Raina Plowright <[REDACTED] (b) (6)> Lauren Warner <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Subject: Re: Dividing bagged fecal samples

Hi Trent,

Do you think we could have a quick phone or Zoom call to chat about this and finalize details? I'm around the office all day.

Cheers,
Maureen

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Tue, Dec 17, 2019 at 2:04 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:
Hello all,
It looks like I will need to come over for January 9th for a new graduate student orientation in the morning. Would it work if I bring over the supplies and we could meet the afternoon on January 9th or anytime on 10th?

-Trent

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Tuesday, December 17, 2019 2:04 AM
To: Devin Jones <[REDACTED] (b) (6)>

Cc: Raina Plowright <[REDACTED] (b) (6)> Maureen Kessler <[REDACTED] (b) (6)>
Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>; Lauren Warner
<[REDACTED] (b) (6)>

Subject: Re: Dividing bagged fecal samples

Easiest would be to have ALL samples put in ethanol and shipped to MSU? I think not just the extraction method, but also preservation method might be kept as similar as possible (within reason)

Cheers,

Vincent

On Dec 16, 2019, at 18:34, Devin Jones <[REDACTED] (b) (6)> wrote:

I may be gone Jan 1-2, but not sure yet. I can be flexible in any case.

Re-DNA Extractions: I'll confirm what Maureen said. It's important that each of the sample types is extracted in the same way. The purpose is to compare microbiomes across each sample type. I started collecting fresh EtOH-F for my project, but we don't have those samples for all bats. Thus, if the non-fresh, NB, or rectal swabs or similar enough, I'd like to be able to use them too if I need to increase my sample size. It has been shown that microbiome results can vary across DNA extraction kits, labs, etc. so it's better to be as consistent as possible across sample types to remove any of that source of potential variation that may influence the results.

On Fri, Dec 13, 2019 at 2:57 PM Raina Plowright <[REDACTED] (b) (6)> wrote:

Yep, I'm not going anywhere until January 23rd. I'll be here.

Raina

On Dec 13, 2019, at 2:53 PM, Maureen Kessler <[REDACTED] (b) (6)> wrote:

Raina, will you be around to meet with Trent sometime Jan 1 - 5??

Hi Trent,

DNA extractions

I'll let Devin chime in about this. I think the goal here is to compare the collection and sampling methods (fecal vs. rectal, feces with vs. without ethanol, swab vs. bagged, and fresh vs. noninvasive).

- Most important thing is that ALL the samples for this trial have to be extracted using the exact same extraction method for Devin's project.
 - it'll be difficult (potentially) to extract from the fecal swabs using all three of those methods. From our perspective, if you think it's still feasible, we're happy for you to try

whichever comparison you think is best (but note that the swabs are already in 70% EtOH).

- Might be best to extract from all the samples using RLT, and then do the trizol, RLT, EtOH comparison on the bagged fecal samples since there is more material.
- For the ethanol comparison, the ideal scenario here is to compare the effects of ethanol itself by extracting an aliquot from the bagged fecal samples 1) without putting them into ethanol; and 2) after putting them into ethanol. This shouldn't be hard with the bagged samples.
- After adding to RLT, why do you need to add the sample back into 70% EtOH? I thought the RLT was sufficient for deactivating viruses.

Cortisol

- That sounds great! They'll wind up being boiled for 20 min.

Timeline:

- What's the timeline that works best for you guys for all this? That's the most important consideration!!
 - Maybe we can pre-order supplies and get started on prepping things in advance of that timeline? It might be easier than you having to haul supplies over, unless that's what you would prefer.
 - I'll be around Jan 1-5; I'll check in with Raina and see if she will be, if she's not scanning these messages.
- I'm really hoping to get some of my own DNA extractions underway, potentially even before we have the results from Devin's trial. The sooner I can get some of the bagged fecal samples homogenized and put in ethanol the better, since my sequencing methods need a bit of troubleshooting first. Alternatively, I could use a few of the swabbed fecal samples from grey-headed flying foxes for this, and those could be shipped over now-ish.
- I also have a few undergrads who are keen to start their research projects in early January, since they'll have more free time over winter break (classes start again on Jan 13). The undergrads are reliant on the UR feces into formalin, since they're undertaking basic microscopy projects. Does it seem like it might be feasible to sort out the supplies and divide the samples quickly enough to meet that timeline?
- Bottom line, just wondering when it's best for you to work on all this!

Again, thanks for all the help with coordinating everything. We deeply appreciate it. Looking forward to seeing you face-to-face soon!

Cheers,
Maureen

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Mon, Dec 9, 2019 at 2:25 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)

wrote:

Maureen,

Fecal cort:

We could have your team label the tubes then measure the dry weight(label, tube, top). Then send us the labeled tubes, with an excel file. We can then scoop, weigh, and then add 1ml of 95% EtOH. How does this sound? I will check that our tubes can withstand boiling. How long do you want to boil?

DNA extraction:

- I would like to do a comparison between RLT, Trizol, and 95% EtOH.
- The easiest option is that I can put a scoop of the size you want in 95% EtOH tube, send you the sample, and MSU can do the extraction in the Powersoil kit.
- The second best and easiest option is the RLT extraction in the ALLPrep kit. I would have to do all the extractions at RML and send you the DNA extract(if it works). I wouldn't keep the RNA, only the DNA. The method would be a scoop/weight, add RLT, homogenize with bead, transfer to new tube with 70% EtOH, and then doing the remaining extraction outside of the field room with the AllPrep kit. I would then send you the extract.
- Trizol is a control because of the amount of labor involved. This will yield the best results during the inactivation but we just want to see if the other methods will yield "good enough" results for what you want to achieve.

Let me know what you think?

I have not planned a time to come over and visit yet. Suggestion? I might be in the area around Jan 1-5th to visit family. Let me know what you think.

-Trent

From: Maureen Kessler <[REDACTED]> (b) (6)

Sent: Monday, December 09, 2019 11:55 AM

To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6)

Cc: Devin Jones <[REDACTED]> (b) (6) Raina Plowright <[REDACTED]> (b) (6) Lauren Warner <[REDACTED]> (b) (6) Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)

Subject: Re: Dividing bagged fecal samples

Hi Trent,

Fecal cort

I'll need the tube dry weight and then the weight of the tube after adding a scoop of feces. The concern here is that the tube weights are likely variable enough that they'll affect our interpretation of the final cortisol weights. These tubes will also have to be able to withstand being boiled in ethanol.

DNA extractions

- What do you view as the next step after the results of that test? If RLT or trizol are the best methods, would you then suggest we do all the rest of our DNA extractions at RML? Or do you just view that as another useful comparison for Devin's paper?
 - If you're thinking that the remainder of samples will be extracted at MSU, the hope is that we'll be able to do DNA extractions from samples shipped in EtOH using the Qiagen PowerSoil kit. We have no plans for fecal RNA, and the the soil kit is half the price of the AllPrep kits.
 - We're unlikely to go with extraction via trizol at MSU, so **comparison with trizol might not be necessary**, unless you think it's essential to include as a "control" extraction method. Devin does not think it's critical to include in her paper, because most microbiome studies use the soil or allprep kits anyway.
- comparing the 95% EtOH and RLT will involve putting samples into EtOH and then into RLT, correct? Because you use the AllPrep kits?

Are we at the stage where we should start discussing supplies needed for all this? Happy to order if you guys have preferred supplies (tubes, labels, etc.).

Finally, when are you headed over to MSU to visit?

Thanks for bearing with us!!

Maureen

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Mon, Dec 9, 2019 at 10:08 AM Bushmaker, Trenton (NIH/NIAID) [E] [REDACTED] (b) (6) wrote:

Ok sounds good

-Trent

From: Devin Jones <[REDACTED] (b) (6)>

Sent: Monday, December 09, 2019 8:12 AM

To: Bushmaker, Trenton (NIH/NIAID) [E] [REDACTED] (b) (6)

Cc: Maureen Kessler <[REDACTED] (b) (6)> Raina Plowright <[REDACTED] (b) (6)> Lauren Warner <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] [REDACTED] (b) (6)

Subject: Re: Dividing bagged fecal samples

95% EtOH is fine for the metabolomics.

On Thu, Dec 5, 2019 at 4:59 PM Bushmaker, Trenton (NIH/NIAID) [E] [REDACTED] (b) (6) wrote:

Hey,

The weights shouldn't be an issue. You want the scoop in the dry tube, weighed, then the 95% EtOH in, then weighed again?

DNA extraction- we will do all three (RLT, trizol, 95% EtOH) and see what is best of the 5 samples Devin was thinking about. Does that sound ok? Let me know if I am missing something.

-Trent

From: Maureen Kessler <[REDACTED] (b) (6)>

Sent: Thursday, December 05, 2019 4:50 PM

To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>

Cc: Devin Jones <[REDACTED] (b) (6)> Raina Plowright <[REDACTED] (b) (6)> Lauren Warner <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

Subject: Re: Dividing bagged fecal samples

Hi Trent,

Those little scoops look nifty! I think even with the standard sample size of each aliquot the tubes and samples will still need to be weighed for the cortisol extraction, though (which is a huge pain) - there's no way for me to standardize the concentrations otherwise.

Clarification for the DNA extraction - do you mean do a trial run for the ACTOW004 subset Devin is thinking about? And then send the rest of the requested samples in 95% EtOH?

Cheers,
Maureen

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Thu, Dec 5, 2019 at 3:37 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> wrote:

Hey,

We might want to look into these [dosing scoop](#) for this testing.

For the testing I think we could do this:

1. DNA extraction- We could do a trial run using the RLT extraction with the Qiagen Allprep kit cat#80204 and send you the extract. In addition, do a trizol extraction and send you the extract(this will be our control because it will work but is the most work). Both RLT and Trizol

are approved for inactivation of Hendra samples. In final, we can send you a tube with fecal material in 95% EtOH. 95% EtOH is suggested in this paper:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5069758/>.

2. Cortisol extraction (individual samples only)- use the scoop and put into 95% EtOH tubes
3. Microscopic diet analysis – use scoop and put into 10% buffered Formalin
4. Metabolomics (individual samples only)- use scoop into a dry tube then irradiation.

Let me know what you think of this?

One questions: Does the Metabolomics have to be irradiated or can it be in 95% EtOH?

-Trent

From: Maureen Kessler <[REDACTED] (b) (6)>

Sent: Thursday, December 05, 2019 10:55 AM

To: Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)>

Cc: Devin Jones <[REDACTED] (b) (6)> Raina Plowright <[REDACTED] (b) (6)> Lauren Warner <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>

Subject: Re: Dividing bagged fecal samples

Hi Trent,

Here is the link to our draft [protocol for dividing samples](#). Like I said, it's a bit complicated so we'd like to chat with you about ways to streamline the process, or ways to get you some help.

I think this summarizes all the tests for the bagged fecal samples:

1. DNA extraction followed by metabarcoding for diet (Maureen), microbiome analysis (Devin), and PCR for parasites (Ticha)
 - Worry here is that there may not be enough representative homogenized material on the swabs in EtOH for the diet analysis
 - We have questions about whether it is easiest to do these extractions at RML or ship to MSU; Maureen will have to do library prep on her samples for MiSeq
2. Cortisol extraction (individual samples only)
 - will want to ship to MSU for undergrad projects
3. Microscopic diet analysis
 - safranin stained wet mounts of feces in formalin
 - will want to ship to MSU for undergrad projects
4. Metabolomics (individual samples only)
 - Devin can give more info here, I think.

I think the freeze-thaw process limits your ability to do fecal smears for parasites, but I could be wrong!

From my perspective, after these divisions I think the bags can be autoclaved. I'll let Devin speak up about autoclaving, though. She's hoping to have a small amount saved for metabolomics, and I think she's waiting to select samples for that project until some of the microbiome results come back.

Cheers,
Maureen

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology
Montana State University

On Wed, Dec 4, 2019 at 5:09 PM Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

Could you send the draft protocol of the work flow?

Could you let us know what other tests (smear slides?) you want to perform?

Can we autoclave the samples after done?

We have a few ideas for the DNA extraction for Devin.

-Trent

From: Bushmaker, Trenton (NIH/NIAID) [E]
Sent: Tuesday, December 03, 2019 9:49 PM
To: Maureen Kessler <[REDACTED]> (b) (6) Devin Jones <[REDACTED]> (b) (6) Raina Plowright <[REDACTED]> (b) (6) Lauren Warner <[REDACTED]> (b) (6)
Cc: Munster, Vincent (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Subject: RE: Dividing bagged fecal samples

Maureen-I will read over your email again tomorrow and discuss with Vincent a little more this week. He leaves this weekend for Congo till December 23st. I will see what else I can bring over for you!

Raina- I will confirm with everyone it is ok that I bring the slides over to you but I don't see an issue with it. I will discuss with Vincent and Kwe when would be a good time for me to come over. We are pushing to get those Bangladesh samples done so want to be here for that work.

Lauren- Great to meet you, glad you are on the team!

-Trent

--

Maureen Kessler, ScM
Ph.D. Student | Bozeman Disease Ecology Lab
Department of Ecology

Montana State University

--

Devin Jones, MSc

she/her(s)

Ph.D. Student, Plowright lab

Montana State University | Department of Microbiology & Immunology

Griffith University | Environmental Futures Research Institute

Mobile: [REDACTED] (b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 18 Jun 2020 07:41:30 -0600
To: (b) (6) Raina Plowright
Subject: Re: isolation sequencing

The problem is that he might only be allowed to work on COVID19 as well,

Lets see what he comes back with

From: Alison Peel <(b) (6)>
Reply-To: "(b) (6)" <(b) (6)>
Date: Wednesday, June 17, 2020 at 5:14 PM
To: Raina Plowright <(b) (6)> "(b) (6)" <(b) (6)>
Subject: Re: FW: isolation sequencing

Hi both,

No, we are waiting on MTA approval from Jeffrey Thruston. It's been ages- I just sent a reminder email.

We have some age data but I haven't had a chance to go through it yet. The accuracy on PMs is lower than canines and I want to check reliability first before starting to analyse the data. Not enough hours in the day! The slides are being shipped back to Griffith, where eventually, we can look for stress lines

Cheers
Ali

On Thu, 18 Jun 2020 at 6:20 am, Alison Peel <(b) (6)> wrote:

From: Munster, Vincent (NIH/NIAID) [E]
Sent: 18 June 2020 06:20:09 (UTC+10:00) Brisbane
To: Raina Plowright; Alison Peel
Subject: Re: isolation sequencing

Hi Raina,

Complete standstill on this end, but I think all the MTAs are updated (Ali?). We are trying to move the work forward, but unclear about the timeframe (but it might not be in the next 6 months).

Also it's a bit confusing when you are talking about phylodynamic (which we discussed before) as I think you guys are largely interested in quasispecies dynamics rather time-dated phylogeny (which Kwe is doing). The problem is that it is not clear whether the data will actually lend itself for the kind of analyses you guys want to do (largely because modelers typically are not really to well versed in the

potential restrictions of the assays used, rather than what in theory should be possible). The problem is that most of the virus hits have very high Ct value and the sequencing depth will likely be very minimal.

Sorry that I can't have a better answer at the moment,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

On 6/17/20, 2:05 PM, "Raina Plowright" <[REDACTED] (b) (6)> wrote:

Ali and Vincent,

where did we get to with HeV isolation and whole genome sequencing before COVID hit? Did we get the MTAs finished? Vincent, what is a reasonable time-line for isolation & sequencing?

I've employed a postdoc who will do phylodynamics and want to be strategic about whether I keep paying his salary, or let him move onto other projects or other jobs. If you think it wont happen for 6 months, or a year, or ever, it will help me strategize how to spend the money I have aside for this work and maybe I can prioritize other projects and people.

Related to this, Ali did you ever get the age data from the bats?

Thanks,

Raina

From: Letko, Michael (NIH/NIAID) [F]
Sent: Mon, 15 Jun 2020 20:52:11 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: 2020 Evaluation
Attachments: 2020 Evaluation - Letko.docx

Attached is my 2020 evaluation forms – can you add in under the “mentor evaluation” section and sign it? I’ll scan it and send it over to Kay.

Thank you!
-michael

--

Michael Letko, Ph.D
Postdoctoral IRTA
Dr. Vincent Munster Laboratory
Virus Ecology Unit, Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH
[903S 4th Street](#)
[Hamilton MT 59840](#)

(b) (6)

NIAID DIR Trainee Career Development Plan and Evaluation

Laboratory of Virology, DIR, NIAID, NIH

Date: June 15th 2020

Trainee Name: Michael Letko

Signature: _____

Mentor Name: Vincent Munster

Signature: _____

Part 1 Career Goals:

- Briefly describe your current career development goal(s) (e.g. academia, industry, science policy, teaching) and discuss what you will need to do during your Fellowship to achieve these goals.

_____ (b) (6)

What further research activity or other training is needed before it is appropriate to start a job search?

_____ (b) (6)

- When do you anticipate beginning a job search?
_____ (b) (6)
- Please indicate if there are other issues that affect your job search (an international trainee with an assured position in home country):
- Mentor evaluation:

Part 2. Progress Review: Research and Professional Training in the Past Year

- Brief overview of your research project and major accomplishments in the past year

(b) (6)

- Publications:

Letko, M. *Studying Evolutionary Adaptation of MERS-CoV.* [Methods in Molecular Biology: Coronaviruses](#). 2020. PMID: 31883083. (book chapter)

Schulz J., Seifert S., Thompson J., Avanzato V., Sterling S., Yan L., **Letko M.**, Matson M., Fischer R., Tremeau-Bravard A., Seetahal J., Ramkissoon V., Foster J., Goldstein T., Anthony S., Epstein J., Laing E., Broder C., Carrington C., Schountz T., Munster V. *Serological Evidence for Henipa-like and Filo-like Viruses in Trinidad Bats.* [Journal of Infectious Diseases](#). 2020. PMID: 32034942.

Letko, M., Marzi, A., Munster, V. *Functional assessment of cell entry and receptor usage for SARS-CoV-2 and other lineage B betacoronaviruses.* [Nature Microbiology](#). 2020. PMID: 32094589.

Njenga M.K. , Dawa J., Nanyingi M., Gachohi J., Ngere I., **Letko M.**, Otieno C. F. , Gunn B. M., Osoro E. *Why is There Low Morbidity and Mortality of COVID-19 in Africa?* [Am J Trop Med Hyg.](#) 2020. PMID: 32484156.

Letko M., Seifert S. N., Olival K. J., Plowright R. K., Munster V. *Bat-borne virus diversity, spillover and emergence.* [Nat Rev Microbiol.](#) 2020. PMID: 32528128.

- Patents:
- Honors/Awards (include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.):
- National or other professional meetings attended (indicate meeting title, oral or poster presentation):

- Seminar Presentations (title, department):
- New areas of research or technical expertise acquired in past year:
 (b) (6)
- Teaching activity:
 - Oversight of graduate, undergraduate or summer student (name, academic level, project title):
 - Course lectures (department, course name) or lab sections(section title, supervised/unsupervised):
- Clinical activity:
- Committee or other service activity (indicate if you held an office):
- Other professional activities not identified above:
- Other activities (community, etc) with professional relevance:
- Mentor Evaluation:

Part 3. Plans for the Up-coming year: Research and other training plans

- Research project goals (brief paragraph):
 (b) (6)
- Anticipated publications (indicate projected titles):
 (b) (6)
- Anticipated meeting or workshop attendance:
- Fellowship or other funding applications planned (indicate name of award):
- Other professional training (course work, teaching activity):
- Mentor Evaluation:

From: Schountz, Tony
Sent: Mon, 15 Jun 2020 16:13:54 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: Deer mice

Yeah, we did a hamster study with a human monoclonal antibody for a small company in San Diego. It knocks down viral load quite a bit ($p < 0.05$) at 1 mg per hamster but we're still waiting on the pathology report to see if there was any meaningful reduction in disease.

Is the mouse model the human ACE2 that Jackson Labs will be distributing?

It's remarkable how busy we are. We have restrictions on the number of people in the lab and that really compromises our ability to move very fast. Quite frustrating.

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)

On Jun 15, 2020, at 10:09 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Hamsters work quite well too, we now have a lethal mouse model

From: Tony Schountz <(b) (6)>

Date: Monday, June 15, 2020 at 10:08 AM

To: (b) (6)

Subject: Re: Deer mice

Yes, pneumonia on days 3-6 (at least) with recovery by day 14. Neutralizing antibody on day 6 and increasing titer on day 14. Looks like the virus may get to the olfactory bulb through the maxillary nerve. Still processing samples and planning a larger study. Crazy.

There aren't too many New World rodent ACE2 sequences in Genbank and none from South American rodents that I'm aware of. We have the long-tailed pygmy rice rat ACE2 sequence if you're interested in it for your receptor binding assay. It's from RNA seq data from the Andes virus project.

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)

On Jun 15, 2020, at 10:01 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Did the deer mice work?

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Sat, 13 Jun 2020 08:22:30 -0600
To: Matson, Jeremiah (NIH/NIAID) [F]; van Doremalen, Neeltje (NIH/NIAID) [E]; Seifert, Stephanie (NIH/NIAID) [E]; Danielle Adney; Letko, Michael (NIH/NIAID) [F]; Fischer, Robert (NIH/NIAID) [F]; Bushmaker, Trenton (NIH/NIAID) [E]; Avanzato, Victoria (NIH/NIAID) [F]; Purushotham, Jyothi (NIH/NIAID) [F]; Schulz, Jonathan (NIH/NIAID) [F]; Holbrook, Myndi (NIH/NIAID) [C]; Kwe Claude, Yinda (NIH/NIAID) [F]; Offei Owusu, Irene (NIH/NIAID) [F]; Port, Julia (NIH/NIAID) [F]; Hebner, Madison (NIH/NIAID) [F]
Subject: Re: Farewell party DR. Letko

That beautiful piece of Americana!

Must be a centerpiece of the Schulz residence?

So Sat 6:00?

From: "Matson, Jeremiah (NIH/NIAID) [F]" <(b) (6)>
Date: Friday, June 12, 2020 at 4:58 PM
To: Neeltje van Doremalen <(b) (6)> "Seifert, Stephanie (NIH/NIAID) [E]" <(b) (6)> " (b) (6) <(b) (6)> Danielle Adney <(b) (6)> Michael Letko <(b) (6)> Robert Fischer <(b) (6)> Trenton Bushmaker <(b) (6)> Victoria Avanzato <(b) (6)> "Purushotham, Jyothi (NIH/NIAID) [F]" <(b) (6)> Jonathan Schulz <(b) (6)> "Holbrook, Myndi (NIH/NIAID) [C]" <(b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <(b) (6)> "Offei Owusu, Irene (NIH/NIAID) [F]" <(b) (6)> "Port, Julia (NIH/NIAID) [F]" <(b) (6)> "Hebner, Madison (NIH/NIAID) [F]" <(b) (6)>
Subject: RE: Farewell party DR. Letko

I know which hat you speak of. And I second this.

From: van Doremalen, Neeltje (NIH/NIAID) [E] <(b) (6)>
Sent: Friday, June 12, 2020 4:57 PM
To: Matson, Jeremiah (NIH/NIAID) [F] <(b) (6)> Seifert, Stephanie (NIH/NIAID) [E] <(b) (6)> Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Danielle Adney <(b) (6)> Letko, Michael (NIH/NIAID) [F] <(b) (6)> Fischer, Robert (NIH/NIAID) [F] <(b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <(b) (6)> Avanzato, Victoria (NIH/NIAID) [F] <(b) (6)> Purushotham, Jyothi (NIH/NIAID) [F] <(b) (6)> Schulz, Jonathan (NIH/NIAID) [F] <(b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <(b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <(b) (6)> Offei Owusu, Irene (NIH/NIAID) [F] <(b) (6)> Port, Julia (NIH/NIAID) [F] <(b) (6)> Hebner, Madison (NIH/NIAID) [F] <(b) (6)>
Subject: RE: Farewell party DR. Letko

I am not coming unless snacks are served in a hat.

From: Matson, Jeremiah (NIH/NIAID) [F] <[REDACTED] (b) (6)>
Sent: Friday, June 12, 2020 4:55 PM
To: Seifert, Stephanie (NIH/NIAID) [E] <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Danielle Adney <[REDACTED] (b) (6)> van Doremalen, Neeltje (NIH/NIAID) [E] <[REDACTED] (b) (6)> Letko, Michael (NIH/NIAID) [F] <[REDACTED] (b) (6)> Fischer, Robert (NIH/NIAID) [F] <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Avanzato, Victoria (NIH/NIAID) [F] <[REDACTED] (b) (6)> Purushotham, Jyothi (NIH/NIAID) [F] <[REDACTED] (b) (6)> Schulz, Jonathan (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Offei Owusu, Irene (NIH/NIAID) [F] <[REDACTED] (b) (6)> Port, Julia (NIH/NIAID) [F] <[REDACTED] (b) (6)> Hebner, Madison (NIH/NIAID) [F] <[REDACTED] (b) (6)>
Subject: RE: Farewell party DR. Letko

Are we going to pass around vincent's beer-drinking helmet with the straw? I can't envision any other way to efficiently drink lots of beer with a face mask on.

From: Seifert, Stephanie (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, June 12, 2020 4:52 PM
To: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)> Danielle Adney <[REDACTED] (b) (6)> van Doremalen, Neeltje (NIH/NIAID) [E] <[REDACTED] (b) (6)> Letko, Michael (NIH/NIAID) [F] <[REDACTED] (b) (6)> Fischer, Robert (NIH/NIAID) [F] <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Matson, Jeremiah (NIH/NIAID) [F] <[REDACTED] (b) (6)> Avanzato, Victoria (NIH/NIAID) [F] <[REDACTED] (b) (6)> Purushotham, Jyothi (NIH/NIAID) [F] <[REDACTED] (b) (6)> Schulz, Jonathan (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Offei Owusu, Irene (NIH/NIAID) [F] <[REDACTED] (b) (6)> Port, Julia (NIH/NIAID) [F] <[REDACTED] (b) (6)> Hebner, Madison (NIH/NIAID) [F] <[REDACTED] (b) (6)>
Subject: Re: Farewell party DR. Letko

Sounds like [REDACTED] (b) (6) might be over by 5PM on Saturday.

Would 6PM on Saturday work?

Cheers,
Steph

Sent via Skynet

On Jun 12, 2020, at 1:57 PM, Seifert, Stephanie (NIH/NIAID) [E] <[REDACTED]> (b) (6) wrote:

We're virtually attending [REDACTED] (b) (6) next Saturday so that is a no go for us.

Fri or Sun would work for me.

Cheers,
Steph

From: "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED]> (b) (6)

Date: Friday, June 12, 2020 at 1:52 PM

To: Danielle Adney <[REDACTED]> (b) (6) "van Doremalen, Neeltje (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Letko, Michael (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Seifert, Stephanie (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Fischer, Robert (NIH/NIAID) [F]" <[REDACTED]> (b) (6) Trenton Bushmaker <[REDACTED]> (b) (6) "Matson, Jeremiah (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Avanzato, Victoria (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Purushotham, Jyothi (NIH/NIAID) [F]" <[REDACTED]> (b) (6) Jon Schulz <[REDACTED]> (b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED]> (b) (6) "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Offei Owusu, Irene (NIH/NIAID) [F]" <[REDACTED]> (b) (6), "Port, Julia (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Hebner, Madison (NIH/NIAID) [F]" <[REDACTED]> (b) (6)

Subject: Farewell party DR. Letko

Dear LoVE,

[REDACTED] (b) (6) LoVE soon to start his Laboratory of Functional Viromics (LoFV). This is cause for a celebration, and even though we are in the middle of a pandemic, given our daily interaction I think it is justified to have a small (LoVE members only) get together at [REDACTED] (b) (6) (social distancing and snazzy face masks mandatory).

This could either be next Friday, Saturday or Sunday, let me know what your preferences is.

Cheers,

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 12 Jun 2020 14:38:51 -0600
To: van Doremalen, Neeltje (NIH/NIAID) [E]; Seifert, Stephanie (NIH/NIAID) [E]; Purushotham, Jyothi (NIH/NIAID) [F]; Port, Julia (NIH/NIAID) [F]; Matson, Jeremiah (NIH/NIAID) [F]; Kwe Claude, Yinda (NIH/NIAID) [F]; Fischer, Robert (NIH/NIAID) [F]; Bushmaker, Trenton (NIH/NIAID) [E]; Letko, Michael (NIH/NIAID) [F]; Avanzato, Victoria (NIH/NIAID) [F]; Schulz, Jonathan (NIH/NIAID) [F]; Holbrook, Myndi (NIH/NIAID) [C]; Offei Owusu, Irene (NIH/NIAID) [F]; Hebner, Madison (NIH/NIAID) [F]; Adney, Danielle
Subject: Re: Meeting today

Can you sign me up for the 11 o'clock one?

Thanks,

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Neeltje van Doremalen <[REDACTED]> (b) (6)
Date: Friday, June 12, 2020 at 9:34 AM
To: "Seifert, Stephanie (NIH/NIAID) [E]" <[REDACTED]> (b) (6) "Purushotham, Jyothi (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Port, Julia (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Matson, Jeremiah (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Robert Fischer <[REDACTED]> (b) (6) Trenton Bushmaker <[REDACTED]> (b) (6) Michael Letko <[REDACTED]> (b) (6) Victoria Avanzato <[REDACTED]> (b) (6) Jonathan Schulz <[REDACTED]> (b) (6) "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED]> (b) (6) "Offei Owusu, Irene (NIH/NIAID) [F]" <[REDACTED]> (b) (6) "Hebner, Madison (NIH/NIAID) [F]" <[REDACTED]> (b) (6) Danielle Adney <[REDACTED]> (b) (6)
Subject: RE: Meeting today

Hi Steph,

Could you sign me up for the 1PM workshop on Tuesday?

