OMB No. 1018-0093
Expires 05/31/2017

Department of the Interior
U.S. Fish and Wildlife Service

Federal Fish and Wildlife Permit Application Form

Return to: U.S. Fish and Wildlife Service
Division of Management Authority (DMA)
Branch of Permits, MS: IA
5275 Leesburg Pike
Falls Church, VA 22041-3803
1-800-358-2104 or 703-358-2104

Type of Activity:
EXPORT/RE-EXPORT/IMPORT/INTERSTATE AND FOREIGN COMMERCE/TAKE OF ANIMALS (LIVE/ SAMPLES/PARTS/PRODUCTS) *(ESA and/or CITES)*
(circle/highlight proposed activity)
☑ **New Application**
☐ **Requesting Re-issuance/Amendment of Permit#:** _____

Complete Sections A or B, and C through H of this application. U.S. address may be required in Section C, see instructions for details.
See attached instruction pages for information on how to make your application complete and help avoid unnecessary delays.

A. Complete if applying as an individual			
1.a. Last name	1.b. First name	1.c. Middle name or initial	1.d. Suffix
2. Date of birth (mm/dd/yyyy)	3. Social Security No.	4. Occupation	5. Affiliation/ Doing business as (see instructions)
6.a. Telephone number	6.b. Alternate telephone number	6.c. Fax number	6.d. E-mail address

B. Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution			
1.a. Name of business, agency, Tribe, or institution		1.b. Doing business as (dba)	
Duke University			
2. Tax identification no.	3. Description of business, agency, Tribe, or institution		
56-0532129	Educational and research institution		
4.a. Principal officer Last name	4.b. Principal officer First name	4.c. Principal officer Middle name/ initial	4.d. Suffix
Vick	Daniel [redacted]		
5. Principal officer title	6. Primary contact name		
Director of Export Controls	Dr Christopher Woods		
7.a. Business telephone number	7.b. Alternate telephone number	7.c. Business fax number	7.d. Business e-mail address
919-668-7174	919-451-9795	919-613-7434	chris.woods@duke.edu

C. All applicants complete address information				
1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes)				
101 Science Drive, CIEMAS Building, Room 2149				
1.b. City	1.c. State	1.d. Zip code/Postal code:	1.e. County/Province	1.f. Country
Durham	NC	27710	Durham	USA
2.a. Mailing Address (include if different than physical address; include name of contact person if applicable)				
Duke Box 90519				
2.b. City	2.c. State	2.d. Zip code/Postal code:	2.e. County/Province	2.f. Country
Durham	NC	27710	Durham	USA

D. All applicants MUST complete

1. Attach check or money order payable to the U.S. FISH AND WILDLIFE SERVICE **in the amount of $100 nonrefundable processing fee**. Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – ***attach documentation of fee exempt status as outlined in instructions.*** (50 CFR 13.11(d))

2. Do you currently have or have you ever had any Federal Fish and Wildlife permits?
Yes ☑ If yes, list the number of the most current permit you have held or that you are applying to renew/re-issue: 17US217642/9 No ☐

3. Certification: I hereby certify that I have read and am familiar with the regulations contained in ***Title 50, Part 13 of the Code of Federal Regulations*** and the other ***applicable parts in subchapter B of Chapter I of Title 50***, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

Signature (**in blue ink**) of applicant/person responsible for permit (No photocopied or stamped signatures) — Date of signature (mm/dd/yyyy): 11/21/2017

E. EXPORT/RE-EXPORT/IMPORT/INTERSTATE AND FOREIGN COMMERCE/TAKE OF NON-NATIVE ANIMALS (Live/samples/parts/products) (CITES and/or ESA)

Allow at least 90 days for the application to be processed. Applications for endangered species permits must be published in the Federal Register for a 30-day public comment period.

Complete all questions on the application. Mark questions that are not applicable with "N/A". If needed, use a separate sheet of paper. On all attachments or separate sheets you submit, indicate the application question number you are addressing. If you are applying for multiple specimens, be sure to indicate which specimen you are addressing in each response.

1. What activity are you requesting authorization to carry out (Indicate appropriate activities):

EXPORT [✓] IMPORT [ ]
INTERSTATE COMMERCE [ ] FOREIGN COMMERCE [ ]

*Interstate Commerce permits authorize the sale of endangered and threatened species across State lines, but only for that will contribute to enhancing the propagation or survival of that species. Captive-breeding alone will not generally meet this requirement. Scientific research must be related to the species to be permitted. Interstate commerce activities with wildlife require the buyer to obtain a permit prior to the sale.

2. For EACH animal/specimen involved in the proposed activity provide:

Scientific name (genus, species, and, if applicable, subspecies)	Common Name	Birth/Hatch Date (mm/dd/yyyy) Or Approximate date	Quantity	Gender, if known	Permanent markings (e.g., tattoo, ID #, microchip #, scars), if alive	Type of Sample or product (e.g., blood, tissue, DNA)
EXAMPLE: *Macaca fascicularis*	Crab-eating macaque					
Pan paniscus	Bonobo	unknown	70 (see attached)		Biological samples only	199 serum aliquots from 70 bonobos

3. The current location of the specimen(s) (address and country):

Name: Dr. Christopher Woods, MD, MPH

Business Name: Duke University

Address: 101 Science Drive

Address: CIEMAS Building

City: Durham

State/Province: NC

Country, Postal Code: 27710 USA

4. Recipient/Sender:
   - If export, provide name and address of the recipient in the foreign country.
   - If import, provide name and address of the exporter in the foreign country.
   - If interstate or foreign commerce, provide name and address of recipient.

Name: Linfa Wang, PhD

Business Name: Duke-NUS Medical School

Address: Program in Emerging Infectious Diseases

Address: 8 College Road

City: Singapore

State/Province:

Country, Postal Code: Singapore, 169857

F. **SOURCE OF SPECIMEN (answer question 5 or 6 for each animal/specimen involved, as appropriate).**

5. For each animal or animal from which specimen are obtained born in captivity:
   a. If you are the **breeder** of the specimen(s), please provide a signed and dated statement that includes the following:
      i. Scientific name (genus, species, and, if applicable, subspecies) and common name;
      ii. That the animal was bred and born at your facility;
      iii. Birth/hatch date (mm/dd/yyyy), and, if applicable, identification information (as described in question 2b above);
      iv. Name and address of your facility where each animal was bred and born; and
      v. Location (Name of facility, address, city, State/province, postal code) of parental stock.

   b. If you are **NOT the breeder** of the specimen(s), provide copies of documentation showing that you acquired the animal from the breeder or documentation demonstrating the history of transactions (e.g., chain of ownership of the animal) and a signed and dated statement from the breeder or breeder's record that clearly includes the following:
      i. Scientific name (genus, species, and, if applicable, subspecies) and common name;
      ii. That each animal was bred and born/hatched at his/her facility;
      iii. Birth/hatch date (mm/dd/yyyy), and, if applicable, identification information (as described in question 2b above);
      iv. Name and address of the breeder's facility; and
      v. Location (name of facility, address, city, State/province, postal code) of parental stock.

6. For each animal/specimen **taken from the wild**, provide the following:
   a. Scientific name (genus, species, and, if applicable, subspecies) and common name;
   b. Specific location of where, when, and by whom (name and address) the specimen was removed from the wild;
   c. Purpose of removal and length or approximate length of time held in captivity;
   d. Describe your efforts to use captive specimens (e.g., captive-born, captive-held), or parts thereof, in lieu of taking animals from the wild.
   e. Copies of your foreign or domestic collecting permit, license, contract or agreement;
   f. Documentation showing that the specimen(s) was legally obtained by the applicant; and
   g. Copies of any applicable State, Tribal, Federal, or Foreign government permits or licenses that authorized the removal of this animal from the wild.

G. JUSTIFICATION FOR REQUESTED ACTIVITY.

7. Provide a full statement justifying the proposed activity, particularly the following:
   a. Describe the purpose of your proposed activity. For example, if the purpose is scientific research, attach a copy of your research proposal outlining the purpose, objectives, methods (e.g., specific information on survey/collection methods, sampling regime, equipment to be used), and whether similar work has already been done or is currently being done. If the purpose is conservation education, provide copies of educational materials (e.g., handouts, text of signage or public presentations), and include the purpose and objectives of the proposed activity. If the purpose is for propagation for conservation purposes, provide a description of how the species will be propagated, disposition of progeny, and cooperative agreements that are/will be established for re-introduction.
   b. Description of the technical expertise of each person (please include CV or resume), as it relates to the proposed activities. If the proposed activity involves the import of live animals, include the experience of each animal caretaker working with the species.
   c. Copies of contracts, agreements or other documents that identify persons involved and dates of activities for which authorization is being requested.

8. Provide a statement on how the activities will **enhance or benefit the wild population** (e.g., in-situ and ex-situ projects).

9. If live specimens are to be held in captivity as part of the proposed activity:
   a. Provide a detailed description (e.g., size, construction materials, protection from the elements) and photographs or diagrams (no blueprints, please) clearly depicting the existing facilities **where the wildlife will be maintained**. If the specimens will be housed at multiple facilities, either immediately or within the next year, provide a full description of each facility. If you are unsure of which facilities may be receiving specimens (e.g., SSP has not made final decision), please indicate likely candidates and the mechanism that will be used to determine recipient facilities.
   b. A statement of the specific technical experience of CV or resume available to the recipient(s) for maintaining and propagating live specimens of the same or similar species.
   c. The number of years each species has been maintained at the facility;
   d. The number of births by year for each species for the last 5 years; and
   e. Mortalities at the facility with these or similar species in the last 5 years, causes of such mortalities, and steps taken to avoid or decrease such mortalities.

H. IMPORTS, EXPORTS, OR RE-EXPORTS.

10. For shipment of LIVE specimens, the transport conditions for animals must comply with the CITES Guidelines for Transport of Live Animals or, in the case of air transport, with the International Air Transport Association (IATA) live animal regulations (contact airline for information). As such, describe:
    i. The type, size, and construction of any shipping container; and
    ii. The arrangements for watering or otherwise caring for the wildlife during transport.

11. **For import of LIVE CITES Appendix-I marine mammal specimens**, provide a copy of your FWS or NOAA Fisheries permit or authorization.

12. For import of CITES **Appendix-I listed species**, provide information to show the import is not for primarily commercial purposes as outlined in Resolution Conf. 5.10 (www.cites.org).

13. For export of CITES **Appendix-I species**, provide a copy of the CITES import permit, or evidence one will be issued by the Management Authority of the country to which you plan to export the specimen(s). In accordance with Article III of the CITES treaty, it is required that import permits are issued before the corresponding export permit.

14. If the specimen is being **re-exported** (e.g., exporting a specimen that was previously imported into the United States), provide:

    a. A copy of the canceled CITES export or re-export document issued by the appropriate CITES office in the country from which the wildlife was imported (if applicable); and
    b. A cleared copy of Form 3-177, wildlife Declaration for Import (hard copy or electronic release); **or**
    c. If you did not make the original import, provide a copy of the importer's documents outlined above and the invoice or other documentation that shows you acquired the wildlife from the original importer or history of transactions which demonstrate chain of ownership.

15. All international shipment(s) must be through a designated port. A list of designated ports (where an inspector is posted) is available from http://www.fws.gov/le/designated-ports.html. If you wish to use a port not listed, please contact the Office of Law Enforcement for a Designated Port Exemption Permit (form 3-200-2).

16. Name and address where you wish permit mailed, **if** different from page 1 (All permits will be mailed via the U.S. Postal Service, unless you identify an alternative means below):

    Same as mailing address on Page 1.

17. If you wish the permit to be delivered by means other than USPS regular mail, provide an air bill, pre-paid envelope, or billing information. If you do not have a pre-paid envelope or air bill and wish to pay for a courier service with your credit card, please check the box below. Please DO NOT include credit card number or other information; you will be contacted for this information.

    ☑ If a permit is issued, please send it via a courier service to the address on page 1 or question 11. I understand that you will contact me for my credit card information once the application has been processed.

18. Who should we contact if we have questions about the application? (Include name, phone number, and email):

Dr Elizabeth Petzold, PhD
elizabeth.petzold@duke.edu
Cell: [redacted]

19. **Disqualification Factor**. A conviction, or entry of a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act disqualifies any such person from receiving or exercising the privileges of a permit, unless such disqualification has been expressly waived by the Service Director in response to a written petition. (50 CFR 13.21(c)) Have you or any of the owners of the business, if applying as a business, been convicted, or entered a plea of guilty or nolo contendere, forfeited collateral, or are currently under charges for any violations of the laws mentioned above?

☐ Yes ☑ No If you answered "Yes" provide: a) the individual's name, b) date of charge, c) charge(s), d) location of incident, e) court, and f) action taken for each violation.

F. Source of Specimen

5. For each animal from which specimens are obtained born in captivity:
a. Breeding animals.
These are solely biological samples. We do not breed the animals, so this question is not applicable.

b. Acquiring animals.
These are solely biological samples. We did not acquire the animals, so this question is not applicable.

6. For each specimen taken from the wild.
The bonobos we worked with reside at a bonobo sanctuary called Lola ya Bonobo close to Kinshasa in the Democratic Republic of Congo (DRC). Below is an introduction to the research project that was initiated in 2014, which is a collaboration between Duke University, Lola ya Bonobo, UCLA and the Emerging Infectious Disease program at Duke-NUS Medical School in Singapore. The full research protocol is also included in this permit application, if further details are required.

A. **Scientific name:** *Pan paniscus*

B. **Specific location:** Lola ya Bonobo, Les Petites Chutes de la Lukaya, Kinshasa, Democratic Republic of Congo.

C. **Purpose of removal etc:** The bonobos were rescued from the wild by sanctuary after being orphaned or injured such that they would not be able to survive on their own. We did not remove them for the purposes of this project. For additional information, please refer to the 'Background on the research project' section below.

D. **Using captive specimens:** These bonobos have been rescued after being orphaned or injured in the wild, by the Lola ya Bonobo sanctuary. The sanctuary rehabilitates the bonobos, and attempts to replace them back in the wild once they are able to successfully care for themselves.

E. **Permits, licenses, contracts etc:** We have included copies of the following documents:
   i. CITES permits #6918 and 6919 for shipment of specimens from the University of Kinshasa School of Public Health
   ii. CITES import permit #17US217642/9 for receiving bonobo specimens into the USA
   iii. US Fish and Wildlife Form 3-177 (cleared)

F. **Documents showing legally obtained specimens:** We are providing copies of the following documents with this submission –
   i. Democratic Republic of Congo, University of Kinshasa School of Public Health approval – May 02 2014.
   ii. Duke Institutional Animal Care and Use Committee (IACUC) approval for sample collection – Oct 25, 2013.
   iii. Duke Institutional Review Board approval (2014) and continuing reviews (2015, 2016, 2017).

G. **Permits or licenses authorizing removal of the animal from the wild:** Not applicable.

Background on the research project:

DRC is a hotspot for emerging infectious diseases because of its tropical location, shattered health care infrastructure, and the reliance of its population on wild animals as its major source of protein[1]. Bonobos (*Pan paniscus*) only live in the Democratic Republic of Congo, and are among the species targeted for consumption despite their close genetic relationship to humans [2]. Illegal hunting of bonobos for sale as bushmeat or as pets, is the leading threat to this species survival in the wild.[2] A series of "sanctuaries" have been established to care for apes orphaned by the bushmeat trade. In collaboration with the Congolese Ministry of Environment, the infants are confiscated and brought to sanctuaries for care. Sanctuary populations are currently growing at an astonishing rate of 15% per year due to intensive hunting [3]. As a result, humans are increasingly coming into close contact with bonobos – both through processing bushmeat and when caring for orphans.

Established in 1994, Lola ya Bonobo (LyB) is a sanctuary for orphaned bonobos. LyB is located 45 minutes outside of Kinshasa the capital of DRC, is 30 hectares of tropical forest, and contains the largest captive population of bonobos in the world. In 2013, the sanctuary was home to 63 bonobos (30 females and 33 males; range 0-23 years of age; 22 individuals $\leq$6 years). Some are orphans brought from the wild (n=49) and others (n=14) were born at the sanctuary over the previous six years. All bonobos roam in large forested day enclosures but sleep in night buildings that allow for routine veterinary evaluations. Rehabilitating infants requires close human contact with wild animals that are often traumatized and sick. Rehabilitated animals live in large mixed-aged and mixed sex social groups, but still come into close contact (<1-2m) through education programs meant to encourage conservation[2]. This context provides unprecedented opportunity for pathogen transmission between bonobos and humans. Humans are thought to be most vulnerable to disease transmission from other apes like the bonobo[1]. For example, HIV originated in great apes before being transmitted to humans[4]. In addition, respiratory diseases are known to readily transfer between humans and apes through passive contact[5]. Thus, understanding risk factors for transmission of zoonotic diseases at African Sanctuaries like LyB will be crucial in protecting human and nonhuman ape health.

Because of close contact that occurs between bonobos and humans, the close proximity of the DRC's national reference laboratory in Kinshasa, and the sanctuary's record of hosting Duke Researchers since 2008 [e.g. 6, 7], Lola ya Bonobo was an ideal site for our research. Upon arrival at the sanctuary, an orphan bonobo is typically sick, malnourished, and traumatized. Only 50% of individuals survive the first few weeks at the sanctuary. During this crucial time, a human caretaker is assigned to stay with the infant. Once the infant is strong enough, they are integrated into the larger nursery group where five surrogate human mothers spend each day with them inside their enclosure. After a year or two in this nursery group all individuals are integrated into a larger mixed age-sex social group. Annually, influenza-like illness occurs, often involving the entire colony with the youngest bonobos developing the most severe symptoms. Bonobos have been lost to these epidemics. In addition, LyB experienced three Encephalomyocarditis virus (EMCV) epidemics in the past 8 years: 2004[8], 2008[9] and 2012 [Rimoin *et al,* unpublished data]. These epidemics have killed over a dozen bonobos at the sanctuary (~10% of the adults). Our investigative team has also documented a Chikungunya epidemic among the staff [Rimoin, unpublished data]. At least one of the bonobos also tested positive for the virus. It is possible that confiscated bonobos are passing disease to staff and highlights the need for surveillance to protect the health of the humans and non-human apes.