Thanks!
Neeltje

From: Seifert, Stephanie (NIH/NIAID) [E] <[REDACTED]> (b) (6)
Sent: Thursday, June 11, 2020 1:06 PM
To: van Doremalen, Neeltje (NIH/NIAID) [E] <[REDACTED]> (b) (6) Purushotham, Jyothi (NIH/NIAID) [F] <[REDACTED]> (b) (6) Port, Julia (NIH/NIAID) [F] <[REDACTED]> (b) (6)

Matson, Jeremiah (NIH/NIAID) [F] < [REDACTED] (b) (6) > Kwe Claude, Yinda (NIH/NIAID) [F]
< [REDACTED] (b) (6) > Munster, Vincent (NIH/NIAID) [E] < [REDACTED] (b) (6) > Fischer,
Robert (NIH/NIAID) [F] < [REDACTED] (b) (6) > Bushmaker, Trenton (NIH/NIAID) [E]
< [REDACTED] (b) (6) > Letko, Michael (NIH/NIAID) [F] < [REDACTED] (b) (6) > Avanzato,
Victoria (NIH/NIAID) [F] < [REDACTED] (b) (6) > Schulz, Jonathan (NIH/NIAID) [F]
< [REDACTED] (b) (6) > Holbrook, Myndi (NIH/NIAID) [C] < [REDACTED] (b) (6) > Offei Owusu,
Irene (NIH/NIAID) [F] < [REDACTED] (b) (6) > Hebner, Madison (NIH/NIAID) [F]
< [REDACTED] (b) (6) > Adney, Danielle < [REDACTED] (b) (6) >

Subject: RE: Meeting today

Hi all,

I was hoping to mention the diversity and inclusion workshops organized for next week. It would be great to have a strong showing from our lab in these workshops. PhD students are welcome to join the informal postbacc session. Several new faculty members have signed up for workshops despite intense lab schedules, and it has been much appreciated!

Joyce will be giving a **general seminar on Monday at 9AM**, then the **postbacc workshop is Monday at 11AM**, with two **workshops on microinequities on Tuesday at 11AM and 1PM**. Please let me know if you would like to sign-up for a workshop!

Cheers,
Steph

From: van Doremalen, Neeltje (NIH/NIAID) [E] < [REDACTED] (b) (6) >
Sent: Thursday, June 11, 2020 12:46 PM
To: Purushotham, Jyothi (NIH/NIAID) [F] < [REDACTED] (b) (6) > Port, Julia (NIH/NIAID) [F]
< [REDACTED] (b) (6) > Matson, Jeremiah (NIH/NIAID) [F] < [REDACTED] (b) (6) > Kwe Claude,
Yinda (NIH/NIAID) [F] < [REDACTED] (b) (6) > Munster, Vincent (NIH/NIAID) [E]
< [REDACTED] (b) (6) > Fischer, Robert (NIH/NIAID) [F] < [REDACTED] (b) (6) > Bushmaker,
Trenton (NIH/NIAID) [E] < [REDACTED] (b) (6) > Letko, Michael (NIH/NIAID) [F]
< [REDACTED] (b) (6) >; Avanzato, Victoria (NIH/NIAID) [F] < [REDACTED] (b) (6) > Seifert,
Stephanie (NIH/NIAID) [E] < [REDACTED] (b) (6) > Schulz, Jonathan (NIH/NIAID) [F]
< [REDACTED] (b) (6) > Holbrook, Myndi (NIH/NIAID) [C] < [REDACTED] (b) (6) > Offei Owusu,
Irene (NIH/NIAID) [F] < [REDACTED] (b) (6) > Hebner, Madison (NIH/NIAID) [F]
< [REDACTED] (b) (6) >

Subject: Meeting today

Hi all,

It looks like Vincent will have a recurring meeting at Thursday at 3PM, so we would like to move our lab meeting back to the Tuesday 3PM time. Today's meeting will be cancelled.

We would also like to have 2 people present per week. I will make a schedule for this – please let me know if you have data you would like to present this week or next week, and I will put you first on the list.

I will send a zoom link out once I have one.

Neeltje van Doremalen, PhD
Staff Scientist
Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories, NIAID/NIH
903 South 4th Street
Hamilton, MT, 59840

(b) (6)

(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 12 Jun 2020 13:56:08 -0600
To: Holbrook, Myndi (NIH/NIAID) [C]; van Doremalen, Neeltje (NIH/NIAID) [E]; Letko, Michael (NIH/NIAID) [F]; Seifert, Stephanie (NIH/NIAID) [E]; Fischer, Robert (NIH/NIAID) [F]; Bushmaker, Trenton (NIH/NIAID) [E]; Matson, Jeremiah (NIH/NIAID) [F]; Avanzato, Victoria (NIH/NIAID) [F]; Purushotham, Jyothi (NIH/NIAID) [F]; Schulz, Jonathan (NIH/NIAID) [F]; Holbrook, Myndi (NIH/NIAID) [C]; Kwe Claude, Yinda (NIH/NIAID) [F]; Offei Owusu, Irene (NIH/NIAID) [F]; Port, Julia (NIH/NIAID) [F]; Hebner, Madison (NIH/NIAID) [F]
Subject: Re: Farewell party DR. Letko

Myndi is always on top of things,

Sun = fathers day, lets do Fri or Sat

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: "Holbrook, Myndi (NIH/NIAID) [C]" <[REDACTED] (b) (6)>
Date: Friday, June 12, 2020 at 1:54 PM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Subject: RE: Farewell party DR. Letko

Woohoo! Just a heads up Sunday (6/21) is Father's Day – so maybe we stick to Friday or Saturday.

Have a great weekend!

Myndi

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Friday, June 12, 2020 1:53 PM
To: Danielle Adney <[REDACTED] (b) (6)> van Doremalen, Neeltje (NIH/NIAID) [E] <[REDACTED] (b) (6)> Letko, Michael (NIH/NIAID) [F] <[REDACTED] (b) (6)> Seifert, Stephanie (NIH/NIAID) [E] <[REDACTED] (b) (6)> Fischer, Robert (NIH/NIAID) [F] <[REDACTED] (b) (6)> Bushmaker, Trenton (NIH/NIAID) [E] <[REDACTED] (b) (6)> Matson, Jeremiah (NIH/NIAID) [F] <[REDACTED] (b) (6)> Avanzato, Victoria (NIH/NIAID) [F] <[REDACTED] (b) (6)> Purushotham, Jyothi (NIH/NIAID) [F] <[REDACTED] (b) (6)> Schulz, Jonathan (NIH/NIAID) [F] <[REDACTED] (b) (6)> Holbrook, Myndi (NIH/NIAID) [C] <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F] <[REDACTED] (b) (6)> Offei Owusu, Irene (NIH/NIAID) [F] <[REDACTED] (b) (6)> Port, Julia (NIH/NIAID) [F] <[REDACTED] (b) (6)> Hebner, Madison (NIH/NIAID) [F] <[REDACTED] (b) (6)>
Subject: Farewell party DR. Letko

Dear LoVE,

(b) (6) LoVE soon to start his Laboratory of Functional Viromics (LoFV). This is cause for a celebration, and even though we are in the middle of a pandemic, given our daily interaction I think it is justified to have a small (LoVE members only) get together at (b) (6) (social distancing and snazzy face masks mandatory).

This could either be next Friday, Saturday or Sunday, let me know what your preferences is.

Cheers,

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 12 Jun 2020 13:44:45 -0600
To: Raina Plowright; Kevin Olival;; Letko, Michael (NIH/NIAID) [F]; Seifert, Stephanie (NIH/NIAID) [E]
Subject: Great work team!

Review is out:

<https://www.nature.com/articles/s41579-020-0394-z>

great work team!

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 11 Jun 2020 07:55:21 -0600
To: (b) (6) LaTrielle, Sara; (b) (6) Plowright, Raina
Cc: (b) (6); Peggy Eby
Subject: Re: Letter to the Editor and DSD bullet

Hi (b) (6)

Indeed not directly funded by DARPA but part of the overall change of scope of the my group towards COVID19. Unless DARPA funds will be directly used for the work (and we don't directly use DARPA funds for COVID19), it will be not acknowledged.

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

On 6/11/20, 7:45 AM, (b) (6) wrote:

Hi all,

Thanks for the communications on this and congrats on getting this paper accepted. Was this funded in part via DARPA funding? If so, I don't see any acknowledgement on the manuscript. If not, it seems to be loosely related to PREEMPT work, as have been recent papers.

Thanks,
(b) (6)

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

From: LaTrielle, Sara <(b) (6)>
Sent: Tuesday, June 9, 2020 3:54 PM
To: (b) (6); Plowright, Raina
<(b) (6)>
Cc: (b) (6); (b) (6); (b) (6); Peggy Eby <(b) (6)>
Subject: Re: Highlight of the week and moving our weekly call if possible

(b) (6)

Please find Vincent Munster's synopsis below, along with the attachment. I have cc'ed Vincent should you have any follow-up queries.

During the ongoing COVID-19 pandemic many have speculated about the risk for healthcare-acquired or nosocomial transmission of SARS-CoV-2. Here we propose a framework for guiding research in this area. We compare the characteristics of SARS-CoV-1, MERS-CoV, and SARS-CoV-2 that influence transmission and summarize evidence for infections among healthcare workers. This framework will guide science driven intervention strategies to prevent nosocomial transmission.

Best,
Sara

From: LaTrielle, Sara <(b) (6)>
Sent: Tuesday, June 9, 2020 11:52 AM
To: (b) (6); Plowright, Raina
<(b) (6)>
Cc: (b) (6); (b) (6); (b) (6)
<(b) (6)>; Peggy Eby <(b) (6)>
Subject: Re: Highlight of the week and moving our weekly call if possible

(b) (6)

We will work on the request today with Vincent from RML.

Unfortunately, this Thursday won't work for our team, and in fact Friday was going to be difficult for our PI. During our call we are planning to have the follow-up discussion with Peggy Eby on our ecological intervention if that works for your team.

Can we plan for another day next week? The later in the day the better as Peggy is in Eastern Aus- Sydney.

Best,
Sara

From: (b) (6) <(b) (6)>
Sent: Tuesday, June 9, 2020 11:37:14 AM
To: Plowright, Raina <(b) (6)>; LaTrielle, Sara <(b) (6)>
Cc: (b) (6); (b) (6); (b) (6)
Subject: Highlight of the week and moving our weekly call if possible

Hi Raina, Sara,

(b) (6) would like to highlight the paper you just got accepted for publication (congrats!):
Judson SD, Munster VJ. A Framework for Nosocomial Transmission of Emerging Coronaviruses. Infection Control & Hospital Epidemiology,

Could you please provide abstract/key findings as well as the draft paper and involved subs?

--Additionally, would it be possible to move our monthly call to Thursday this week (same time)?

Thanks.

(b) (6)
Lead Scientist
Support to Biological Technologies Office, DARPA Science and Technology Associates, Inc.
(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 9 Jun 2020 14:59:09 -0600
To: LaTrielle, Sara; Plowright, Raina
Subject: Re: Highlight of the week and moving our weekly call if possible

Thanks!

All well in zootown?

From: "LaTrielle, Sara" <(b) (6)>
Date: Tuesday, June 9, 2020 at 1:54 PM
To: (b) (6), "Plowright, Raina"
<(b) (6)>
Cc: "(b) (6), (b) (6)
(b) (6), Peggy Eby <(b) (6) <(b) (6)>
<(b) (6)>
Subject: Re: Highlight of the week and moving our weekly call if possible

(b) (6)

Please find Vincent Munster's synopsis below, along with the attachment. I have cc'ed Vincent should you have any follow-up queries.

During the ongoing COVID-19 pandemic many have speculated about the risk for healthcare-acquired or nosocomial transmission of SARS-CoV-2. Here we propose a framework for guiding research in this area. We compare the characteristics of SARS-CoV-1, MERS-CoV, and SARS-CoV-2 that influence transmission and summarize evidence for infections among healthcare workers. This framework will guide science driven intervention strategies to prevent nosocomial transmission.

Best,
Sara

From: LaTrielle, Sara <(b) (6)>
Sent: Tuesday, June 9, 2020 11:52 AM
To: (b) (6); Plowright, Raina
<(b) (6)>
Cc: (b) (6); (b) (6)
(b) (6); Peggy Eby <(b) (6)>
Subject: Re: Highlight of the week and moving our weekly call if possible

(b) (6)

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Can we plan for another day next week? The later in the day the better as Peggy is in Eastern Aus-Sydney.

Best,
Sara

From: (b) (6)
Sent: Tuesday, June 9, 2020 11:37:14 AM
To: Plowright, Raina <(b) (6)> LaTrielle, Sara <(b) (6)>
Cc: (b) (6); (b) (6)
(b) (6)
Subject: Highlight of the week and moving our weekly call if possible

Hi Raina, Sara,

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Judson SD, Munster VJ. A Framework for Nosocomial Transmission of Emerging Coronaviruses. Infection Control & Hospital Epidemiology,

Could you please provide abstract/key findings as well as the draft paper and involved subs?

--Additionally, would it be possible to move our monthly call to Thursday this week (same time)?

Thanks.

(b) (6)
Lead Scientist
Support to Biological Technologies Office, DARPA
Science and Technology Associates, Inc.
(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 9 Jun 2020 13:47:40 -0600
To: LaTrielle, Sara
Cc: Plowright, Raina
Subject: Re: Highlight of the week and moving our weekly call if possible
Attachments: Letter to the Editor.docx

Hi Sara,

During the ongoing COVID-19 pandemic many have speculated about the risk for healthcare-acquired or nosocomial transmission of SARS-CoV-2. Here we propose a framework for guiding research in this area. We compare the characteristics of SARS-CoV-1, MERS-CoV, and SARS-CoV-2 that influence transmission and summarize evidence for infections among healthcare workers. This framework will guide science driven intervention strategies to prevent nosocomial transmission.

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: "LaTrielle, Sara" <[REDACTED]> (b) (6)
Date: Tuesday, June 9, 2020 at 11:45 AM
To: '[REDACTED]' (b) (6) <[REDACTED]> (b) (6)
Cc: "Plowright, Raina" <[REDACTED]> (b) (6)
Subject: Fwd: Highlight of the week and moving our weekly call if possible

Vincent,

Darpa would like to highlight your paper this week (to the Pentagon).... can you please address her request below? sorry to unexpectedly put you in the hot seat when you are already plum busy!

Please email your synopsis back to me and I'll forward to (b) (6) and cc' you.

As you may know, they have a quick turn around for this- cob today so they can submit first thing wed am.

Sara

From: (b) (6)
Sent: Tuesday, June 9, 2020 11:38 AM
To: Plowright, Raina; LaTrielle, Sara
Cc: (b) (6); (b) (6)
Subject: Highlight of the week and moving our weekly call if possible

Hi Raina, Sara,

(b) (6) would like to highlight the paper you just got accepted for publication (congrats!):
Judson SD, Munster VJ. A Framework for Nosocomial Transmission of Emerging Coronaviruses. Infection Control & Hospital Epidemiology,

Could you please provide abstract/key findings as well as the draft paper and involved subs?

--Additionally, would it be possible to move our monthly call to Thursday this week (same time)?

Thanks.

(b) (6)
Lead Scientist
Support to Biological Technologies Office, DARPA
Science and Technology Associates, Inc.
(b) (6)

A Framework for Nosocomial Transmission of Emerging Coronaviruses

Seth D. Judson MD¹, Vincent J. Munster PhD²

¹ Department of Medicine, University of Washington, Seattle, WA 98195, USA

² Laboratory of Virology, Division of Intramural Research, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Hamilton, MT 59840, USA

Corresponding Author:

Vincent J. Munster PhD

903 S. 4th St., Hamilton, MT 59840

Phone: (b) (6) Fax: 406-375-9620; Email: (b) (6)

Word count: 900

Over the past 17 years, three coronaviruses have emerged and caused diseases with high case fatality rates. From the severe acute respiratory syndrome (SARS) epidemic of 2002-2003, to outbreaks of Middle East respiratory syndrome (MERS) since 2013, to the pandemic of coronavirus disease 2019 (COVID-19), coronavirus diseases have afflicted global communities. Nosocomial or health-care associated infections have been recognized with each of the aforementioned diseases. This is because the viruses that cause these diseases are contagious, relatively stable on surfaces, and potentially disseminated through medical procedures. With the emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19, many have wondered whether personal protective equipment (PPE) and hospital protocols are adequate to prevent transmission. In order to answer these questions, it is helpful to have a framework and examine prior data for severe acute respiratory syndrome coronavirus 1 (SARS-CoV-1) and Middle East respiratory syndrome coronavirus (MERS-CoV).

Transmission of a virus occurs when an individual sheds viable virus that infects a susceptible host either through direct contact, indirect contact with a contaminated surface (fomite transmission), or by exposure to virus-laden particles suspended in air. These particles are aerosols, which are often divided by size into large and small droplets.¹ The term droplet transmission refers to infection via large droplets, airborne transmission refers to small droplets, and aerosol transmission can generally refer to both categories of particles.¹ These terms and the exact cut-off for droplet size are controversial. Given these different routes of transmission, research regarding nosocomial transmission of emerging viruses should address the following questions: Where is viable virus shed from infected individuals? How stable is the virus on surfaces, in liquids, and within aerosols in clinical settings? Through what routes of exposure and dosages of virus does infection occur? And lastly, in what situations are nosocomial

transmission events occurring? Using this framework, we can assess the risks for nosocomial transmission of emerging coronaviruses. These characteristics for SARS-CoV-1, MERS-CoV, and SARS-CoV-2 are shown in Table 1.

During the initial epidemic of SARS, many HCWs were infected, with estimates ranging from 18.8-57.7% of total cases within outbreaks.² Retrospective studies showed that SARS-CoV-1 transmission was associated with certain aerosol-generating medical procedures (AGMPs), which can either generate or induce a patient to form virus-laden aerosols.¹ For SARS-CoV-1 transmission, these included cardiopulmonary resuscitation, bronchoscopy, noninvasive ventilation, intubation, and manual ventilation.¹ Viable SARS-CoV-1 was found to be shed via secretions in the upper and lower respiratory tracts (URT, LRT), urine, as well as in feces from patients.³ The angiotensin-converting enzyme 2 receptor was identified as the entry point for the virus to infect cells in the respiratory tract. Therefore, it was presumed that direct and indirect contact were likely sources of transmission. Given the association with AGMPs and detection of virus in the LRT and URT, aerosol transmission was also likely, although the specific relationship of aerosol size with infection was unclear.

When MERS-CoV emerged in 2013, healthcare settings were recognized as areas of outbreak amplification and possible super-spreading events.² Multiple cases of MERS among HCWs were linked to hospital facilities in Saudi Arabia and South Korea.² Experimental studies of MERS-CoV found that the virus was more stable on surfaces in temperate versus tropical environmental conditions and that the stability of the virus in aerosol decreased with increasing relative humidity.⁴ These findings supported that healthcare environments could be particular areas of virus persistence. MERS-CoV was detected in similar bodily fluids to SARS-CoV-1 but

was found to utilize a different host cell receptor for entry, dipeptidyl peptidase 4 (DPP4), and to predominantly replicate in the LRT, indicating potential differences in transmission.⁵

As reports emerged about a disease caused by a novel coronavirus in China, which became known as COVID-19 and SARS-CoV-2 respectively, nosocomial transmission was again suspected. During the initial outbreak in China, there were 1716 confirmed COVID-19 cases (3019 suspected) among HCWs as of February 11th 2020, and some of these infections likely occurred in healthcare settings.⁶ Subsequently the pandemic spread to Italy, where at least 2026 HCWs were confirmed to have COVID-19 as of March 15th 2020.⁷ As the United States became a new epicenter of the pandemic, additional infections among HCWs occurred. Similarly to SARS-CoV-1, viable SARS-CoV-2 was identified in the URT, LRT, and feces of patients, as well as found to use the ACE-2 receptor.⁸ Stability studies found that the virus was similarly stable to SARS-CoV-1 on surfaces and in aerosols.⁹ Multiple hospital surfaces and air samples were also found to be contaminated with SARS-CoV-2 RNA.¹⁰ Meanwhile, ongoing studies are evaluating where viable virus can be detected in clinical settings and whether certain medical procedures are associated with transmission. During these studies it will be important to understand the variety of environments in different healthcare facilities. Given the similar stability of SARS-CoV-1 and SARS-CoV-2, one can presume that AGMPs would also pose an increased risk for aerosol transmission of SARS-CoV-2 and that healthcare surfaces could be sources of fomite transmission. As the pandemic continues to unfurl, it will be critical to identify which HCWs and patients may have been infected in clinical settings and via which route of transmission. This will not only allow healthcare systems to improve policies regarding PPE and decontamination procedures, but also enable risk assessment for healthcare personnel and patients. While experiments can help us understand characteristics of emerging viruses,

ultimately it will require multidisciplinary collaborations in clinical settings to understand and prevent nosocomial transmission.

Acknowledgments

Financial support: Dr. Munster is supported by the Intramural Research Program of the National Institute of Allergy and Infectious Diseases, National Institutes of Health.

Conflicts of interest: The authors declare no conflicts of interest.

References:

1. Judson SD, Munster VJ. Nosocomial Transmission of Emerging Viruses via Aerosol-Generating Medical Procedures. *Viruses*. 2019;11(10):940.
2. Chowell G, Abdirizak F, Lee S, et al. Transmission characteristics of MERS and SARS in the healthcare setting: a comparative study. *BMC Med*. 2015;13(1):210.
3. Xu D, Zhang Z, Jin L, et al. Persistent shedding of viable SARS-CoV in urine and stool of SARS patients during the convalescent phase. *Eur J Clin Microbiol Infect Dis*. 2005;24(3):165-171.
4. van Doremalen N, Bushmaker T, Munster V. Stability of Middle East respiratory syndrome coronavirus (MERS-CoV) under different environmental conditions. *Eurosurveillance*. 2013;18(38):20590.
5. Corman VM, Albarak AM, Omrani AS, et al. Viral Shedding and Antibody Response in 37 Patients With Middle East Respiratory Syndrome Coronavirus Infection. *Clin Infect Dis*. 2015;62(4):civ951.
6. Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China. *JAMA*. February 2020.
7. Livingston E, Bucher K. Coronavirus Disease 2019 (COVID-19) in Italy. *JAMA*. March 2020.
8. Wang W, Xu Y, Gao R, et al. Detection of SARS-CoV-2 in Different Types of Clinical Specimens. *JAMA*. March 2020.
9. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and Surface Stability of

SARS-CoV-2 as Compared with SARS-CoV-1. *N Engl J Med*. March 2020;NEJMc2004973.

10. Guo Z-D, Wang Z-Y, Zhang S-F, et al. Aerosol and Surface Distribution of Severe Acute Respiratory Syndrome Coronavirus 2 in Hospital Wards, Wuhan, China, 2020. *Emerg Infect Dis*. 2020;26(7).

Table 1. Characteristics of Emerging Coronaviruses and Nosocomial Transmission					
Virus	Location of shedding	Stability	Receptor	Cases (%) among HCWs	Associated settings/procedures
SARS-CoV-1	URT ³ LRT ³ Urine ³ Feces ³	Similarly stable in aerosol as SARS-CoV-2 ⁹	ACE-2	1,0002 (18.8) China 2003 ² 386 (22) Hong Kong 2003 ² 97 (40.8) Singapore 2003 ² 36 (57.1) Vietnam 2003 ² 109 (43.4) Canada 2003 ²	Settings: Hospital Procedures: CPR, bronchoscopy, noninvasive ventilation, intubation, manual ventilation ¹
MERS-CoV	URT ⁵ LRT ⁵ Urine ^{5a} Feces ^{5a}	More stable on surfaces at temperate than tropical conditions ⁴ Decreased stability in aerosol with increased relative humidity ⁴	DPP4	106 (13.5) Saudi Arabia 2013-2015 ² 25 (13.4) South Korea 2015 ²	Settings: Hospital, dialysis unit
SARS-CoV-2	URT ⁸ LRT ⁸ Feces ⁸	Similarly stable in aerosol as SARS-CoV-1 ⁹ Detected on hospital surfaces and in aerosol samples ^{10a}	ACE-2	1716 (3.8) China 2020 ⁶ 2026 (9) Italy 2020 ⁷	Settings: Hospital, nursing facility
Upper respiratory tract (URT), Lower respiratory tract (LRT)					
a. RNA detected, not confirmed viable virus					

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 4 Jun 2020 14:45:36 -0600
To: LaTrielle, Sara
Cc: Plowright, Raina
Subject: Re: REQUEST by June 9: need your COVID Impacts on PREEMPT tasks
Attachments: Darpa.docx

Let me know if this is sufficient

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: "LaTrielle, Sara" <[REDACTED] (b) (6)>
Date: Thursday, June 4, 2020 at 11:08 AM
To: "[REDACTED] (b) (6)" <[REDACTED] (b) (6)>
Cc: "Plowright, Raina" <[REDACTED] (b) (6)>
Subject: Re: REQUEST by June 9: need your COVID Impacts on PREEMPT tasks

Vincent,

Attached are the milestones (I pulled only RML's out of the doc) and below you will find the full SOW with RML imbedded in the metrics as well. I did not pull RML's from the metrics as I did not want to risk getting it 'wrong'.

Hope this helps.

Sara

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Thursday, June 4, 2020 9:20 AM
To: LaTrielle, Sara <[REDACTED] (b) (6)>
Cc: Plowright, Raina <[REDACTED] (b) (6)>
Subject: Re: REQUEST by June 9: need your COVID Impacts on PREEMPT tasks

Can you give me an overview of the milestones I'm responsible for, that way I can turn this around pretty quickly

From: "LaTrielle, Sara" <(b) (6)>
Reply-To: "LaTrielle, Sara" <(b) (6)>
Date: Thursday, June 4, 2020 at 8:50 AM
To: "(b) (6) <(b) (6)>
Cc: "Plowright, Raina" <(b) (6)>
Subject: REQUEST by June 9: need your COVID Impacts on PREEMPT tasks

All,

DARPA has requested all programs report on a monthly basis how our collective tasks have been augmented due to covid19. This will help DARPA advocate for any project extensions in addition to needing to understanding our general state of project affairs. It looks like a lot but in truth, I am hopeful you can pull this quickly and spend no more than 10-15 mins on-estimates are of course ok. When responding (via email 1:1 to me) please just fill in the blanks below. **(keep it very very simple- no need for narratives)**

From each Sub (+Aga and Vincent) I need the following by June 9

Technical Impacts *(Each task you are responsible for will fall into one of the 3 bullet points below)*

- Task/Milestone/Deliverable ###: Work on this task has stopped, as of DATE. At the time of stoppage, this task was XX % complete. The anticipated total delay to this task as of this reporting period will be XX weeks.
- Task/Milestone/Deliverable ###: Alternate work related to this task (manuscript preparation, computational modeling, etc) is ongoing as of DATE. This alternate work will last until DATE.
- Task/Milestone/Deliverable ###: Work on this task is proceeding without impact.

Budget/Financial Impacts (estimates will do)

- Due to work stoppage on Task ###, we are underspending on that task by \$XXXX.
- Due to overall work stoppage as of DATE, we are underspending on supplies/labor/etc by \$XXXX

Best,
Sara

Task 11.03, Lab: screening, metagenomics to identify virus and quasispecies

- Screening of field samples from Australia and Bangladesh finished. Over 400 novel Nipah and Hendra virus sequence signatures have been identified. Novel target-enrichment based deep sequence methods have been developed to increase NSG sensitivity. G and F glycoprotein from Hendra viruses sequenced and analyzed phylogenetically and forwarded into the genotype-to-phenotype pipeline. Full-genome sequencing currently on hold of NIAIDs 100% focus on COVID19. Work on this task has stopped, as of 2/2020. At the time of stoppage, this task was 75 % complete. The anticipated total delay to this task as of this reporting period is currently unknown.

Task 11.12, Lab: screening retrospective samples from human/domestic livestock hosts.

- Screening at partner labs finalized. Import permits in place. Samples ready to ship from partner lab to RML. Work on this task has stopped, as of 2/2020. At the time of stoppage, this task was 75 % complete. The anticipated total delay to this task as of this reporting period will be unknown.

Task 22.02, Proof-of-concept demonstration of ChAd/VSV vaccination feasibility and scalability of ChAd/VSV vaccination in bats.

Milestones

Vaccine development (RML):

- Design and pre-clinical development of Nipah chadOx1 vaccine in the finalizing phase. Efficacy studies performed in hamsters and NHPs. VSV-vaccine proof of principle studies finalized and we are able to induce humoral response in Rousettus bats (manuscript in preparation). Further henipa bat model development currently on hold of NIAIDs 100% focus on COVID19. Work on this task has stopped, as of 2/2020. At the time of stoppage, this task was 50 % complete. The anticipated total delay to this task as of this reporting period will be unknown. ASPs and ACURO approval in place
- ChadOx vaccine development ongoing on COVID19. NHP rhesus macaque model successfully developed (Munster et al, Nature) and preclinical efficacy of the vaccine evaluated. Vaccine is currently in phase I/II clinical trial in the UK, and large clinical trial in the US is planned (enrollment of 30,000 individuals). Vaccine licensed to AstraZenca. RML PI part of USG operation warp speed.

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 28 May 2020 07:43:46 -0600
To: Jamie Lloyd-Smith; Plowright, Raina
Cc: Barbara Han; Emily Gurley; LaTrielle, Sara
Subject: Re: Monday PI mtg: covid update possible?