References

1. Pedersen, A.B. and T.J. Davies, Cross-species pathogen transmission and disease emergence in primates. EcoHealth, 2009. 6(4): p. 496-508.
2. André, C., et al., The conservation value ofLola ya Bonobo Sanctuary. The Bonobos, 2008: p. 303-322.
3. Faust, L.J., et al., Predicting capacity demand on sanctuariesfor African chimpanzees (Pan troglodytes). International Journal of Primatology, 2011. 32(4): p. 849-864.
4. Gao, F., et al., Origin ofHIV-I in the chimpanzee Pan troglodytes troglodytes. Nature, 1999. 397(6718): p. 436-440.
5. Kaur, T., et al., Descriptive epidemiology offatal respiratory outbreaks and detection of a human - related metapneumovirus in wild chimpanzees (Pan troglodytes) at Mahale Mountains National Park, Western Tanzania. American Journal of Primatology, 2008. 70(8): p. 755-765.
6. Wobber, V., et al., Differential changes in steroid hormones before competition in bonobos and chimpanzees. Proceedings of the National Academy of Sciences, 2010. 107(28): p. 12457-12462.
7. Wobber, V. and B. Hare, Psychological health oforphan bonobos and chimpanzees in African sanctuaries. Plos one, 2011. 6(6): p. el 7147.
8. Jones, P., et al., Fatal inflammatory heart disease in a bonobo (Pan paniscus). Journal of medical primatology, 2005. 34(1): p. 45-49.
9. Jones, P., et al., Encephalomyocarditis virus mortality in semi - wild bonobos (Pan panicus). Journal of medical primatology, 2011. 40(3): p. 157-163.

G. Justification for requested activity

7. Justification for activity.

a. Description of proposed activity.

Two new technological platforms from Duke-NUS will enhance the success of pathogen discovery.
Hybridization enrichment-Next Generation Sequencing (NGS): Due to the low abundance of pathogen nucleic acid in most clinical samples, pathogen discovery by NGS has not reached its full potential. Duke-NUS is working with a major Biotech company to construct a library of virus-specific probes that will be used to enrich virus-specific nucleic acid before NGS. It will not only increase the chance of success, but also reduce the cost of sequencing per sample. Our first library will contain 57,000 hybridization probes, which will cover all known viruses. Since the probes will be targeting conserved regions of virus genome, they will also be able to pick up novel pathogens, which have sequence homology to known viruses.

Multiplex oligonucleotide-linked signal-amplification technology (MOST): Recent application of serological techniques to pathogen detection has been limited, as the current tests are all based on one-test-for-one-pathogen. Further, it is prohibitively expensive and time-consuming to conduct these classical serological tests routinely against all pathogens known to cause illness with similar symptoms. At Duke-NUS, we have recently developed a new platform, MOST, which is extremely suitable for the detection and quantification of different antibodies with great sensitivity and high multiplexing capability. A provisional patent application has been filed by NUS in October 2012 for this technology based on detection of antibodies to dengue and flu viruses. Briefly, the technology is based on two

important concepts. First, by linking an oligonucleotide with a barcoding sequence to a peptide or protein, it is possible to use PCR/NGS to interrogate the binding of this particular peptide to its cognate antibody(ies). Second, if a library of peptide-oligo (P-O) probes is established to cover conserved immunodominant epitopes of all known pathogens, it is possible to conduct a single serological assay to measure the presence of antibodies against all known pathogens as well as novel pathogens, which have crossreactive epitopes with known advantage of MOST is its high sensitivity. This means that a very small sample volume (1ul or less of serum) is required to detect antibodies to all known pathogens in a single assay.

b. Description of technical expertise of each person.

Christopher Woods is a CDC-trained epidemiologist, medical microbiologist, and infectious diseases clinician with research expertise in novel respiratory viral diagnostics. He is Director of the Hubert-Yeargan Center for Global Health, Associate Director at the Center for Applied Genomics and Precision Medicine, Professor of Medicine-Infectious Disease, Pathology, and Global Health at Duke University Medical Center, and Chief of Infectious Diseases at the Durham VA Medical Center. He has extensive experience working with zoonotic infections in Africa and SE Asia. Together with Dr. Geoff Ginsburg, he developed the Duke Center for Applied Genomics Infectious Disease genomics program, which has focused on the development and validation of mRNA diagnostics for pre-symptomatic viral infection. Of relevance, he has performed DARPA funded index-cluster studies on the Duke University undergraduate campus and has worked with Duke investigators on a Gates Foundation supported non-human primate model of pneumococcal pneumonia. This application merges his experience in global health, epidemiologic study design, and infectious disease diagnosis at the human-animal interface.

Dr. Linfa Wang is the Director of the Programme in Emerging Infectious Diseases at Duke-NUS Medical School, and an honourable professor at the University of Melbourne and the Chinese Academy of Sciences. As well, he retains his position as a Senior Research Scientist at the BSL-3/4 laboratory at CSIRO, Geelong. He is an international leader in the field of emerging zoonotic viruses and virus-host interaction, specializing in bat-borne viruses. He is a member of the WHO SARS Scientific Research Advisory Committee, and played a key role in identification of bats as the natural host of SARS-like viruses. Prof. Wang has more than 350 scientific publications, including papers in Science and Nature, and is currently the Editor-in-Chief for the open access Virology Journal. Prof. Wang is an elected fellow of the Australian Academy of Technological Sciences and Engineering.

Anna Uehara is a fourth year PhD student in the Laboratory of Emerging Zoonotic Viruses (LEZV) under the guidance of Prof. Linfa Wang, where she focuses on pathogen detection for emerging infectious diseases through the utilization of molecular sequencing and serological techniques. She began her scientific career in molecular neuroscience, studying how maternal stress experienced *in utero* can affect aspects of the offsprings' circadian rhythm. After, she continued exploring her interest in research combined with human health, by joining an ongoing febrile illness study focusing on molecular epidemiology of a dengue outbreak in Sri Lanka, under the direction of Dr. Chris Woods. For her doctoral work, she has been focusing on two studies - a neurologic infectious disease cohort where both a pan-viral and pan-antibody sequencing platform are used in an attempt to elucidate the putative etiologic agents for neuronal infections with otherwise unknown etiologies; and a study looking at the complete serologic approach of creating pathogen-specific gene constructs to screen for antibodies against different bat-borne viruses. She will also be assaying the bonobo and human study samples as part of her PhD project - "A multi-platform approach in emerging infectious disease investigation and response".

Brad Nicholson is Director of the Molecular Epidemiology Research Laboratory at the Durham VA Medical Center. His interests lie in the detection, identification and molecular analysis of pathogens. The MERL participates in academic and industry sponsored research of hospital- and community-acquired infections. Currently the MERL is involved in the molecular characterization of community or healthcare-acquired infections caused by *C. difficile*, extended spectrum beta-lactamase, or carbapenem resistant *Enterobacteriaceae* and methicillin resistant *S. aureus*. Collaborations with researchers at Duke University have supported work on the detection of infection by measuring biomarkers of the host response to pathogens. Current extramural research is assisting in an observational study for detecting interspecies disease transmission at Lola Ya Bonobo Sanctuary, Democratic Republic of Congo.

c. Copies of contracts, agreements etc.

Included in this submission are the following supporting documents:

- Protocol – An Innovative Model for Detecting Interspecies Disease Transmission and Novel Pathogen Detection at Lola ya Bonobo Sanctuary, Democratic Republic of Congo
- Duke IRB initial approval (2014), and subsequent annual renewals (2015, 2016 and 2017) for human component of the study
- Duke IACUC approval to collect bonobo samples (2013-2017)
- Democratic Republic of Congo, University of Kinshasa School of Public Health ethics committee approval (May 2014) for bonobo and human involvement

8. How will the activities enhance or benefit the wild population?

The activities focus on understanding the epidemiology of infectious exposures of bonobos who currently live in captivity in Kinshasa, but many of whom have a history of living in the wild. Therefore, we can assess exposures from the wild and exposures from the ecology of the free range captivity area of Lola ya Bonobo. In particular, we can assess human:bonobo interspecies spread. The value to wild bonobos includes both an understanding of what threats that human encroachment poses to bonobo safety as well as a better understanding of what pathogens should be considered when embarking upon a release program.

9. Animals held in captivity.

We will not be holding animals in captivity as part of this activity, so this question is not applicable.

H. Imports, Exports or Re-Exports

10. Shipment of Live specimens.

These are solely biological samples, so this question is not applicable.

11. Import of Appendix I - Marine mammals.

These are not marine mammals, so this question is not applicable.

12. Import of Appendix I species.

We are not importing, so this question is not applicable.

13. Export of Appendix I species.

The draft CITES import application for Duke-NUS School of Medicine, Singapore (Dr Linfa Wang) to receive human and bonobo biological samples (blood serum) from Duke University, USA (Dr Christopher Woods) is attached. Singapore uses an online permit application system called LicenceOne. A packing list is also attached.

14. Re-export of Appendix I species.

Please find the documents requested detailed below, and attached in this packet.

a. Copy of canceled CITES export documents – See attached
    - Export permit #6918 – Shipment (4 boxes) from Democratic Republic of Congo (University of Kinshasa) to Dr Christopher Woods.
    - Export permit #6919 – Shipment (4 boxes) from Democratic Republic of Congo (University of Kinshasa) to Dr Christopher Woods.

b. Copy of cleared Form 3-177.
    - US Fish and Wildlife Service Form 3-177 (cleared) – imported 03/03/2017 through NY and shipped to Brad Nicholson who works for Dr. Chris Woods, and received the samples.

RESEARCH PROTOCOL

An Innovative Model for Detecting Interspecies Disease Transmission and Novel Pathogen Detection at Lola Ya Bonobo Sanctuary, Democratic Republic of Congo.

Principal Investigator (Duke): Christopher W. Woods, MD, MPH
Associate Professor of Medicine, Pathology, and Global Health, DGHI, IGSP and Durham VAMC
chris.woods@duke.edu
[redacted]

Principal Investigator (Duke-NUS): Linfa Wang, PhD
Professor and Director, Emerging Infectious Diseases Program
Linfa.wang@duke-nus.edu.sg
[redacted]

Co-Principal Investigator (Duke): Brian Hare, PhD
Associate Professor of Evolutionary Anthropology, Center for Cognitive Neuroscience
[redacted]

Co-Investigators
Annie Rimoin, PhD, MPH
Associate Professor of Epidemiology, UCLA; Institute Nationale de Recherche Biomedicale, DRC
arimoin@ucla.edu

Abstract

Recent studies have highlighted Central Africa as an emerging infections hotspot and African apes as a reservoir of pathogens posing risk to humans. We propose an index-cluster study for detection of interspecies disease transmission at Lola-ya-Bonobo sanctuary in the Democratic Republic of Congo (DRC). We will focus on respiratory viruses given the transmissibility, sample accessibility, and potential for global distribution. We will establish surveillance for symptomatic respiratory illness among humans and bonobos (Index Cases). For each of 10 separate index events, we will serially sample (5 days) a contact cluster of 5 bonobos and 5 human staff to determine secondary attack rate and risk factors for transmission. We will detect known viruses from respiratory samples and create a biorepository for biomarkers of early disease and pathogen discovery. We will use the generated data to apply for "one health" focused grant opportunities with plans to extend to sanctuaries across Central Africa.

"Mamas" with their bonobo charges at the Lola ya Bononbo Sanctuary

Specific Aims

1. To detect intra- and inter-species transmission (symptomatic and asymptomatic) of respiratory viral pathogens in the Lola ya Bonobo (LyB) animal sanctuary in DRC.
2. To determine risk factors for intra- and inter-species transmission of respiratory viral infections among enrolled subjects in specific aim 1.
3. To establish an interspecies biorepository for pathogen discovery and biomarker development.

DRC is a hotspot for emerging infectious diseases because of its tropical location, shattered health care infrastructure, and the reliance of its population on wild animals as its major source of protein[1]. Bonobos (*Pan paniscus*) only live in DRC and are among the species targeted for consumption despite their close genetic relationship to humans [2]. Illegal hunting of bonobos for sale as bushmeat or pets often to Asian destinations, is the leading threat to this species survival in the wild[2]. A series of "sanctuaries" have been established to care for apes orphaned by the bushmeat trade. Sanctuary populations are currently growing at an astonishing rate of 15% per year due to intensive hunting [3]. As a result, humans are increasingly coming into close contact with bonobos – both through processing bushmeat and when caring for orphans.

Established in 1994, LyB is a sanctuary for orphaned bonobos. Rehabilitating infants requires close human contact with wild animals that are often traumatized and sick. Rehabilitated animals live in large mixed-aged and mixed sex social groups, but still come into close contact (<1-2m) through education programs meant to encourage conservation[2]. This context provides unprecedented opportunity for pathogen transmission between bonobos and humans. Humans are thought to be most vulnerable to disease transmission from other apes like the bonobo[1]. For example, HIV originated in great apes before being transmitted to humans[4]. In addition, respiratory diseases are known to readily transfer between humans and apes through passive contact[5]. Thus, understanding risk factors for transmission of zoonotic diseases at African Sanctuaries like LyB will be crucial in protecting human and nonhuman ape health.

LyB is our first test site because of close contact that occurs between bonobos and humans, it's proximity to the DRC's national reference laboratory, and their record of hosting Duke Researchers since 2008 [e.g., 6, 7]. Upon arrival at the sanctuary, an orphan bonobo is typically sick, malnourished, and traumatized. Only 50% of individuals survive the first few weeks at the sanctuary. During this crucial time a human caretaker is assigned to stay with the infants. Once the infant is strong enough, they are integrated into the larger nursery group where five surrogate human mothers spend each day with them inside their enclosure. After a year or two in this nursery group all individuals are integrated into a larger mixed age-sex social group. Annually, influenza-like illness occurs, often involving the entire colony with the youngest bonobos developing the most severe symptoms. Bonobos have been lost to these epidemics. In addition, LyB experienced three Encephalomyocarditis virus (EMCV) epidemics in the past 8 years: 2004[8], 2008[9] and 2012 [Rimoin et al, unpublished data]. These epidemics have killed over a dozen bonobos at the sanctuary (~10% of the adults). Our investigative team has also documented a Chikungunya epidemic among the staff [Rimoin, unpublished data]. At least one of the bonobos also tested positive for the virus. It is possible that confiscated bonobos are passing disease to staff and highlights the need for surveillance to protect the health of the humans and non-human apes.

This project builds an innovative team representing an important step toward developing a large, longitudinal, interdisciplinary project in a region where few researchers are working. A successful research program will require close collaboration between field and lab researchers as well as human and nonhuman primate experts. ***Christopher Woods*** is a CDC-trained epidemiologist, medical microbiologist, and infectious diseases clinician with research expertise in novel respiratory viral diagnostics. He has extensive experience working with zoonotic infections in Africa and SE Asia. Of relevance, he has performed DARPA funded index-cluster studies on the Duke University undergraduate campus and has worked with Duke investigators on a Gates Foundation supported non-human primate model of

pneumococcal pneumonia. ***Linfa Wang*** is the Director of the Emerging Infections Program of Duke NUS and its affiliated pathogen identification reference laboratory. Dr. Wang has extensive experience working with emerging zoonotic viruses in various hosts. He has recently invented a novel multiplex platform for detection of antibodies against a large panel of pathogens that is extremely powerful for sero-epidemiologic investigation and for studying co-infection at a population level. ***Brian Hare*** is an evolutionary anthropologist who has studied bonobo cognition and psychological health since 2005. He is the scientific coordinator for LyB and is on the board of directors of the U.S. NGO that supports the sanctuaries' work. He has published extensively on bonobo behavior and cognition as it relates to human cognitive evolution. ***Annie Rimoin***, an infectious disease epidemiologist at UCLA, directs an active disease surveillance program for cross species transmission of disease in animal and human populations in the DRC. Her work includes outbreak investigation of suspected infectious diseases in NHP sanctuaries/ wildlife reserves and their staff and regular laboratory screening for novel and known pathogens from newly rescued NHPs for local ape sanctuaries.

Innovative approach

Site description and populations

Lola ya Bonobo is located 45 minutes outside of Kinshasa the capital of DRC, is 30 hectares of tropical forest, and contains the largest captive population of bonobos in the world. The sanctuary is currently home to 63 bonobos (30 females and 33 males; range 0-23 years of age; 22 individuals ≤6 years). Some are orphans brought from the wild (n=49) and others (n=14) were born at the sanctuary over the past six years. All bonobos roam in large forested enclosures but sleep in night buildings that allow for routine veterinary evaluations.

The Institute Nationale de Recherche Biomedicale (INRB) is located in Kinshasa and includes virology, microbiology, molecular biology and entomology laboratories. The INRB has full time security and generators to provide back up electricity in the event of power failure. Each laboratory is equipped with vertical flow hoods meeting current biosafety regulations, storage capacity (-80°C freezers, Liquid nitrogen storage), refrigerated centrifuges, and biosafety cabinets for preparing PCR reagents. Dr. Rimoin's research team is hosted by the INRB.

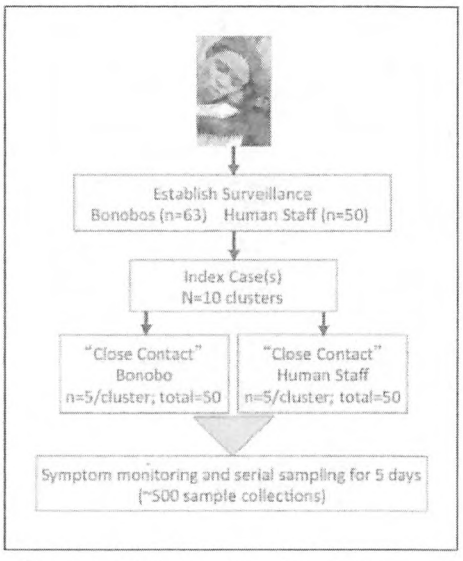

Figure 1. Work flow for index-cluster study for interspecies transmission

Index-cluster

Surveillance. Upon achieving regulatory approval, we will establish prospective respiratory viral surveillance among bonobo (n=63) and human populations (n=~50) in LyB (Figure 1). A subject (bonobo or human) will be considered an index case if he/she develops 3 or more symptoms of acute respiratory illness (e.g., cough, rhinorrhea, increased sputum, pharyngitis, shortness of breath, myalgias, headache, or fever (T≥38.0)). Viral confirmation is not required.

Close contact clusters. Each contact cluster will consist of 5 bonobos and 5 human staff members. In this pilot we intend to enroll a total of 10 cluster groups (~100 subjects=50 bonobos and 50 humans). Bonobos and humans may participate in multiple clusters. A standardized clinical questionnaire will be obtained daily in addition to serial sample collection for 5 days. Risk factor assessment will include age, sex, species, social interaction, and job responsibility (for staff members).

Sample collection. A trained investigator will collect baseline blood and nasal swabs from all subjects. Nasal swabs, whole blood, and urine will be collected from human IC. Nasal swabs, urine will be collected from bonobo IC. Sample collections will be accomplished through voluntary sample collections. Bonobos

can be rewarded for presenting their nose and providing a sample. Hare and colleagues collected thousands of saliva samples using a similar technique[6].

Laboratory methods. Nasopharyngeal samples will be tested for viral respiratory tract infection by ***Multiplex RT-PCR*** using the ResPlex II v2.0 kit and detected on the LiquiChip instrument (Qiagen) at Dr. Woods Molecular Epidemiology Research Laboratory (MERL). The assay tests for 18 viral targets; Influenza A and B, Respiratory Syncytial Virus A and B, Parainfluenza 1,2,3 and 4, Human Metapneumovirus, Coxsackie/Echovirus, Rhinovirus, Coronavirus 229E, OC43, NL63 and HKU1, Bocavirus and Adenovirus B and E. Additional realtime (RT)-PCR assays will be used as needed to investigate suspected viral agents[9]. Additional aliquot(s) will be retained for future testing for both pathogen discovery and biomarker development.

Two new technological platforms from Duke-NUS will enhance the success of pathogen discovery.

Hybridization enrichment-Next Generation Sequencing (NGS): Due to the low abundance of pathogen nucleic acid in most clinical samples, pathogen discovery by NGS has not reached its full potential. Duke-NUS is working with a major Biotech company to construct a library of virus-specific probes that will be used to enrich virus-specific nucleic acid before NGS. It will not only increase the chance of success, but also reduce the cost of sequencing per sample. Our first library will contain 57,000 hybridization probes which will cover all known viruses. Since the probes will be targeting conserved regions of virus genome, they will also be able to pick up novel pathogens which have sequence homology to known viruses.

Multiplex oligonucleotide-linked signal-amplification technology (MOST): Recent application of serological techniques to pathogen detection has been limited, as the current tests are all based on one-test-for-one-pathogen. Further, it is prohibitively expensive and time-consuming to conduct these classical serological tests routinely against all pathogens known to cause illness with similar symptoms. At Duke-NUS, we have recently developed a new platform, MOST, which is extremely suitable for the detection and quantification of different antibodies with great sensitivity and high multiplexing capability. A provisional patent application has been filed by NUS in October 2012 for this technology based on detection of antibodies to dengue and flu viruses. Briefly, the technology is based on two important concepts. First, by linking an oligonucleotide with a barcoding sequence to a peptide or protein, it is possible to use PCR/NGS to interrogate the binding of this particular peptide to its cognate antibody(ies) (see Figure 2). Second, if a library of peptide-oligo (P-O) probes is established to cover conserved immunodominant epitopes of all known pathogens, it is possible to conduct a single serological assay to measure the presence of antibodies against all known pathogens as well as novel pathogens which have cross-reactive epitopes with known pathogens. The additional advantage of MOST is its high sensitivity. This means that a very small sample volume (1 µl or less of serum) is required to detect antibodies to all known pathogens in a single assay.

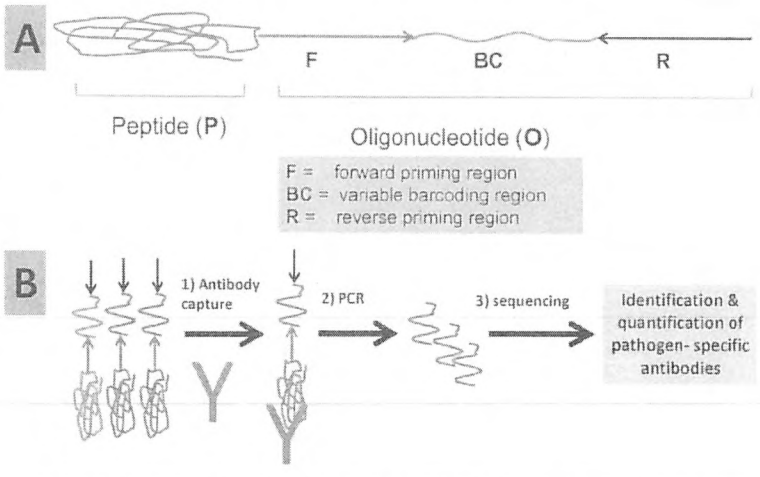

Figure 2. Principle of MOST. (A) Design of the P-O probe. The barcoding (BC) sequence enables a large number of P-O probes to be processed in a single assay. A 15-nt BC sequence can code for more than a billion different P-O probes. **(B)** Library probing. Pathogen-specific antibodies (indicated in green here) will bind to the epitope (peptide) and "purify" it away from the unbound P-O probes. The identification and quantification of the epitope/bound antibody will be achieved by PCR, followed by NGS

Regulatory approval. Ethics review and approval will be obtained from Duke and DRC before conducting this research and within 3 months of receipt of funding. Brian Hare has an existing IACUC approval for work with non-Duke primates at LyB and will submit an amendment to this protocol for the purpose of this pilot study. The Evolutionary Anthropology Department has a blanket CITES permit. We will use it to assist LyB in obtaining export permits (i.e., LyB has a strong record of exportation[6, 10]). Dr. Woods holds CDC and USDA import permits for human diagnostic specimens. All samples will be shipped in accordance with IATA regulations and handled with appropriate biosafety protection.

Mitigation planning. Dr. Hare directs the Ape Research Consortium (ARC) (www.aperesearch.org/beta) which provides alternative site options should safety become an issue in the DRC. In addition to expansion to the entire ARC network, we are very interested in expanding surveillance to DRC's international airports and the growing migrant worker community in DRC that is a major catalyst of the bushmeat trade and threat for global expansion of local epidemics. Our ultimate goal is to gain unprecedented access to the little studied primate and human populations where Duke is uniquely positioned to be a leader in emerging human and primate disease surveillance.

Future funding and scientific direction

Our pilot study will provide excellent preliminary data for extramural funding. NIH-NSF joint call on the Ecology and Evolution of Infectious Disease (http://www.fic.nih.gov/programs/Pages/ecology-infectious-diseases.aspx) is especially appropriate. Also, typical mechanisms through US and Singapore funding agencies including. NIAID (e.g., RO-1, R-21), emerging infections funding through USAID, Defense Threat Reduction Agency (DTRA), and Department of Defense programs such Global Emerging Infections Surveillance have encouraged applications.

Months	1-2	3-4	5-6	7-8	9-10	11-12
Regulatory submission and approval						
Index cluster study						
Molecular detection and analysis						
Manuscript preparation						

Figure 3 - Timeline for An Innovative Model for Detecting Interspecies Disease Transmission and Novel Pathogen Detection at Lola Ya Bonobo Sanctuary, Democratic Republic of Congo.

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ETHICAL APPROVAL – CONGO

REPUBLIQUE DEMOCRATIQUE DU CONGO
Ministère de l'Enseignement Supérieur, Universitaire et Recherche Scientifique
Université de Kinshasa
ECOLE DE SANTE PUBLIQUE
COMITE D'ETHIQUE *No d'Approbation: ESP/CE/016../14.*

Kinshasa, le 02 mai 2014

A Monsieur le Prof. Dr Okitolonda Wemankoy
Investigateur Principal
Ecole de Santé Publique
Université de Kinshasa
à Kinshasa.

Concerne : Avis favorable concernant l'étude : « *La détection de la transmission inter-espèces des maladies et de nouvelles pathogènes à Lola ya Bonobo*».

Monsieur l'Investigateur Principal,

Le Comité d'Ethique de l'Ecole de Santé Publique de l'Université de Kinshasa a bien reçu le protocole dont le titre est repris en marge.

Après examen du protocole selon les normes d'éthique nationales sur les études impliquant les êtres humains, le Comité a donné un avis favorable à cette recherche et autorise sa mise en œuvre pour la période allant du 02 mai 2014 au 01 mai 2015.

Veuillez agréer, Monsieur l'Investigateur Principal, l'expression de notre considération distinguée.

ESP UNIKIN COMITE D'ETHIQUE

Prof. BONGOPASI MOKE SANGOL

Vice Président du Comité Ethique

DukeMedicine
Institutional Review Board for Clinical Investigations

NOTIFICATION OF IRB APPROVAL

Protocol ID: Pro00039243
Principal Investigator: Chris Woods
Protocol Title: Detecting Interspecies Disease Transmission and Novel Pathogen Detection at Lola Ya Bonobo Sanctuary
Sponsor/Funding Source(s): Duke-NUS
Federal Funding Agency ID:
Date of Declared Concordance with federally funded grant, if applicable: N/A

The Duke University Health System Institutional Review Board for Clinical Investigations has conducted the following activity on the study cited above:

Activity: Initial Review **Review Type:** Expedited
Review Date: 3/25/2014
Issue Date: 3/26/2014
Expiration Date: 3/25/2015

DUHS IRB approval encompasses the following specific components of the study:

Protocol, version/date: --
Summary, version/date: 3/25/2014
Consent form reference date: English, French, and Backtranslation consents - 3/25/2014
Investigator Brochure, version/date: --
Pediatric Risk Category: --
Other: Questionnaires

The DUHS IRB has determined the specific components above to be in compliance with all applicable Health Insurance Portability and Accountability Act ("HIPAA") regulations.

This study expires at 12 AM on the Expiration Date cited above. At that time, all study activity must cease. If you wish to continue specific study activities directly related to subject safety, you must immediately contact Dr. John Falletta or Jody Power. Continuing review submissions (renewals) must be received by the DUHS IRB office 60 to 45 days prior to the Expiration Date.

No change to the protocol, consent form or other approved document may be implemented without first obtaining IRB approval for the change. Any proposed change must be submitted as an amendment. If necessary in a life-threatening situation, where time does not permit your prior consultation with the IRB, you may act contrary to the protocol if the action is in the best interest of the subject. You must notify the IRB of your action within five (5) working days of the event.

The Duke University Health System Institutional Review Board for Clinical Investigations (DUHS IRB), is duly constituted, fulfilling all requirements for diversity, and has written procedures for initial and continuing review of human research protocols. The DUHS IRB complies with all U.S. regulatory requirements related to the protection of human research participants. Specifically, the DUHS IRB complies with 45CFR46, 21CFR50, 21CFR56, 21CFR312, 21CFR812, and 45CFR164.508-514. In addition, the DUHS IRB complies with the Guidelines of the International Conference on Harmonization to the extent required by the U. S. Food and Drug Administration.

DUHS Institutional Review Board
2424 Erwin Rd | Suite 405 | Durham, NC | 919.668.5111
Federalwide Assurance No: FWA 00009025

DUKE – CONTINUING REVIEW, 2015

DukeMedicine
Institutional Review Board for Clinical Investigations

IRB NOTIFICATION OF CONTINUING REVIEW APPROVAL

Continuing Review ID: CR001_Pro00039243
Principal Investigator: Chris Woods
Protocol Title: Detecting Interspecies Disease Transmission and Novel Pathogen Detection at Lola Ya Bonobo Sanctuary
Sponsor/Funding Source(s): Duke-NUS
Federal Funding Agency ID:
Date of Declared Concordance with federally funded grant, if applicable: N/A

The Duke University Health System Institutional Review Board for Clinical Investigations has conducted the following activity on the study cited above:

Activity:	Continuing Review	**Review Type:**	Expedited
Review Date:	2/26/2015		
Issue Date:	2/27/2015		
Anniversary Date:	3/25/2015		
Expiration Date:	3/25/2016		

DUHS IRB approval encompasses the following specific components of the study:

Protocol, version/date:	--
Summary, version/date:	--V1.0 - 3.25.2014
Consent form reference date:	--N/A Enrollment Ended
Investigator Brochure, version/date:	--
Pediatric Risk Category:	--
Other:	--Questionnaires

The DUHS IRB has determined the specific components above to be in compliance with all applicable Health Insurance Portability and Accountability Act ("HIPAA") regulations.

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Federalwide Assurance No: FWA 00009025

DukeMedicine
Institutional Review Board for Clinical Investigations

IRB NOTIFICATION OF CONTINUING REVIEW APPROVAL

Continuing Review ID: CR002_Pro00039243
Principal Investigator: Chris Woods
Protocol Title: Detecting Interspecies Disease Transmission and Novel Pathogen Detection at Lola Ya Bonobo Sanctuary
Sponsor/Funding Source(s): Duke-NUS
Federal Funding Agency ID:
Date of Declared Concordance with federally funded grant, if applicable: N/A

The Duke University Health System Institutional Review Board for Clinical Investigations has conducted the following activity on the study cited above:

Activity:	Continuing Review	**Review Type:**	Expedited
Review Date:	2/26/2016		
Issue Date:	2/26/2016		
Anniversary Date:	3/25/2016		
Expiration Date:	3/25/2017		

DUHS IRB approval encompasses the following specific components of the study:

Protocol, version/date:	--
Summary, version/date:	March 2014
Consent form reference date:	Enrollment closed
Investigator Brochure, version/date:	--
Pediatric Risk Category:	--
Other:	--

The DUHS IRB has determined the specific components above to be in compliance with all applicable Health Insurance Portability and Accountability Act ("HIPAA") regulations.

This study expires at 12 AM on the Expiration Date cited above. At that time, all study activity must cease. If you wish to continue specific study activities directly related to subject safety, you must immediately email Jody Power at jody.power@duke.edu or call the IRB Office at 668-5111 and follow the instructions to reach the IRB Chair on call. Continuing review submissions (renewals) must be received by the DUHS IRB office 60 to 45 days prior to the Expiration Date.

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DukeMedicine
Institutional Review Board for Clinical Investigations

IRB NOTIFICATION OF CONTINUING REVIEW APPROVAL

Continuing Review ID: CR003_Pro00039243
Principal Investigator: Chris Woods
Protocol Title: Detecting Interspecies Disease Transmission and Novel Pathogen Detection at Lola Ya Bonobo Sanctuary
Sponsor/Funding Source(s): Duke-NUS
Federal Funding Agency ID:
Date of Declared Concordance with federally funded grant, if applicable: N/A

The Duke University Health System Institutional Review Board for Clinical Investigations has conducted the following activity on the study cited above:

Activity:	Continuing Review	**Review Type:**	Expedited
Review Date:	2/27/2017		
Issue Date:	3/13/2017		
Anniversary Date:	3/25/2017		
Expiration Date:	3/25/2018		

DUHS IRB approval encompasses the following specific components of the study:

Protocol, version/date:	--
Summary, version/date:	--March 2014
Consent form reference date:	--n/a
Investigator Brochure, version/date:	--
Pediatric Risk Category:	--
Other:	--

The DUHS IRB has determined the specific components above to be in compliance with all applicable Health Insurance Portability and Accountability Act ("HIPAA") regulations.

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Federalwide Assurance No: FWA 00009025

IACUC APPROVAL

Duke University
Durham, North Carolina 27705

Institutional Animal Care & Use Committee
Campus Mail: Hock Plaza Box 2724
US Mail: 2424 Erwin Road; Suite 1104; Durham, NC 27705

Voice: 919.668.6720
Fax: 919.668.6725
http://vetmed.duhs.duke.edu

October 25, 2013

Dr. Brian Hare
Box 90383, DUMC

Dear Dr. Hare,

Re: DETECTING INTERSPECIES DISEASE TRANSMISSION AND NOVEL PATHOGEN AT LOLA YA BONOBO SANCTUARY
Protocol Registry Number A261-13-10

On October 24, 2013, the Duke University & Duke University Medical Center Institutional Animal Care and Use Committee (IACUC) reviewed and **approved** the above referenced protocol. The terms of this approval are as follows:

Approval Period: Approval is for 35 months and 3 weeks (1088 days) years from this date, contingent upon submission of the annual renewal form for review during months 12 and 24. If you fail to submit the necessary annual renewal form, the protocol will instead expire on the last day of month 12 or 24 as applicable.

Approved Number of Animals: Confirmation that there are sufficient facilities and expertise to house and manage each species is required prior to procuring animals. Animals may not be procured without prior IACUC approval, and only for the species and number approved. The species and numbers of animals approved for the full three-year period of this study are:

- 70 Bonobos

Annual Reporting: Continued approval during this three year period is contingent upon the timely submission of Annual Review reports. The report forms are available / downloadable from the animal program website. The web address is: http://vetmed.duhs.duke.edu/FormsReports.html. Annual Review reports must be received and approved by the anniversary date of the original approval for continued approval of your protocol. All personnel listed on the approved protocol must be current on employee health surveillance and training requirements; supervisors can assess the status of employees health and safety status on the OESO web site (see Management Reports). The Office of Animal Welfare Assurance will alert you to the approaching annual report date so that you may respond promptly with your report.

Protocol Access: Information contained in your animal use protocol is considered privileged. The policy that governs access to the file can be viewed here: http://vetmed.duhs.duke.edu/PDF/Policies/IACUC%20Process/policy_on_IACUC_practices_protection_of_protocol_information.pdf.

Renewal of the Protocol: Federal requirements dictate a complete new review of continuing studies at the end of the three-year approval period. If you desire continuation of the protocol beyond the current (3 year) approval, you will need to submit a renewal application for review and approval by the IACUC. This renewal application must be a de novo submission; the IACUC cannot consider the current document in its present form. The Office of Animal Welfare Assurance will alert you at approximately the 32nd month of your current approval period. At that time, please prepare a new application for animal use and submit it before the applicable deadline. Please use the most current protocol template, also available on the animal program web site. Without renewed IACUC approval, ongoing research under the retiring protocol must be halted. Any remaining animals must be: 1) turned over to DLAR for disposal; 2) transferred to another approved protocol; or 3) transferred to the DLAR holding protocol (you cannot use any animals in active research being held on the DLAR protocol). With IACUC approval of a new protocol submission, a new protocol registry number will be assigned. Any cage cards for existing cages of animals should be transferred to the new protocol number. You will need to contact DLAR so that they can prepare cage cards for you, and your staff should replace the retiring cage cards with the cards that reflect the new registry information. Failure to promptly transfer the animals to the new protocol registry number may result in the placement of new cage cards by DLAR staff with assessment of a service charge.

Duke University
Durham, North Carolina 27705

Institutional Animal Care & Use Committee
Campus Mail: Hock Plaza Box 2724
US Mail: 2424 Erwin Road; Suite 1104; Durham, NC 27705

Voice: 919.668.6720
Fax: 919.668.6725
http://vetmed.duhs.duke.edu

Principal Investigator Responsibilities: Use of animals for research, testing, teaching, production, or exhibition must be in accordance with the USDA Animal Welfare regulations, PHS Policy on Humane Care and Use of Laboratory Animals, the NIH/NRC Guide for the Care and Use of Laboratory Animals, AAALAC accreditation guidelines, and Duke University Institutional Animal Care and Use Committee (DUIACUC) care and use policies. These references materials are available for review on the animal program web site at: http://vetmed.duhs.duke.edu.

Personnel Performing Work Under This Approval: All personnel working with animals must be enrolled in an appropriate occupational health and safety program. The Duke University Occupational Health Program is available to all Duke students, employees and staff. Enrollment forms are available from the animal program web site. If you determine that additional personnel should be associated with this approved activity, then you must notify the IACUC of these personnel changes to the protocol, including changes in roles for existing personnel, and the addition or deletion of animal care and use personnel. These changes must be approved by the IACUC before personnel can begin work with animals. Except for a change in the Principal Investigator, a Minor Amendment form should be used for this purpose, also available on the animal program web site at http://vetmed.duhs.duke.edu/FormsReports.html.

Amendment of the protocol: Approval for any change to the protocol (whether Significant or Minor) must be obtained from the IACUC prior to implementation of the change. Forms for requesting either a Minor or Significant Change are available / downloadable from the animal program web site at http://vetmed.duhs.duke.edu/FormsReports.html. Please note, certain granting agencies (e.g. Department of Defense) also require their review and approval of the amendment prior to performing the work.