I'll try to make it, but no guarantees. Lot of moving parts on this end,

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Jamie Lloyd-Smith <(b) (6)>
Date: Wednesday, May 27, 2020 at 9:36 PM
To: "Plowright, Raina" <(b) (6)>
Cc: Barbara Han <(b) (6)> Emily Gurley <(b) (6)> "LaTrielle, Sara" <(b) (6)> <(b) (6)> <(b) (6)> <(b) (6)>
Subject: Re: Monday PI mtg: covid update possible?

Yes I can do that.

Jamie

On Wed, May 27, 2020 at 7:53 PM Plowright, Raina <(b) (6)> wrote:
Thanks guys. We were thinking 'off the top of your head' updates so the team can know the latest on COVID. Small children, barking dogs, interrupting spouses all welcome!
Barbara, I was thinking it would be great to get a summary of the paper you just put out as a preprint on bats and COVID. Emily – contact tracing etc!
Raina

From: "LaTrielle, Sara" <(b) (6)>
Date: Wednesday, May 27, 2020 at 8:26 PM
To: Barbara Han <(b) (6)> Emily Gurley <(b) (6)>
Cc: "Plowright, Raina" <(b) (6)> <(b) (6)> <(b) (6)> <(b) (6)>
Subject: Re: Monday PI mtg: covid update possible?

Yes- during our normally scheduled PI meeting, 4-5pm (eastern time). Apologies for not clarifying. Thanks for confirming ...Emily and Barbara. Look forward to the updates.

Sara

From: Barbara Han <[REDACTED] (b) (6)>
Sent: Wednesday, May 27, 2020 8:07 PM
To: Emily Gurley
Cc: LaTrielle, Sara; Plowright, Raina; [REDACTED] (b) (6) [REDACTED] (b) (6)
Subject: Re: Monday PI mtg: covid update possible?

Sure - I think you mean during the regular PI call, right? 4 pm ET?

Barbara

On Wed, May 27, 2020 at 8:53 PM Emily Gurley <[REDACTED] (b) (6)> wrote:
Sure – but can you confirm the time? Are you proposing 2-3 pm Montana time?

From: LaTrielle, Sara <[REDACTED] (b) (6)>
Sent: Wednesday, May 27, 2020 8:42 PM
To: [REDACTED] (b) (6) [REDACTED] (b) (6) Emily Gurley <[REDACTED] (b) (6)> Barbara Han [REDACTED] (b) (6)
Cc: Plowright, Raina <[REDACTED] (b) (6)>
Subject: Monday PI mtg: covid update possible?

All,

Would you each be willing to give a super informal update (no ppt!) on you/your teams recent Covid activities during our PI meeting this coming Monday, 2-3pm? Thinking each chat for aprox 10 mins ?

Please let me know if this works for you. Please remember- 'Off the cuff' chatter works for us- no/minimal prep.

Best,

Sara

--

Dr. Barbara A. Han
Disease Ecologist
Cary Institute of Ecosystem Studies
Tel: [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
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

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 26 May 2020 11:16:25 -0600
To: Barbara Han; Jamie Lloyd-Smith; Plowright, Raina
Subject: FW: [EXTERNAL] - UKRI-US call on Covid-19 collaboration
Attachments: Pandemic Intelligence - 4-2-2020 - v4.docx

FYI,

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Gray Handley <(b) (6)>
Date: Tuesday, May 26, 2020 at 7:52 AM
To: NIAID BUGS <(b) (6)> "Cassetti, Cristina (NIH/NIAID) [E]"
<(b) (6)> "Post, Diane (NIH/NIAID) [E]" <(b) (6)> "Patterson, Jean (NIH/NIAID) [E]"
<(b) (6)>
Cc: Mark Pineda <(b) (6)> "Dominique, Joyelle (NIH/NIAID) [E]"
<(b) (6)> "Marston, Hilary (NIH/NIAID) [E]" <(b) (6)>
Subject: FW: [EXTERNAL] - UKRI-US call on Covid-19 collaboration

Some of you may have seen this before, but the NSF has shared this early concept paper on a program they are developing to identify and track emerging pathogens with pandemic potential. This is obviously something we have been doing, fully or in part, for many years through various NIAID programs and projects.

It is not clear how NSF might be planning to advance this idea but they mentioned it on a recent call with the UK Research and Innovation agency (UKRI) with some intention of collaboration. The summary of that call is the original message in this string. The UK Medical Research Council is part of UKRI.

Feel free to contact Roxanne Nikolaus if interested in the NSF initiative and to share this message with anyone potentially interested at NIAID.

Thanks,

Gray

From: Nikolaus, Roxanne <(b) (6)>
Sent: Monday, May 25, 2020 3:05 PM

To: Myriam Volk - UKRI North America < (b) (6) > Kjelland, Christin C. EOP/OSTP
< (b) (6) > Keiser, Rebecca Lynn < (b) (6) > Binkley, Steve J
< (b) (6) > Casey, Winter EOP/OSTP
< (b) (6) > Handley, Gray (NIH/NIAID) [E] < (b) (6) > Donovan,
Cole < (b) (6) > DiGiulian, Maria < (b) (6) > Nichols, Lisa M.
EOP/OSTP < (b) (6) > Auchincloss, Hugh (NIH/NIAID) [E]
< (b) (6) > Eiss, Robert (NIH/FIC) [E] < (b) (6) > Arvis, Constance C
< (b) (6) > Dominique, Joyelle (NIH/NIAID) [E] < (b) (6) > Adomako,
Melissa (NIH/NIAID) [C] < (b) (6) >
Cc: Tim Wheeler - UKRI < (b) (6) > Michael Bright - UKRI < (b) (6) >
Jonathan Pearce - UKRI MRC < (b) (6) > Chris Dain (Sensitive)
< (b) (6) >

Subject: RE: [EXTERNAL] - UKRI-US call on Covid-19 collaboration

Hello Everyone,

In response to one of the follow-up actions, please find attached the paper on pandemic predictive intelligence Rebecca mentioned during the discussion.

Roxanne

Roxanne Nikolaus
Program Manager
&
Acting Cluster Lead, Countries and Regions
Office of International Science and Engineering
National Science Foundation

(b) (6)
(b) (6)

From: Myriam Volk - UKRI North America < (b) (6) >
Sent: Friday, May 22, 2020 9:58 PM
To: Kjelland, Christin C. EOP/OSTP < (b) (6) > Keiser, Rebecca Lynn
< (b) (6) > Binkley, Steve J < (b) (6) > Casey, Winter EOP/OSTP < (b) (6) > Nikolaus, Roxanne < (b) (6) >
Handley, Gray (NIH/NIAID) [E] < (b) (6) > Donovan, Cole < (b) (6) >
DiGiulian, Maria < (b) (6) > Nichols, Lisa M. EOP/OSTP
< (b) (6) > Auchincloss, Hugh (NIH/NIAID) [E] < (b) (6) > Eiss,
Robert (NIH/FIC) [E] < (b) (6) > Arvis, Constance C < (b) (6) > Dominique, Joyelle
(NIH/NIAID) [E] < (b) (6) > Adomako, Melissa (NIH/NIAID) [C]
< (b) (6) >
Cc: Tim Wheeler - UKRI < (b) (6) > Michael Bright - UKRI < (b) (6) >
Jonathan Pearce - UKRI MRC < (b) (6) > Chris Dain (Sensitive)
< (b) (6) >
Subject: [EXTERNAL] - UKRI-US call on Covid-19 collaboration

This email originated from outside of the National Science Foundation. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear all,

Thank you so much for joining the call with UKRI on Wednesday. We felt that it was a very productive discussion, and look forward to working with you to further explore the potential areas for collaboration that were flagged during the call. With this in mind, please find below a list of immediate action points – and below that a broader list of areas for further exploration.

Actions

- **OSTP** and **UKRI-MRC** to share links to their respective databases of pre-print Covid-19 papers.
- **OSTP** and **UKRI** to share links to C-19 project trackers. [From the UKRI side, the Covid-19 Research Project Tracker created by UKCDR can be found [here](#).]
- **NSF** to share the paper on pandemic predictive intelligence.
- **OSTP** and **UKRI-MRC** to share background information on respective serology working groups and their priority areas for potential exchange.
- **NIH** and **UKRI-MRC** to share information on large-scale vaccine trials.
- **NSF** and **UKRI** to continue conversation on expanding Lead Agency collaboration to incorporate rapid response mechanisms.
- **All** to share examples of public engagement efforts around Covid-19 science. [UKRI has created the [Coronavirus Explained](#) website].
- **All** to indicate any areas they would like to explore further with UKRI, and nominate a point of contact.

Areas for further discussion

- Reopening the research enterprise and supporting recovery of international research collaboration.
- Pandemic preparedness / pandemic predictive intelligence.
- Future of work.
- Coordinating work across UK-US-Ireland-Canada.

Of course, this list should in no way be seen as comprehensive, and we would be very happy to discuss collaboration in other areas of mutual interest beyond Covid-19.

Wishing you all a happy Memorial Day weekend!

With best wishes,
Myriam

Myriam Volk
Deputy Director
UK Research and Innovation North America

Please note: I will primarily be working from home in response to COVID-19 guidance. The contact information below is up-to-date.

(b) (6)

Mobile: (b) (6)

British Embassy, 3100 Massachusetts Avenue NW, Washington, DC 20008

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Pandemic Predictive Intelligence

The outbreak of the novel SARS-CoV-2 coronavirus and the resulting COVID-19 disease has exposed how the world has changed in ways that make it harder to contain disease. These changes range from enhanced local and regional commuting as well as increased use of international air travel; an intrinsic human nature to be socially connected; a lack of early, reliable, and consistent disease data and public health information; and generally long lead times for research and human subject testing. SARS-CoV-2 is not the first virus in the family of coronaviruses that has triggered a large-scale outbreak (though its impacts have certainly far exceeded those of previous coronaviruses), and it is not likely to be the last. This reality presents an opportunity for the science and engineering community and the Nation as a whole: *what steps could we take now that would allow us as a society to be more effective at predicting future outbreaks of disease and introducing the necessary medical and societal interventions, in real time, to contain them, thereby preventing large numbers of deaths and/or economic hazards? While we cannot prevent pathogen evolution and their targeting of humans, we can envision having the ability to target monitoring and quickly detect and counter such threats so that we never have to experience a global pandemic again.*

Answering the above question mandates an approach of “pandemic predictive intelligence (PPI)” that can bring together multiple scientific disciplines, including the biological sciences, computer and information science, systems engineering, geospatial science, mathematics, and social, behavioral, and economic sciences. Together, these scientific communities can work to improve our understanding of zoonotic pathogens, their evolution, likely threat to humans, transmission among hosts, modes of action, virulence, and environmental stability; and to develop the predictive modeling capabilities that can inform strategies for mitigation to slow, contain, and eliminate such pathogens. Investments in PPI would allow us to *accelerate and integrate advances in genomics, structural biology, synthetic biology, artificial intelligence (AI), machine learning (ML), predictive modeling, the Internet of Things/networked sensors, management science, social and behavioral sciences, and economics to transform society’s ability to prevent, respond to, and mitigate future potential pathogens before they present as pandemics.*

PPI research areas span:

- Understanding the structure and function of zoonotic pathogens;
- Understanding the evolutionary origins of these pathogens and genetic variations within host species, to offer predictions of possible mutations and future disease emergence;
- Developing approaches for real-time, privacy-preserving data collection, storage, curation, and analytics, along with a “model commons” serving as a repository of leading-edge modeling and simulation about pathogens and pandemics;
- A computational epidemiological theory of local-to-global dynamics and forecasting;
- New statistical/machine learning and AI techniques for ensemble modeling, spatial detection of weak signals, and change detection;
- Investigating how human attitudes and behaviors contribute to disease transmission; and

- Experimental loops that allow models and methods to learn and adapt from ongoing data collection and learning.

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 26 May 2020 09:42:24 -0600
To: LaTrielle, Sara; Kwe Claude, Yinda (NIH/NIAID) [F]
Cc: Plowright, Raina
Subject: Re: Weekly update for DARPA: request for info/updates

All the projects will remain the same for quite some time (but might add some work),

COVID publications:

- Michael Letko, Stephanie Seifert, Kevin Olival, Raina Plowright and **Vincent J. Munster**. Bat-borne viruses: mechanisms of spillover and emergence. Nature Microbiology Reviews, accepted.
- Judson SD, **Munster VJ**. A Framework for Nosocomial Transmission of Emerging Coronaviruses. Infection Control & Hospital Epidemiology, accepted
- Robert J. Fischer, Dylan H. Morris, Neeltje van Doremalen, Shanda Sarchette, M. Jeremiah Matson, Trenton Bushmaker, Claude Kwe Yinda, Stephanie N. Seifert, Amandine Gamble, Brandi N. Williamson, Seth D. Judson, Emmie de Wit, James O. Lloyd-Smith, **Vincent J. Munster**. Assessment of N95 respirator decontamination and re-use for SARS-CoV-2. Emerging Infectious Diseases. Accepted

From: "LaTrielle, Sara" <[REDACTED] (b) (6)>
Date: Tuesday, May 26, 2020 at 9:30 AM
To: "[REDACTED] (b) (6)" <[REDACTED] (b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)>
Cc: "Plowright, Raina" <[REDACTED] (b) (6)>
Subject: Re: Weekly update for DARPA: request for info/updates

Here is what I have from your last update, end-April: (I also receive weekly updates from UCLA-often noting RML's involvement/leadership in various studies)

- Modeling of surface and fluid environmental stability of SARS-CoV-2 in human respiratory tract fluids
- Modeling of surface and aerosol environmental stability of SARS-CoV-2 under conditions mimicking winter, summer and indoors
- SARS-CoV-2, decontamination of PPE, including re-use of N95s (under review EID)
- Rhesus macaque animal model development (accepted Nature)
- Analyses of SARS-CoV-2 spike using pseudotype systems
- Vaccine development (ChadOx1 COVID19), currently in phase 1 clinical trials
- Antiviral development (remdesivir) against SARS-CoV-2 (submitted)
- Small animal model development (hamsters and mice)
- SARS-CoV-2 surveillance in Republic of the Congo and Ghana (part of WHO framework)
- Vaccine development J&J (Adenovirus) and Curevac (mRNA vaccine)

Published:

- Letko M, Marzi A, **Munster V**. Functional assessment of cell entry and receptor usage for SARS-CoV-2 and other lineage B betacoronaviruses. Nat Microbiol. 2020.
- **Munster VJ**, Koopmans M, van Doremalen N, van Riel D, de Wit E. A Novel Coronavirus Emerging in China - Key Questions for Impact Assessment. N Engl J Med. 2020;382(8):692-4.
- van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, Tamin A, Harcourt JL, Thornburg NJ, Gerber SI, Lloyd-Smith JO, de Wit E, **Munster VJ**. Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. N Engl J Med. 2020.
- Judson SD, Neeltje van Doremalen, **Munster VJ** Stability and Viability of SARS-CoV-2, reply of the authors. NEJM 2020
- **Vincent J. Munster**, Friederike Feldmann, Brandi N. Williamson, Neeltje van Doremalen, Lizzette Pérez-Pérez, Jonathan Schulz, Kimberly Meade-White, Atsushi Okumura, Julie Callison, Beniah Brumbaugh, Victoria A. Avanzato, Rebecca Rosenke, Patrick W. Hanley, Greg Saturday, Dana Scott, Elizabeth R. Fischer, Emmie de Wit. Respiratory disease and virus shedding in rhesus macaques inoculated with SARS-CoV-2. Nature accepted.

Sara

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Tuesday, May 26, 2020 8:08 AM
To: LaTrielle, Sara <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]
<[REDACTED] (b) (6)>
Cc: Plowright, Raina <[REDACTED] (b) (6)>
Subject: Re: Weekly update for DARPA: request for info/updates

Probably, but not clear what was submitted last time

From: "LaTrielle, Sara" <[REDACTED] (b) (6)>
Date: Tuesday, May 26, 2020 at 7:58 AM
To: "[REDACTED] (b) (6) <[REDACTED] (b) (6)> "Kwe Claude, Yinda (NIH/NIAID) [F]" <[REDACTED] (b) (6)>
Cc: "Plowright, Raina" <[REDACTED] (b) (6)>
Subject: Re: Weekly update for DARPA: request for info/updates

Thanks Vincent- are there updates to the list- the update I have is from end April- Updates to publications as well?

Many thanks,
Sara

From: Munster, Vincent (NIH/NIAID) [E] <[REDACTED] (b) (6)>
Sent: Tuesday, May 26, 2020 7:56 AM
To: LaTrielle, Sara <[REDACTED] (b) (6)> Kwe Claude, Yinda (NIH/NIAID) [F]
<[REDACTED] (b) (6)>
Cc: Plowright, Raina <[REDACTED] (b) (6)>
Subject: Re: Weekly update for DARPA: request for info/updates

Hi Sara,

Just copy paste our last one if possible, as they are all long-term covid projects we are now running

Cheers,

Vincent

From: "LaTrielle, Sara" <[REDACTED] (b) (6)>
Reply-To: "LaTrielle, Sara" <[REDACTED] (b) (6)>
Date: Tuesday, May 26, 2020 at 7:54 AM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Cc: "Plowright, Raina" <[REDACTED] (b) (6)> "[REDACTED] (b) (6)" <[REDACTED] (b) (6)>
Subject: Re: Weekly update for DARPA: request for info/updates

Please send your COVID19 activities/updates this morning. And thanks to those (2) who already have!

DARPA wants to know how we have pivoted our efforts (where possible) to COVID and to be able to appreciate you/your teams' hard work.

Thanks,
Sara

From: LaTrielle, Sara <[REDACTED] (b) (6)>
Sent: Monday, April 13, 2020 8:52 AM
To: [REDACTED] (b) (6) <[REDACTED] (b) (6)>
Cc: Plowright, Raina <[REDACTED] (b) (6)>
Subject: Re: Weekly update for DARPA: request for info/updates

Monday greetings your way...

This serves as a reminder to send any of you and your teams' weekly updates to me today so I can forward to DARPA.

You may have read in our email to the team late last week that Tony Shountz's update from last Monday was submitted to Congress a part of their COVID research update. I will add these Monday reports in Box: Reporting- for your viewing pleasure.

Keep any and all updates coming. Difficulties and challenges too.

Best,

Sara LaTrielle

Program Manager
PREEMPT Project
Montana State University

(b) (6)

From: LaTrielle, Sara

Sent: Friday, April 3, 2020 12:27 PM

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

Cc: Plowright, Raina <(b) (6)>

Subject: Weekly update for DARPA: request for info/updates

PREEMPT team members:

DARPA has requested a brief weekly update (each Monday) as (b) (6) (DARPA Program Manager) is working to highlight our team and our pivot to COVID19 work to his leadership. Don't worry- I don't need a weekly update from each of you- merely ad hoc updates per below. I have included our full team in this email/request- hoping all team members will help with this effort.

Here's the simple request:

Send a few sentences 1:1 to me (by Monday morning) if you have an update for the week prior that we should highlight to DARPA that includes PREEMPT and/or work on COVID19. I will leave the request open but this can include publications (with link)- results- things you or your team are working on- excited about, et al.

In addition to your collective submissions, I will use slack and email correspondence to pick up on additional topics. Thanks in advance for your help with this.

Sending much goodness from Montana where winter continues to rule the day ❄️ I hope this finds you all well in your respective locations around the world.

Best,

Sara LaTrielle

Program Manager
PREEMPT Project
Montana State University

(b) (6)

From: Rasmussen, Angela L.
Sent: Fri, 22 May 2020 18:02:02 +0000
To: Cesar Munoz-Fontela; Graham, Barney (NIH/VRC) [E]; Perlman, Stanley; 秦川; Adolfo Garcia-Sastre; Baric, Ralph; Chien-Te K. Tseng; Estefania BNI; Matthew Frieman; jfwchan; Johan Neyts; (b) (6) Koert Stittelaar; (b) (6) B. H. G. Rockx; Carroll, Miles; Vasan, Vasan (H&B, Geelong AAHL); Reed, Douglas S; Albrecht, Randy; (b) (6) Munster, Vincent (NIH/NIAID) [E]; Javier Salguero; Crozier, Ian (NIH) [C]; (b) (6) Roy, Chad; Brasel, Trevor; Barouch, Dan (HMFP - Division of Vaccine Research); Richt, Juergen; Dohm, Erik Daniel; (b) (6)
Cc: William Dowling; Simon Funnell; GSELL, Pierre; RIVEROS BALTA, Alina Ximena; HENAO RESTREPO, Ana Maria
Subject: Re: WHO COM Review

Hi all,

I'm happy to participate in this. We are still in the process of generating CC mice through crosses, but I'm glad to provide some text about our planned efforts, as well as contribute anywhere else I might be useful.

Best,
Angie

From: Cesar Munoz-Fontela <(b) (6)>
Date: Friday, May 22, 2020 at 1:58 AM
To: '(b) (6) <(b) (6) "Perlman, Stanley" (b) (6) (b) (6), 秦川 <(b) (6) Adolfo Garcia-Sastre (b) (6) (b) (6), "Baric, Ralph S" <(b) (6) "Chien-Te K. Tseng" <(b) (6) "Rasmussen, Angela L." <(b) (6) Estefania BNI <(b) (6) Matthew Frieman <(b) (6) jfwchan <(b) (6) Johan Neyts <(b) (6) "(b) (6) (b) (6) <(b) (6) Koert Stittelaar <(b) (6) (b) (6) "(b) (6) <(b) (6) "B. H. G. Rockx" <(b) (6) Miles Carroll <(b) (6) "Vasan, Vasan (H&B, Geelong AAHL)" <(b) (6) "Reed, Douglas S" <(b) (6) "Albrecht, Randy" (b) (6), (b) (6) <(b) (6) "Munster, Vincent (NIH/NIAID) [E]" <(b) (6) Javier Salguero <(b) (6) Ian Crozier <(b) (6) (b) (6) (b) (6), "Roy, Chad J" <(b) (6) "Brasel, Trevor" <(b) (6) "Barouch, Dan (HMFP - Division of Vaccine Research)" <(b) (6) (b) (6) Juergen Richt (b) (6), "Dohm, Erik Daniel" <(b) (6) (b) (6) <(b) (6) (b) (6)
Cc: William Dowling <(b) (6) Simon Funnell <(b) (6) (b) (6) "GSELL, Pierre" <(b) (6) "RIVEROS BALTA, Alina Ximena" <(b) (6) (b) (6) "HENAO

RESTREPO, Ana Maria" < [REDACTED] (b) (6)

Subject: WHO COM Review

Dear colleagues,

As discussed during these last few calls of the WHO ad hoc group for COVID-19 animal models (WHO-COM) we would like to publish a short review about the state-of-the-art regarding the development of animal models for COVID-19. The goal of this review would be to communicate the findings of the group to the wide audience and in particular to developers of vaccines and therapeutics, so that they have as much information as possible for choosing preclinical models for their products.

Based on your expertise and the data that you have generated over the past weeks, we would like to ask you to contribute to this paper. As you can see in the attached draft, we have organized subgroups for the different animal models. Please take this only as a suggestion and feel free to contribute to other parts of the review as you deem fit. Also feel free to suggest additional authors as needed.

Due to the urgency of this, we aim to have a final version of the manuscript by **June 12th**. I would suggest to setup a progress report meeting on **June 5th**. In order to maximize the impact of this review the idea would be to submit to a top journal. Any suggestions to contact editors in advance are welcomed.

Thank you all very much for your contribution and your continued support.

Very best,

César, Bill and Simon.

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 22 May 2020 10:11:46 -0600
To: Cesar Munoz-Fontela; Graham, Barney (NIH/VRC) [E]; Perlman, Stanley; 秦川; Adolfo Garcia-Sastre; Baric, Ralph; Chien-Te K. Tseng; Rasmussen, Angela L.; Estefania BNI; Matthew Frieman; jfwchan; Johan Neyts; (b) (6) Koert Stittelaar; (b) (6) B. H. G. Rockx; Carroll, Miles; Vasan, Vasan (H&B, Geelong AAHL); Reed, Douglas S; Albrecht, Randy; (b) (6) Javier Salguero; Crozier, Ian (NIH) [C]; (b) (6) Roy, Chad; Brasel, Trevor; Barouch, Dan (HMFP - Division of Vaccine Research); Richt, Juergen; Dohm, Erik Daniel; (b) (6)
Cc: William Dowling; Simon Funnell; GSELL, Pierre; RIVEROS BALTA, Alina Ximena; HENAO RESTREPO, Ana Maria
Subject: Re: WHO COM Review

Sounds good,

More than happy to contribute,

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: Cesar Munoz-Fontela <(b) (6)>
Date: Friday, May 22, 2020 at 2:58 AM
To: Barney Graham <(b) (6)> "Perlman, Stanley" <stanley-perlman@uiowa.edu>, 秦川 <(b) (6)> "(b) (6)" <(b) (6)>
<(b) (6)> "Baric, Ralph" <(b) (6)> "Chien-Te K. Tseng" <(b) (6)>
<(b) (6) Angie Rasmussen <(b) (6)> Estefania BNI <(b) (6)>
<(b) (6) Matthew Frieman <(b) (6)> jfwchan <(b) (6)>
<(b) (6) Johan Neyts <(b) (6)> "(b) (6)" <(b) (6)>
<(b) (6) koert Stittelaar <(b) (6)> "(b) (6) <(b) (6)> "B. H. G. Rockx" <(b) (6)>
<(b) (6) "Carroll, Miles" <(b) (6)> "Vasan, Vasan (H&B, Geelong AAHL)" <(b) (6)> "Reed, Douglas S" <(b) (6)>
<(b) (6) "Albrecht, Randy" <(b) (6)> Darryl Falzarano <(b) (6)>
<(b) (6) " <(b) (6)> <(b) (6)> Javier Salguero <(b) (6)>
<(b) (6) Ian Crozier <(b) (6)> <(b) (6)> <(b) (6)> <(b) (6)> "Roy, Chad" <(b) (6)>
<(b) (6) "Brasel, Trevor" <(b) (6)> "Barouch, Dan (HMFP - Division of Vaccine Research)" <(b) (6)>
<(b) (6) Jurgen richt <(b) (6)> <(b) (6)> "Dohm, Erik Daniel" <(b) (6)>

< (b) (6) ' (b) (6)

< (b) (6)

Cc: William Dowling < (b) (6) Simon Funnell < (b) (6)
"GSELL, Pierre" < (b) (6) "RIVEROS BALTA, Alina Ximena" < (b) (6) "HENAO
RESTREPO, Ana Maria" < (b) (6)

Subject: WHO COM Review

Dear colleagues,

As discussed during these last few calls of the WHO ad hoc group for COVID-19 animal models (WHO-COM) we would like to publish a short review about the state-of-the-art regarding the development of animal models for COVID-19. The goal of this review would be to communicate the findings of the group to the wide audience and in particular to developers of vaccines and therapeutics, so that they have as much information as possible for choosing preclinical models for their products.

Based on your expertise and the data that you have generated over the past weeks, we would like to ask you to contribute to this paper. As you can see in the attached draft, we have organized subgroups for the different animal models. Please take this only as a suggestion and feel free to contribute to other parts of the review as you deem fit. Also feel free to suggest additional authors as needed.

Due to the urgency of this, we aim to have a final version of the manuscript by **June 12th**. I would suggest to setup a progress report meeting on **June 5th**. In order to maximize the impact of this review the idea would be to submit to a top journal. Any suggestions to contact editors in advance are welcomed.

Thank you all very much for your contribution and your continued support.

Very best,

César, Bill and Simon.

From: Schountz, Tony
Sent: Mon, 18 May 2020 20:10:12 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: Artibeus sera

OK, thanks!

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)

On May 18, 2020, at 2:09 PM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Go ahead!

From: Tony Schountz <(b) (6)>
Date: Monday, May 18, 2020 at 12:50 PM
To: "(b) (6)" <(b) (6)>
Subject: Re: Artibeus sera

Vinnie,

I'm giving an update on the Artibeus inoculations tomorrow morning for the IUCN bat group. I think at this point there's no conclusive evidence they are susceptible. However, I was wondering if it would be ok if I mentioned your transfection of BHK cells with Aj Ace2. If not, no worries, I won't mention it.

Thanks,

T.

—
Tony Schountz, PhD
Associate Professor
Arthropod-borne and Infectious Disease Laboratory
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College of Veterinary Medicine

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3185 Rampart Road
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(b) (6)

(b) (6)

On Apr 21, 2020, at 2:19 PM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Yes, the ACE2 of the Artibeus works fine,

Weird results though. Very inconclusive? Anything on serology? If you send the sera we can run them here,

Busy times big man!

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Tony Schountz <(b) (6)>

Date: Monday, April 20, 2020 at 3:04 PM

To: "(b) (6)" <(b) (6)>

Subject: Re: Artibeus sera

So, we have some peculiar data on the bats. We are getting PCR positives through at least day 21 oral and rectal swabs, including the contact bats (from $> 10^4$ to $\sim 10^2$ TCID₅₀ equivalents) but our 3 negative control bats (which were in a separate cage ABOVE the inoculated bats) all came up PCR positive ($\sim 5 \times 10^2$) 5 days after the study started. We used a smoke stick to check the airflow in the room and it is apparent it goes down from the ceiling (HEPA filtered) to the floor, then back to the wall right behind where the bat cages are before leaving the room through the exhaust HEPA filter that is also on the ceiling. So, I suppose it's conceivable that the airflow carried the virus from the inoculated cages up to the negative control cage and all 3 bats became infected. It's also possible that one of the Laboratory Animal Resources technicians who feed the bats each day didn't follow the procedure to feed the negative control bats first, then all the other cages afterwards. We have a sign noting this but I cannot exclude the possibility that it was a contamination issue. But I'm quite nervous about this so I have requested 12 more bats from our IACUC to repeat it to see if we get airborne transmission. The bats have appeared otherwise healthy and no gross pathology at necropsy.