Post-Approval Monitoring of Protocols: Duke University and Duke University Medical Center is fully committed to quality animal care and compassionate animal use in an atmosphere of progressive animal based research. To fulfill our legal, ethical, and moral obligations under federal regulations, funding commitment, and accreditation principles, the institution will perform post-approval monitoring of approved activities:

A. All animal use areas are inspected every 6 months by a subcommittee of the IACUC. When this activity is required, the Office of Animal Welfare Assurance may contact your staff and determine a convenient schedule to visit your laboratory. While these visits are usually announced, the IACUC has the obligation to perform unannounced visits on occasion.

B. A second method of meeting public expectation of animal research management is through the Office of Animal Welfare Assurance's Compliance Liaison Program (CLP). These individuals assure research integrity for the institution while facilitating your research needs and goals. The institution's Liaisons may perform either scheduled or un-announced visits to the animal research environment. While the goal is a fully compliant audit, any correction of issues discovered during a compliance visit will be facilitated by the CLP. The Liaisons will partner with your laboratory to keep your research fully productive and your adherence to the plethora of rules and regulations fully engaged.

At any time, please visit the animal program web site for the latest in program information. You are also encouraged to use the IACUC's Email address IACUC@Duke.edu for all of your correspondence and communication needs.

Please do not hesitate to contact me if there is anything that we can do to facilitate your research.

Sincerely,

Laura P. Hale

Laura P. Hale, M.D., Ph.D.
Chair, IACUC

THE DUKE UNIVERSITY ANIMAL CARE & USE PROGRAM IS COMMITTED TO ADVANCING HEALTHCARE FOR HUMANS AND ANIMALS THROUGH COMPASSIONATE CARE AND PROGRESSIVE ANIMAL USE.

EXPORT PERMITS – CONGO to USA

CONVENTION SUR LE COMMERCE INTERNATIONAL DES ESPÈCES DE FAUNE ET DE FLORE SAUVAGES MENACÉES D'EXTINCTION

PERMIS / CERTIFICAT

[X] EXPORTATION
[ ] REEXPORTATION
[ ] IMPORTATION
[ ] AUTRE :

N° 6918

Original

2. Valable jusqu'au: 11/07/2017

3. Importateur (nom et adresse)
CHRISTOPHER WOODS
DURHAM VIA MEDICAL CENTER
508 FULTON STREET, DURHAM, VA 27705
TEL : 919-286-0411 FAX : 919-613-7434

3a. Pays d'importation: USA

4. Exportateur (nom et adresse, pays)
ECOLE DE SANTE PUBLIQUE
UNIVERSITE DE KINSHASA
ESP/UCLA DRC PROGRAM

REP. DEM. DU CONGO

5. Conditions particulières
Transport aérien conforme aux normes IATA.

Pour les animaux vivants, ce permis ou certificat n'est valable que si les conditions de transport sont conformes aux Lignes directrices pour le transport des animaux vivants ou, en cas de transport aérien, à la Réglementation IATA du transport des animaux vivants.

5a. But de la transaction (voir au dos): S.

5b. N° du timbre de sécurité: CD 1174947

6. Nom, adresse, cachet/sceau national et pays de l'organe de gestion
Organe de gestion CITES / RDC
7e Rue Limete
Q. Industriel n° 17
KINSHASA / GOMBE
Commune de Limete
République Démocratique du Congo

	7/8. NOM COMMUN ET NOM SCIENTIFIQUE (genre et espèce) DE L'ANIMAL OU DE LA PLANTE	9. Description des parties ou produits marques ou numéros d'identification (âge/sexe si vivant)	10. Annexe et source (voir au dos)	11. Quantité (y compris l'unité)	11a. Total exporté/ quota
A	7/8. BONOBO Pan paniscus	9. ECHANTILLON SANG	10. IR	11. 77	11a.
	12. Pays d'origine ★ / N° permis / Date	12a. Pays de provenance / N° certificat / Date		12b. N° de l'établissement ★★ ou date de l'acquisition ★★★	
B	7/8. BONOBO Pan paniscus	9. ECHANTILLON SANG TOTAL	10. IR	11. 265	11a.
	12. Pays d'origine ★ / N° permis / Date	12a. Pays de provenance / N° certificat / Date		12b. N° de l'établissement ★★ ou date de l'acquisition ★★★	
C	7/8. BONOBO Pan paniscus	9. ECHANTILLON SERUM	10. IR	11. 534	11a.
	12. Pays d'origine ★ / N° permis / Date	12a. Pays de provenance / N° certificat / Date		12b. N° de l'établissement ★★ ou date de l'acquisition ★★★	
D	7/8. BONOBO Pan paniscus	9. ECHANTILLON PLASMA	10. IR	11. 694	11a.
	12. Pays d'origine ★ / N° permis / Date	12a. Pays de provenance / N° certificat / Date		12b. N° de l'établissement ★★ ou date de l'acquisition ★★★	

★ Pays dans lequel les spécimens ont été prélevés dans la nature, sont nés et ont été élevés en captivité ou reproduits artificiellement (seulement en cas de reéxportation)
★★ Uniquement pour les spécimens de l'Annexe I nés et élevés en captivité ou reproduits artificiellement à des fins commerciales
★★★ Pour les spécimens pré-Convention

13. CE PERMIS EST DÉLIVRÉ PAR L'AUTORITÉ SUIVANTE:

LE DIRECTEUR-CHEF DE SERVICE,

Dieudonné KALO-ka-KALO

KINSHASA — 12 JAN 2017 — CITES 1174947

Lieu / Date / Timbre de sécurité, signature et cachet officiel

14. APPROBATION DE L'EXPORTATION:

15. Connaissement/Lettre de transport aérien:

Bloc	Quantité
A	
B	
C	
D	

Port d'exportation / Date / Signature / Cachet et titre officiel

CITES PERMIS / CERTIFICAT N° 6918

CONVENTION SUR LE COMMERCE INTERNATIONAL DES ESPÈCES DE FAUNE ET DE FLORE SAUVAGES MENACÉES D'EXTINCTION

PERMIS / CERTIFICAT

[X] EXPORTATION
[ ] REEXPORTATION
[ ] IMPORTATION
[ ] AUTRE :

N° 6919

Original

2. Valable jusqu'au: 11/07/2017

3. Importateur (nom et adresse)
CHRISTOPHER WOODS
DURHAM VIA MEDICAL CENTER
508 FULTON STREET, DURHAM, VA 27705
TEL: 919-286-0411 FAX: 919-613-7434

3a. Pays d'importation: USA

4. Exportateur (nom et adresse, pays)
ECOLE DE SANTE PUBLIQUE
UNIVERSITE DE KINSHASA
ESP/UCLA DRC PROGRAM
REP. DEM. DU CONGO

5. Conditions particulières
Transport aérien conforme aux normes IATA.

Pour les animaux vivants, ce permis ou certificat n'est valable que si les conditions de transport sont conformes aux Lignes directrices pour le transport des animaux vivants ou, en cas de transport aérien, à la Réglementation IATA du transport des animaux vivants.

5a. But de la transaction (voir au dos): S.

5b. N° du timbre de sécurité: CD 1174948

6. Nom, adresse, cachet/sceau national et pays de l'organe de gestion
Organe de gestion CITES / RDC
7e Rue Limete
Q. Industriel n° 17
KINSHASA / GOMBE
Commune de Limete
République Démocratique du Congo

	7/8. NOM COMMUN ET NOM SCIENTIFIQUE (genre et espèce) DE L'ANIMAL OU DE LA PLANTE	9. Description des parties ou produits marques ou numéros d'identification (âge/sexe si vivant)	10. Annexe et source (voir au dos)	11. Quantité (y compris l'unité)	11a. Total exporté/ quota
A	BONOBO Pani paniscus	ECHANTILLON ECOUVILLON NASAL	IR	1010	
	12. Pays d'origine ★ / N° permis / Date	12a. Pays de provenance / N° certificat / Date		12b. N° de l'établissement ★★ ou date de l'acquisition ★★★	
B	BONOBO Pan paniscus	ECHANTILLON ECOUVILLON de GORGE	IR	828	
	12. Pays d'origine ★ / N° permis / Date	12a. Pays de provenance / N° certificat / Date		12b. N° de l'établissement ★★ ou date de l'acquisition ★★★	
C	BONOBO Pan paniscus	ECHANTILLON FECES	IR	429	
	12. Pays d'origine ★ / N° permis / Date	12a. Pays de provenance / N° certificat / Date		12b. N° de l'établissement ★★ ou date de l'acquisition ★★★	
D	BONOBO Pan paniscus	ECHANTILLON URINE	IR	248	
	12. Pays d'origine ★ / N° permis / Date	12a. Pays de provenance / N° certificat / Date		12b. N° de l'établissement ★★ ou date de l'acquisition ★★★	

★ Pays dans lequel les spécimens ont été prélevés dans la nature, sont nés et ont été élevés en captivité ou reproduits artificiellement (seulement en cas de reéxportation)
★★ Uniquement pour les spécimens de l'Annexe I nés et élevés en captivité ou reproduits artificiellement à des fins commerciales
★★★ Pour les spécimens pré-Convention

13. CE PERMIS EST DÉLIVRÉ PAR L'AUTORITÉ SUIVANTE:

LE DIRECTEUR CHEF DE SERVICE
Dieudonné KALO-ka-KALO

CITES 1174948

KINSHASA — 12 JAN 2017

Lieu | Date | Timbre de sécurité, signature et cachet officiel

14. APPROBATION DE L'EXPORTATION:

15. Connaissement/Lettre de transport aérien:

Bloc	Quantité
A	
B	
C	
D	

Port d'exportation | Date | Signature | Cachet et titre officiel

CITES PERMIS / CERTIFICAT N° 6919

USFWS Form 3-177
(Revised: 03/10)
O.M.B. No. 1018-0012
(Exp. Date: 09/30/2019)

U.S. FISH AND WILDLIFE SERVICE

DECLARATION FOR IMPORTATION OR EXPORTATION OF FISH OR WILDLIFE

1. Date of Import/Export (mm/dd/yyyy): 03/03/2017	7. Name of Carrier: BRUSSELS AIRLINES
2. Import/Export License Number: ******	8. Air Waybill or Bill of Lading No.: Master: [redacted] House: [redacted]
3. Indicate One: ☑ import ☐ export	9. Transportation Code: A License No. State or Province:
4. Port of Clearance: NY	10. Bonded Location for Inspection: JFK / SN 501
5. Purpose Code: S	11. Number of Cartons Containing Wildlife: 3
6. Customs Document Number(s): [redacted]	12. Markings on Cartons Containing Wildlife:

13. (indicate one) ☑ U.S. Importer ☐ U.S. Exporter DUKE UNIVERSITY MEDICAL CENTER BRAD NICHOLSON 508 FULTON STREET DURHAM, NC 27705 919-286-0411 BRAD.NICHOLSON@DUKE.EDU 13b. Identifier Number: ID Type:	14. (indicate one) ☐ Foreign Importer ☑ Foreign Exporter ECOLE DE SANTE PUBLIQUE UNIVERSITE DE KINSHASA REENA DOSHI ESP/UCLA DRC PROGRAM REP DEM DU, CD 14c. Identifier Number: ID Type:

15. Customs Broker, Shipping Agent or Freight Forwarder: World Customs Brokerage inc — 15b. Identifier Number: — ID Type:

Phone Number / Fax Number / Email Address: [redacted] 15c. Contact Name: [redacted]

Species Code	16a. Scientific Name 16b. Common Name	17a. Foreign CITES Permit Num. 17b. U.S. CITES Permit Num.	18a. Description Code 18b. Source	19a. Quantity/Units 19b. Total Monetary Value	20. Country of Species Origin Code (ISO Code)	21. Venomous Live Wildlife Indicator
PPAN	PAN PANISCUS BONOBO	6918 17US217642/9	SPE R	70.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6918 17US217642/9	SPE R	239.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6918 17US217642/9	SPE R	486.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6918 17US217642/9	SPE R	631.00 NO $ 1	CD	☐

Knowingly making false statement in a Declaration for Importation or Exportation of Fish or Wildlife may subject the declarant to the penalty provided by 18 U.S.C. 1001 and 16 U.S.C. 3372(d).

22. I certify under penalty of perjury that the information furnished is true and correct:
Filed Electronically 03/07/2017 - Confirm [redacted]
No Fees Required

Action/Comments:

U FISH & WILDLIFE SERVICE S
N *Electronic Filing* T
I CLEARED A
T T
E E
D S

Date: 03/28/2017

Wildlife Declared

Wildlife Inspected: [redacted]

Inspected By: [redacted]

U.S. FISH AND WILDLIFE SERVICE

USFWS Form 3-177
(Revised: 03/10)
O.M.B. No. 1018-0012
(Exp. Date: 09/30/2019)

DECLARATION FOR IMPORTATION OR EXPORTATION OF FISH OR WILDLIFE

CONTINUATION SHEET

2. I/E License Number:
******

13. Name of Importer/Exporter:
DUKE UNIVERSITY MEDICAL CENTER BRAD NICHOLSON
8. Air Waybill or Bill of Lading Number:
Master: [redacted] House: [redacted]

Species Code	16a. Scientific Name 16b. Common Name	17a. Foreign CITES Permit Num. 17b. U.S. CITES Permit Num.	18a. Description Code 18b. Source	19a. Quantity/Units 19b. Total Monetary Value	20. Country of Species Origin Code (ISO Code)	21. Venomous Live Wildlife Indicator
PPAN	PAN PANISCUS BONOBO	6919 17US217642/9	SPE R	929.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6919 17US217642/9	SPE R	753.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6919 17US217642/9	SPE R	178.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6919 17US217642/9	SPE R	222.00 NO $ 1	CD	☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐

Knowingly making false statement in a Declaration for Importation or Exportation of Fish or Wildlife may subject the declarant to the penalty provided by 18 U.S.C. 1001 and 16 U.S.C. 3372(d).	22. I certify under penalty of perjury that the information furnished is true and correct: Filed Electronically 03/07/2017

U FISH & WILDLIFE SERVICE S
N *Electronic Filing* T
I CLEARED A
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D S

Date: 03/28/2017

FORM 3-201A (1/97)

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA

IMPORT PERMIT

1. Original Permit/Certificate No.
17US217642/9

2. Valid
11/15/2017

3. Permittee (name and address, country)
DUKE UNIVERSITY
2200 WEST MAIN STREET
ORS - SUITE 710
DURHAM, NC 27705
U.S.A.

4. Consignor (name and address, country)

5. Special Conditions

MUST COMPLY WITH ENCLOSED GENERAL PERMIT CONDITIONS.

IMPORT OF U.S. ENDANGERED AND THREATENED SPPS [50 CFR 17.22 & 17.32].

PERMITTEE MUST COMPLETE BLOCKS 4, 11, AND SHIPMENT #:_____, PRIOR TO EACH SHIPMENT.

PERMIT MAY BE COPIED, PERMITTEE TO RETAIN ORIGINAL; ONE COPY PER SHIPMENT FROM ONE COUNTRY OF EXPORT OR RE-EXPORT.

THIS REPLACES AND AMENDS 16US217642/9 ISSUED NOVEMBER 16, 2016.

-May not be used for commercial purposes. For live animals, only valid if the transport conditions comply with the CITES Guidelines for Transport of Live Animals or, in the case of air transport, with IATA Live Animals Regulations.

5a. Purpose of Transaction
S

6. U.S. Management Authority
Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
DIVISION OF MANAGEMENT AUTHORITY
BRANCH OF PERMITS, MS: IA
5275 LEESBURG PIKE
FALLS CHURCH VA 22041-3803

U.S. CITES Management Authority

03/24/2017
Issuing Date — United States Management Authority

AUTHORITY: Endangered Species Act of 1973 (16 USC 1531 et. seq.)

7/8. Common Name and Scientific name (genus and species) of Animal or Plant	9. Description of Part or Derivative, Including identifying marks or numbers (age/sex if live)	10. Appendix No. and Source / 11. Quantity (including units) / 12. Country of Origin
A. Common Name: CROSSLEY'S DWARF LEMUR Scientific Name: CHEIROGALEUS CROSSLEYI	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units): NO 12. Country of Origin: MADAGASCAR
B. Common Name: SIBREE'S DWARF LEMUR Scientific Name: CHEIROGALEUS SIBREEI	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units): NO 12. Country of Origin: MADAGASCAR
C. Common Name: GREATER DWARF LEMUR Scientific Name: CHEIROGALEUS MAJOR	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units): NO 12. Country of Origin: MADAGASCAR
D. Common Name: LESSER DWARF LEMUR Scientific Name: CHEIROGALEUS MEDIUS	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units): NO 12. Country of Origin: MADAGASCAR
E. Common Name: MOUSE LEMUR Scientific Name: MICROCEBUS SPECIES	9. IMPORT; BIOLOGICAL SPECIMENS:BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS; Microcebus lehilahytsara.	10. 1 W 11. Quantity (including units): NO 12. Country of Origin: MADAGASCAR

5855697

CITES

IMPORT CONTINUATION SHEET

Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
DIVISION OF MANAGEMENT AUTHORITY
BRANCH OF PERMITS, MS: IA
5275 LEESBURG PIKE
FALLS CHURCH VA 22041-3803

1. Original Permit/Certificate No.
17US217642/9

6. U.S. Management Authority
FALLS CHURCH VA — PLACE
03/24/2017 — Issuing Date

U.S. CITES Management Authority

7/8. Common Name and Scientific name (genus and species) of Animal or Plant	9. Description of Part or Derivative, including identifying marks or numbers (age/sex if live)	10. Appendix No. and Source
F. Common Name EASTERN WOOLLY LEMUR Scientific Name AVAHI LANIGER	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units) NO 12. Country of Origin MADAGASCAR
G. Common Name INDRI Scientific Name INDRI INDRI	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units) NO 12. Country of Origin MADAGASCAR
H. Common Name DIADEMED SIFAKA Scientific Name PROPITHECUS DIADEMA	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units) NO 12. Country of Origin MADAGASCAR
I. Common Name BROWN LEMUR Scientific Name EULEMUR FULVUS	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units) NO 12. Country of Origin MADAGASCAR
J. Common Name WEASEL LEMUR Scientific Name LEPILEMUR MUSTELINUS	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units) NO 12. Country of Origin MADAGASCAR
K. Common Name AYE-AYE Scientific Name DAUBENTONIA MADAGASCARIENSIS	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units) NO 12. Country of Origin MADAGASCAR
L. Common Name BLK-&-WHITE RUFFED LEMUR Scientific Name VARECIA VARIEGATA	9. IMPORT: BIOLOGICAL SPECIMENS: BLOOD, SERUM, SKIN TISSUE, FAT TISSUE, BACTERIAL CULTURE SWABS, AND HAIR FROM LIVE SPECIMENS; ORGAN SAMPLES IN FORMALIN FROM SALVAGED, DEAD SPECIMENS.	10. 1 W 11. Quantity (including units) NO 12. Country of Origin MADAGASCAR
M. Common Name BONOBO Scientific Name PAN PANISCUS	9. IMPORT: BIOLOGICAL SPECIMENS: SALIVA, NASAL SECRETIONS, BLOOD, BLOOD FACTIONS, AND UROGENITAL SECRETIONS.	10. 1 F 11. Quantity (including units) NO 12. Country of Origin DEM. REPUBLIC OF CONGO

585706

CITES APPLICATION DRAFT FOR IMPORT OF SPECIMENS FROM USA to SINGAPORE

CLOSE

LicenceOne (../authentication/showLogin.action)

Singapore Government Integrity · Service · Excellence (http://www.gov.sg)

Contact Us (/AVA/cms/showContactUs.action) | Feedback (../efm/showEFMCaseNew.action) | Sitemap (/AVA/cms/showSitemap.action)

A A A | Within this Website | Find Licence by Keywords

HOME (../AUTHENTICATION/SHOWLOGIN.ACTION) > LOGOUT (/AVA/AUTHENTICATION/LOGOUT.ACTION)

MY PORTFOLIO (../OVERVIEW360/SHOW360OVERVIEWSEARCH.ACTION) LICENCE APPLICATION

HOWE SHIQIN

1 SELECT Licence(s) — 2 ADD General Information — 3 **PROVIDE Application Details** — 4 UPLOAD Supporting Document(s) — 5 REVIEW & SUBMIT Application *(Payment if applicable)* — 6 ACKNOWLEDGEMENT

Apply for New Licence

CITES Permit

Permit Details

Category of Permit * ○ Plant ◉ Animal

Appendix * ◉ APP I & II ○ APP III

Appendix I & II Species * ○ Export ◉ Import ○ Re-Export

Description Type * ○ Live ○ Manufactured Products ◉ Parts

Category Type * Mammals & Wild Animals

Purpose of Transaction * S, Scientific

Application selected under 'Plant' and 'Animal' will be processed and issued by Plant Health Section (PHS) (http://www.ava.gov.sg/AgricultureFisheriesSector/ImportExportTransOfPlants/ (http://www.ava.gov.sg/AgricultureFisheriesSector/ImportExportTransOfPlants/)) and Wildlife Section (WS) (http://www.ava.gov.sg/AnimalsPetSector/CITESEndangeredSpecies/ (http://www.ava.gov.sg/AnimalsPetSector/CITESEndangeredSpecies/)) respectively.

Appendix of the Convention (I, II or III) in which the species is listed. For the latest CITES Appendices, please refer to the official CITES website:- http://www.cites.org (http://www.cites.org)

Transport Details

Application Error(s)

Airway Bill No./Bill of Lading No.

CLOSE

CLOSE

Flight No./Vessel No.

Permittee

Name * Wang Linfa, Duke-NUS Medical School

Singapore Address

Applicant Address Copy

Mailing Address Copy

Postal Code * 169857 Retrieve Address

Please enter postal code and click on Retrieve Address button

Block/House Number 8

Street Name * COLLEGE ROAD

Floor Number

Eg. 05-01 Key in: 05

Unit Number

Eg. 05-01 Key in: 01

Building Name Duke-NUS Medical School

Care Of Programme in Emerging Infectious Diseases

Note: Permitee should be filled with a valid/registered company's name and address for corporate applications

Consignor Details

Name of the Consignor * Christopher W. Woods

Address Line 1 * 40 Duke Medicine Circle, Clinic 1K,

Application Error(s)

Address Line 2 Durham, NC 27710, United

Address Line 3

CLOSE

CLOSE

Address Line 4

Address Line 5

City

State

Country of Last Export/Re-Export * UNITED STATES

Postal Code

Consignment Product Details

Scientific Name and Common Name (Genus and Species) * Please Select

Appendix * II

Description * SERUM

Source * W, Wild

Quantity * 199

Unit * VIALS

Marking 199 vials of Pan paniscus (Bonobo) serum

Country of Origin * UNITED STATES

Permit Number (from Origin) *

Date of Issue (from Origin)

Application Error(s)

Country of Re-export * Please Select

CLOSE

CLOSE

Permit Number (from last re-export) *

Date of Issue (from last re-export)

Remarks

Add Reset

S.No	Scientific Name and Common Name (Genus and Species)	Appendix	Description	Source	Quantity	Unit	Marking	Country of Origin	Permit Number (from Origin)	Date of Issue (from Origin)	Country of Re-export

Delete

Application

Collection Option * Collect from AVA Counter Self-Print

Note:
For more information on printing of watermarked permits/certificates and a list of compatible watermark printers, please refer to the Public User Guide for Watermark Printing (https://licence1.business.gov.sg/guidelines/web/help-internet/15.-print-certificate-with-watermark). 'Self-print' is only applicable for CITES import permit which must be printed using a compatible watermark printer.

Emergency Contact

S.No	Salutation *	Name *	Designation	Contact No. *	Ema
1	Please Select			+65	

Application Error(s)

CLOSE

Type of Service

Type of Service * (•) Normal ( ) Express

Previous Next Save as Draft Save as Draft & Exit

PACKING LIST - SPECIMENS (BONOBOS)

Species	SID	Date	Event	Specimen	Specimen ID	Box ID	Location	Pick
Pan	API	8-Nov-15	Closeout	Serum	DU14-01S10035	DU14-01B01660	H3	1
Pan	Api	29-Jan-14	Baseline	Serum	DU14-01S00640	DU14-01B01760	A1	1
Pan	Bandundu	28-Jan-14	Baseline	Serum	DU14-01S00891	DU14-01B01760	A2	1
Pan	BILI	7-Nov-15	Closeout	Serum	DU14-01S10005	DU14-01B01660	G7	1
Pan	Bili	30-Jan-14	Baseline	Serum	DU14-01S00840	DU14-01B01760	A3	1
Pan	BISENGO	5-Nov-15	Closeout	Serum	DU14-01S09904	DU14-01B01660	C9	1
Pan	Bisengo	Not noted	Baseline	Serum	DU14-01S01105	DU14-01B01760	A4	1
Pan	BOENDE	29-Sep-15	Closeout	Serum	DU14-01S09452	DU14-01B01666	B7	1
Pan	BOENDE	not noted	Index - Injured	Serum	DU14-01S01237	DU14-01B01727	H4	1
Pan	Boende	29-Jan-14	Baseline	Serum	DU14-01S00446	DU14-01B01760	A5	1
Pan	BOLINGO	1-Oct-15	Closeout	Serum	DU14-01S09588	DU14-01B01666	F3	1
Pan	Bolingo	30-Jan-14	Baseline	Serum	DU14-01S00911	DU14-01B01767	E1	1
Pan	Bolomba	28-Jan-14	Baseline	Serum	DU14-01S00252	DU14-01B01760	A7	1
Pan	Boma	27-Jan-14	Baseline	Serum	DU14-01S00034	DU14-01B01760	A8	1
Pan	BOMBA	9-Nov-15	Closeout	Serum	DU14-01S02787	DU14-01B01660	I4	1
Pan	Bombo	28-Jan-14	Baseline	Serum	DU14-01S00212	DU14-01B01760	A9	1
Pan	BOSONAO	2-Nov-15	Closeout	Serum	DU14-01S09183	DU14-01B01680	E4	1
Pan	DILOLO	2-Oct-15	Closeout	Serum	DU14-01S09684	DU14-01B01666	F4	1
Pan	Dilolo	31-Jan-14	Baseline	Serum	DU14-01S01085	DU14-01B01760	B2	1
Pan	ELEKE	8-Nov-15	Closeout	Serum	DU14-01S10036	DU14-01B01660	H7	1
Pan	ELEKE	3-Dec-14	Unknown	Serum	DU14-01S04719	DU14-01B01673	D4	1
Pan	Eleke	30-Jan-14	Baseline	Serum	DU14-01S00824	DU14-01B01760	B3	1
Pan	ELEKE	29-Nov-14	Unknown	Serum	DU14-01S09261	DU14-01B01767	F8	1
Pan	Elikia	12-Mar-14	Close Contact	Serum	DU14-01S01451	DU14-01B01701	E8	1
Pan	Elikia	5-Apr-14	Convalescent	Serum	DU14-01S02069	DU14-01B01745	D5	1
Pan	Elikia	30-Jan-14	Baseline	Serum	DU14-01S00897	DU14-01B01760	B4	1
Pan	Elikia	8-Mar-14	Close Contact	Serum	DU14-01S01376	DU14-01B01760	I3	1
Pan	ELIKYA	15-Oct-15	Closeout	Serum	DU14-01S09846	DU14-01B01660	B6	1
Pan	FIZI	28-Sep-15	Closeout	Serum	DU14-01S09373	DU14-01B01666	A6	1
Pan	Fizi	28-Jan-14	Baseline	Serum	DU14-01S00321	DU14-01B01760	B6	1
Pan	Garamba	28-Jan-14	Baseline	Serum	DU14-01S00246	DU14-01B01760	B7	1
Pan	ILEBO	15-Oct-15	Closeout	Serum	DU14-01S09840	DU14-01B01660	C3	1
Pan	Ilebo	29-Jan-14	Baseline	Serum	DU14-01S00607	DU14-01B01760	B8	1
Pan	ISIRO	29-Sep-15	Closeout	Serum	DU14-01S09461	DU14-01B01666	D1	1
Pan	Isiro	21-May-14	Index Individual	Serum	DU14-01S08625	DU14-01B01727	A8	1
Pan	Isiro	23-May-14	Index Individual	Serum	DU14-01S08692	DU14-01B01727	D1	1
Pan	Isiro	25-May-14	Close Contact	Serum	DU14-01S08823	DU14-01B01727	E7	1
Pan	Isiro	18-Jun-14	Convalescent	Serum	DU14-01S08969	DU14-01B01727	G6	1
Pan	Isiro	29-Jan-14	Baseline	Serum	DU14-01S00449	DU14-01B01760	B9	1
Pan	KALINA	1-Oct-15	Closeout	Serum	DU14-01S09591	DU14-01B01666	E9	1
Pan	Kalina	30-Jan-14	Baseline	Serum	DU14-01S00888	DU14-01B01760	C1	1
Pan	KANANGA	2-Oct-15	Closeout	Serum	DU14-01S09669	DU14-01B01666	H1	1
Pan	Kananga	28-Jan-14	Baseline	Serum	DU14-01S00240	DU14-01B01760	C2	1
Pan	KASONGO	6-Nov-15	Closeout	Serum	DU14-01S09955	DU14-01B01660	E4	1
Pan	Kasongo	30-Jan-14	Baseline	Serum	DU14-01S00880	DU14-01B01760	C3	1
Pan	KATAKO	3-Oct-15	Closeout	Serum	DU14-01S09707	DU14-01B01666	H7	1
Pan	Katako	12-Mar-14	Close Contact	Serum	DU14-01S01455	DU14-01B01701	E9	1
Pan	Katako	12-Oct-14	Close Contact	Serum	DU14-01S09149	DU14-01B01706	E4	1
Pan	Katako	5-Apr-14	Convalescent	Serum	DU14-01S02063	DU14-01B01745	D3	1
Pan	Katako	29-Jan-14	Baseline	Serum	DU14-01S00629	DU14-01B01760	C4	1
Pan	Katako	8-Mar-14	Close Contact	Serum	DU14-01S01374	DU14-01B01760	I9	1
Pan	KEZA	7-Nov-15	Closeout	Serum	DU14-01S10008	DU14-01B01660	G2	1
Pan	KEZA	3-Dec-14		Serum	DU14-01S04734	DU14-01B01673	B1	1
Pan	Keza	11-Apr-14	Convalescent	Serum	DU14-01S02168	DU14-01B01680	A7	1
Pan	Keza	20-Mar-14	Close Contact	Serum	DU14-01S01993	DU14-01B01746	D4	1
Pan	Keza	1-Feb-15	Baseline	Serum	DU14-01S01167	DU14-01B01760	C5	1
Pan	Keza	18-Mar-14	Close Contact	Serum	DU14-01S01921	DU14-01B01761	G9	1

Pan	Keza	16-Mar-14	Close Contact	Serum	DU14-01S01798	DU14-01B01761	H5	1
Pan	KEZA	29-Nov-14		Serum	DU14-01S09255	DU14-01B01767	C8	1
Pan	KIKWIT	14-Nov-15	Closeout	Serum	DU14-01S09799	DU14-01B01660	A9	1
Pan	Kikwit	31-Jan-14	Baseline	Serum	DU14-01S01094	DU14-01B01760	C6	1
Pan	KIMYA	2-Oct-15	Closeout	Serum	DU14-01S09672	DU14-01B01666	G8	1
Pan	Kimya	30-Jan-14	Baseline	Serum	DU14-01S00900	DU14-01B01760	C7	1
Pan	Kinsele	27-Jan-14	Baseline	Serum	DU14-01S00030	DU14-01B01760	C8	1
Pan	KINSHASA	1-Oct-15	Closeout	Serum	DU14-01S09600	DU14-01B01666	D9	1
Pan	Kinshasa	29-Jan-14	Baseline	Serum	DU14-01S00459	DU14-01B01760	C9	1
Pan	Kinzia	27-Jan-14	Baseline	Serum	DU14-01S00032	DU14-01B01760	D1	1
Pan	KIPOLO	30-Sep-15	Closeout	Serum	DU14-01S09535	DU14-01B01666	D4	1
Pan	Kipolo	31-Jan-14	Baseline	Serum	DU14-01S01037	DU14-01B01760	D2	1
Pan	KISANTU	27-Jan-15	Post-Mortem	Serum	DU14-01S09314	DU14-01B01680	D1	1
Pan	Kisantu	12-Oct-14	Close Contact	Serum	DU14-01S09152	DU14-01B01706	E7	1
Pan	Kisantu	30-Jan-14	Baseline	Serum	DU14-01S00830	DU14-01B01760	D3	1
Pan	KODORO	15-Oct-15	Closeout	Serum	DU14-01S09843	DU14-01B01660	B9	1
Pan	Koduro	30-Jan-14	Baseline	Serum	DU14-01S00827	DU14-01B01760	D4	1
Pan	KOLE	5-Nov-15	Closeout	Serum	DU14-01S09869	DU14-01B01660	D7	1
Pan	Kole	28-Jan-14	Baseline	Serum	DU14-01S00249	DU14-01B01760	D5	1
Pan	LIKASI	28-Sep-15	Closeout	Serum	DU14-01S09376	DU14-01B01666	A2	1
Pan	Likasi	29-Jan-14	Baseline	Serum	DU14-01S00443	DU14-01B01760	D6	1
Pan	Lisala	Not noted	Baseline	Serum	DU14-01S01108	DU14-01B01760	D8	1
Pan	LIYAKA	6-Nov-15	Closeout	Serum	DU14-01S09952	DU14-01B01660	E1	1
Pan	Liyaka	30-Jan-14	Baseline	Serum	DU14-01S00820	DU14-01B01760	D9	1
Pan	LOMAKO	28-Sep-15	Closeout	Serum	DU14-01S09367	DU14-01B01666	B1	1
Pan	Lomako	28-Jan-14	Baseline	Serum	DU14-01S00234	DU14-01B01760	E1	1
Pan	LOMAMI	6-Nov-15	Closeout	Serum	DU14-01S09958	DU14-01B01660	E7	1
Pan	Lomami	29-Jan-14	Baseline	Serum	DU14-01S00481	DU14-01B01760	E2	1
Pan	LUKURU	14-Oct-15	Closeout	Serum	DU14-01S09802	DU14-01B01660	A6	1
Pan	Lukuru	28-Jan-14	Baseline	Serum	DU14-01S00215	DU14-01B01760	E4	1
Pan	MABALI	3-Oct-15	Closeout	Serum	DU14-01S09710	DU14-01B01666	H4	1
Pan	Mabali	11-Apr-14	Convalescent	Serum	DU14-01S02177	DU14-01B01680	D7	1
Pan	Mabali	16-Mar-14	Index Case	Serum	DU14-01S01792	DU14-01B01727	H8	1
Pan	Mabali	20-Mar-14	Index Individual	Serum	DU14-01S01987	DU14-01B01746	E4	1
Pan	Mabali	31-Jan-14	Baseline	Serum	DU14-01S01097	DU14-01B01760	E5	1
Pan	Mabali	18-Mar-14	Index Individual	Serum	DU14-01S01932	DU14-01B01761	G7	1
Pan	MAKALI	29-Sep-15	Closeout	Serum	DU14-01S09458	DU14-01B01666	C7	1
Pan	Makali	21-May-14	Close Contact	Serum	DU14-01S08622	DU14-01B01727	A3	1
Pan	Makali	23-May-14	Close Contact	Serum	DU14-01S08695	DU14-01B01727	C7	1
Pan	Makali	25-May-14	Close Contact	Serum	DU14-01S08808	DU14-01B01727	E4	1
Pan	Makali	17-Jun-14	Convalescent	Serum	DU14-01S08913	DU14-01B01727	G5	1
Pan	Makali	29-Jan-14	Baseline	Serum	DU14-01S00455	DU14-01B01760	E6	1
Pan	Makasi	11-Oct-14	Post Mortem	Serum	DU14-01S09098	DU14-01B01706	F3	1
Pan	Makasi	29-Jan-14	Baseline	Serum	DU14-01S00601	DU14-01B01760	E7	1
Pan	MALAIKA	5-Nov-15	Closeout	Serum	DU14-01S09901	DU14-01B01660	D1	1
Pan	MALAIKA	3-Dec-14		Serum	DU14-01S04722	DU14-01B01673	D7	1
Pan	Malaika	11-Apr-14	Convalescent	Serum	DU14-01S02163	DU14-01B01680	C7	1
Pan	Malaika	29-Jan-14	Baseline	Serum	DU14-01S00598	DU14-01B01760	E8	1
Pan	Malaika	18-Mar-14	Index Individual	Serum	DU14-01S01918	DU14-01B01761	G4	1
Pan	Malaika	16-Mar-14	Index Case	Serum	DU14-01S01804	DU14-01B01761	I1	1
Pan	MALAIKA	29-Nov-14	Index	Serum	DU14-01S09246	DU14-01B01767	H6	1
Pan	MANIEMA	29-Sep-15	Closeout	Serum	DU14-01S09455	DU14-01B01666	C4	1
Pan	Maniema	29-Jan-14	Baseline	Serum	DU14-01S00452	DU14-01B01760	E9	1
Pan	MANONO	6-Nov-15	Closeout	Serum	DU14-01S09951	DU14-01B01660	F1	1
Pan	Manono	12-Mar-14	Close Contact	Serum	DU14-01S01170	DU14-01B01701	E1	1
Pan	Manono	12-Oct-14	Close Contact	Serum	DU14-01S09123	DU14-01B01706	B2	1
Pan	Manono	5-Apr-14	Convalescent	Serum	DU14-01S02058	DU14-01B01745	D4	1
Pan	Manono	31-Jan-14	Baseline	Serum	DU14-01S01091	DU14-01B01760	F1	1