Our diagnostic lab did initial testing of an antibody from GeneTex (<https://www.genetex.com/Product/Detail/SARS-CoV-2-COVID-19-nucleocapsid-antibody/GTX135357>) for IHC but the first attempt did not detect NP. We didn't have a confirmed positive control and the datasheet does not state that it's suitable for IHC (rabbit polyclonal) so it may not be useful. Dick has hamsters he is euthanizing today that should be antigen positive based upon Jasper Chang's paper so we

are having this antibody tested again on those tissues to make sure it's working. So, at this point, we have no corroborating evidence of infection with IHC. I have mice immunized with recombinant SARS-CoV-2 NP and we will use that serum for IHC if we need to (fusions for MAb will be next Monday).

The virus did not get past passage 2 on the Aj cells, so now I am beginning to suspect they are not susceptible. My student is going to blind passage it on the cells. The CPE that we saw is difficult to explain, though. Mix-up of cells (e.g., Vero contamination) seems to be most likely. She amplified a product of the expected size for Aj Ace2 and it has been submitted for Sanger sequencing, but I suspect the cells express Ace2 and that they are not susceptible or not permissive. Did Kwe transfect cells with Aj Ace2 and test for susceptibility?

I've gotten dragged into several projects now and am trying to juggle them all at once. I feel like I'm in graduate school again!

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)

On Apr 17, 2020, at 1:34 PM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Thanks Tony,

How did the AJs do?

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Tony Schountz <(b) (6)>

Date: Friday, April 17, 2020 at 12:18 PM

To: "Seifert, Stephanie (NIH/NIAID) [E]" <(b) (6)>

Cc: Tony Schountz <(b) (6)> "(b) (6)"

< (b) (6) "Port, Julia (NIH/NIAID) [F]" (b) (6)

Subject: Re: Artibeus sera

Stephanie, I just chatted with Miles and he reminded me we have a bunch of necropsies to do on Monday, so we will send you sera from 3 infected bats on Tuesday for delivery on Wednesday. Is 25 ul of each sufficient?

Thanks,

Tony

—

Tony Schountz, PhD
Associate Professor
Arthropod-borne and Infectious Disease Laboratory
Department of Microbiology, Immunology and Pathology
College of Veterinary Medicine
Colorado State University
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Fort Collins, CO 80523-1692

(b) (6)

(b) (6)

On Apr 17, 2020, at 11:17 AM, Seifert, Stephanie (NIH/NIAID) [E] (b) (6) wrote:

Thanks Tony, much appreciated!

Cheers,
Steph

From: "Schountz,Tony" < (b) (6) >

Date: Friday, April 17, 2020 at 6:31 AM

To: "Seifert, Stephanie (NIH/NIAID) [E]" < (b) (6) >

Cc: "Munster, Vincent (NIH/NIAID) [E]" < (b) (6) > "Port, Julia (NIH/NIAID) [F]" < (b) (6) >

Subject: Re: Artibeus sera

Hi Stephanie, we will ship a few serum samples to you on Monday.

Tony

—

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)

From: Seifert, Stephanie (NIH/NIAID) [E] <st (b) (6)>
Sent: Thursday, April 16, 2020 1:50 PM
To: Schountz, Tony <(b) (6)>
Cc: Munster, Vincent (NIH/NIAID) [E] <(b) (6)> Port, Julia (NIH/NIAID) [F]
(b) (6)
Subject: Re: Artibeus sera

Hi Tony,

Even a small amount of serum would be great, I know that bat serum is precious! We're doing cross-neutralization experiments with both live SARS-CoV-1 & SARS-CoV-2 as well as pseudotyped particles with the spike glycoprotein of some of the novel sarbecoviruses that have not been isolated (e.g. RatG13).

Cheers,
Steph

Sent via Skynet

On Mar 28, 2020, at 9:16 AM, Schountz, Tony <(b) (6)> wrote:

Vinnie, that should be fine depending on how much you need and how much we have. I'll have to check with Miles when he gets in on Monday to see how much he collected from each at terminal bleed.

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)

On Mar 28, 2020, at 8:18 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

Hi Tony,

Can you spare some sera from your SARS-CoV-2 seropositive Artibeus? We can do the pseudotype assay here, would like to see how this compares to your and our Elisa,

Cheers,

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Thu, 14 May 2020 20:53:39 -0600
To: Plowright, Raina
Subject: Re: PREEMPT samples to MSU

Yeah, I'm mostly concerned about diluting our really good work into smtg mediocre like predict

From: "Plowright, Raina" <[REDACTED] (b) (6)>
Date: Thursday, May 14, 2020 at 8:51 PM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Subject: Re: PREEMPT samples to MSU

I'll find out what USGS has planned and see if there are virology gaps. USGS are good folks but the proposal is not organized.

From: "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)>
Date: Thursday, May 14, 2020 at 8:40 PM
To: Raina Plowright <[REDACTED] (b) (6)>
Subject: Re: PREEMPT samples to MSU

we can look into this, got a couple of contacts in Kisangani

From: "Plowright, Raina" <[REDACTED] (b) (6)>
Date: Thursday, May 14, 2020 at 8:36 PM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Subject: Re: PREEMPT samples to MSU

That would be brilliant. Thanks. The students did a priority list but wanted to ask how much hassle each stage is. They don't have a clear idea of the process. I'll suggest they send to you and Trent and you can push back on anything that is too time consuming.

Been meaning to email you today about STOP spillover. Anything you can do in DRC? Sounds like they have to work there. Can't do ROC

raina

From: "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)>
Date: Thursday, May 14, 2020 at 8:31 PM
To: Raina Plowright <[REDACTED] (b) (6)>
Subject: Re: PREEMPT samples to MSU

Working on it, we should have these samples to you shortly.

Btw, if needed we can set-up a flow for sending more needed samples let me know

From: "Plowright, Raina" <(b) (6)>
Date: Wednesday, May 13, 2020 at 2:58 PM
To: '(b) (6) <(b) (6)>
Cc: Trenton Bushmaker <(b) (6)>
Subject: PREEMPT samples to MSU

Hi Vincent,

We are wondering if Trent can ship box 164 (Aust samples) from RML to MSU. This box is chosen because it should take RML the least time to find and process. Although we have many samples that we need from RML.

Dan and Caylee are trying to be cognizant of the long days the RML staff are putting in right now and want to make their shipment request as simple as possible. They are working under the assumption that picking samples from multiple boxes and working with multiple sample types is more time consuming and laborious for Trent. Box 164 has only serum samples in the box, according to the shipping manifest. Please let us know if it would be possible to receive these samples in the next two weeks or so.

We have all of our immunology on hold, and Maureen and Devin's PhD projects are on hold, until we can get samples from RML to MSU. Let me know if there is anything we can do at this end to make things easier.

We have a CDC permit in process so that in future we can receive samples directly but this won't help us for the samples already at RML.

Thanks,

Raina

From: Letko, Michael (NIH/NIAID) [F]
Sent: Thu, 14 May 2020 00:21:06 +0000
To: ursula.hofer1@nature.com
Cc: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: Edited version of manuscript NRMICRO-18-165V4

Dear Ursula,

Yes we will have this completed and returned before the requested date of May 20th.

Looking forward to returning the final version to you.

Thank you,
-michael

--

Michael Letko, Ph.D
Postdoctoral IRTA
Dr. Vincent Munster Laboratory
Virus Ecology Section, Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH
[903S 4th Street](#)
[Hamilton MT 59840](#)

(b) (6)

On May 6, 2020, at 7:11 AM, "ursula.hofer1@nature.com" <ursula.hofer1@nature.com> wrote:

Dear Vincent,

Manuscript number: NRMICRO-18-165V4

Title: Bat-borne viruses: mechanisms of spillover and emergence

Authors: Vincent Munster, Michael Letko, Stephanie Seifert, Kevin Olival, and Raina Plowright

Submission date for revisions: 20th May 2020

Thank you very much for your patience in awaiting editorial feedback on the article that you have written for Nature Reviews Microbiology. As I mentioned previously, the article is accepted in principle, but this offer is conditional on editorial queries being addressed.

Two versions of the edited file are attached to this message. The one named "clean" is the one to which you should make revisions, ensuring you track the changes in Word. The other, named "tracked", is for your information only and shows where and what changes have been made.

All our articles are thoroughly edited, taking into account clarity, language, scientific correctness, consistency and house style, to ensure they meet our high publication standards. The majority of changes have been made to bring the article in line with house style and to tighten up the narrative flow. These changes are just suggestions and you should feel free to discuss them with me. At places marked [Au:OK?], I'd be grateful if you could check especially carefully that the meaning of what you wrote has not been altered by the editing. I have also asked a few questions where I felt a bit more information or clarity was needed.

Please be aware that we use standard gene and protein nomenclature — for example, human genes (uppercase and italic), human proteins (uppercase), mouse genes (first letter only uppercase and italic) and mouse proteins (uppercase). If it is not clear which species is being referred to, we default to human nomenclature.

The redrawn figures are not ready yet but I'll send them along when our art editor has finished them.

Finally, please ensure that all the following items are included when you submit the finalized manuscript (details for each are included at the end of this email). I will not be able to formally accept the manuscript if any are missing:

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References complete, cited in order and without duplicates

Highlighted references

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I would appreciate it if you could address the editorial queries and return your revised manuscript using the following link by 20th May 2020.

<https://mts-nrmicro.nature.com/cgi-bin/main.plex?el=A7Z2BFe7A5TyV7J2A9ftdNSRAg8kJc8kq6OILxIRjJgZ>

Thank you very much for all your hard work on this piece so far. Please don't hesitate to contact me if you have any questions or wish to discuss any points in this letter. Finally, I would be very grateful if you could acknowledge receipt of this e-mail and confirm whether you will be able to return your final draft by the suggested date.

Best wishes,
Ursula

Ursula Hofer, MD PhD
Chief Editor, Nature Reviews Microbiology
4 Crinan Street
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N1 9XW

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tel: +44 (0)20 7014 6648
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2. Author, A. B. & Author, B. C. Title of the article. *Nat. Cell Biol.* 6, 123–131 (2001).
3. Author, A. B., Author, Z. X. & Author, B. C. Title of the article. *EMBO J.* 25, 3454–3461 (2006).
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Please select the top 5–10% of references in your list that those entering the field must read and write a single sentence in bold beneath each one to explain the significance of the work.

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As a result of the significant disruption that is being caused by the COVID-19 pandemic we are very aware that many researchers will have difficulty in meeting the timelines associated with our peer review process during normal times. Please do let us know if you need additional time. Our systems will continue to remind you of the original timelines but we intend to be highly flexible at this time.

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<Munster_NRMICRO-18-165_MS_v4_tracked_1588770542_2.docx>

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 12 May 2020 16:56:18 -0600
To: (b) (6); Jamie Lloyd-Smith
Cc: LaTrielle, Sara; (b) (6); (b) (6); (b) (6)
(b) (6); (b) (6); Plowright, Raina; Dylan H. Morris; Amandine Gamble
Subject: Re: MSU weekly update

Hi (b) (6)

It was a little a bit a combination of what we could do rapidly within our laboratory (as these procedures are actually extremely labor intensive) so we picked 2 "low key" methods, heat and ethanol and two more developed methods (UV-C and VHP). Obviously, SARS-CoV-2 is not special in its ability to be inactivated, and we believe that any decon methods previously tested for a wide range of pathogens such as influenza will work. We just have to formally show it.

One other method which is in the pipeline, is Ozone as it appears to be readily available as well. But obviously techniques such as irradiation (typically used in the food industry) will be equally successful.

Some of the studies we are now running focus on wastewater inactivation, and stability on common surfaces like cotton (scrubs) and Tyvek (PPE). We also did a heat-inactivation of sera (56) and showed complete activation at 30 minutes, which was a question of several labs starting-up serology. All data was shared immediately with WHO, and all the different USG counterparts (including the WH)

Cheers,

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

On 5/12/20, 12:21 PM, (b) (6) wrote:

Thanks, Jamie.

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

From: Jamie Lloyd-Smith <(b) (6)>
Sent: Tuesday, May 12, 2020 2:18 PM
To: (b) (6)
Cc: LaTrielle, Sara <(b) (6)>; (b) (6); (b) (6); (b) (6); (b) (6); Plowright, Raina <(b) (6)>; Dylan H. Morris <(b) (6)>; Amandine Gamble <(b) (6)>; Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Subject: Re: MSU weekly update

Hi (b) (6)

No those methods were not included in this study. Vincent can comment on whether they were considered at all - I see that he's been added to the thread. I do want to emphasize that this is work led by RML, with UCLA

attention at senior levels (no surprise these days), so I want to maintain the positive attention. Best, (b) (6)

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

From: [redacted] (b) (6)

Sent: Tuesday, May 12, 2020 12:23 PM

To: LaTrielle, Sara (b) (6); [redacted] (b) (6); [redacted] (b) (6); [redacted] (b) (6); [redacted] (b) (6)

Cc: [redacted] (b) (6)

Subject: RE: MSU weekly update

Hi Sara/Raina,

(b) (6) would like to submit as program highlight for this week, the work your teams did on the N95 decontamination. Can you please send a paragraph and the draft manuscript?

Thank you!

[redacted] (b) (6)
Lead Scientist
Support to Biological Technologies Office, DARPA
Science and Technology Associates, Inc.
[redacted] (b) (6)

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

From: LaTrielle, Sara [redacted] (b) (6)

Sent: Monday, May 11, 2020 6:22 PM

To: [redacted] (b) (6); [redacted] (b) (6); [redacted] (b) (6); [redacted] (b) (6); [redacted] (b) (6)

Cc: Plowright, Raina [redacted] (b) (6)

Subject: MSU weekly update

(b) (6) and team,

Please find our weekly update below.

UCLA

Publication of a viewpoint about the use of modelling to study COVID-19 and inform policy, with notably focus on superspreading: [redacted] (b) (4), (b) (6)

Analyses and modelling of the environmental stability of SARS-CoV-2 moving forward

- N95 decontamination: manuscript (b) (6), (b) (4) to be soon resubmitted to (b) (6), (b) (4).

- Modeling of aerosol transmission: finalization of the analyses, (b) (6), (b) (4) in prep).

- Method for analysis of viral titration data: (b) (6), (b) (4) in prep b).

- Impact of environmental conditions on SARS-CoV-2 stability: RML has now produced a data set exploring SARS-CoV-2 stability in 9 temperature-humidity combinations on plastic and 6 temperature-humidity combinations in aerosols. We are currently analyzing the data with the objective of characterizing the general pattern of SARS-CoV-2 stability in different environmental conditions.

Synthesis of literature data and characterization of the kinetics of the antibody response against SARS-CoV-2. We have now compiled data from the literature and run statistical analyses to characterize time to seroconversion, antibody and virus detection probabilities across time, and antibody titer kinetics, accounting for methodological variations between studies. A manuscript draft is now circulating among co-authors and expected to be submitted in the coming weeks (b) (6), (b) (4) in prep.). The outputs of this study will help to interpret serological data, for instance, to inform epidemiological models or serosurvey implementation and interpretation.

Griffith University

Publication by AUS based Griffith University PI, Alison Peel: Ali co-authored a piece for The Conversation which came out last week addressing the negative press and myths surrounding bats and Covid-19 that have been prevalent in Australian social media. <https://theconversation.com/no-aussie-bats-wont-give-you-covid-19-we-rely-on-them-more-than-you-think-137168> <<https://theconversation.com/no-aussie-bats-wont-give-you-covid-19-we-rely-on-them-more-than-you-think-137168>> <<https://theconversation.com/no-aussie-bats-wont-give-you-covid-19-we-rely-on-them-more-than-you-think-137168>> <<https://theconversation.com/no-aussie-bats-wont-give-you-covid-19-we-rely-on-them-more-than-you-think-137168>> <<https://theconversation.com/no-aussie-bats-wont-give-you-covid-19-we-rely-on-them-more-than-you-think-137168>>

Multiple media interviews by team members including another appearance by Dr. Plowright on NPR.

As always, let us know if you have any questions or need clarification.

Best,

Sara LaTrielle

Program Manager
PREEMPT Project
Montana State University

(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
Box 723905
Los Angeles, CA 90095-7239

Phone: [REDACTED] (b) (6)

<https://xxx.eeb.ucla.edu/Faculty/lloydsmith/>
Office: 4135 Terasaki Life Sciences Building
Lab: 4000 Terasaki Life Sciences Building

From: Plowright, Raina
Sent: Sun, 10 May 2020 21:39:33 +0000
To: Hudson, P; (b) (6); Jamie Lloyd-Smith; Munster, Vincent (NIH/NIAID) [E]; (b) (6)
Cc: Emily Gurley
Subject: Re: quick question re bats and potential interventions

Great points Pete. You raise the critical issues about applicability to other systems. I'll add to that. And hope that Peggy may weigh in when morning her time. The fission and urbanization of migratory species is a phenomenon occurring globally in response to lost habitat. We assume this happened in Bangladesh decades ago and is probably occurring across bat habitats in Asia and Africa. There are so many papers linking bat virus spillover (e.g. dozens on Ebola) to deforestation but not a single paper outlines a biological mechanism. The work on the Australian system sets up the biological mechanisms that can now be investigated in these other contexts. With some investigation of bat dynamics in other countries (we are talking just a few salaries for ecologists in different locations -- such a small investment if you consider the millions out of work now) we can identify the triggers for bat fission and viral shedding and implement similar solutions.

On 5/10/20, 3:34 PM, "Hudson, P" <(b) (6)> wrote:

Hi (b) (6)

Not sure if Raina is on line being a Sunday so I'll give you a quick answer

Q: PREEMPT's mission involves developing novel technologies and methods for containing or treating pathogens at their source. What intervention techniques are PREEMPT teams working on for bats? Or, what methods and technologies are PREEMPT teams working on that may be applicable to bats?

Here we go:

Primarily we are seeking ways and means to prevent spillover taking place through environmental and ecological means that will change the behavior of bats and stop bats shedding virus. This involves the strategic planting of specific tree species that are critical during the winter period when bats get notionally stressed. Our data come from a long term study of bat biology in Australia and the spillover of the Hendra virus, but we are now examining multiple other systems where this can be applied. For example we are examining if this approach could be used to prevent spillover of Nipah virus from bats and we have evidence it may explain Ebola issues in the Congo. Of course this is a long term strategy and so in the short term we seek to use environmental reclamation with vaccine deployment in hot spots - and this vaccine could be aimed at bridging hosts like horses with Hendra (where we have a vaccine), or even with humans with Nipah and we have currently have a Nipah vaccine in development.

Thanks!

(b) (6)

From: Plowright, Raina
Sent: Sun, 10 May 2020 21:33:14 +0000
To: (b) (6); Jamie Lloyd-Smith; Hudson, P; Munster, Vincent (NIH/NIAID) [E]; (b) (6)
Cc: Emily Gurley
Subject: Re: quick question re bats and potential interventions
Attachments: Ecological Lever for HeV_perspective_2019_12_10.docx

Hi (b) (6)

We are working on two solutions for Hendra virus spillover. The first is a short-term solution which involves predicting periods and places of high risk of spillover and then working with our partners in government to deliver warnings and encourage vaccination in those areas. E.g., we currently have early warning advisories out to veterinarians across northern NSW and southern QLD in Australia.

The second solution is long-term and is the forests as biosecurity concept. I've attached the first draft of a perspective I wrote last year (note this is FIRST draft!) -- this manuscript is on hold until we publish the big ONI-->food shortage-->Hendra virus paper. We are not discussing the ONI Hendra paper with the media as we are close to submitting a manuscript to Science. However, we do talk vaguely about the concepts with the media: 'we detected a climatic signal that predicts food shortages, and a behavioral change that is triggered by food shortages for bats'. My intention is to submit the attached perspective (after input from coauthors) at the same time as the paper for Science and hope for a perspective in Science that relates the triggers for spillover to a potential solution.

Of course, we are also working on bat vaccinations and Vincent was about to vaccinate bats for Nipah virus before COVID hit. However, that narrative may be difficult to convey and control without provoking a lot of questions.

In Bangladesh, Emily and team have worked for many years to prevent bat virus spillover through skirts across collection pots. I've added Emily to the conversation so she can weigh in. My understanding is that this behavioral intervention is difficult to sustain without a huge effort of engagement with individual communities.

I'll let the others jump in with additional thoughts.

Raina

On 5/10/20, 3:02 PM, (b) (6) wrote:

Hi Raina and crew,

I am speaking with a reporter tmrw (Monday) and I would like to highlight some issues re bats, and want to talk about your work on bats. (you are the only team working on bats in PREEMPT, so you're it!)

Can you quickly just weigh in on this question below, which will help augment my own answer (any/all of you can throw me an email, I can summarize as needed when I speak with this guy):

Q: PREEMPT's mission involves developing novel technologies and methods for containing or treating pathogens at their source. What intervention techniques are PREEMPT teams working on for bats? Or, what methods and technologies are PREEMPT teams working on that may be applicable to bats?

Thanks!

(b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Wed, 6 May 2020 07:46:59 -0600
To: LaTrielle, Sara; Plowright, Raina
Cc: (b) (6)
Subject: Re: SLIDES/get on early! : DARPA MSU annual ppt

Worked, btw I assume that they manage the slides moving forward?

Cheers,

Vincent

From: "LaTrielle, Sara" <(b) (6)>
Date: Wednesday, May 6, 2020 at 7:34 AM
To: '(b) (6) <(b) (6)> "Plowright, Raina"
<(b) (6)>
Cc: '(b) (6) <(b) (6)>
Subject: Re: SLIDES/get on early! : DARPA MSU annual ppt

Try this:

(b) (6)

From: Munster, Vincent (NIH/NIAID) [E] <(b) (6)>
Sent: Wednesday, May 6, 2020 7:32 AM
To: LaTrielle, Sara <(b) (6)> Plowright, Raina <(b) (6)>
Cc: (b) (6) <(b) (6)>
Subject: Re: SLIDES/get on early! : DARPA MSU annual ppt

Apparently I need a login to access the slides?

From: "LaTrielle, Sara" <(b) (6)>
Date: Wednesday, May 6, 2020 at 7:12 AM
To: "Plowright, Raina" <(b) (6)> "Hudson, P" <(b) (6)> Emily
Gurley <(b) (6)> (b) (6) <(b) (6)> <(b) (6)> Jamie
Lloyd-Smith <(b) (6)> Collin Parrish <(b) (6)> Hector Aguilar-
Carreno <(b) (6)> Alex Washburne <(b) (6)> Amandine Gamble
<(b) (6)> Tony Schountz <(b) (6)> Barbara Han
<(b) (6)> Olivier Restif <(b) (6)> Peggy Eby
<(b) (6)>

Cc: '(b) (6) <(b) (6)>

Subject: SLIDES/get on early! : DARPA MSU annual ppt

Few pointers:

Slides are here in Box: I will share the slide from Box to presenters to make sure you have them.

(b) (6)

Please make sure to get onto the call at least 15-20 minutes before the actual start time- as there have been delays getting approved to enter the Zoom room. If for some reason you did not receive the call-in info please email:

Jennifer Howell: (b) (6)

Slack channel: We have a slack channel for internal conversations for the meeting:

(b) (6)

Sara LaTrielle

Program Manager
PREEMPT Project
Montana State University

(b) (6)

From: LaTrielle, Sara

Sent: Monday, April 27, 2020 11:43 AM

To: Plowright, Raina <(b) (6)> Hudson, P <(b) (6)> Emily Gurley <(b) (6)> <(b) (6)> <(b) (6)> <(b) (6)> <(b) (6)> Colin Ross Parrish <(b) (6)> Hector Aguilar-Carreno <(b) (6)> Alex Washburne <(b) (6)> Amandine Gamble <(b) (6)> Schountz, Tony <(b) (6)> Barbara Han <(b) (6)> Olivier Restif <(b) (6)> Peggy Eby <(b) (6)>

Cc: (b) (6) <(b) (6)>

Subject: DARPA MSU annual ppt

When: Wednesday, May 6, 2020 9:00 AM-10:30 AM.

Where:

Calendar invite for MSU presentation to DARPA. Please make sure you have registered by today.

Once registered, you will receive an email with call instructions from Jennifer Howell, who is organizing the meeting on behalf of DARPA. Once registered, you can listen to all other PREEMPT presentations (5), per the agenda previously sent.

Let me know if you have any questions.

Best,
Sara

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 5 May 2020 12:12:42 -0600
To: Raina Plowright; LaTrielle, Sara; 'Plowright, Raina'
Subject: presentation
Attachments: DARPA Munster 05052020.pptx

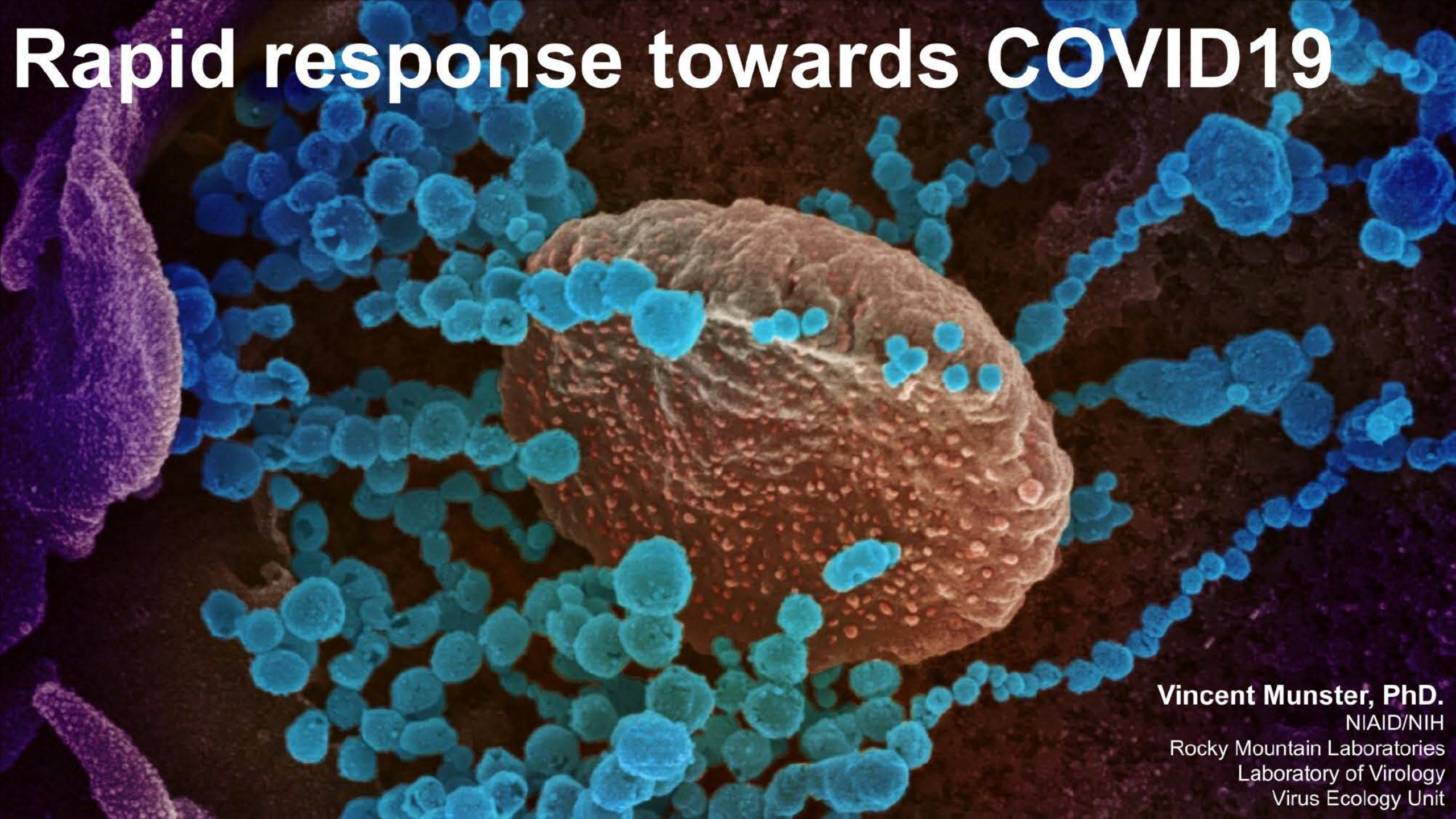
Here it is,

What time are we up again? Should have access now

Cheers,

Vincent

Rapid response towards COVID19



Vincent Munster, PhD.
NIAID/NIH
Rocky Mountain Laboratories
Laboratory of Virology
Virus Ecology Unit

Virus discovery

Molecular diversity of coronaviruses in bats

Detection of Group 1 Coronaviruses in Bats in North America

M. V. Holmes*

**Not much is done
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Can it transmit to humans?

Other animals?

Cause disease?

ts, Ghana

members

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Li Shi^{1*}, Meriadeg Ar Gouilh^{2,5*},
Mathias Vandebogaert,
Valérie Caro³, Astrid Vab

Full-text

coronaviruses in horseshoe bats and genetic
variation analysis

Wuze Ren,^{1,2} Wendong Li,^{2,3} Meng Yu,⁴ Pei Ha
Peng Zhou,¹ Shuyi Zhang,³ Guoping Zhao,⁵ Ya
Shengyue Wang,^{5,6} Lin-Fa Wang⁴ and Zhengli

Coronaviruses in bent-winged bats
(*Miniopterus* spp.)