Pan	Manono	8-Mar-14	Close Contact	Serum	DU14-01S01351	DU14-01B01760	H7	1
Pan	Manono	10-Mar-14	Close Contact	Serum	DU14-01S01400	DU14-01B01760	I7	1
Pan	MASISI	5-Nov-15	Closeout	Serum	DU14-01S09872	DU14-01B01660	D4	1
Pan	MASISI	3-Dec-14		Serum	DU14-01S04731	DU14-01B01673	B4	1
Pan	Masisi	30-Jan-14	Baseline	Serum	DU14-01S00816	DU14-01B01760	F2	1
Pan	MASISI	29-Nov-14		Serum	DU14-01S09252	DU14-01B01767	B6	1
Pan	MATADI	14-Oct-15	Closeout	Serum	DU14-01S09796	DU14-01B01660	B3	1
Pan	Matadi	31-Jan-14	Baseline	Serum	DU14-01S01088	DU14-01B01760	F3	1
Pan	Max	11-Apr-14	Convalescent	Serum	DU14-01S02174	DU14-01B01680	E7	1
Pan	Max	20-Mar-14	Close Contact	Serum	DU14-01S01996	DU14-01B01746	E1	1
Pan	Max	30-Jan-14	Baseline	Serum	DU14-01S00756	DU14-01B01760	F5	1
Pan	Max	18-Mar-14	Close Contact	Serum	DU14-01S01924	DU14-01B01761	G1	1
Pan	Max	16-Mar-14	Close Contact	Serum	DU14-01S01791	DU14-01B01761	H7	1
Pan	Maya	Not noted	Baseline	Serum	DU14-01S01040	DU14-01B01760	F6	1
Pan	MBANDAKA	7-Nov-15	Closeout	Serum	DU14-01S09979	DU14-01B01660	F7	1
Pan	Mbandaka	30-Jan-14	Baseline	Serum	DU14-01S00819	DU14-01B01760	F8	1
Pan	Minova	27-Jan-14	Baseline	Serum	DU14-01S00031	DU14-01B01777	A4	1
Pan	MONGATA	7-Nov-15	Closeout	Serum	DU14-01S09976	DU14-01B01660	G4	1
Pan	Mongata	3-Feb-14	Baseline	Serum	DU14-01S01182	DU14-01B01760	G3	1
Pan	MOYI	28-Sep-15	Closeout	Serum	DU14-01S09364	DU14-01B01666	B6	1
Pan	Moyi	21-May-14	Index Individual	Serum	DU14-01S08616	DU14-01B01727	A5	1
Pan	Moyi	25-May-14	Close Contact	Serum	DU14-01S08816	DU14-01B01727	D7	1
Pan	Moyi	17-Jun-14	Index Individual	Serum	DU14-01S08919	DU14-01B01727	F8	1
Pan	Moyi	28-Jan-14	Baseline	Serum	DU14-01S00324	DU14-01B01760	G5	1
Pan	MUANDA	8-Nov-15	Closeout	Serum	DU14-01S10039	DU14-01B01660	H4	1
Pan	Muanda	30-Jan-14	Baseline	Serum	DU14-01S00834	DU14-01B01760	G6	1
Pan	Ndjili	27-Jan-14	Baseline	Serum	DU14-01S00036	DU14-01B01760	G8	1
Pan	OPALA	2-Oct-15	Closeout	Serum	DU14-01S09678	DU14-01B01666	G1	1
Pan	Opala	12-Oct-14	Close Contact	Serum	DU14-01S09143	DU14-01B01706	C4	1
Pan	Opala	5-Apr-14	Convalescent	Serum	DU14-01S02066	DU14-01B01745	D1	1
Pan	Opala	29-Jan-14	Baseline	Serum	DU14-01S00604	DU14-01B01760	G1	1
Pan	Opala	8-Mar-14	Index Case	Serum	DU14-01S01353	DU14-01B01760	H2	1
Pan	OSHWE	6-Nov-15	Closeout	Serum	DU14-01S09948	DU14-01B01660	F6	1
Pan	Oshwe	28-Jan-14	Baseline	Serum	DU14-01S00209	DU14-01B01760	G2	1
Pan	POLE	2-Oct-15	Closeout	Serum	DU14-01S09681	DU14-01B01666	F7	1
Pan	Pole	12-Mar-14	Close Contact	Serum	DU14-01S01452	DU14-01B01701	F2	1
Pan	Pole	5-Apr-14	Convalescent	Serum	DU14-01S02072	DU14-01B01745	D2	1
Pan	Pole	29-Jan-14	Baseline	Serum	DU14-01S00632	DU14-01B01760	G4	1
Pan	Pole	8-Mar-14	Close Contact	Serum	DU14-01S01367	DU14-01B01760	I1	1
Pan	Pole	10-Mar-14	Close Contact	Serum	DU14-01S01399	DU14-01B01760	I5	1
Pan	SAKE	12-Oct-15	Closeout	Serum	DU14-01S09726	DU14-01B01660	A1	1
Pan	SAKE	3-Dec-14		Serum	DU14-01S04725	DU14-01B01673	D2	1
Pan	Sake	11-Apr-14	Convalescent	Serum	DU14-01S02171	DU14-01B01680	F1	1
Pan	Sake	20-Mar-14	Close Contact	Serum	DU14-01S01990	DU14-01B01746	D1	1
Pan	Sake	30-Jan-14	Baseline	Serum	DU14-01S00813	DU14-01B01760	F7	1
Pan	Sake	16-Mar-14	Close Contact	Serum	DU14-01S01795	DU14-01B01761	I4	1
Pan	SAKE	29-Nov-14		Serum	DU14-01S09258	DU14-01B01767	I8	1
Pan	SALONGA	2-Oct-15	Closeout	Serum	DU14-01S09675	DU14-01B01666	G4	1
Pan	Salonga	30-Jan-14	Baseline	Serum	DU14-01S00894	DU14-01B01760	G7	1
Pan	SANDOA	28-Sep-15	Closeout	Serum	DU14-01S09370	DU14-01B01666	A9	1
Pan	Sandoa	21-May-14	Close Contact	Serum	DU14-01S08619	DU14-01B01727	A4	1
Pan	Sandoa	23-May-14	Close Contact	Serum	DU14-01S08701	DU14-01B01727	C2	1
Pan	Sandoa	25-May-14	Close Contact	Serum	DU14-01S08819	DU14-01B01727	D4	1
Pan	Sandoa	18-Jun-14	Convalescent	Serum	DU14-01S08972	DU14-01B01727	H1	1
Pan	Sandoa	28-Jan-14	Baseline	Serum	DU14-01S00237	DU14-01B01760	H1	1
Pan	SANZA	1-Oct-15	Closeout	Serum	DU14-01S09594	DU14-01B01666	E6	1
Pan	Sanza	28-Jan-14	Baseline	Serum	DU14-01S00355	DU14-01B01760	F4	1
Pan	Semendwa	12-Oct-14	Close Contact	Serum	DU14-01S09119	DU14-01B01706	A6	1

Pan	Semendwa	29-Jan-14	Baseline	Serum	DU14-01S00643	DU14-01B01760	F9	1
Pan	Semendwa	8-Mar-14	Close Contact	Serum	DU14-01S01365	DU14-01B01760	H4	1
Pan	SHIBOMBO	29-Sep-15	Closeout	Serum	DU14-01S09449	DU14-01B01666	C1	1
Pan	Singi	28-Jan-14	Baseline	Serum	DU14-01S00243	DU14-01B01760	G9	1
Pan	Tshibombo	21-May-14	Close Contact	Serum	DU14-01S08613	DU14-01B01727	A6	1
Pan	Tshibombo	25-May-14	Close Contact	Serum	DU14-01S08826	DU14-01B01727	F1	1
Pan	Tshibombo	17-Jun-14	Convalescent	Serum	DU14-01S08922	DU14-01B01727	F5	1
Pan	Tshibombo	28-Jan-14	Baseline	Serum	DU14-01S00318	DU14-01B01760	E3	1
Pan	TSHILOMBA	1-Oct-15	Closeout	Serum	DU14-01S09597	DU14-01B01666	E3	1
Pan	Tshilomba	21-May-14	Close Contact	Serum	DU14-01S08628	DU14-01B01727	A1	1
Pan	Tshilomba	23-May-14	Close Contact	Serum	DU14-01S08698	DU14-01B01727	C5	1
Pan	Tshilomba	25-May-14	Close Contact	Serum	DU14-01S08813	DU14-01B01727	E1	1
Pan	Tshilomba	17-Jun-14	Convalescent	Serum	DU14-01S08916	DU14-01B01727	F9	1
Pan	Tshilomba	28-Jan-14	Baseline	Serum	DU14-01S00338	DU14-01B01760	D7	1
Pan	WAKA	15-Oct-15	Closeout	Serum	DU14-01S09837	DU14-01B01660	C4	1
Pan	Waka	30-Jan-14	Baseline	Serum	DU14-01S00810	DU14-01B01760	B5	1
Pan	Wongolo	10-Mar-14	Post-Mortem	Serum	DU14-01S01415	DU14-01B01727	H3	1
Pan	Wongolo	30-Jan-14	Baseline	Serum	DU14-01S00914	DU14-01B01760	B1	1
Pan	YOLO	9-Nov-15	Closeout	Serum	DU14-01S02790	DU14-01B01660	I1	1
Pan	YOLO	3-Dec-14		Serum	DU14-01S04728	DU14-01B01673	B7	1
Pan	Yolo	11-Apr-14	Convalescent	Serum	DU14-01S02160	DU14-01B01680	B7	1
Pan	Yolo	20-Mar-14	Close Contact	Serum	DU14-01S01998	DU14-01B01746	D7	1
Pan	Yolo	30-Jan-14	Baseline	Serum	DU14-01S00837	DU14-01B01760	A6	1
Pan	Yolo	18-Mar-14	Close Contact	Serum	DU14-01S01929	DU14-01B01761	H1	1
Pan	Yolo	16-Mar-14	Close Contact	Serum	DU14-01S01801	DU14-01B01761	I7	1
Pan	YOLO	29-Nov-14		Serum	DU14-01S09249	DU14-01B01767	F6	1

Bradly P. Nicholson, Ph.D.

Personal Data Head, Molecular Epidemiology and Research Laboratory

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Durham, NC 27705
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Email: brad.nicholson@duke.edu

11 Aug 2017

Training & Experience

Baccalaureate Degree: [redacted] B. S. with Honors (Microbiology)
[redacted]

Advanced Degree: Ph.D. [redacted] Experimental Pathology)
[redacted]
Thesis Advisor: Dr. David Low

Post-Doctoral Fellowship: [redacted]
Duke University (Molecular Genetics and Microbiology)
Advisor: Dr. John McCusker

Research Analyst: [redacted]
Department of Infectious Diseases, Duke University
Supervisor: Dr. Kenneth Wilson

Research Scientist: [redacted] present
[redacted] Veterans Affairs Medical Center

Publications

Nicholson B. and Low D. DNA methylation-dependent regulation of *Pef* expression in *Salmonella typhimurium*. 2000. Molecular Microbiology 35(4), 728 –742.

Hertzog P., Nicholson B. and McCusker J. Cytosine Deaminase MX Cassettes as Positive/Negative Selectable Markers in Saccharomyces cerevisiae. 2005. Yeast 22(10), 789-98.

Sinha H., Nicholson B., Steinmetz L. and McCusker J. Complex genetic interactions in a quantitative trait locus. 2006. PloS Genetics. 2(2). E13. Epub.

Killgore G, Thompson A, Johnson S, Brazier J, Kuijper E, Pepin J, Frost EH, Savelkoul P, Nicholson B, van den Berg RJ, Kato H, Sambol SP, Zukowski W, Woods C, Limbago B, Gerding DN, McDonald LC. Comparison of seven techniques for typing international epidemic strains of Clostridium difficile: restriction endonuclease analysis, pulsed-field gel electrophoresis, PCR-ribotyping, multilocus sequence typing, multilocus variable-number tandem-repeat analysis, amplified fragment length polymorphism, and surface layer protein A gene sequence typing. J Clin Microbiol. 2008 Feb;46(2):431-7.

Zaas A, Chen M, Varkey J, Veldman T, Hero A, Lucas J, Huang Y, Turner R, Gilbert A, Lambkin-Williams R, Øien C, Nicholson B, Kingsmore S, Carin L, Woods C and Ginsburg G. Gene Expression Signatures Diagnose Influenza and Other Symptomatic Respiratory Viral Infection in Humans. Cell Host Microbe. 2009 Sep 17;6(3):207-17.

Tsalik EL, Jones D, Nicholson B, Waring L, Liesenfeld O, Park LP, Glickman SW, Caram LB, Langley RJ, van Velkinburgh JC, Cairns CB, Rivers EP, Otero RM, Kingsmore SF, Lalani T, Fowler VG, Woods CW. Multiplex PCR to diagnose bloodstream infections in patients admitted from the emergency department with sepsis. J Clin Microbiol. 2010 Jan;48(1):26-33.

Seña AC, Seed P, Nicholson B, Joyce M, Cunningham CK. Kingella kingae endocarditis and a cluster investigation among daycare attendees. Pediatr Infect Dis J. 2010 Jan;29(1):86-8.

Peterson LR, Liesenfeld O, Woods CW, Allen SD, Pombo D, Patel PA, Mehta MS, Nicholson B, Fuller D, Onderdonk A. Multicenter evaluation of the LightCycler methicillin-resistant Staphylococcus aureus (MRSA) advanced test as a rapid method for detection of MRSA in nasal surveillance swabs. J Clin Microbiol. 2010 May;48(5):1661-6.

Naggie S, Miller BA, Zuzak KB, Pence BW, Mayo AJ, Nicholson BP, Kutty PK, McDonald LC, Woods CW. A case-control study of community-associated Clostridium difficile infection: no role for proton pump inhibitors. Am J Med. 2011 Mar;124(3):276.e1-7.

Huang Y, Zaas AK, Rao A, Dobigeon N, Woolf PJ, Veldman T, Øien NC, McClain MT, Varkey JB, Nicholson B, Carin L, Kingsmore S, Woods CW, Ginsburg GS, Hero AO 3rd. Temporal dynamics of host molecular responses differentiate symptomatic and asymptomatic influenza a infection. PLoS Genet. 2011 Aug;7(8):e1002234.

Woods CW, McClain MT, Chen M, Zaas AK, Nicholson BP, Varkey J, Veldman T, Kingsmore SF, Huang Y, Lambkin-Williams R, Gilbert AG, Hero AO 3rd, Ramsburg E, Glickman S, Lucas JE, Carin L, Ginsburg GS. A host transcriptional signature for presymptomatic detection of infection in humans exposed to influenza H1N1 or H3N2. PLoS One. 2013;8(1):e52198

Bagga B, Woods CW, Veldman TH, Gilbert A, Mann A, Balaratnam G, Lambkin-Williams R, Oxford JS, McClain MT, Wilkinson T, Nicholson BP, Ginsburg GS, Devincenzo JP. Comparing influenza and RSV viral and disease dynamics in experimentally infected adults predicts clinical effectiveness of RSV antivirals. Antivir Ther. 2013 May 28.

Zaas AK, Burke T, Chen M, McClain M, Nicholson B, Veldman T, Tsalik EL, Fowler V, Rivers EP, Otero R, Kingsmore SF, Voora D, Lucas J, Hero AO, Carin L, Woods CW, Ginsburg GS. A host-based RT-PCR gene expression signature to identify acute respiratory viral infection. Sci Transl Med. 2013 Sep 18;5(203):203ra126.

Alagna L, Park LP, Nicholson BP, Keiger AJ, Strahilevitz J, Morris A, Wray D, Gordon D, Delahaye F, Edathodu J, Miró JM, Fernández-Hidalgo N, Nacinovich FM, Shahid R, Woods CW, Joyce MJ, Sexton DJ, Chu VH. Repeat endocarditis: analysis of risk factors based on the International Collaboration on Endocarditis - Prospective Cohort Study. Clin Microbiol Infect. 2013 Sep 18.

McClain MT, Park LP, Nicholson B, Veldman T, Zaas AK, Turner R, Lambkin-Williams R, Gilbert AS, Ginsburg GS, Woods CW. Longitudinal analysis of leukocyte differentials in peripheral blood of patients with acute respiratory viral infections. J Clin Virol. 2013 Dec;58(4):689-95.

Chen LF, Freeman JT, Nicholson B, Keiger A, Lancaster S, Joyce M, Woods CW, Cook E, Adcock L, Louis S, Cromer AL, Sexton DJ, Anderson DJ. Widespread Dissemination of CTX-M-15 Genotype Extended-Spectrum-β-Lactamase-Producing Enterobacteriaceae among Patients Presenting to Community Hospitals in the Southeastern United States. Antimicrob Agents Chemother. 2014 Feb;58(2):1200-2.

Ngo HT, Wang HN, Fales AM, Nicholson BP, Woods CW, Vo-Dinh T. DNA bioassay-on-chip using SERS detection for dengue diagnosis. Analyst. 2014 Nov 21;139(22):5655-9.

O'Meara WP, Mott JA, Laktabai J, Wamburu K, Fields B, Armstrong J, Taylor SM, MacIntyre C, Sen R, Menya D, Pan W, Nicholson BP, Woods CW, Holland TL. Etiology of pediatric fever in western Kenya: a case-control study of falciparum malaria, respiratory viruses, and streptococcal pharyngitis. Am J Trop Med Hyg. 2015 May;92(5):1030-7.

Becker-Dreps S, Kistler CE, Ward K, Killeya-Jones LA, Better OM, Weber DJ,

Zimmerman S, Nicholson BP, Woods CW, Sloane P. Pneumococcal Carriage and Vaccine Coverage in Retirement Community Residents. J Am Geriatr Soc. 2015 Oct;63(10):2094-8.

McClain MT, Henao R, Williams J, Nicholson B, Veldman T, Hudson L, Tsalik EL, Lambkin-Williams R, Gilbert A, Mann A, Ginsburg GS, Woods CW. Differential evolution of peripheral cytokine levels in symptomatic and asymptomatic responses to experimental influenza virus challenge. Clin Exp Immunol. 2016 Mar;183(3):441-51.

Yang WE, Suchindran S, Nicholson BP, McClain MT, Burke T, Ginsburg GS, Harro CD, Chakraborty S, Sack DA, Woods CW, Tsalik EL. Transcriptomic Analysis of the Host Response and Innate Resilience to Enterotoxigenic Escherichia coli Infection in Humans. J Infect Dis. 2016 May 1;213(9):1495-504.

McClain MT, Nicholson BP, Park LP, Liu TY, Hero AO 3rd, Tsalik EL, Zaas AK, Veldman T, Hudson LL, Lambkin-Williams R, Gilbert A, Burke T, Nichols M, Ginsburg GS, Woods CW. A Genomic Signature of Influenza Infection Shows Potential for Presymptomatic Detection, Guiding Early Therapy, and Monitoring Clinical Responses. Open Forum Infect Dis. 2016 Jan 19;3(1):ofw007.