D. K. W. Chu, L. L. M. Poon, K. H. Chan, H. Chen, Y. Guan, K. Y. Yuen
and J. S. M. Peiris

Lineage B, betacoronaviruses

Identify unique RBDs

All β -CoV sequences

>7100



2.0

Lineage B, betacoronaviruses use ACE2

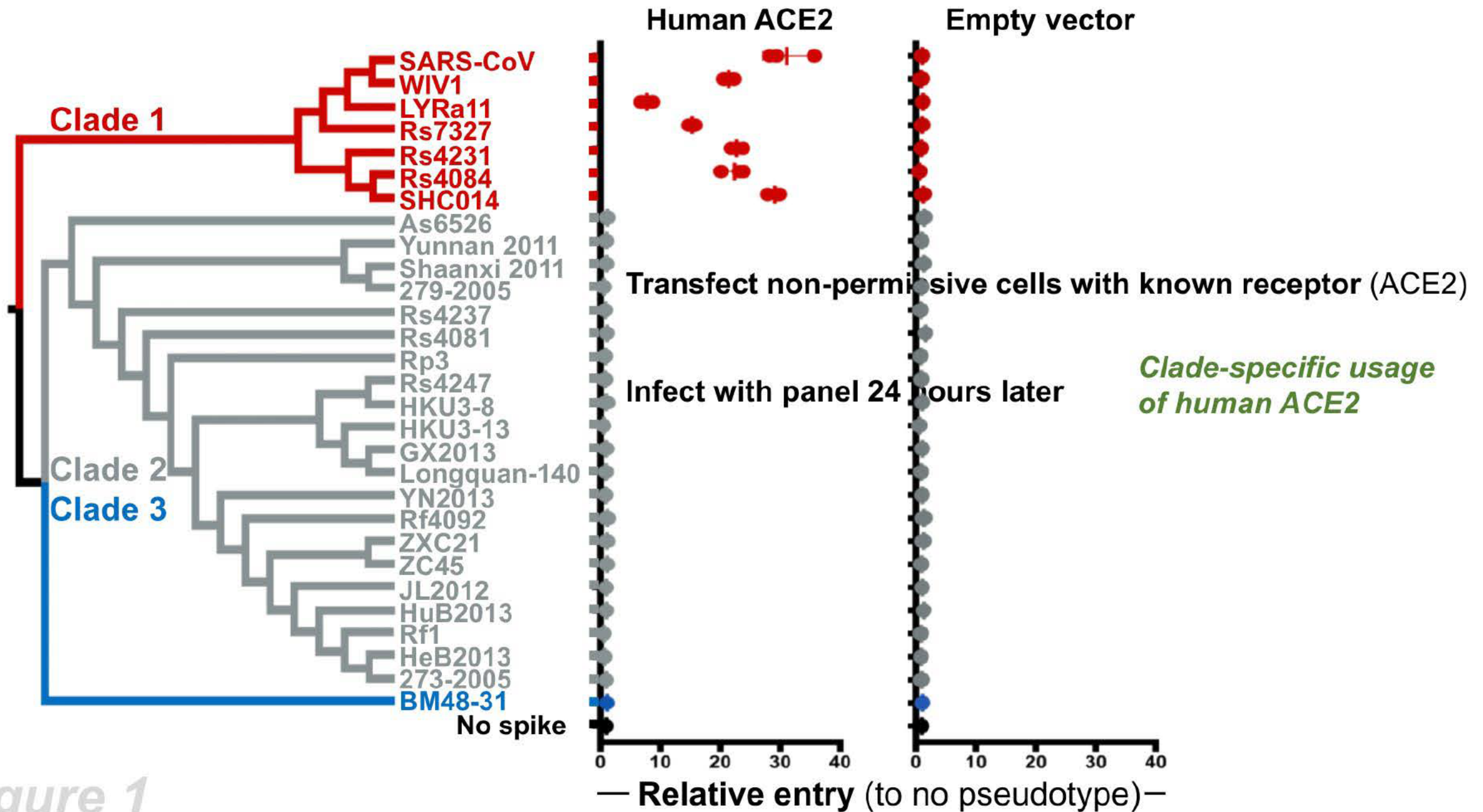
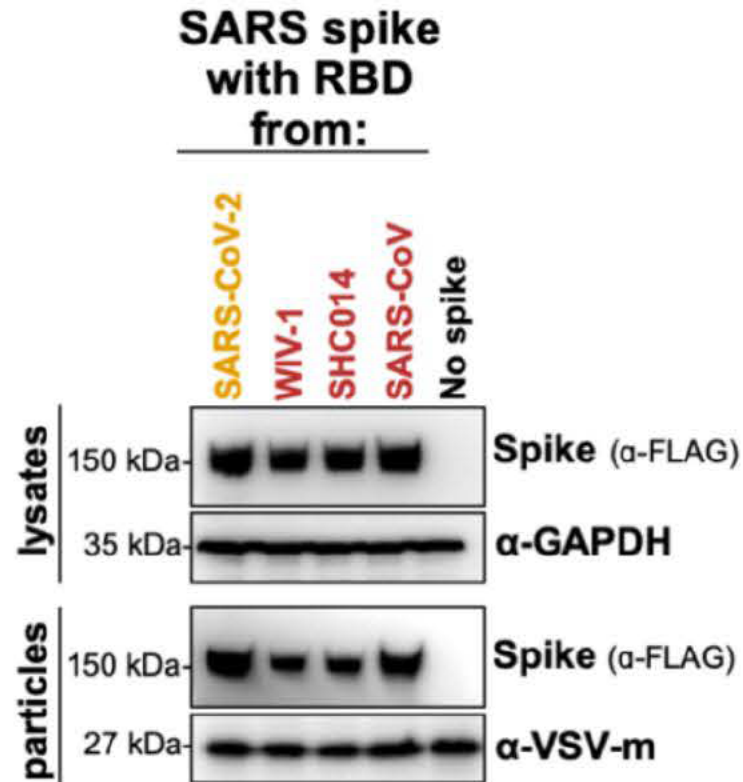


Figure 1

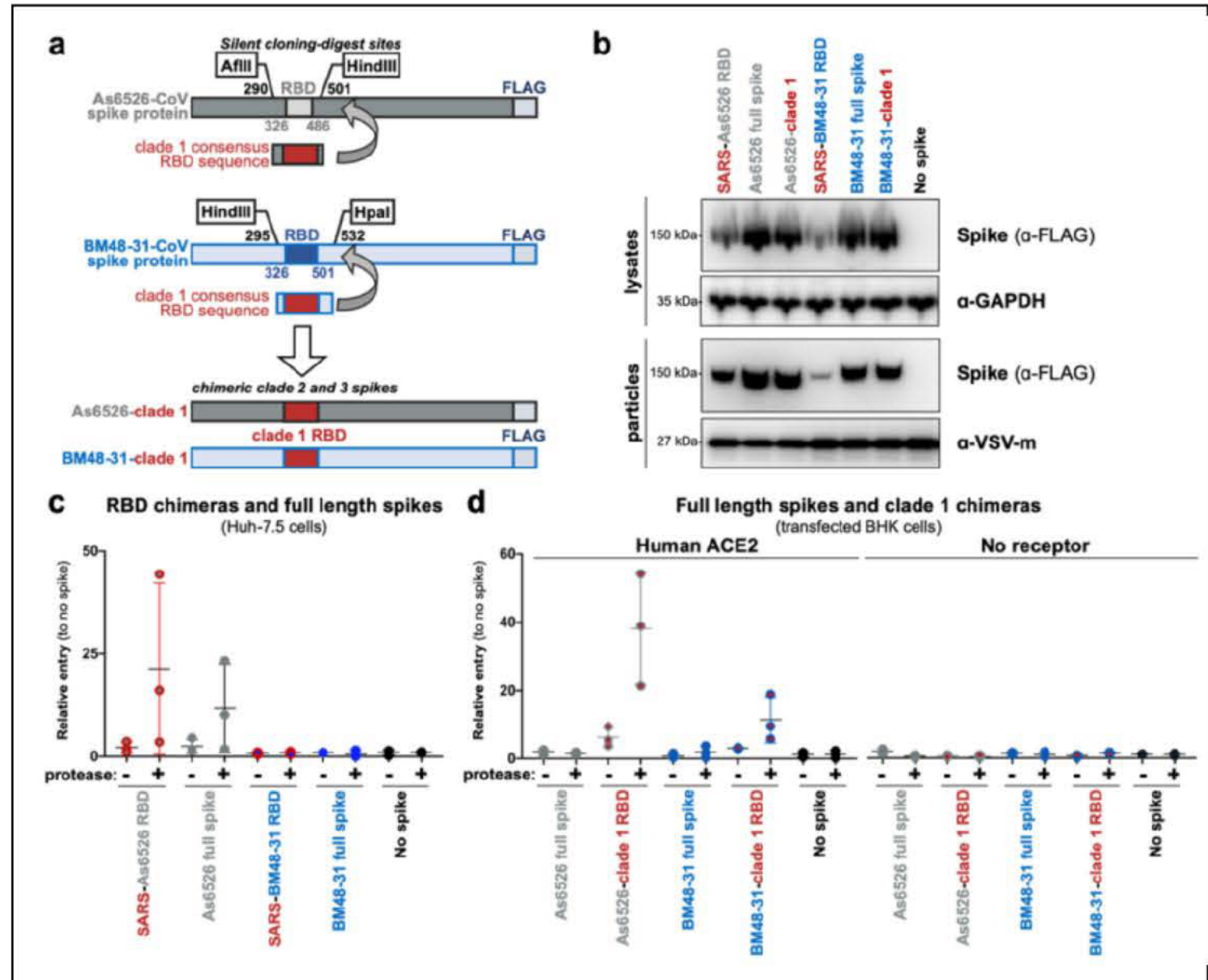
Emergence of SARS-CoV-2, receptor usage



***SARS-CoV-2 uses human ACE2
“better” than SARS-CoV***

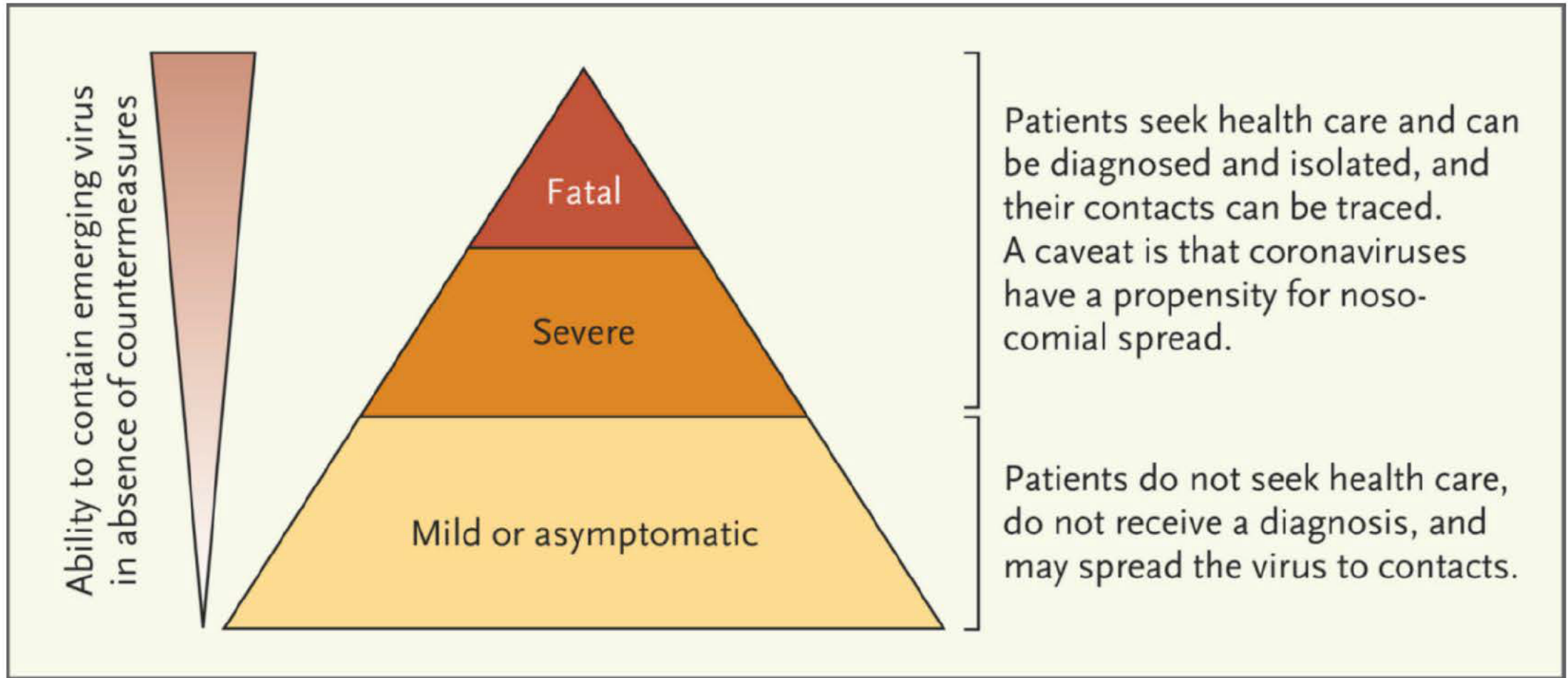
Lineage B, betacoronaviruses

- **Developed scalable platform to test RBDs from lineage B**
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- **First public data on SARS-CoV-2 receptor**
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A Novel Coronavirus Emerging in China — Key Questions for Impact Assessment

January 24th

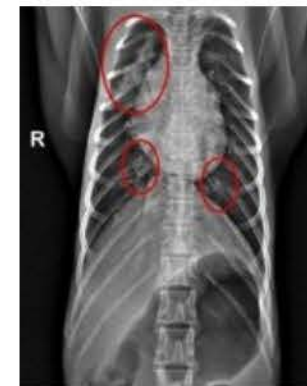
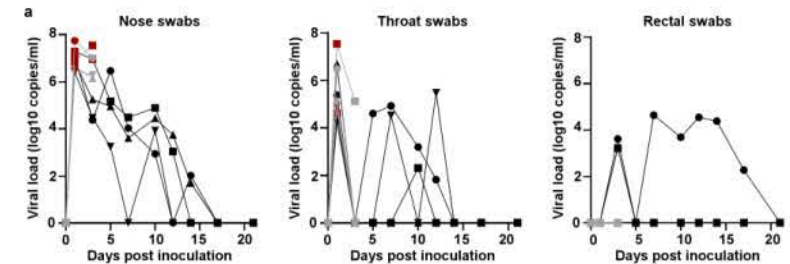
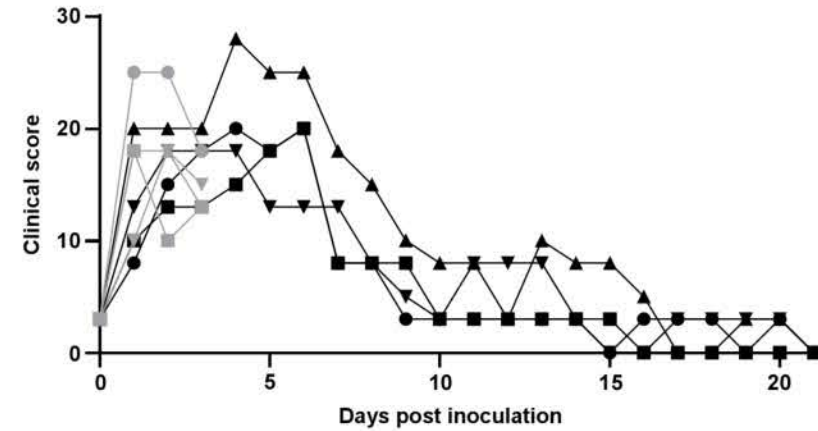


Rapid response towards COVID19

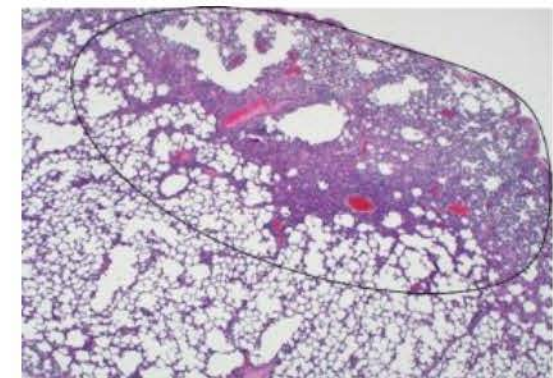
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Rhesus macaques mimic human disease

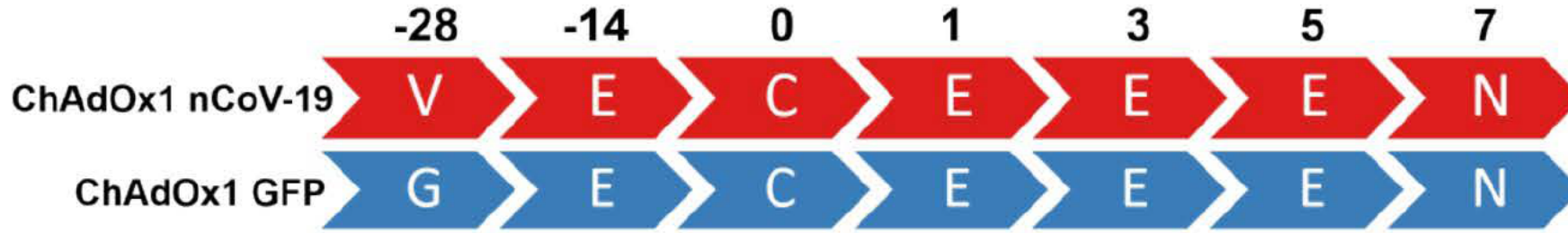
- SARS-CoV-2 infection in rhesus macaques results in transient, moderate respiratory disease
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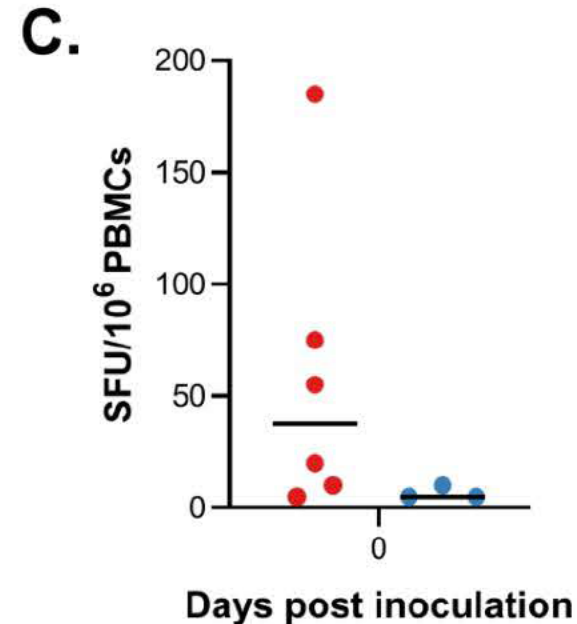
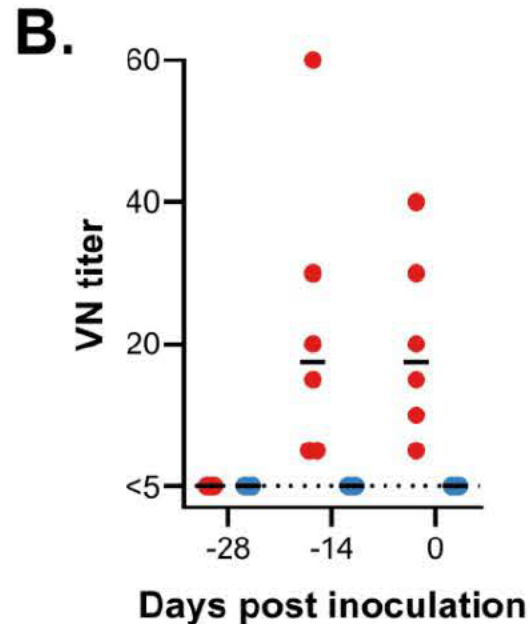
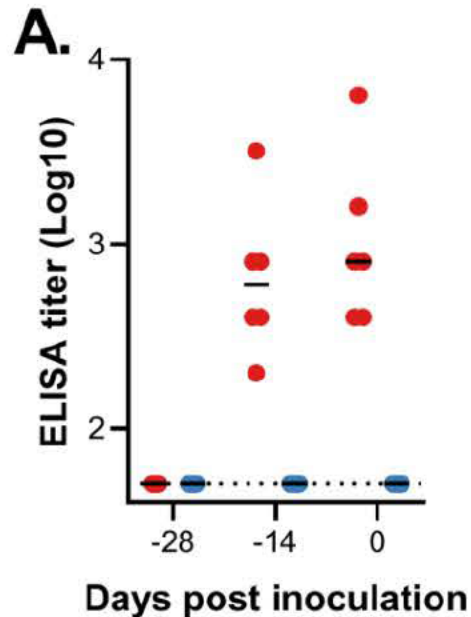
Day 3



ChAdOx1 COVID19 vaccine induces immune response in rhesus macaques



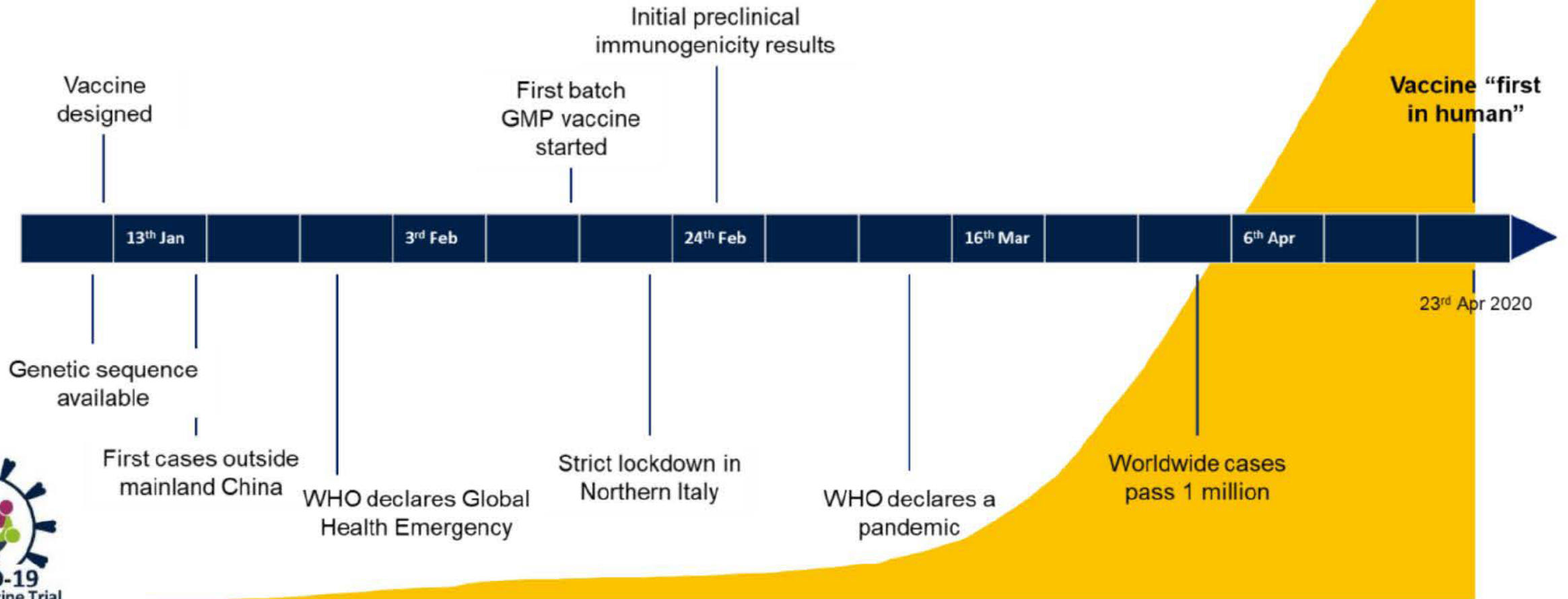
Group 1 was vaccinated with ChAdOx1 nCoV-19 at a dose of 2.5×10^{10} vp/animal at 28 days before challenge. Group 2 (control) was vaccinated with ChAdOx1 GFP at a dose of 2.5×10^{10} vp/animal at 28 days before challenge. The dose is half that which is planned for humans.



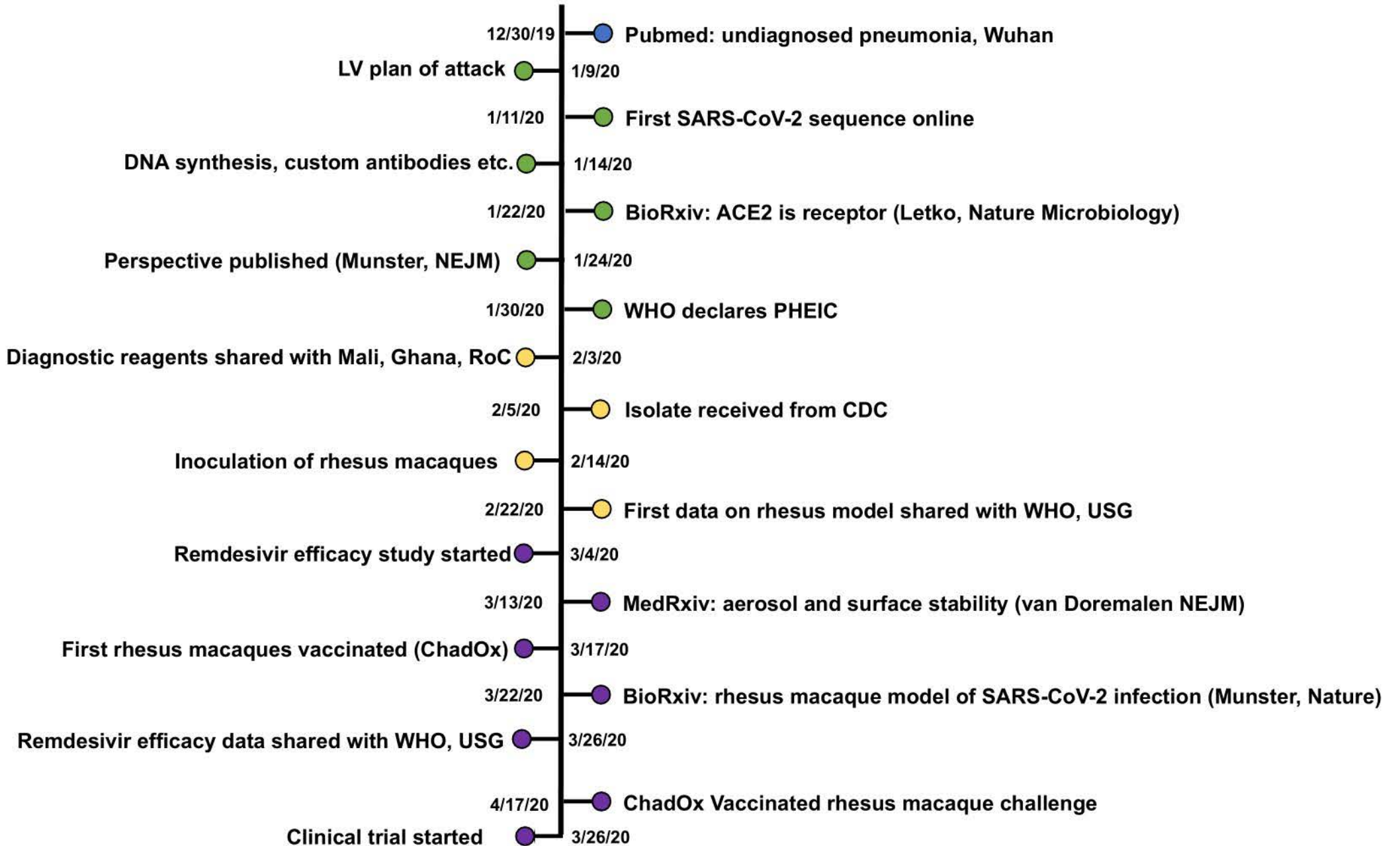
COV001 trial

2.6 million cases worldwide

104 days, from sequence to human



Rapid response towards COVID19



Rapid response towards COVID19 & future preparedness

- Multidisciplinary
- Investment in capacity
- Highly translational
- Data driven
- Extensive knowledge base on the actual needs rather than perceived needs
 1. Cross pathogen
 2. Backgrounds in modeling, fieldwork, epidemiology, diagnostics and actual outbreak

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Tue, 05 May 2020 12:12:22 -0600
To: Raina Plowright; LaTrielle, Sara; 'Plowright, Raina'
Subject: presentation
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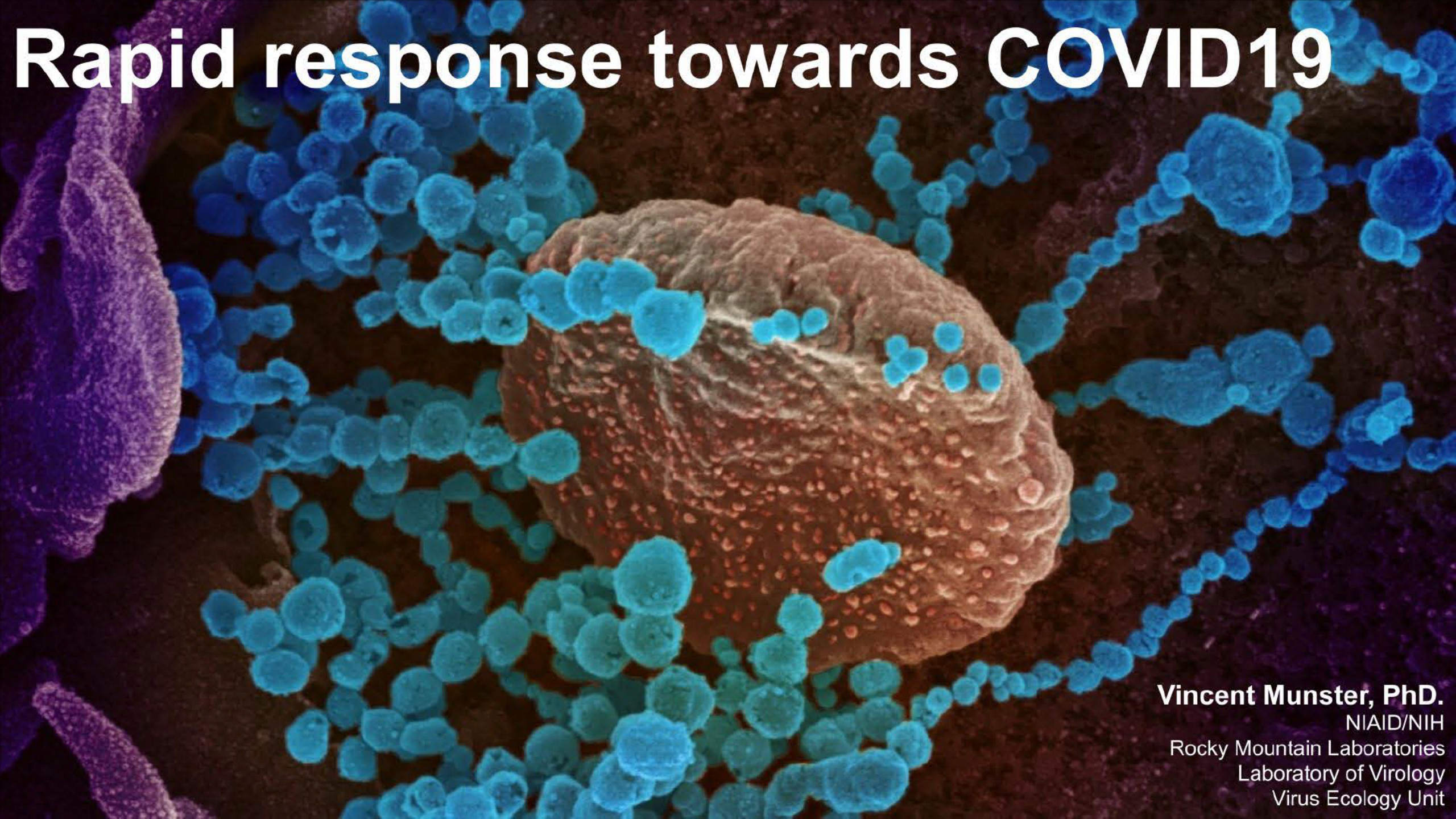
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Identify unique RBDs

All β -CoV sequences



Lineage B, betacoronaviruses use ACE2

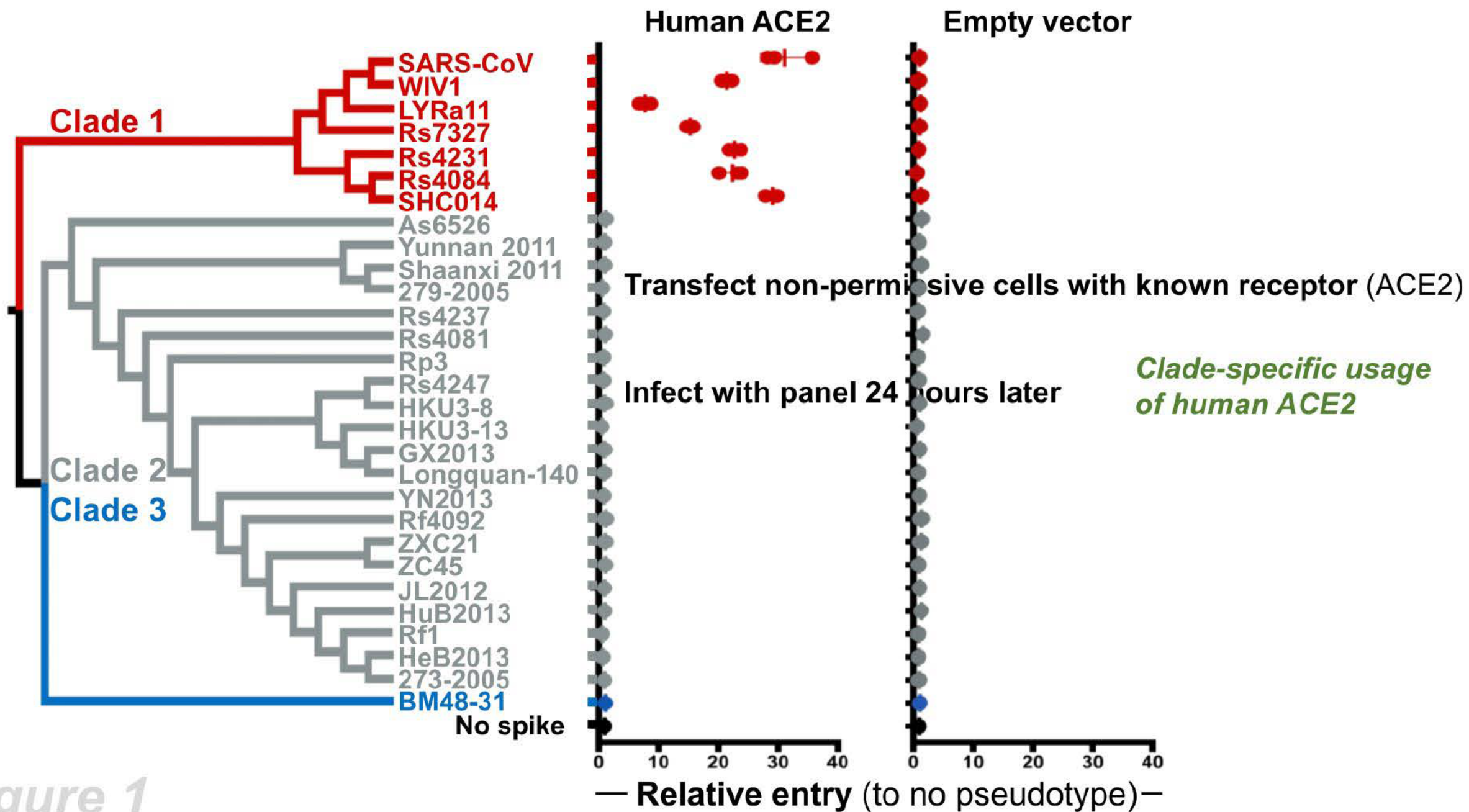
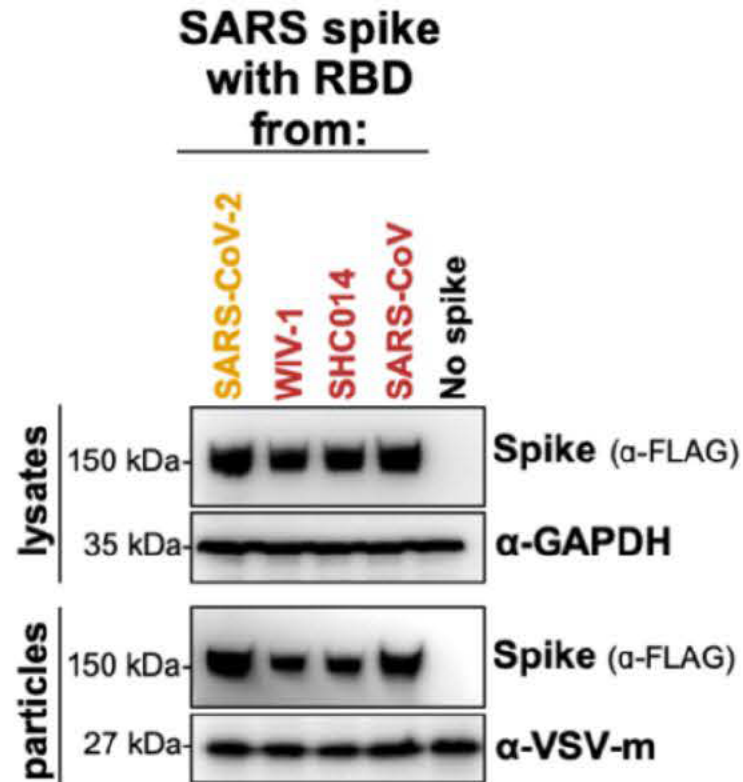


Figure 1

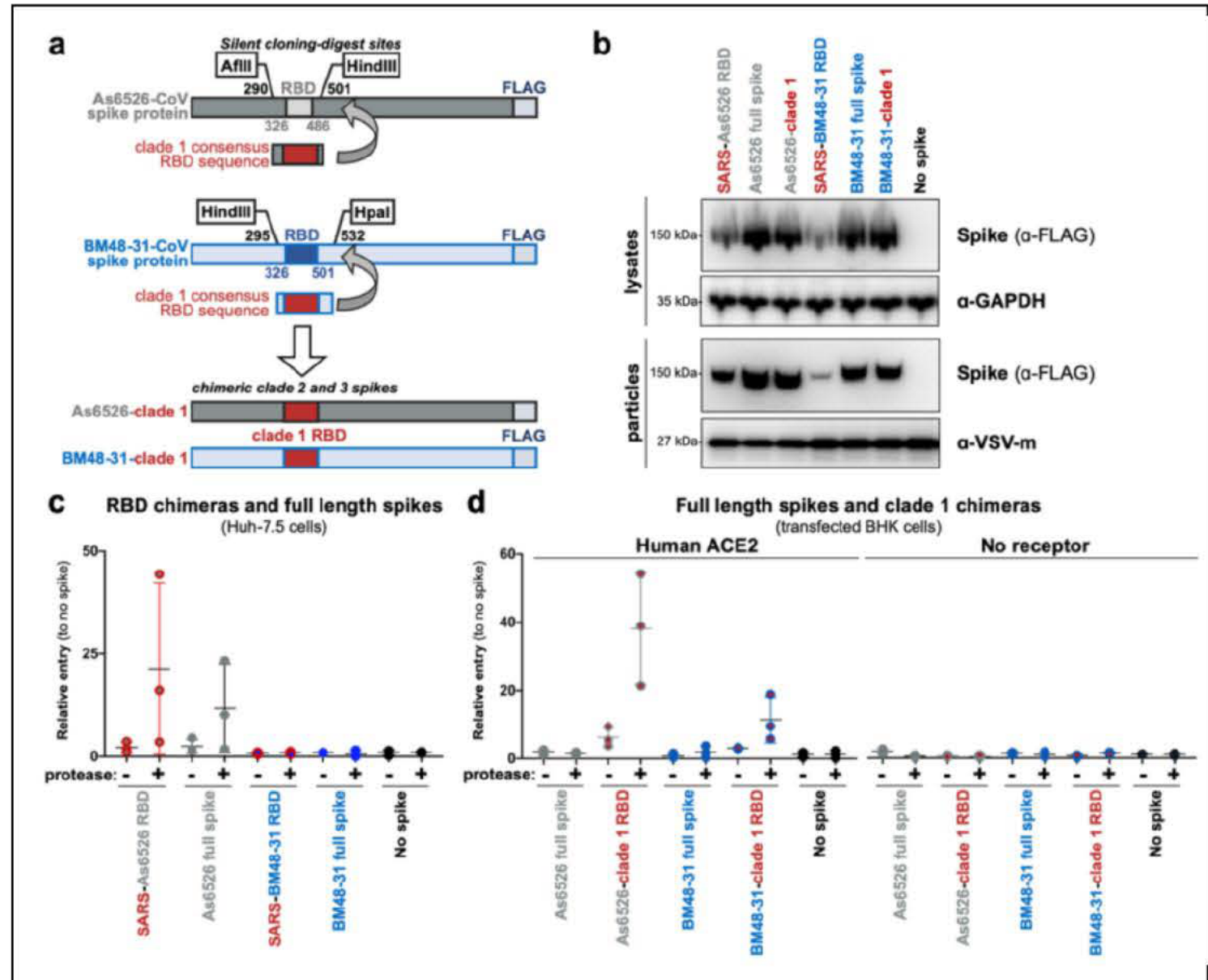
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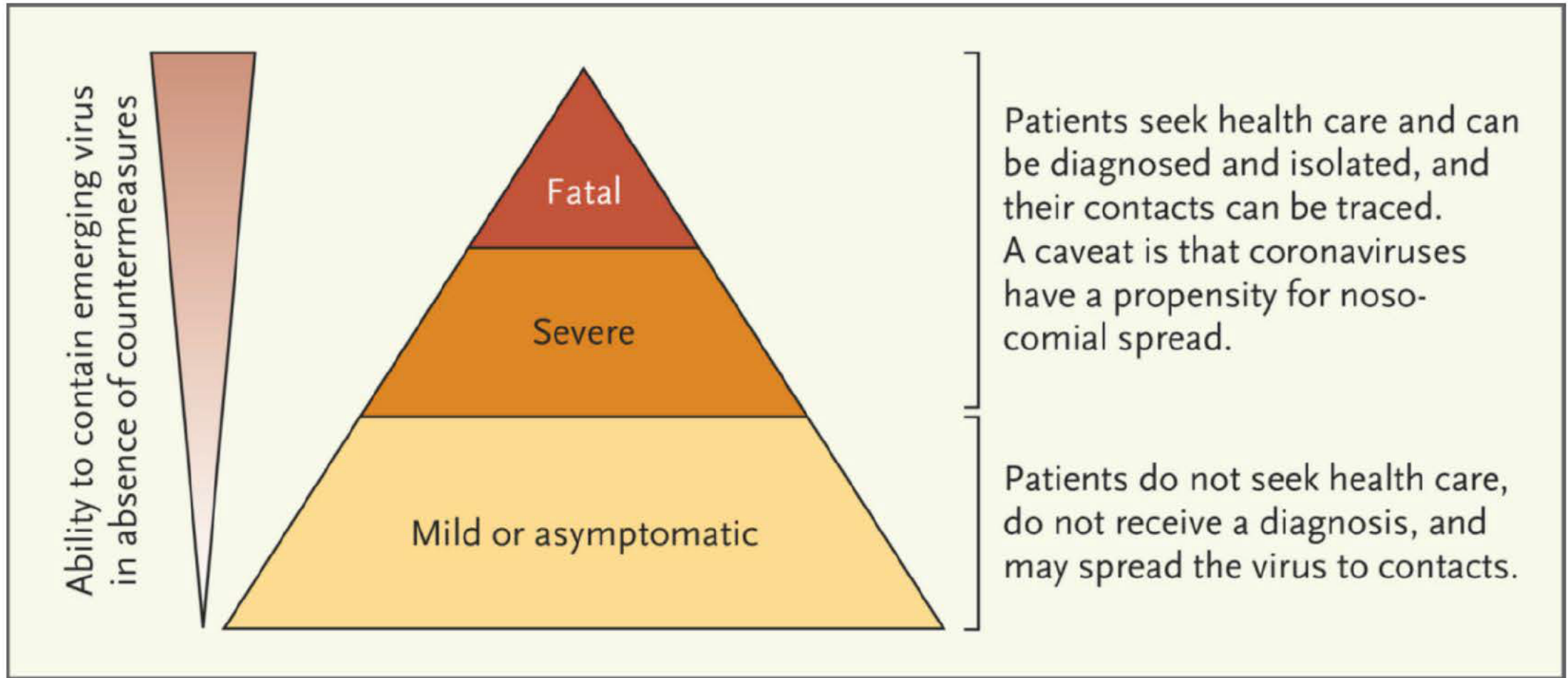
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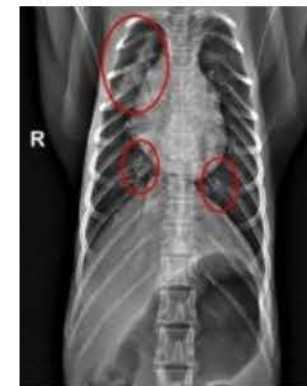
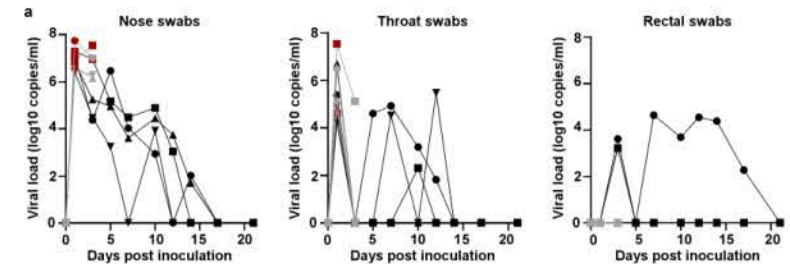
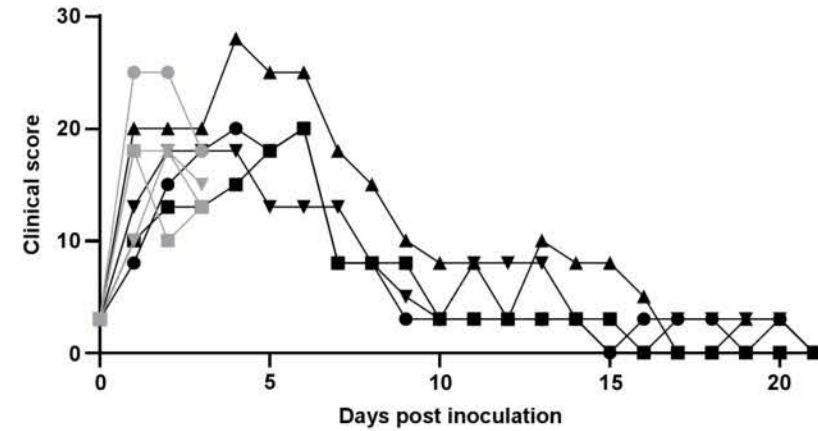


Rapid response towards COVID19

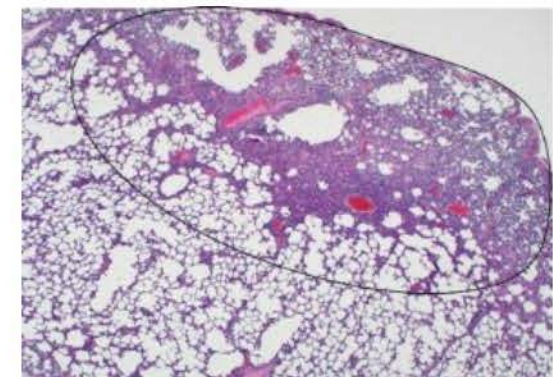
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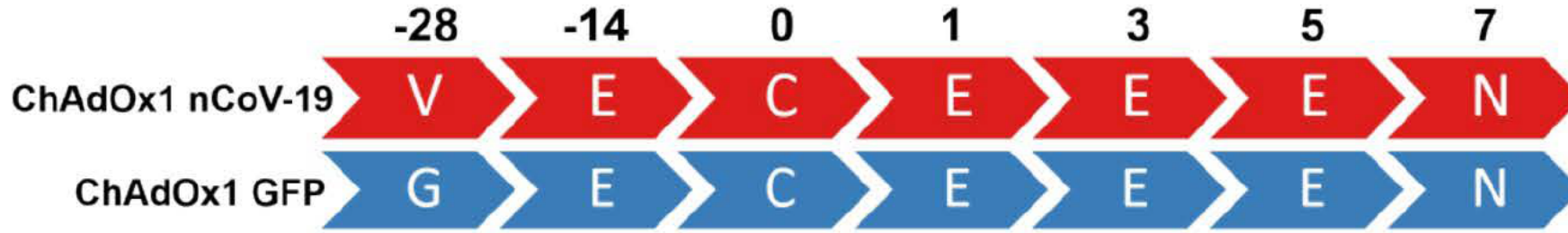
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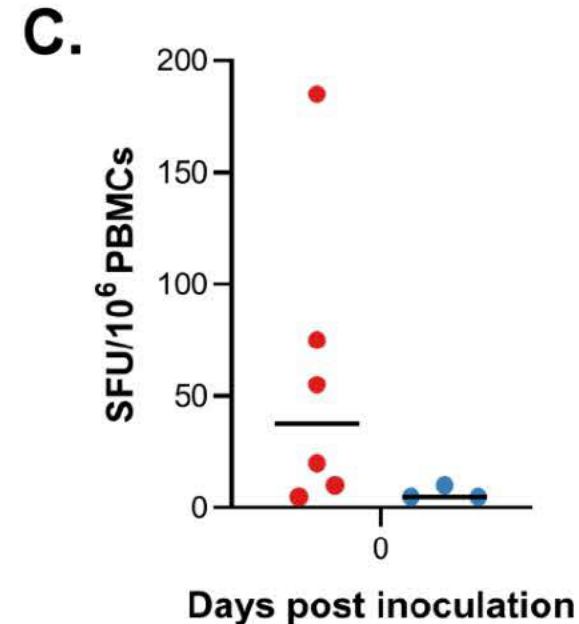
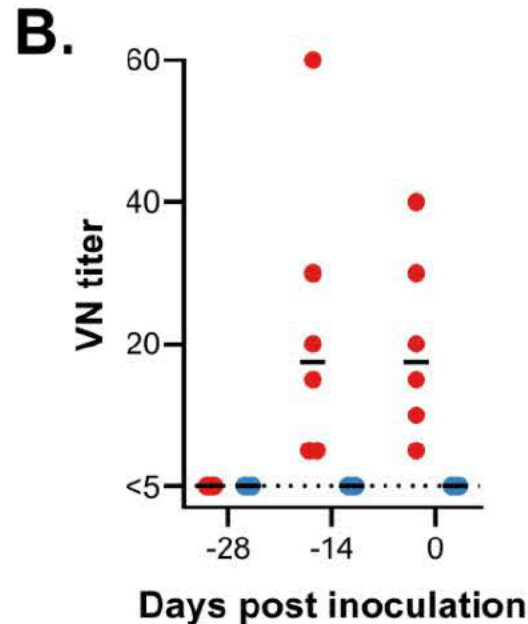
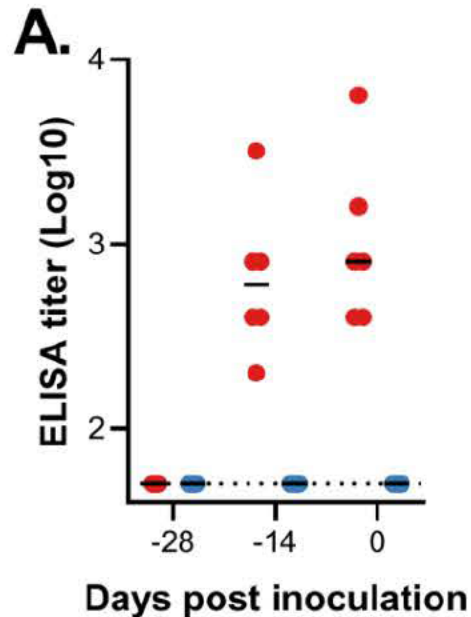
Day 3



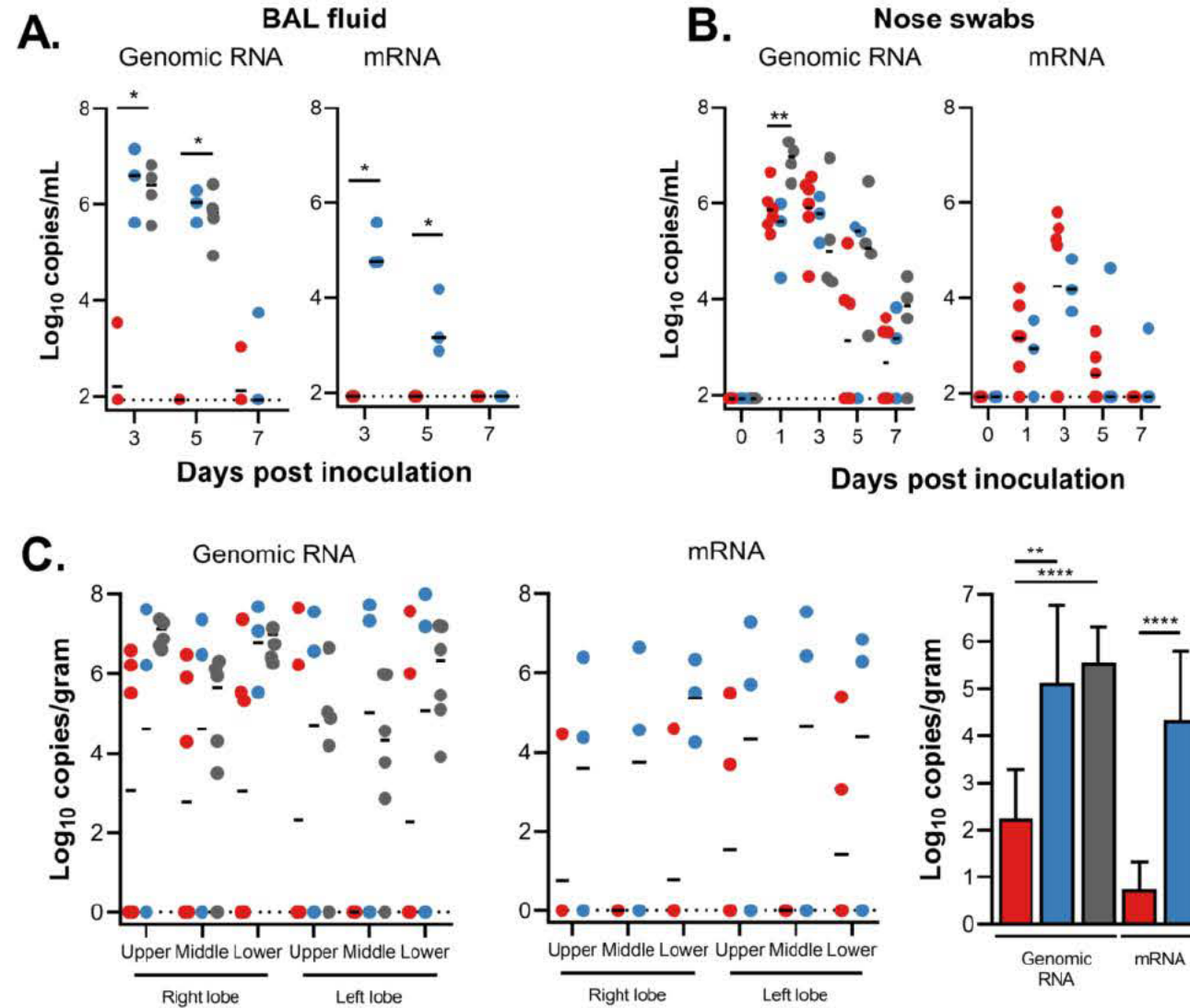
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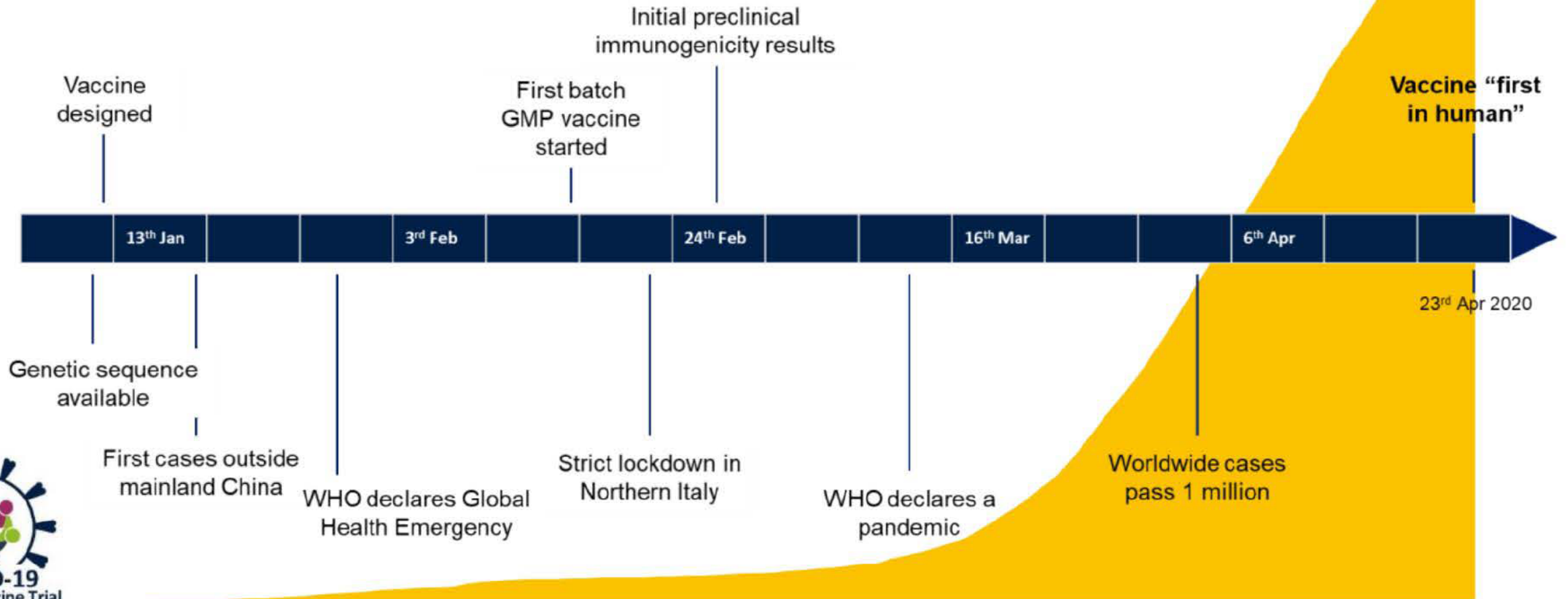
Reduction in SARS-CoV in lower respiratory tract