Tillekeratne LG, Vidanagama D, Tippalagama R, Lewkebandara R, Joyce M, Nicholson BP, Nagahawatte A, Bodinayake CK, De Silva AD, Woods CW. Extended-spectrum ß-Lactamase-producing Enterobacteriaceae as a Common Cause of Urinary Tract Infections in Sri Lanka. Infect Chemother. 2016 Sep;48(3):160-165.

Shapiro D, Bodinayake CK, Nagahawatte A, Devasiri V, Kurukulasooriya R, Hsiang J, Nicholson B, De Silva AD, Østbye T, Reller ME, Woods CW, Tillekeratne LG. Burden and Seasonality of Viral Acute Respiratory Tract Infections among Outpatients in Southern Sri Lanka. Am J Trop Med Hyg. 2017 Jul;97(1):88-96.

Burke TW, Henao R, Soderblom E, Tsalik EL, Thompson JW, McClain MT, Nichols M, Nicholson BP, Veldman T, Lucas JE, Moseley MA, Turner RB, Lambkin-Williams R, Hero AO 3rd, Woods CW, Ginsburg GS. Nasopharyngeal Protein Biomarkers of Acute Respiratory Virus Infection. EBioMedicine. 2017 Mar;17:172-181.

Awards

[redacted] Travel Fellowship to attend The First Bristol-Meyers Squibb Symposium on Infectious Disease Research; The Cell and Molecular Biology of Bacterial-Host Cell Interactions

[redacted] NIH Genetics Training Grant Recipient

Meeting presentations

[redacted] The First Bristol-Meyers Squibb Symposium on Infectious Disease Research, "Analysis of an Adhesin/Invasin Expressed in *Legionella pneumophila*". Poster Presentation.

Cold Spring Harbor Laboratory, Microbial Pathogenesis and Host Response, "Expression Of *Salmonella typhimurium* Plasmid Encoded Fimbriae (Pef) Is Induced By Low pH". Poster Presentation.

Yeast Genetics and Molecular Biology Meeting, "Phase variation in *Saccharomyces cerevisiae*". Poster Presentation.

Infectious Diseases Society of America, "Comparison of Molecular Typing Methods for *Clostridium difficile* " Poster Presentation

[redacted]

Roche SeptiFast User Conference, "SeptiFast to Diagnose Blood Stream Infections in Patients Admitted from the Emergency Department with Sepsis". Session Presentation

Infectious Diseases Society of America, "The Monitoring of Self-Reported Symptoms in a Student Cohort to Follow Respiratory Illness". Poster Presentation.

European Congress of Clinical Microbiology and Infectious Diseases, "Screening of methicillin-resistant *Staphylococcus aureus* — a US perspective". Symposium Presentation

Current Supervisor
Christopher W. Woods, MD, MPH
Associate Professor of Medicine
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Chief, Infectious Diseases
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Anna Uehara

[redacted]

EDUCATION

[redacted] *Commenced August [redacted])*

- PhD Candidate in Program of Integrated Biology and Medicine focusing on Emerging Infectious Diseases
- Mentor: Prof Wang Linfa
- Research focus on development of deep sequencing and serological platforms for infectious disease investigation

[redacted] – Durham, NC [redacted]

- MSc in Global Health
- Fieldwork for Thesis: Febrile Illness Study in Sri Lanka, time spent in Singapore and Sri Lanka (in [redacted])

[redacted] **University** – [redacted]

- B.S. in Neuroscience with Honors in Neuroscience, B.A. in Music completed, Spanish minor
- Dean's List [redacted]

PROFESSIONAL EXPERIENCE

Research Assistant – Dr. Sara Benjamin Neelon, [redacted]

- Performed data QC and preliminary analysis for NEST and NURTURE studies

Research Assistant – Dr. Cathrine Hoyo, [redacted]

- Data cleaning using SAS for merged data collected from Qualtrics and CSPro, preliminary data analysis
- Support recruitment and retention of study participants for longitudinal study

Teaching Assistant – [redacted]

- Graded assignments and held weekly office hours for Biology 154 "AIDS/Emerging Infections" taught by Dr. Sherryl Broverman.

Teacher's Assistant – [redacted]

- Assist instructor with student's questions in elementary through high school levels in math and reading.
- Grade student's work and identify areas of improvement

Research Assistant – Dr. Rae Jean Proeschold-Bell, [redacted]

- Conducted literature reviews for current studies and grant writing support
- Participated in preliminary data cleaning using STATA

Research Assistant – Dr. Bernard Fuemmeler, Newborn Epigenetics Study (NEST) [redacted]

- Worked on data collection, data entry, preliminary data analysis and participant follow-up.

Health Assistant – Center for Talented Youth, Johns Hopkins University [redacted])

- Managed 400 residential campers, ages 11-16, some with developmental and/or mental disabilities
- Provided basic first aid, accompanied campers to doctor's visits, distributed medication

Intern at Office of Civic Engagement – [redacted]

- Worked with local organizations in coordinating community outreach and fundraising events
- Worked as Bucknell in Nicaragua Brigade intern by organizing medical product collection and preparation for donation
- Managed office communication via website and announcement boards

Teaching Assistant for Freshmen Biology Labs – [redacted]

- Prepared and assisted students for Biology-major introductory courses, Introduction Molecular Biology and Organismal Biology primarily through lab class and lecture tutoring

PERSONAL, SERVICE, AND LEADERSHIP EXPERIENCE

[redacted] **of Singapore** – Singapore ([redacted]

- Serving as President [redacted])
- Served as VP of Events for two years [redacted] organizing over 30 events ranging from networking sessions for alumni and current students to large scale receptions for incoming students

[redacted] **University-Institute Pasteur Virology Course**, [redacted] University, [redacted]

Global Health Fieldwork – [redacted] University (Dr. Chris Woods), [redacted] Medical School in Singapore (Dr. Duane Gubler), University of [redacted] (Dr. Ajith Nagahawatte)

Anna Uehara

[redacted]

- [redacted] were spent at Duke-NUS Medical School in Singapore where wet laboratory experiments were carried out (ELISA, IFA, full genome sequencing, PCR, Masstaq RVP, virus isolation)
- [redacted] were spent at University of Ruhuna in Sri Lanka to lead a laboratory capacity building project focusing on establishing dengue serological assays and training in-country investigators.

Undergraduate Research – Dr. Kathleen Page Lab, [redacted]

- Analyzed serotonin receptor levels in adult mice using radioimmuno assay and radioligand assays (EIA, RIA, MPPF Radioligand Assay)
- Analyzed gene expression in melatonin up-regulated and down-regulated rat models (qRT-PCR and gel electrophoresis)

Student Emergency Response Volunteers (SERV) – [redacted]

- Volunteered as an EMT-B for on-campus calls and community calls
- Worked on executive board for three years as Captain of Recruitment, Captain of Training and Chair of PR and Marketing

Service Trips

- [redacted]

Students for Asian Awareness at [redacted]

- Worked to promote Asian culture to other Bucknell students and the Lewisburg community
- *President* [redacted]

[redacted]

- Worked to promote Japanese culture to other Bucknell students and the Lewisburg community
- *President* [redacted]

PUBLICATIONS

Ho, ZJM., Hapuarachchi, HC., Barkham, T., Chow, LPA., Lee, JMV., Leo, YS., Prem, K., Lim YHGL., de Sessions PF., Rabaa, MA., Chong CS., Tan, CH., Rajarethinam, J., Tan JH., Anderson, DE., Ong, XM., Cook, AR., Chong, CY., Hsu, LY., Yap, G., Lai, YL., Chawla, T., Pan, L., Sim S., Chen, ICM., Thoon, KC., Yung, CF., Li, JH., Ng HLD., Nandar, K., Ooi, PL., Lin RTP., Aw, P., **Uehara, A.,** Pratim P., Soon, W., Hibberd, ML., Ng, HH., Maurer-Stroh, S., Sessions, OM. (2017). Outbreak of Zika virus infection in Singapore: an epidemiological, virological, and clinical analysis. *Lancet Infectious Disease* DOI: 10.1016/S1473-3099(17)30249-9

Uehara, A., Tissera, HA., Bodinayake, CK., Amarasinghe, A., Tillekeratne, LG., Cui, J., Reller, ME., Palihawadana, P., Gunasena, S., Desilva, AD., Wilder-Smith, A., Gubler, DJ., Woods, CW., & Sessions, OM. (2017). Analysis of Dengue Serotype 4 in Sri Lanka During the 2012-2013 Dengue Epidemic. *The American Journal of Tropical Medicine and Hygiene*, Available Online 24 April 2017 doi.org/10.4269/ajtmh.16-0540

Bodinayake, CK., Tillekeratne, LG., Nagahawatte, A., Devasiri, V., Kodikara Arachichi, W., Strouse, JJ., Sessions, OM., Kurukulasooriya, R., **Uehara A.,** Howe, S., Ong, XM., Tan S., Chow, A., Tummalapalli, P., De Silva, AD., Ostbye T., Woods, CW., Gubler, DJ., & Reller, ME. (2016). Emergence of Epidemic Dengue-1 Virus in the Southern Province of Sri Lanka. *PLoS Neglected Tropical Diseases*, 2016(10) DOI: 10.1371/journal.pntd.0004995

Uehara, A., Kamaraj U., Tissera H.A., Amarasinghe A., Palihawadana P., Gunasena S., Ong X.M., Howe S., Desilva A.D., Wilder-Smith A., Gubler D., Sessions O.M. (2015). A hybridization-based enrichment strategy to increase the accuracy of next generation sequencing in phylogenetic analysis of dengue viruses in Sri Lanka. *Tropical Medicine & International Health* 20:120-120

Uehara, Anna. (2014). Molecular and Epidemiological Assessment of Dengue Fever in Southern Sri Lanka in 2012. *Master's Theses.* DOI: http://hdl.handle.net/10161/8819

Reif, S., Proeschold-Bell, R.J., Yao, J., LeGrand, S., **Uehara, A.,** Asiimwe, E., & Quinlivan, E.B. (2013). Three types of self-efficacy are associated with medication adherence among patients with co-occurring HIV and substance use disorders, but only when mood disorders are present. *Journal of Multidisciplinary Healthcare, 2013*(6), 229-237. DOI: http://dx.doi.org/10.2147/JMDH.S44204, PMCID: PMC3699252

Uehara, Anna. (2012). The Effects of Prenatal Exposure to Altered Melatonin Levels on Hippocampal Gene Expression in the Male Rat. *Honor's Theses.* Paper 124. DOI: http://digitalcommons.bucknell.edu/honors_theses/124

Anna Uehara
a[redacted]

CONFERENCE PRESENTATIONS

Uehara A., Mani S., Tan C.W., Anderson D., Wang LF. (2017). Development of a highly sensitive serological test for zoonotic infections. Duke-NUS Medical School. American Society of Tropical Medicine and Hygiene 66th Annual Meeting. *(Poster)*

Uehara A., Sangumathi U., Tan J.H., Chan Y.F.Z., Tan K., Ooi E.E., Low J., Ong X.M., Pan L., Anderson D., Wijaya L., Wang L.F., Sessions O.M. (2017). Utilization of a viral enrichment platform to understand neuronal infections in Singapore. Duke-NUS Medical School. American Society of Tropical Medicine and Hygiene 66th Annual Meeting. *(Poster)*

Uehara A., Mani S., Tan C.W., Anderson D., Wang LF. (2017). Development of a highly sensitive serological test for orthoreovirus. Duke-NUS Medical School. DUNES Symposium. *(Oral Presentation)*

Uehara, A., Sangumathi, U., Zhang, R., Howe, S., Wang, LF., Sessions, O.M. (2016). Pathogen Identification: Enrichment through hybridization of deep sequencing techniques. Duke-NUS Medical School. NUS Yong Loo Lin School of Medicine 6th Annual Graduate Scientific Congress.*(Poster)*

Uehara, A., Tissera, H.A., Bodinayake, C., Amarasinghe, A. Nagahawatte, A., Tillekeratne, G., Dhanasekaran, V., Reller, M., Palihawadana, P., Gunasena, S., DeSilva, A.D., de Silva, A., Wilder-Smith, A., Sessions, O.M., Gubler, D.J., Woods, C.W. (2014). Molecular and Epidemiological Assessment of Dengue Fever in Southern Sri Lanka in 2012. Duke Global Health Institute. Duke-NUS Graduate Medical School. American Society of Tropical Medicine and Hygiene Annual Meeting. (Poster)

Uehara, A. (2013). Improving Detection of Dengue Fever in Southern Sri Lanka. Duke Global Health Institute. Duke University. Duke Global Health Showcase. (Poster)

Uehara, A., Ripple J., Pizzorno, M., Page, K. (2012). The effects of altered melatonin levels on hippocampal gene expression in the male rat. Bucknell University. Kalman Symposium. (Poster)

Uehara, A., Ripple, J., Pizzorno, M., Page, K. (2011). The effects of altered melatonin levels and hippocampal gene expression in the male rat. Bucknell University. Susquehanna Valley Undergraduate Research Conference. (Poster)

AWARDS AND RECOGNITION

[redacted]

ADDITIONAL INFORMATION

Computer Program Experience: Microsoft Office and Access, Windows and Mac, STATA, SPSS, Geneious, CSPro, EBrowser/IDX, Endnote, WordPress, learning SAS and Qualtrics

Foreign Language: [redacted]

Health Skills: [redacted]

CURICULLUM VITAE

[redacted]

Programme in Emerging Infectious Diseases
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Tel. +65-65167256 (office)
[redacted]
Email: linfa.wang@duke-nus.edu.sg

PERSONAL DETAILS

Birthdate: [redacted]
Birthplace:
Sex:
Citizen:
Marriage:

ACADEMIC QUALIFICATIONS

Ph.D. Biochemistry (Molecular Biology), [redacted]

B.S. (Honour) Biology (Biochemistry), [redacted]
China, [redacted].

EMPLOYMENT AND RESEARCH EXPERIENCE

[redacted]present Director and Professor, Program in Emerging Infectious Diseases, Duke-NUS Graduate Medical School, Singapore

[redacted]

OCE Science Leader, CSIRO [redacted] Animal Health Laboratory, [redacted].

Senior Principal Research Scientist and project leader, CSIRO [redacted] Animal Health Laboratory, [redacted]

Project Leader, [redacted] Biosecurity Cooperative Research Centre for Emerging Infectious Diseases (AB-CRC), [redacted]

Principal Research Scientist and project leader, CSIRO [redacted] Animal Health Laboratory, [redacted].

Senior Research Scientist and project leader, CSIRO [redacted] Animal Health Laboratory, [redacted]

Research Scientist, CSIRO [redacted] Animal Health Laboratory, [redacted].

[redacted]

Senior Research Officer, the Centre for Molecular Biology and Medicine, [redacted] University, [redacted]

Senior Tutor, Department of Biochemistry, [redacted] University, [redacted]

Postdoctoral Research Fellow, Department of Biochemistry, University of [redacted].

Postgraduate Student, Department of Biochemistry, University [redacted]

TEACHING EXPERIENCE

[redacted]

Professor, Program in Emerging Infectious Diseases, [redacted]

Supervisor for Ph.D. and Honours students, CSIRO [redacted]

Senior Tutor, Department of Biochemistry [redacted]

Associate Professor, Department of Biology, [redacted]

Teaching Assistant, Department of Biochemistry, [redacted]

Assistant Teacher, Department of Biology, [redacted]

HONORARY POSITIONS AND INVITED MEMBERSHIPS

Professor, Duke Global Health Institute, Duke University ([redacted]

Honorary Professor, University of Melbourne ([redacted]

Honorary Professor, Wuhan Institute of Virology, Chinese Academy of Sciences ([redacted]

Adjunct Professor, East China Normal University ([redacted]

Adjunct Professor, Deakin University ([redacted]

Editorial Board, Asia Pacific Journal of Molecular Biology and Biotechnology ([redacted]

Editorial Board, Immunology Laboratory Manuals, R.D. Landes Company Biomedical Publishers, Austin, USA. ([redacted]

Editorial Board, Academic Journals, New York, USA ([redacted]

Editorial Board, Chinese Journal of Virology ([redacted]

Editorial Board, Zoonoses and Public Health ([redacted]

Editorial Board, Frontiers in Virology ([redacted]

Editorial Board, Journal of Bioterrorism and Biodefense ([redacted]

Editor-in-Chief, Virology Journal ([redacted]

WHO SARS Scientific Research Advisory Committee ([redacted]

WHO SARS Animal Reservoir Working Group ([redacted]

WHO SARS Laboratory Diagnosis Working Group ([redacted]

NH&MRC Grant Review Panel ([redacted]

NH&MRC Grant Review Panel ([redacted]

ARC Future Fellowship Selection Advisory Committee (Medical and Health) ([redacted]

Member of Biotechnology Advisory Board, Deakin University ([redacted]

Chair, Scientific Advisory Board, Centre for Emerging Infectious Diseases, Wuhan Institute of Virology, Chinese Academy of Sciences ([redacted]

Member of International Scientific Advisory Board, Harbin Veterinary Research Institute, Chinese Academy of Agricultural Sciences ([redacted]

Chair, Study Group of Paramyxoviridae, International Committee on Virus Taxonomy [redacted]

Member, Study Group of Paramyxoviridae, International Committee on Virus Taxonomy ([redacted]

Board of Directors, Singapore Eye Research Institute ([redacted]

Executive Committee, Australasian Society of Virology ([redacted])

WHO International Health Regulations Roster of Experts on Zoonoses ([redacted]

Advisory Board of Investigative Medicine Unit, SingHealth ([redacted]

World Economic Forum Global Health Security Advisory Board ([redacted]

AWARDS AND FELLOWSHIPS

Winner of Eureka Prize for Infectious Disease Research, [redacted]

Finalist, Prime Minister Award for Science, Australia [redacted]

Finalist, President Science Award, Singapore [redacted]

ASM Bazeley Orator, Melbourne [redacted]

CSIRO Chairman's Medal, [redacted]

Finalist, Eureka Prize for Infectious Disease Research, [redacted]

Gardner Lecturer, European Society for Clinical Virology, [redacted]

Elected Fellow of the Australian Academy of Technological Sciences and Engineering, [redacted]

CSIRO OCE Science Leader, [redacted]

CSIRO Service from Science Award, [redacted] (Equine Influenza Team)

Finalist, Eureka Prize for Scientific Research, [redacted]

CSIRO Award for Excellence in Partnership, [redacted] (SARS Team)

CSIRO CLI Award for Excellence in Partnership, [redacted]

Finalist, Australian Chinese Achiever's Award (Science & Engineering), [redacted]

Nominee and participant of the CEO's Workshop for CSIRO Outstanding Young Staff, [redacted]

Research Award for Outstanding Young University Teachers, The Huo-Ying-Dong Education Fundation, 1[redacted].