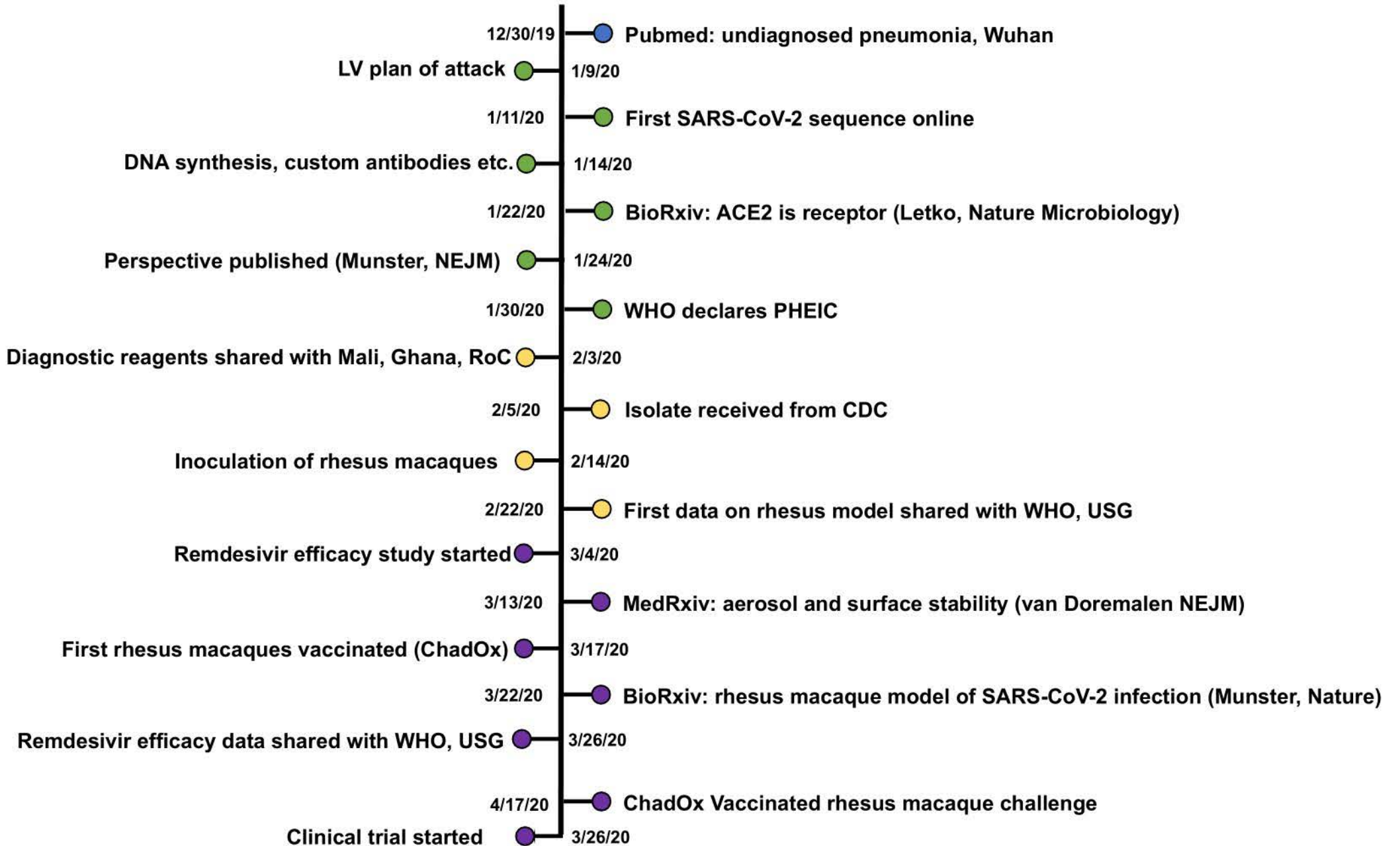
COV001 trial

2.6 million cases worldwide

104 days, from sequence to human



Rapid response towards COVID19



Rapid response towards COVID19 & future preparedness

- Multidisciplinary
- Investment in capacity
- Highly translational
- Data driven
- Extensive knowledge base on the actual needs rather than perceived needs
 1. Cross pathogen
 2. Backgrounds in modeling, fieldwork, epidemiology, diagnostics and actual outbreak

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 4 May 2020 14:02:14 -0600
To: Jennifer Howell; 'Plowright, Raina'
Cc: LaTrielle, Sara
Subject: Re: DARPA PREEMPT Review (to include one-on-one meeting)

Web browser and chrome,

Sounds good

From: Jennifer Howell <(b) (6)>
Date: Monday, May 4, 2020 at 2:01 PM
To: '(b) (6) <(b) (6)> "'Plowright, Raina"'
<(b) (6)>
Cc: "LaTrielle, Sara" <(b) (6)>
Subject: RE: DARPA PREEMPT Review (to include one-on-one meeting)

Can you confirm if you are using the web browser or the Zoom app?

If web browser please use Google Chrome. Then we can try to connect after 5pm EDT today if that works for your schedule.

Jennifer Howell
Executive Conference Center Manager
Strategic Analysis, Inc.
4075 Wilson Blvd. Suite 300
Arlington, VA 22203
(b) (6)
Email: (b) (6) or (b) (6)
Website: <https://sa-ecc.com/>

From: Munster, Vincent (NIH/NIAID) [E] [mailto:(b) (6)]
Sent: Monday, May 4, 2020 3:56 PM
To: Jennifer Howell <(b) (6) 'Plowright, Raina' <(b) (6)>
Cc: LaTrielle, Sara <(b) (6)>
Subject: [Notice: External URLs] [EXTERNAL] Re: DARPA PREEMPT Review (to include one-on-one meeting)

Thanks! Just let me know if you need anything from my end?

From: Jennifer Howell <(b) (6)>
Date: Monday, May 4, 2020 at 1:06 PM
To: "'Plowright, Raina"' <(b) (6) " (b) (6)>
<(b) (6)>

Cc: "LaTrielle, Sara" <[REDACTED] (b) (6)>

Subject: RE: DARPA PREEMPT Review (to include one-on-one meeting)

Will do!

Jennifer Howell
Executive Conference Center Manager
Strategic Analysis, Inc.
4075 Wilson Blvd. Suite 300
Arlington, VA 22203

[REDACTED] (b) (6)

Email: [REDACTED] (b) (6) or [REDACTED] (b) (6)

Website: <https://sa-ecc.com/>

From: Plowright, Raina [mailto:[REDACTED] (b) (6)]

Sent: Monday, May 4, 2020 3:03 PM

To: Jennifer Howell <[REDACTED] (b) (6)> Munster, Vincent (NIH/NIAID) [E]

<[REDACTED] (b) (6)>

Cc: LaTrielle, Sara <[REDACTED] (b) (6)>

Subject: [Notice: External URLs] [EXTERNAL] Re: DARPA PREEMPT Review (to include one-on-one meeting)

Hi Jennifer,

Vincent was not able to get the links to work today. Could you help him troubleshoot before Wednesday?

Thanks,

Raina

From: Jennifer Howell <[REDACTED] (b) (6)>

Date: Monday, May 4, 2020 at 11:42 AM

To: Raina Plowright <[REDACTED] (b) (6)>

Cc: "LaTrielle, Sara" <[REDACTED] (b) (6)>

Subject: DARPA PREEMPT Review (to include one-on-one meeting)

Dear Dr. Plowright,

This email contains the **important log-in information to join the DARPA PREEMPT Review live webinar on May 4 – 6, 2020**. As a reminder **Monday schedule is for performer one-on-one closed sessions**, therefore you should only connect, if you are participating in the closed session or attending the only test connection listed below. The agenda is attached and is also posted on the meeting website.

The **connect information provided below will be used for the live meeting days**. If you have any questions do not hesitate to contact your host, Jennifer Howell at [REDACTED] (b) (6) or by phone at [REDACTED] (b) (6)

Webinar Connection with ZoomGov

Highly recommend using the CHROME web browser if joining by web.

Link: <https://darpa.zoomgov.com/join/91234567890?pwd=VG8rZFo1Yk1kL002MThyblJ2cjhRZz09>

Meeting ID: 91234567890

Password: 1234567890 (if your system requests a password)

Audio connection: if you are speaking to the audience we ask that you dial-in vs. use computer audio. As the audio via computer can be poor if the internet is not strong. Please log-on to ZoomGov and follow the steps to dial in, as a unique participant code will be assigned.

Dial by your location

+1 669 254 5252 US (San Jose)

+1 646 828 7666 US (New York)

+1 833 568 8864 US Toll-free

[+33 1 8565 8565](tel:+33185658565) (France)

Meeting ID: 91234567890

Participant Code: assigned once logged on to Zoom

Password: 1234567890

Dialing from outside the United States? Find your local number: <https://darpa.zoomgov.com/u/aqBS3NgM6>

Finally I have attached a ZoomGov Guidance to assist if this is your first time using Zoom.

PREEMPT Website: [REDACTED] (b) (6)

User Name: [REDACTED] (b) (6)

PW: [REDACTED] (b) (6)

I look forward to working with you on this webinar.

Jennifer Howell

Executive Conference Center Manager

Strategic Analysis, Inc.

4075 Wilson Blvd. Suite 300

Arlington, VA 22203

[REDACTED] (b) (6)

Email: [REDACTED] (b) (6) or [REDACTED] (b) (6)

Website: <https://sa-ecc.com/>

From: Plowright, Raina
Sent: Mon, 4 May 2020 19:57:29 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: DARPA PREEMPT Review (to include one-on-one meeting)

Yes. For Wednesday. About to have PI call and will leave you with a slot. Talk in a minute.

From: "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)>
Date: Monday, May 4, 2020 at 1:56 PM
To: Raina Plowright <[REDACTED] (b) (6)>
Subject: Re: DARPA PREEMPT Review (to include one-on-one meeting)

Should I still prepare a slide or 3-4-5 for Friday highlighting covid19 (other than what Jamie's crew is preparing?)

From: "Plowright, Raina" <[REDACTED] (b) (6)>
Date: Monday, May 4, 2020 at 1:03 PM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Subject: Re: DARPA PREEMPT Review (to include one-on-one meeting)

Shoot. So sorry. What a pain. Mtg went well. Just sent email so they can troubleshoot.

From: "Munster, Vincent (NIH/NIAID) [E]" <[REDACTED] (b) (6)>
Date: Monday, May 4, 2020 at 12:38 PM
To: Raina Plowright <[REDACTED] (b) (6)>
Subject: Re: DARPA PREEMPT Review (to include one-on-one meeting)

Can't seem to make it work

From: "Plowright, Raina" <[REDACTED] (b) (6)>
Date: Monday, May 4, 2020 at 12:21 PM
To: '[REDACTED] (b) (6)' <[REDACTED] (b) (6)>
Subject: FW: DARPA PREEMPT Review (to include one-on-one meeting)

We are on the call now.

From: Jennifer Howell <[REDACTED] (b) (6)>
Date: Monday, May 4, 2020 at 11:42 AM
To: Raina Plowright <[REDACTED] (b) (6)>
Cc: "LaTrielle, Sara" <[REDACTED] (b) (6)>
Subject: DARPA PREEMPT Review (to include one-on-one meeting)

Dear Dr. Plowright,

This email contains the **important log-in information to join the DARPA PREEMPT Review live webinar on May 4 – 6, 2020**. As a reminder **Monday schedule is for performer one-on-one closed sessions**, therefore you should only connect, if you are participating in the closed session or attending the only test connection listed below. The agenda is attached and is also posted on the meeting website.

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Webinar Connection with ZoomGov

Highly recommend using the CHROME web browser if joining by web.

Link:

[https://darpa.zoomgov.com/ \(b\) \(6\) pwd=VG8rZFo1Yk1kL002MThyblJ2cjhRZz09](https://darpa.zoomgov.com/join/91234567890?pwd=VG8rZFo1Yk1kL002MThyblJ2cjhRZz09)

Meeting ID: (b) (6)

Password: (b) (6) (if your system requests a password)

Audio connection: if you are speaking to the audience we ask that you dial-in vs. use computer audio. As the audio via computer can be poor if the internet is not strong. Please log-on to ZoomGov and follow the steps to dial in, as a unique participant code will be assigned.

Dial by your location

- +1 669 254 5252 US (San Jose)
- +1 646 828 7666 US (New York)
- +1 833 568 8864 US Toll-free
- [+33 1 8565 8565](tel:+33185658565) (France)

Meeting ID: (b) (6)

Participant Code: assigned once logged on to Zoom

Password: (b) (6)

Dialing from outside the United States? Find your local number:

<https://darpa.zoomgov.com/join/91234567890>

Finally I have attached a ZoomGov Guidance to assist if this is your first time using Zoom.

PREEMPT Website: (b) (6)

User Name: (b) (6)

PW: (b) (6)

I look forward to working with you on this webinar.

Jennifer Howell
Executive Conference Center Manager
Strategic Analysis, Inc.
4075 Wilson Blvd. Suite 300
Arlington, VA 22203

(b) (6)
Email: (b) (6) or (b) (6)
Website: <https://sa-ecc.com/>

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 4 May 2020 13:16:37 -0600
To: Schountz, Tony
Subject: Re: Aj intestines

Path looks a bit weird, no way to discern staining from positivity. Could be background. You need to let your path talk to our guys.

<https://www.biorxiv.org/content/10.1101/2020.03.21.001628v1.full.pdf+html>

see our path,

we see positivity in immune cells in the IT of the rhesus

On 5/4/20, 12:44 PM, "Schountz,Tony" <[REDACTED]> (b) (6) wrote:

Vinnie,

Attached is a Keynote file from our pathologist. He used the mouse polyclonal antibody we made to recombinant SARS-CoV-2 NP for the IHC and he sees viral antigen in several areas of the intestine (DS Red) and noted them in the attached. He's working on other samples (including negative controls) this week but so far this is the only slide he's sent me (other than bone marrow from the same bat, which also seems to have some viral staining). Any thoughts? We bought a new E probe and used it Friday for the qPCR (the last probe was causing a peculiar amp signal that my tech initially thought was real) and it works great on the cell culture virus but so far we have not detected virus in the swab samples we have tested. We're doing qPCR on intestinal RNA in the next few days. I wonder if they get infected but do not shed virus?

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

[REDACTED] (b) (6)

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 4 May 2020 13:13:44 -0600
To: LaTrielle, Sara; Hudson, Peter John; Colin Ross Parrish; [REDACTED] (b) (6)
Barbara Han; Emily Gurley
Cc: Plowright, Raina
Subject: Re: meeting notes from call

Thanks guys!

From: "LaTrielle, Sara" <[REDACTED] (b) (6)>
Date: Monday, May 4, 2020 at 1:09 PM
To: "Hudson, Peter John" <[REDACTED] (b) (6)> Collin Parrish <[REDACTED] (b) (6)> Jamie Lloyd-Smith <[REDACTED] (b) (6)> [REDACTED] (b) (6) <[REDACTED] (b) (6)> Barbara Han <[REDACTED] (b) (6)> Emily Gurley <[REDACTED] (b) (6)>
Cc: "Plowright, Raina" <[REDACTED] (b) (6)>
Subject: Re: meeting notes from call

Great job team- with 45 min's, think a lot was well articulated. In short, this is what I have :

TIMELINE: Phase 1 will continue: shift up in additional months- perhaps by 6 months

BUDGET: The cost of salaries will be increased by 6 months to align with the extended timeline = cost growth.

[REDACTED] (b) (6) 500k COVID budget will be added back in, hopefully.

MOVING to P2 and further forward: [REDACTED] (b) (6)

MORE AI

TOOLS!!!

That's the short of it.

Sara

From: LaTrielle, Sara <[REDACTED] (b) (6)>

Sent: Monday, May 4, 2020 10:23 AM

To: Hudson, Peter John <[REDACTED] (b) (6)> Colin Ross Parrish <[REDACTED] (b) (6)>

[REDACTED] (b) (6) <[REDACTED] (b) (6)> [REDACTED] (b) (6) <[REDACTED] (b) (6)>

Barbara Han <[REDACTED] (b) (6)>

Cc: Plowright, Raina <[REDACTED] (b) (6)>

Subject: meeting notes from call

Meeting notes from this mornings call-

Sara

From: Schountz, Tony
Sent: Mon, 4 May 2020 18:56:11 +0000
To: Schountz, Tony
Cc: Munster, Vincent (NIH/NIAID) [E]
Subject: Re: Aj intestines

Also, were you planning to talk about the BHK cells transfected with Aj Ace2 during today's Zoom call?

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)

> On May 4, 2020, at 12:42 PM, Schountz, Tony <(b) (6)> wrote:

>

> Vinnie,

>

> Attached is a Keynote file from our pathologist. He used the mouse polyclonal antibody we made to recombinant SARS-CoV-2 NP for the IHC and he sees viral antigen in several areas of the intestine (DS Red) and noted them in the attached. He's working on other samples (including negative controls) this week but so far this is the only slide he's sent me (other than bone marrow from the same bat, which also seems to have some viral staining). Any thoughts? We bought a new E probe and used it Friday for the qPCR (the last probe was causing a peculiar amp signal that my tech initially thought was real) and it works great on the cell culture virus but so far we have not detected virus in the swab samples we have tested. We're doing qPCR on intestinal RNA in the next few days. I wonder if they get infected but do not shed virus?

>

> 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)

> <Bat intestine copy 2.key>

From: Schountz, Tony
Sent: Mon, 4 May 2020 18:42:21 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: Aj intestines
Attachments: Bat intestine copy 2.key

Vinnie,

Attached is a Keynote file from our pathologist. He used the mouse polyclonal antibody we made to recombinant SARS-CoV-2 NP for the IHC and he sees viral antigen in several areas of the intestine (DS Red) and noted them in the attached. He's working on other samples (including negative controls) this week but so far this is the only slide he's sent me (other than bone marrow from the same bat, which also seems to have some viral staining). Any thoughts? We bought a new E probe and used it Friday for the qPCR (the last probe was causing a peculiar amp signal that my tech initially thought was real) and it works great on the cell culture virus but so far we have not detected virus in the swab samples we have tested. We're doing qPCR on intestinal RNA in the next few days. I wonder if they get infected but do not shed virus?

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: Plowright, Raina
Sent: Mon, 4 May 2020 18:20:47 +0000
To: Munster, Vincent (NIH/NIAID) [E]
Subject: FW: DARPA PREEMPT Review (to include one-on-one meeting)
Attachments: PREEMPT PI Meeting 4-6 MAY 2020 FINAL-v2.pdf, ZoomGov Guidance.pdf

We are on the call now.

From: Jennifer Howell <[REDACTED] (b) (6)>
Date: Monday, May 4, 2020 at 11:42 AM
To: Raina Plowright <[REDACTED] (b) (6)>
Cc: "LaTrielle, Sara" <[REDACTED] (b) (6)>
Subject: DARPA PREEMPT Review (to include one-on-one meeting)

Dear Dr. Plowright,

This email contains the **important log-in information to join the DARPA PREEMPT Review live webinar on May 4 – 6, 2020**. As a reminder **Monday schedule is for performer one-on-one closed sessions**, therefore you should only connect, if you are participating in the closed session or attending the only test connection listed below. The agenda is attached and is also posted on the meeting website.

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Webinar Connection with ZoomGov

Highly recommend using the CHROME web browser if joining by web.

Link: [https://darpa.zoomgov.com/j/\[REDACTED\] \(b\) \(6\)?pwd=VG8rZFo1Yk1kL002MThybIJ2cjhRZz09](https://darpa.zoomgov.com/j/[REDACTED] (b) (6)?pwd=VG8rZFo1Yk1kL002MThybIJ2cjhRZz09)

Meeting ID: [REDACTED] (b) (6)

Password: [REDACTED] (b) (6) (if your system requests a password)

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Dial by your location

+1 669 254 5252 US (San Jose)

+1 646 828 7666 US (New York)

+1 833 568 8864 US Toll-free

[+33 1 8565 8565](tel:+33185658565) (France)

Meeting ID: [REDACTED] (b) (6)



PREventing EMerging Pathogenic Threats (PREEMPT) Review Meeting (*Held by Teleconference*)

Agenda – Monday, 4 May 2020 (*time shown is EDT*)

Government: Performer One-on-One Meetings (closed sessions; telecon # to be sent separately)	
9:00 – 9:45	Institut Pasteur
9:45 – 12:15	BREAK
12:15 – 1:00	The Pirbright Institute
1:00 – 1:15	BREAK
1:15 – 2:00	Autonomous Therapeutics, Inc.
2:00 – 2:15	BREAK
2:15 – 3:00	Montana State University
3:00 – 3:15	BREAK
3:15 -4:00	Iowa State University
4:00 – 4:15	BREAK
4:15 – 5:00	UC Davis
5:00 – 5:30	Govt-Only Caucus/Wrap-Up

Agenda – Tuesday, 5 May 2020

9:00 – 9:30	Welcome and Agenda (b) (6), BTO Program Manager, DARPA
Team Presentations – Day 1	
9:30 – 11:00	Preventing Flavivirus Spillover Prof. Luke Alphey, The Pirbright Institute, UK
11:00 – 11:15	BREAK
11:15 – 12:45	Rapid Evolution of Influenza A Viruses in Swine Results in Zoonotic Viruses with Human Pandemic Potential Dr. Phillip Gauger, Iowa State University
12:45 – 1:45	Lunch and Discussions (<i>format TBD</i>)
1:45 – 3:15	Prediction of Spillover Potential and Interventional En Masse Animal Vaccination to Prevent Emerging Pathogen Threats in Current and Future Zones of US Military Operation Dr. Peter Barry, One Health Institute, UC Davis
3:15 – 3:30	BREAK

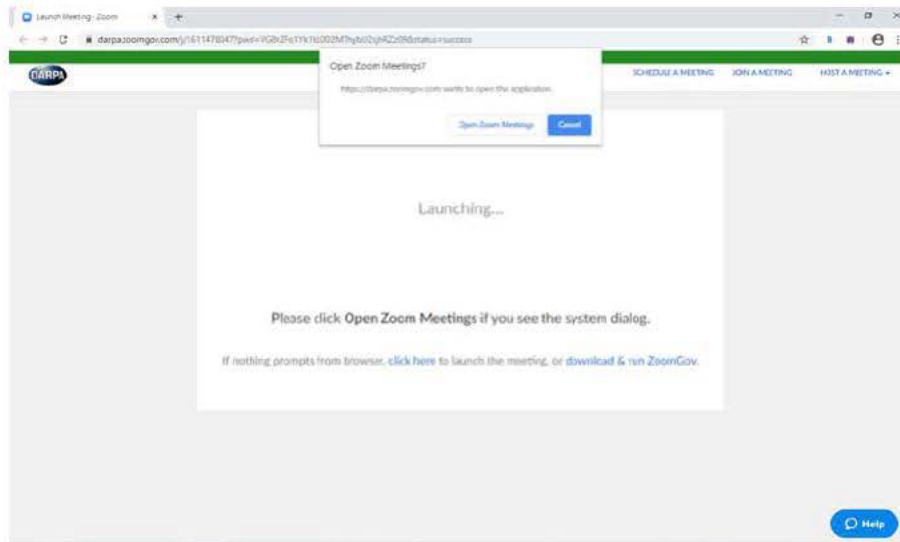
3:30 – 4:45	Guest Presentation Dr. Ethan Jackson, Microsoft Research (to include ideas for 'PREEMPT 2')
4:45 – 6:00	Transition Partner Presentation(s) <ul style="list-style-type: none"> • HHS BARDA/CBRN, Dr. Adam Clark • USAID/Emerging Threats Division, Dr. Padmaja Shetty • DOD GEIS, Armed Forces Health Surveillance Branch, (b) (6) • NIH NIAID, Dr. Adriana Costero-Saint Denis
6:00 – whenever	Remotely held Happy Hours across the world (on your own)

Agenda – Wednesday, 6 May 2020

9:00 – 9:15	Welcome and Agenda, (b) (6), BTO Program Manager, DARPA
Team Presentations – Day 2	
9:15 – 10:45	Understanding Arbovirus Emergence and Changing the Approach to Intervention Dr. Carla Saleh, Institut Pasteur, France
10:45 – 11:00	BREAK
11:00 – 12:30	Preventing Emergence and Spillover of Bat Pathogens in High Risk Global Hotspots Dr. Raina Plowright, Montana State University
12:30 – 1:30	Lunch and Discussions
1:30 – 3:00	Platform Technologies for Enzootic Confinement of Pandemic Threats Dr. Ariel Weinberger, Autonomous Therapeutics, Inc.
3:00 – 3:15	BREAK
3:15 – 4:45	Transition Partners: Performers (Smaller group discussions)
4:45 – 5:00	PM Day 2 Comments & Wrap-Up/Discussion (b) (6), BTO Program Manager, DARPA

Launching Zoom from your computer

1. Open email from webinar host containing meeting link.
2. Use Chrome web browser Click or copy & paste into browser.
3. Choose how to open the Zoom Meeting:
 - a. Click "Open Zoom Meeting" if you have or can download app, if not...
 - b. Below click the link "click here" and to be given the option to join from browser (must click "cancel" first).



4. Enter the password provided in the meeting connection email.
5. Enter your First and Last Name.
6. Click Join
7. The host will be notified that you have arrived and are waiting to join the meeting.
8. Select audio: Phone Call (use the instructions on the webinar connection NOT what is listed in the example below).

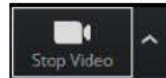


- Dial in now following the 4 steps that appear on your screen it is EXTREMELY important to enter your Participant ID to sync with your online presence.
 - If you plan to be only an observer and you choose Computer Audio switch to phone should you experience poor audio.
9. Become familiar with your options based on Web vs. App:

Connection by Web



Appears when you join by Phone



Turn on webcam



Appears when joined by Computer Audio
When muted the red line appears click to unmute



Turn off webcam



This icon appears to allow user to select microphone and speaker sources, switch to Phone option from Computer Audio



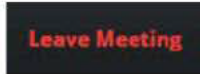
Click to open and view the participants list.



Only the host will be sharing and advancing the slide unless other arrangements have been made in advance.



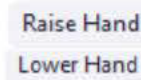
Click to view or start a chat with Everyone or an Individual



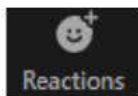
Click to leave the meeting.

Join by App

All the same function from the web will be available PLUS:



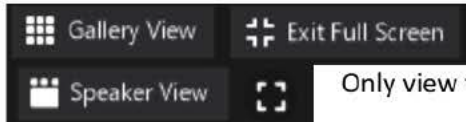
Raise & Lower Hand in Participants list:
This notifies host that you would like to ask a question.



Reactions
This is may not be enabled.



View Options to move the webcam and initials of attendees to the side by side vs on the top of the screen.



See all tiles (webcam and initials of attendees)

Only view the Webcam of the speaker

From: Munster, Vincent (NIH/NIAID) [E]
Sent: Mon, 4 May 2020 07:24:44 -0600
To: Letko, Michael (NIH/NIAID) [F]; Seifert, Stephanie (NIH/NIAID) [E]; Kevin Olival,; Plowright, Raina
Subject: FW: Decision on manuscript NRMICRO-18-165V4

Congrats,

And great work team!

Vincent Munster, PhD
Chief Virus Ecology Section
Rocky Mountain Laboratories
NIAID/NIH

From: "ursula.hofer1@nature.com" <ursula.hofer1@nature.com>
Reply-To: "ursula.hofer1@nature.com" <ursula.hofer1@nature.com>
Date: Monday, May 4, 2020 at 12:32 AM
To: '(b) (6)' <(b) (6)>
Subject: Decision on manuscript NRMICRO-18-165V4

Dear Vincent,

Manuscript number: NRMICRO-18-165V4
Title: Bat-borne viruses: mechanisms of spillover and emergence
Authors: Vincent Munster, Michael Letko, Stephanie Seifert, Kevin Olival, and Raina Plowright

Thank you again for submitting your revised manuscript. I've now had a chance to go through your revisions and response to the referees and I'm satisfied that their comments have been adequately addressed. I'm therefore pleased to say that, in principle, I'm happy to accept your manuscript for publication in Nature Reviews Microbiology.

Please note that this offer is conditional on editorial queries being addressed.

All our articles are thoroughly edited, taking into account clarity, language, scientific correctness, consistency and house style, to ensure they meet our high publication standards. Editing will also address the re-drawing of the figures. This is an in-depth process and I hope to send back the edited manuscript for your revisions within the next 1-3 weeks. If you have any questions regarding the manuscript in the meantime, please don't hesitate to get in touch.

Thanks again for writing for Nature Reviews Microbiology. I look forward to finalizing your manuscript with you.

Best wishes,

Ursula

Ursula Hofer, MD PhD
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As a result of the significant disruption that is being caused by the COVID-19 pandemic we are very aware that many researchers will have difficulty in meeting the timelines associated with our peer review process during normal times. Please do let us know if you need additional time. Our systems will continue to remind you of the original timelines but we intend to be highly flexible at this time.

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From: Munster, Vincent (NIH/NIAID) [E]
Sent: Fri, 1 May 2020 11:05:06 -0600
To: Manuel Ruiz; Clif McKee; Raina Plowright; Hudson, P; Colin Ross Parrish; (b) (6) Bharti, Nita; (b) (6) Schountz, Tony; Caylee Falvo; Dan Crowley; Agnieszka Rynda; Aaron Morris; Tamika Lunn; (b) (6) Kwe Claude, Yinda (NIH/NIAID) [F]; (b) (6) Cara Brook; Hector Aguilar-Carreno; Jamie Lloyd-Smith; Emily Gurley; Devin Jones; Maureen Kessler; Elinor Jax; Lauren Dee
Subject: Re: CoV review, outline and contributions

Great job, herding a flock of scientists!

Cheers,

Vincent

From: Manuel Ruiz <(b) (6)>
Date: Friday, May 1, 2020 at 10:30 AM
To: Clif McKee <(b) (6)> Raina Plowright <(b) (6)>
"Hudson, P" <(b) (6)> Collin Parrish <(b) (6)> " (b) (6)
<(b) (6) "Bharti, Nita" <(b) (6) " (b) (6)
<(b) (6) Tony Schountz <(b) (6) Caylee Falvo
<(b) (6) Dan Crowley <(b) (6) Agnieszka Rynda
<(b) (6) Aaron Morris <(b) (6) Tamika Lunn
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" (b) (6) <(b) (6) "Kwe Claude, Yinda (NIH/NIAID) [F]"
<(b) (6) " (b) (6)
<(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) Elinor Jax <(b) (6) Lauren Dee
<(b) (6)
Subject: Re: CoV review, outline and contributions

Hi everybody!

Thank you all for the great work done for this review. The sections we have received look great! We really appreciate the effort put into this!

Some teams need extra time to finish their sections, so we have extended the deadline: please send us your **contributions by Friday 8th.**

We have already started the editing process of the sections received, so please don't feel that we put stress on you to meet the initial deadline just for fun! If any of the teams that have already sent their

contributions feel that something was left out due to time constraints, please let us know to organize the work.

We weren't lucky convincing the editor of *Cell* (they missed it), so we will send a letter to the editor of Nature Communications in the next couple of days (fingers crossed!).

Thanks again team!

Manuel (on behalf of Clif and Raina)



On Wed, Apr 15, 2020 at 11:46 AM Manuel Ruiz <[REDACTED]> (b) (6) wrote:
Hi everybody,

Some guidelines to prepare and send your sections:

1. Word document (sorry LaTeX users)
2. Citation style "APA" (Author Date)
3. Include list of references at the end of the document (this help us check for duplicates among sections, in case that there is more than one citation with the same "(Author, date)" in the text of multiple sections, but they correspond to different articles).
4. Name the word document as "Section_#_YYmmdd". (e.g. "Section_2.1_20200415"; "Table_1_20200415")
5. Send word document in an email with copy to Clif & Manuel to compile the files.

Thanks all for the enthusiasm!

Manuel



El mar., 14 abr. 2020 a las 14:31, Manuel Ruiz (<[REDACTED]> (b) (6) escribió:
Hi everybody,

[Manuscript outline Link](#)

[Bat CoV Literature OneDrive Folder Link](#) **Contributions by April 29th.**

We have outlined our review article about ecology of coronaviruses in bats and emerging pandemics. Thanks to everybody who contributed with ideas, feedback and writing! We are very excited about making this a solid contribution in a high impact journal! So, now the fun begins: let's put the ideas in writing! There are two links above, one to the google doc with the outline, and another one to a OneDrive folder where we have started to compile the bat literature on CoV. The outline file contains a working title (open for suggestions), a table with the names of contributors and the section/s assigned; In each section, we have included a brief description to guide the review process and narrative, in addition, for some sections/subsections we have included some points that are important to touch in your contributions (if you think those points may not be relevant, please discuss with us to adapt the narrative). Once you have identified your section, please get in touch with the other people assigned to that section. A very important part of preparing your contributions is to keep it within the word length proposed (in “()” next to each section/subsection). We will have flexibility with the overall length, but not until a complete draft is in place, so please keep your writing concise. The OneDrive folder link gives you access to the CoV library that we have started. The idea is for everybody to keep their references in there to help each other with a common library, in this way we can all be sure of having the references used in the article, missing important literature and also avoiding double refs. To avoid duplicates and facilitate management, please name the files with the automatic name generated when you download a pdf. (If anybody has issues getting access to the folder, let Manuel know). We need your **contributions by April 29th**. In the meantime, please work with us iteratively as you progress so we can ensure that all efforts are in line with the theme. Our target journals are Cell or Nature Communications. We will send the letter to the editor of Cell this week and let you know about it as soon as we hear back. Looking forward to putting this together! Happy writing!

Clif, Manuel, & Raina

PS: Olivier, could you please include Lauren and Elionor in the email list?



From: Plowright, Raina
Sent: Thu, 30 Apr 2020 18:15:46 +0000
To: LaTrielle, Sara; Emily Gurley; Barbara Han; Munster, Vincent (NIH/NIAID) [E]; Jamie Lloyd-Smith; Schountz, Tony; Colin Ross Parrish; Hector Aguilar-Carreno; Amandine Gamble; Peggy Eby; Olivier Restif; Alex Washburne
Cc: Hudson, P
Subject: Re: DARPA/MSU 1:1 review mtg (presenters and important info to read today!)

Thanks Sara,

A third of our time will be Q&A, so if you are not presenting, you may still have a critical role in the whole production.

We will keep the presentation to 60 minutes, leaving 30 min for Q&A.

We also decided to prioritize people who have not been to DC and they happen to be people who are working on COVID – so we can both emphasize areas of the project that have not been presented at the in-person meetings, and emphasize our ability to pivot to the current pandemic.

Raina

From: "LaTrielle, Sara" <(b) (6)>
Date: Thursday, April 30, 2020 at 10:53 AM
To: Emily Gurley <egurley1@jhu.edu>, Barbara Han <(b) (6)>
<(b) (6)> <(b) (6)> Jamie Lloyd-Smith
<(b) (6)> "Schountz, Tony" <(b) (6)> Colin Ross
Parrish <(b) (6)> Hector Aguilar-Carreno <(b) (6)> Amandine Gamble
<(b) (6)> Peggy Eby <(b) (6)> Olivier Restif
<(b) (6)> Alex Washburne <(b) (6)>
Cc: "Plowright, Raina" <(b) (6)> "Hudson, P" <(b) (6)>
Subject: DARPA/MSU 1:1 review mtg (presenters and important info to read today!)

All,

In preparation for our Team's presentation to DARPA next WED (calendar invite to follow), we are requesting the following people to present and/or be on the call to field possible questions from DARPA and/or the other PREEMPT teams. We intentionally kept the list of presenters small- and are highlighting those who yet to present in DC. We need to keep our messages crisp and hitting hard on a few key points- not talking about every single result. We need to bring these points together and emphasize our pivot to COVID.

The most important is to register today! This is a MUST- due to DARPA strict rules. Takes 2-3 min- tops.

Link and sign-in here:

- (b) (6)
- Username: (b) (6)
- Password: (b) (6)

Presenters are: *(Slides due to Raina by Sat- final slides sent to DARPA Tues)*

Raina: Introduction (5min)

Raina: Field 3 other sites and Australia system – movement, environment, new serology work (10min)

Emily: Field – Bangladesh (5min)

Tony: Immunology and bat CoV experiment (10min)

Jamie: G-P and COVID (15min)

Vincent: COVID & G-P approach (15min)

Pete: Conclusion (5min)

Present on call for Q&A from DARPA/other PREEMPT teams

Barbara, Colin, Hector, Amandine, Alex, Olivier, Peggy

Please let Raina or I know if you have any questions or need help registering. I will send a meeting invite and instructions for getting into the call.

Best,
Sara/Raina

From: Letko, Michael (NIH/NIAID) [F]
Sent: Thu, 30 Apr 2020 16:21:50 +0000
To: Munster, Vincent (NIH/NIAID) [E]; Seifert, Stephanie (NIH/NIAID) [E]
Subject: Re: Referee reports from Nature Reviews Microbiology - NRMICRO-18-165V3
Attachments: 4_30_20 NRM manuscript REVISED - ML.docx, ATT00001.htm, Rebuttal - ptXpt.docx, ATT00002.htm

Hi guys,

I have finished addressing the reviewers comments. Attached is the revised manuscript and the point-by-point rebuttal.

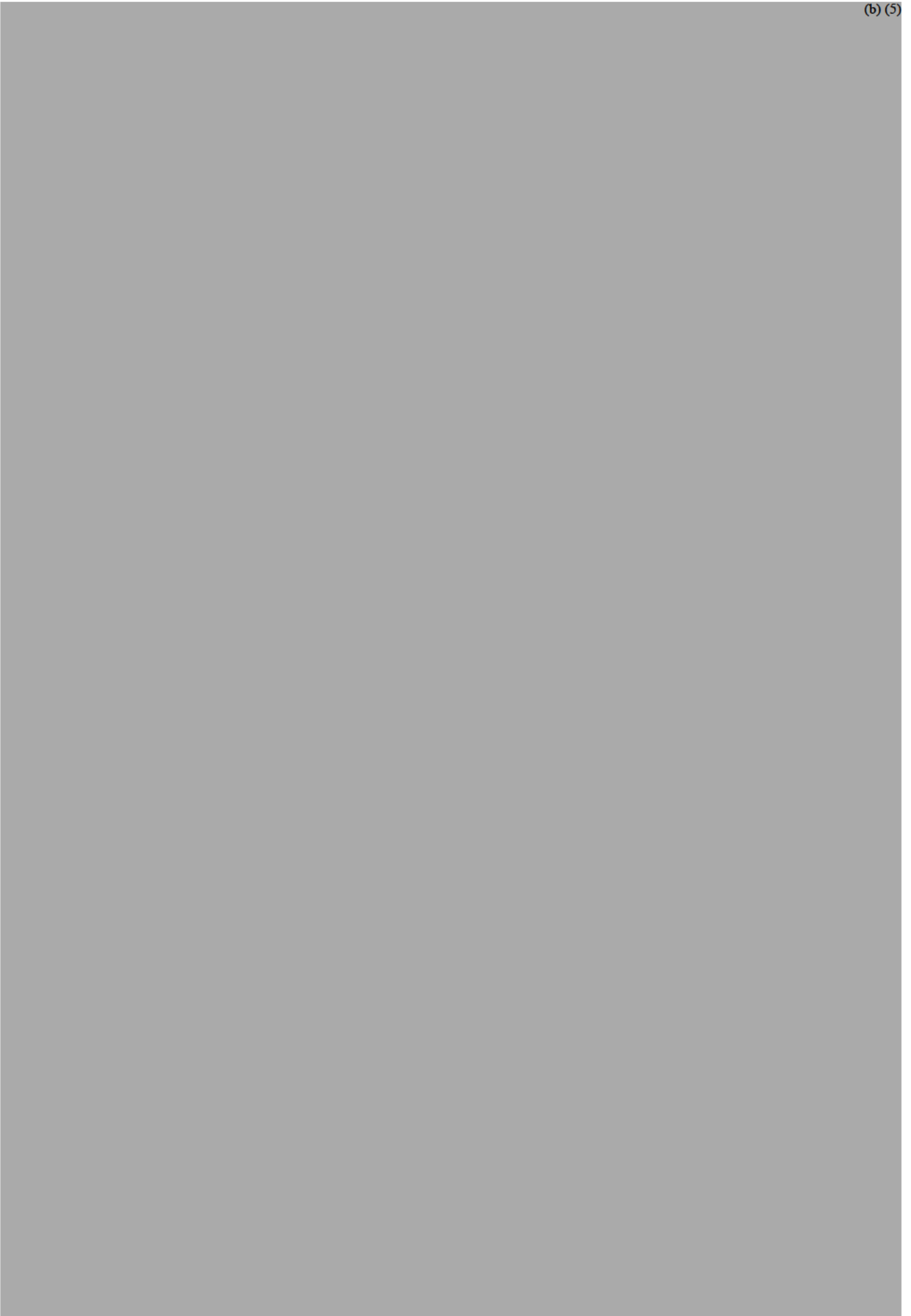
Take a look. Make changes if you think they are needed. The editors want this manuscript file back with all of the changes tracked.

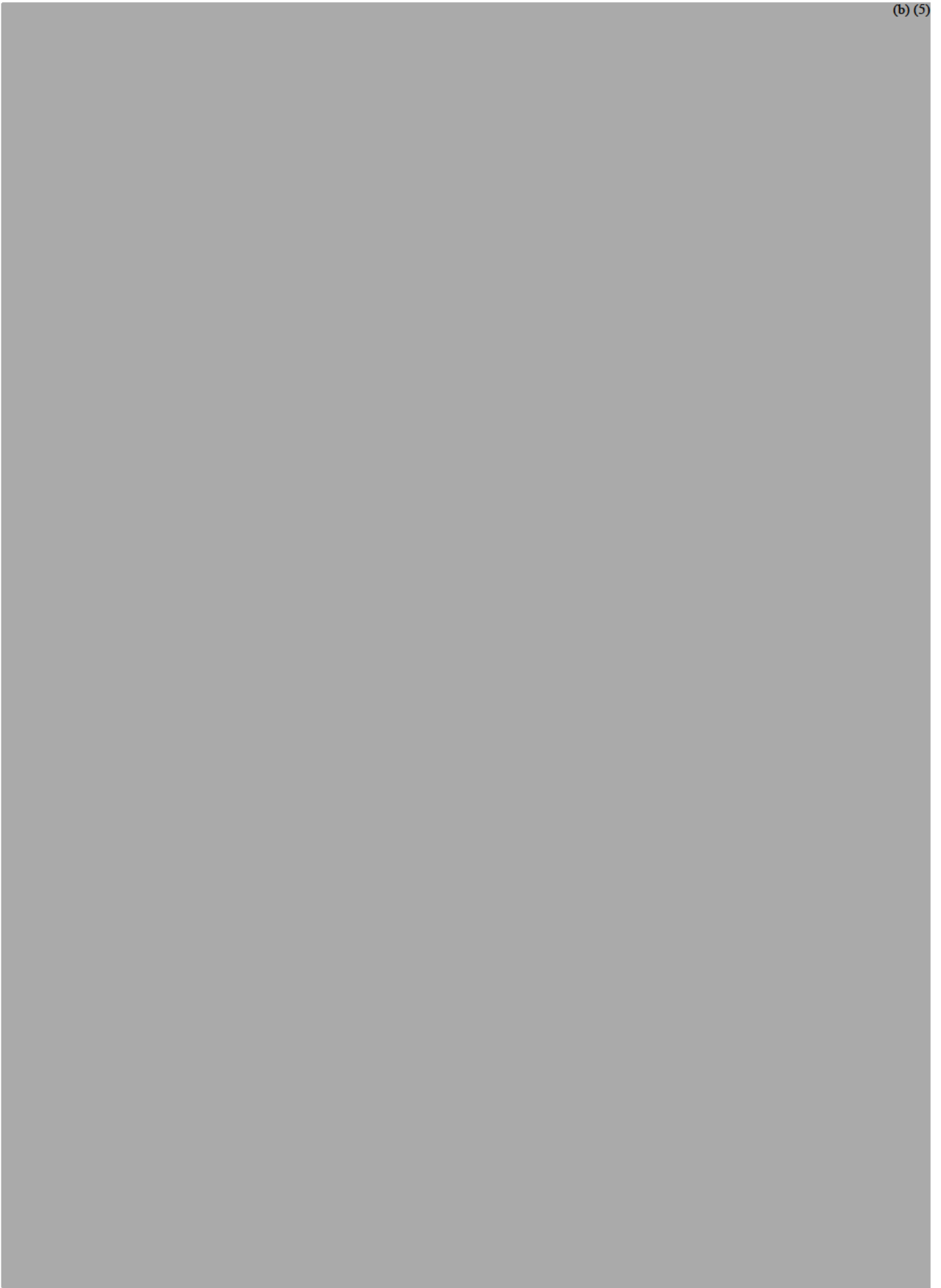
Referee #2

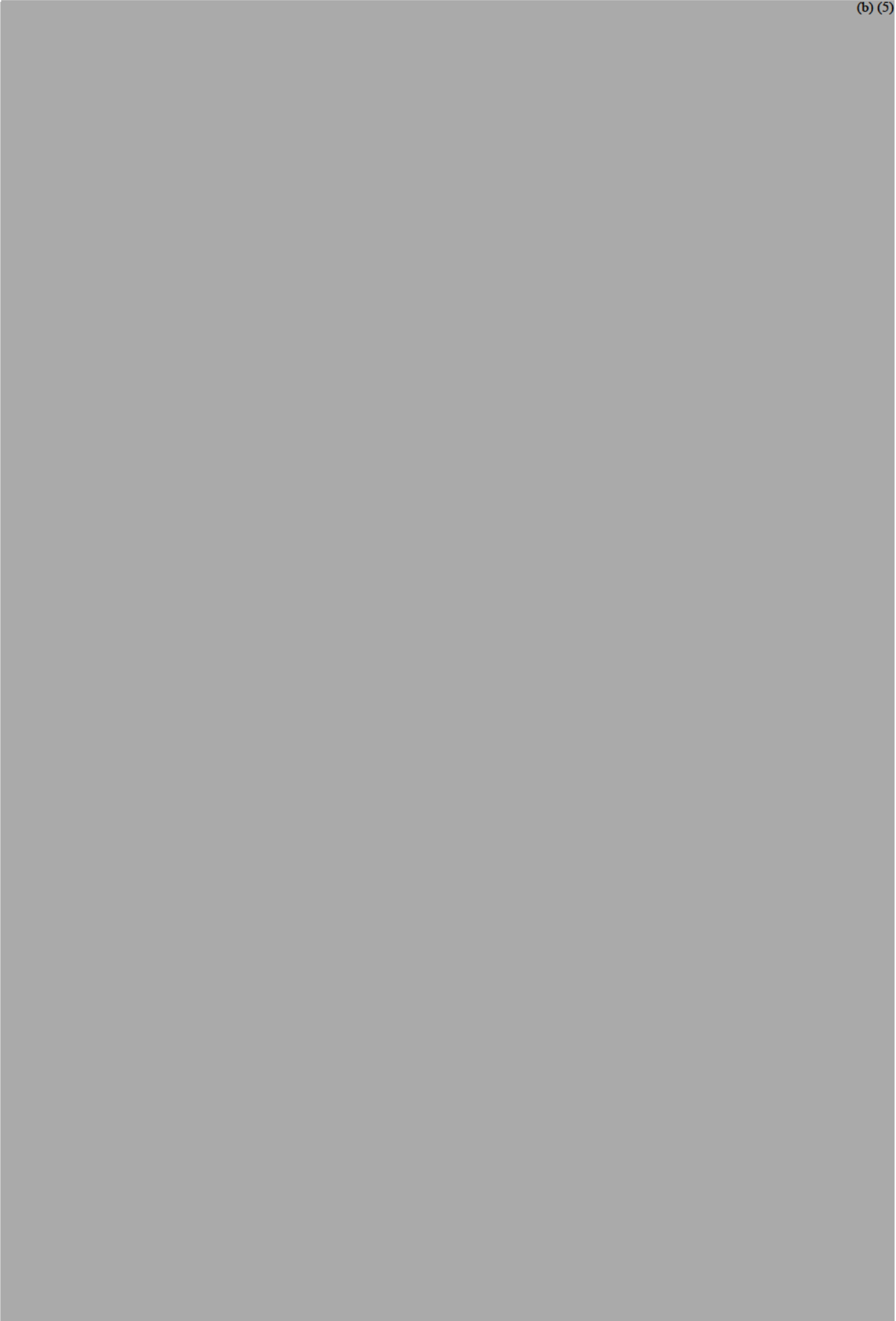
Review for Bat-borne virus diversity, spillover and emergence

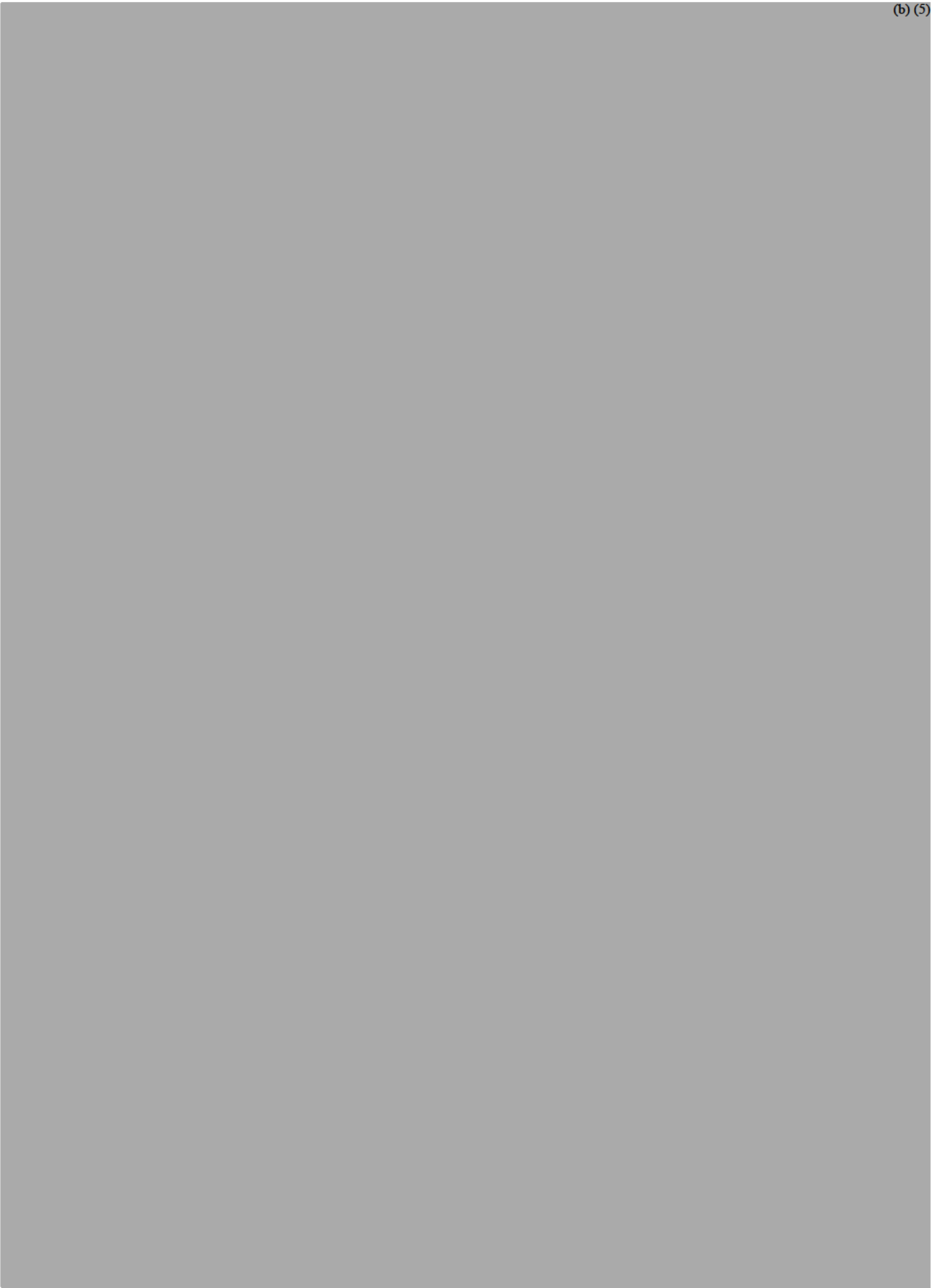
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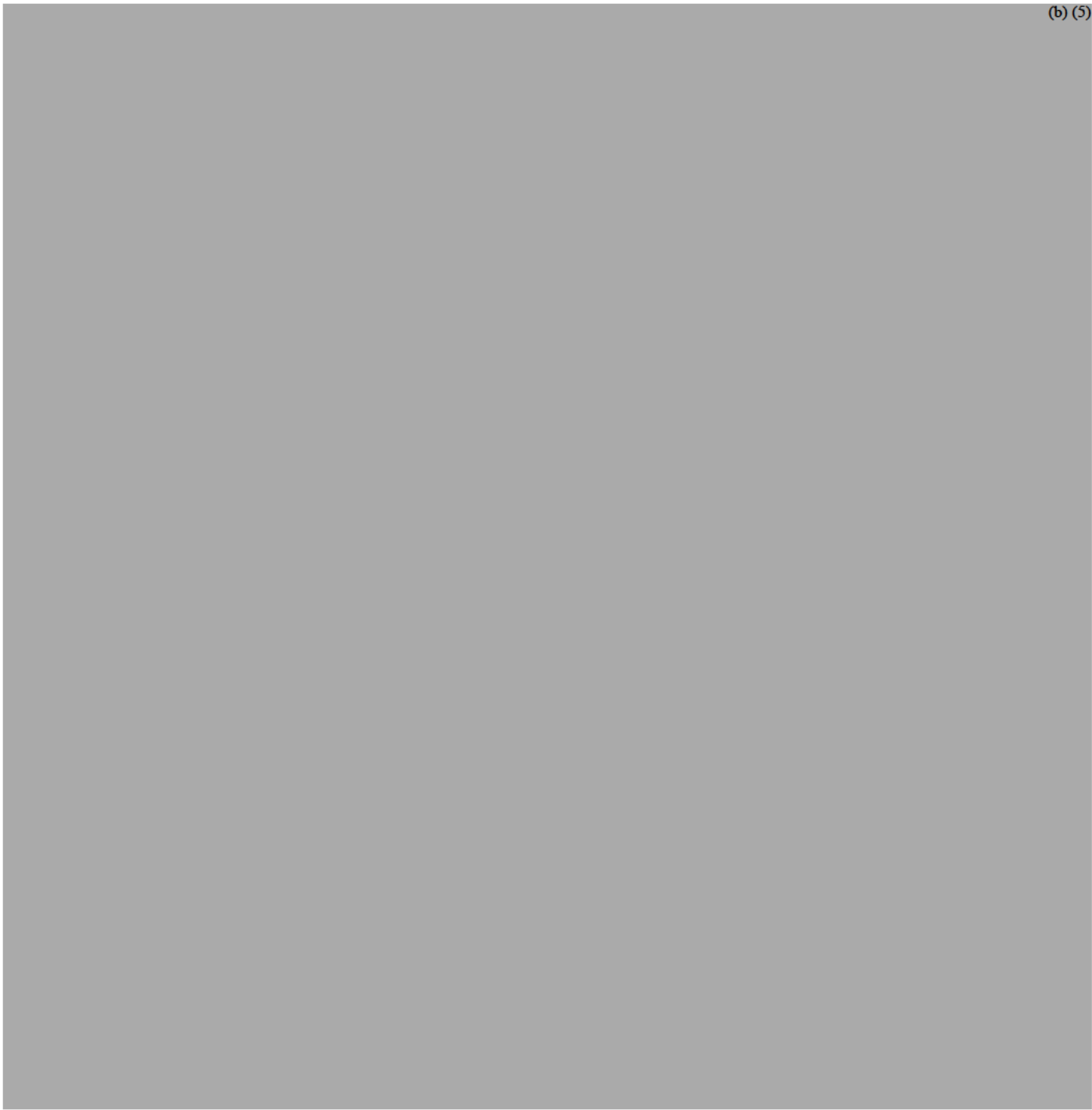














-michael

Michael Letko, Ph.D
Postdoctoral IRTA
Dr. Vincent Munster Laboratory
Virus Ecology Unit, Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH
[903S 4th Street](#)
[Hamilton MT 59840](#)
(b) (6)

On Mar 26, 2020, at 9:38 AM, Munster, Vincent (NIH/NIAID) [E] <(b) (6)> wrote:

We are getting there,

Haven't looked at it yet, but any update on SARS-CoV-2 might be nice (although very limited info on the interface for now)

Vincent Munster, PhD
Chief, Virus Ecology Section
Laboratory of Virology
Rocky Mountain Laboratories
NIAID/NIH

From: "ursula.hofer1@nature.com" <ursula.hofer1@nature.com>
Reply-To: "ursula.hofer1@nature.com" <ursula.hofer1@nature.com>
Date: Thursday, March 26, 2020 at 1:39 AM
To: '(b) (6)' <(b) (6)>
Subject: Referee reports from Nature Reviews Microbiology - NRMICRO-18-165V3

Dear Vincent,

Manuscript number: NRMICRO-18-165V3
Title: Bat-borne viruses: mechanisms of spillover and emergence
Author(s): Vincent Munster, Michael Letko, Stephanie Seifert, Kevin Olival, and Raina Plowright
Submission date for revisions: 23d April 2020

I now have the peer-review comments on your Review article entitled "Bat-borne viruses: mechanisms of spillover and emergence" for Nature Reviews Microbiology, which are presented in the attached Word file. The referees have raised some points that I would like you to address before we proceed. I therefore invite you to revise the manuscript and provide a formal rebuttal to all points raised by the referees. You should detail how you have addressed each comment, including your reasons for not

making any of the suggested changes, by adding your comments after each point in the Word document.

I have attached the version of your article with page and line numbers to help you navigate the referees' comments and would be most grateful if you could make your changes to this document, ensuring that you use the 'track changes' function.

(b) (5)

I would like to receive your revised manuscript and rebuttal by 23d April 2020; please contact me if this deadline presents any problems.

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We hope that you will support this initiative and supply the required information. Should you have any query or comments, please do not hesitate to contact me.

To submit your revised manuscript, please click on the link below:

<https://mts-nrmicro.nature.com/cgi-bin/main.plex?el=A4Z4PDX2C4TyV6I2A9ftddkDSbNEYz0xZrp8nuh6SAZ>

I look forward to receiving your revised manuscript. Please don't hesitate to get in touch if you wish to discuss any of the points raised in this letter or in the referees' reports.

Best wishes and I hope all of you are alright,
Ursula

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