Research Award for Outstanding Young Scientist, The National Science Foundation of China, [redacted]

Michael Swackhamer Fellowship, Department of Biochemistry, University of California, Davis, [redacted]

UCD Graduate Research Award, University of California, Davis, [redacted]

Earle C. Anthony Fellowship, University of California, Davis, [redacted]

Jastro-Shields Graduate Research Scholarship, University of California, Davis, [redacted]

Peter J. Shields Fellowship, University of California, Davis, [redacted]

Chinese Government Graduate Scholarship, The Ministry of Education, The People's Republic of China, [redacted]

Outstanding Undergraduate Award, East China Normal University, [redacted]

PROFFESIONAL MEMBERSHIPS

Australian Society for Biochemistry and Molecular Biology

Australian Society for Microbiology

Australasian Society for Virology

American Society for Microbiology

PUBLICATION

Refereed Journal Papers

1. Zhang Q, Zeng LP, Zhou P, Irving AT, Li S, Shi ZL, **Wang L-F.** (2017) IFNAR2-dependent gene expression profile induced by IFN-α in Pteropus alecto bat cells and impact of IFNAR2 knockout on virus infection. **PLoS One 12**:e0182866.
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DUKE UNIVERSITY MEDICAL CENTER

CURRICULUM VITAE

for
Permanent Record
and the
Appointments and Promotions Committee

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Publications:

Refereed journals:

1. **Woods CW**, McRill C, Plikaytis B, Rosenstein N, Mosley D, Boyd D, Perkins BA, England R, Ampel NM, Hajjeh R. Coccidioidomycosis in Arizona's HIV-infected Population: Incidence, Risk Factors and Prevention. *Journal of Infectious Diseases* 2000; 181: 1428-1434.
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78. Naggie S, **Woods CW**. Community-acquired *Clostridium difficile* Associated Disease (CA-CDAD) in North Carolina: No role for Proton Pump Inhibitors (PPIs). ICAAC/IDSA 2008.
79. **Woods CW**, Zaas A, Lucas J, Varkey J, Veldman T, Hero AO, Huang Y, Turner R, Gilbert A, Lambkin Williams R, Chen M, Oien NC, Nicholson B, Dobos S, Breitschwerdt K, Jones D, Kingsmore SF, Carin L, Ginsberg GS. Presymptomatic Prediction of Influenza Using a Human Viral Challenge Model. ICAAC San Francisco, October, 2009.
80. Hendershot EF, Cunningham CK, Sangvai DG, **Woods CW,** Tsalik EL, Cunningham HM, Purdy WK, Thompson J, Lopez-Marti MG, Caram LB. Large Outbreak of Pandemic Influenza H1N1 2009 in a University-Based Summer Camp. ICAAC San Francisco, October, 2009.
81. Peterson LR, **Woods CW**, Allen S, Pombo D, Onderdonk A. Multicenter Performance of Two Real-Time PCR (qPCR) Tests for Methicillin-resistant Staphylococcus aureus (MRSA) Compared to Microbiological Culture. ICAAC San Francisco, October, 2009.
82. Reller ME, Bodinayake C, Nagahawatte A, Devasiri V, Kodikara-Arachichi W, Clemons E, **Woods CW,** Dumler JS. Unsuspected Rickettsial Disease in Sri Lanka. IDSA Philadelphia, October, 2009 (#577).
83. Reller ME, Bodinayake C, Nagahawatte A, Devasiri V, Kodikara-Arachichi W, Broadwater A, Strouse JJ, **Woods CW**, De Silva A. Dengue among Patients with Undifferentiated Fever in Sri Lanka. American Society of Tropical Medicine and Hygiene. Washington, DC. November, 2009 (#48).
84. Bagga B, **Woods CW**, Veldman TH, Gilbert A, Lambkin-Williams R, DeVincenzo JP. Comparing Flu and RSV Viral and Disease Dynamics in Experimentally Infected Adults Predicts Clinical Effectiveness of RSV Antivirals", abstract #752688, accepted to the 2010 Pediatric Academic Societies' Annual Meeting, May 1-4, 2010, Vancouver, BC, Canada.
85. Holt SL, Drew RH, Fowler VG, Woods CW, **Tsalik EL**, Freeman DH, Tseng T, May DB, Johnson MD. Predictors of Outcome in Emergency Department (ED) Patients Presenting with Documented/Suspected Sepsis. ICAAC Annual Conference, Abstract 2625, 2010.
86. McClain MT, **Woods CW**, Chen M, Zaas AK, Nicholson B, Varkey J, Veldman T, Kingsmore SF, Huang Y, Lambkin-Williams R, Gilbert AG, Hero A, Ramsburg E, Glickman S, Lucas J, Carin L, Ginsburg GS. A host

transcriptome signature arises in the pre-symptomatic period soon after Influenza exposure and accurately detects pandemic H1N1 infection. IDSA National Meeting 2011.

87. McClain MT, Park L, Zaas AK, Nicholson B, Veldman T, Lambkin-Williams R, Gilbert AG, Ginsburg GS, **Woods CW**. Longitudinal analysis of leukocyte differentials in peripheral blood of patients with acute Influenza infection. IDSA National Meeting 2012.
88. Yan Q, Ahn SH, Sharma-Kuinkel BK, Tsalik EL, Cyr DD, Lucas J, **Woods CW**, Scott WK, Rude TH, Fowler VG. *Dusp3* and *Psme3* Are Associated with Susceptibility to *Staphylococcus aureus* Infection in Mice and Human. ICAAC Annual Conference, Abstract LB-2680, 2013.
89. Langley RJ, Tsalik EL, Mohney RP, Harrod KS, Cairns CB, Rivers E, **Woods CW**, Kingsmore SF. Integrative Analysis Of The Metabolome, Proteome, And Transcriptome In Systemic Inflammatory Response Syndrome. ATS International Conference, Abstract A2195, 2014.
90. Dinwiddie DL, Tsalik EL, van Velkinburgh JC, **Woods CW,** Miller NA, Kingsmore SF, Langley RA. Transcriptional Analysis of Sepsis Patients Reveals Differential Expression Patterns. 64th Annual Meeting of the American Society of Human Genetics, Abstract 1076M, 2014.
91. Bodinayake, CK, Tillekeratne, LG, Nagahawatte, A, Devasiri, V, Kodikara Arachchi, W, Vidanagama, D, Ostbye, T, Gubler, DJ, **Woods, CW**, Reller, ME. Accuracy of Clinical Diagnosis of Dengue Fever in Southern Sri Lanka, 2012- 2013. 24th European Congress of Clinical Microbiology and Infectious Diseases, May 2014.
92. Bodinayake, CK, Tillekeratne, LG, Nagahawatte, A, Devasiri, V, Kodikara Arachchi, W, Kurukulasooriya, R, De Silva, D, Ostbye, T, Gubler, DJ, **Woods, CW**, Reller, ME. Patient Costs Associated with Healthcare Utilization and Decreased Productivity Due to Undifferentiated Acute Febrile Illness in Southern Sri Lanka. 2nd International Conference on Global Public Health, July 2014.
93. Tillekeratne, LG, Bodinayake, CK, Nagahawatte, A, Vidanagama, D, Devasiri, V, Kodikara Arachchi, W, Kurukulasooriya, R, De Silva, D, Ostbye, T, Reller, ME, **Woods, CW**. High Rate of Antibiotic Prescriptions for Outpatients with Influenza-Like Illness in Southern Sri Lanka. ID Week, October 2014.
94. Uehara A, **Woods CW**, Gubler DJ, Sessions OM, Tillekeratne LG, Reller ME, Bodinayake C, Nagahawatte A, De Silva D. Molecular and Epidemiologic Assessment of Dengue Fever in Southern Sri Lanka in 2012. American Society of Tropical Medicine and Hygiene, Nov 2014.
95. Yan Q, Ahn SH, Sharma-Kuinkel BK, Tsalik EL, Cyr DD, **Woods CW**, Thaden JT, Messina JA, Qi R, Hu M, Ruffin F, Hecker E, Fowler VG. Crif1 Is Associated with Susceptibility to *Staphylococcus aureus* Infection through Regulating Host Cell Apoptosis. IDWeek, Oral Presentation 51154, 2015.
96. Yang WE, Suchindran S, Nicholson BP, McClain MT, Burke T, Ginsburg GS, Harro CD, Chakraborty S, Sack DA, **Woods CW**, Tsalik EL. Transcriptomic Analysis of the Host Response to Enterotoxigenic *E. coli* Infection in Humans. ID Week, Poster 51040, 2015.
97. Tillekeratne LG, Bodinayake CK, Nagahawatte A, Vidanagama D, Devasiri V, Kodikara Arachchi W, Kurukulasooriya R, De Silva D, Ostbye T, Reller ME, **Woods CW**. Use of Rapid Influenza Testing to Reduce Antibiotic Use Among Outpatients with Influenza-Like Illness, Southern Sri Lanka, 2013- 2014. 25th European Congress of Clinical Microbiology and Infectious Diseases, April 2015.
98. Tillekeratne LG, Vidanagama D, Tippalagama R, Lewkebandara R, Joyce M, Nicholson B, Nagahawatte A, Bodinayake C, De Silva D, **Woods CW**. High prevalence of community-acquired urinary tract infections due to extended-spectrum ß–lactamase- producing Enterobacteriaceae in southern Sri Lanka. American Society for Microbiology, May 2015.
99. McClain MT, Suchindran S, Schmader K, Ginsburg GS, and **Woods CW**. Genomic signatures for detection of upper respiratory viral infections. Veterans Affairs Health System Career Development Award Workshop. Washington, DC. 2015.
100. McClain MT, **Woods CW**, Tsalik EL, Ginsburg GS, Nicholson BP, Burke T, Hudson L, Veldman T, Better OM, Dobos S, Suchindran S, Nichols M, Valente A, Park L, Henao R. Host Transcriptomic Signatures for Early Diagnosis of Acute Respiratory Viral Infection in a University-based Index-Cluster Cohort. IDWeek, New Orleans, Oral Presentation, Abstract 60202, 2016.
101. Yang WE, Suchindran S, Nicholson BP, McClain MT, Burke T, Ginsburg GS, Harro CD, Chakraborty S, Sack DA, **Woods CW**, Tsalik EL. Human ETEC Challenge: Differences in the Symptomatic and

Asymptomatic Host Response. Vaccines Against *Shigella* and ETEC (VASE) Conference, Washington DC, Oral Presentation, 2016.

102. Yang WE, Suchindran S, Nicholson BP, McClain MT, Burke T, Ginsburg GS, Harro CD, Chakraborty S, Sack DA, **Woods CW,** Tsalik EL. Transcriptomic analysis of the host response to Enterotoxigenic *E. coli* infection. 50th US-Japan Cooperative Medical Sciences Program Conference on Emerging Infectious Diseases & Cholera and Other Bacterial Enteric Infections, Rockville, MD, Oral Presentation, 2016.

103. Chao CC, Zhang Z, Belinskaya T, **Woods CW**, Nicholson BP, Tillekeratne LG, Sessions OM, Hsiang J, Lewis M, Reller M, Bodinayake CK, Nagahawatte A, Devasiri V, Kodikara-Arachichi W, De Silva AD, Kurukulasooriya R, Ostbye T, Gubler DJ, and Ching W-M. Scrub typhus as a major cause of illness for patients with unknown fever origin in Galle, Sri Lanka. American Society of Tropical Medicine and Hygiene, November 2016.

104. Ching W-M, Chao CC, Zhang Z, Belinskaya T, Chen H-W, **Woods CW**, Nicholson BP, **Tilekeratne LG**, Sessions OM, Hsiang J, Lewis M, Reller M, Bodinayake CK, Nagahawatte A, Devasiri V, Kodikara-Arachichi W, De Silva AD, Kurukulasooriya R, Ostbye T, Gubler DJ. Leptospirosis is one of the major diseases for patients with unknown fever origin in Galle, Sri Lanka. American Society of Tropical Medicine and Hygiene, November 2016.

105. Montgomery JL, Nawrocki J, Deneris M, Jones J, Crisp RJ, Aydin M, Better OM, Henao R, Burke T, Tsalik EL, Ginsburg GS, **Woods CW**, Hemmert AC. Rapid Discrimination of Viral and Bacterial Infections by Host Transcriptomic Analysis Using the FilmArray® System. ASM-Microbe, New Orleans, Oral Presentation, Abstract 3472, 2017.

Consultant appointments

Consultant-World Health Organization, 1999 "Encephalitis in the Maldives"
Consultant-Centers for Disease Control and Prevention, 2001 "Deliberate Release of *Bacillus anthracis*"
Consultant-Microbiological Risk Assessment for Boston University BSL-4, TetraTech, 2009

Advisory Boards

Gates Foundation, Neonatal Sepsis Diagnostics, October 2008
PhenX: Infectious Diseases and Autoimmunity Working Group, NIAID/RTI, 2010
Gates Foundation, Biomarkers for Childhood Respiratory Infections in LMIC, 2014

Industry Advisory Boards

Becton Dickinson
bioMerieux
Cubist Pharmaceuticals
Emergo Therapeutics
Nanosphere
Roche Molecular Sciences
Theravance Pharmaceuticals

Grant Review Boards

Southeastern Center for Emerging Biological Threats (SECEBT), 2008-2013
Genome Canada, 2009
Gates Foundation, Pneumonia Etiology Research for Child Health (PERCH), 2009
Military Infectious Diseases Research Program (MIDRP), 2013
NIH/USAID Partnerships for Enhanced Engagement in Research (PEER) Health, 2013
NIH/USAID Partnerships for Enhanced Engagement in Research (PEER) Health, 2016
NIH/USAID Partnerships for Enhanced Engagement in Research (PEER) Health, 2017
NIH/NIAID Omnibus Broad Agency Announcement: Advanced Development of Vaccine Candidates for Biodefense and Emerging Infectious Diseases-Viruses, 2017

Editorial Board Activities

Infectious Disease News, 2013-Present

Journal and Manuscript Reviewer

Emerging Infectious Diseases, 2000-Present
Clinical Infectious Diseases, 2001-Present
Journal of Infectious Diseases, 2003-2005
The Lancet, 2001-Present
Journal of the American Medical Association, 2006-Present
American Journal of Tropical Medicine and Hygiene, 2002-Present
Transactions in Tropical Medicine and Hygiene, 2005-Present
Journal of Clinical Microbiology, 2005-Present
Vectorborne and Zoonotic Diseases, 2006-Present
MMWR Special Sections, 2003-2005
PLoS Neglected Tropical Diseases, 2010-Present
PLoS One, 2010-Present
Journal of Clinical Investigation, 2014-Present

Professional awards and special recognitions:

[redacted] Yale University, Edward Gordon Cup: Character and Leadership in the Finest Traditions of Yale
[redacted] Duke University Medical School, Daniel Griffith Graduate School Community Service Award
[redacted], Eugene A. Stead Research Scholarship, Duke University Medical Center
[redacted], Engel Honor Society, Moderator
[redacted], Stead-McDaniel Research Scholarship, Duke University Medical Center
[redacted] Ciba-Geigy Community Service Award
[redacted] AMA/Glaxo Wellcome Community Service Award
[redacted] Duke University Medical School, Excellence in Teaching Award
[redacted] Assistant Chief Resident, Duke University Medical Center
[redacted] AMA/Glaxo Wellcome Achievement Award
[redacted] National Centers for Infectious Diseases Outstanding Service Award
[redacted] National Centers for Infectious Diseases Outstanding Service Award
[redacted] Public Health Service Outstanding Unit Citation
[redacted] Public Health Service Foreign Duty Award
[redacted] Public Health Service Achievement Award
[redacted] Langmuir Prize nominee, Centers for Disease Control and Prevention
[redacted] Health Services Research Fellowship
[redacted] American Society for Tropical Medicine and Hygiene Young Investigator Award Nominee
[redacted] Davidson Council, Duke University Medical School Student Mentorship Award
[redacted] Golden Apple Teaching Award Nominee
[redacted] Duke, Department of Medicine, VA General Medicine Teaching Award
[redacted] Alpha Omega Alpha Medical Honor Society
[redacted] Fellow, Infectious Diseases Society of America
[redacted] Best Duke Medicine Grand Rounds Presentation, Nominee
[redacted] Joseph C. Greenfield, Jr. Research Mentorship Award, Duke Department of Medicine
[redacted] Duke, Department of Medicine, VA General Medicine Teaching Award
[redacted] Fellow, American Society of Tropical Medicine and Hygiene
[redacted] NIH/BARDA Antimicrobial Resistance Diagnostic Challenge Team, First phase winner

Organizations and Professional Participation:

Infectious Diseases Society of America, Fellow
International Society for Disease Surveillance, Research Advisory Board
American Society of Tropical Medicine and Hygiene
American Society of Microbiology

American Medical Association
American College of Physicians
American Public Health Association
Physicians for Social Responsibility
North Carolina Medical Association
North Carolina Infectious Diseases Society

Local, State, National Service
[redacted] Inactive Reserve, Lt. Commander, Public Health Service
[redacted] Duke Representative, Southeastern Center for Emerging Biological Threats
[redacted], SECEBT /SERCEB Preparedness Program Leader:
"Vectorborne Diseases in the Southeastern US",[redacted]
"Foodborne Toxoplasmosis Outbreak Detected on College Campuses", [redacted]
"Academic Consortia: Untapped Resources for Preparedness, Response, and Recovery – Examining the Cholera Outbreak in Haiti", [redacted]
"Defining the One Health Research and Education Agenda", [redacted]
"Emerging Vectorborne Diseases of the Southeastern US, [redacted]
[redacted] Present, North Carolina State Health Department, Infection Control Advisory Committee
[redacted], ASM International Laboratory Capacity Development Committee (LABCAP)
[redacted], IDSA, National and Global Public Health Committee
[redacted], ASTMH, Global Health Committee
2013- Present, ASTMH, Program Committee
2017- Present, Agnes Scott College, Advisory Council on Global Health

Teaching responsibilities including continuing education:

[redacted] Medical Student Physical Diagnosis Course, Department of Medicine, medical student lectures,
Medical Microbiology for Infectious Diseases Fellows, Curriculum Development
Program Faculty, [redacted]

[redacted] ecture presentations (6 annually),
Body and Disease-Tickborne diseases
Body and Disease-Zoonoses
Body and Disease-Bloodborne Parasites
Body and Disease-Streptoccoci I
Body and Disease-Streptococci II

[redacted] edical Microbiology for Pathology Residents Lecture Series
Laboratory Diagnosis of Viral Infections
An Update on Antimicrobial Susceptibility Testing in the Clinical Laboratory
Gram Positive
Gram Negative
Clinical Mycology
Clinical Pathology and Public Health
Real-time PCR

[redacted] nfections and Inequality
The Global Ecological Deficit: Who is Responsible? Who will Suffer? March 18, 2003

[redacted] HPAA Critical Issues in Global Health
Globalization and Infectious Diseases

[redacted] pidemiology 213, Acute Disease Surveillance and Outbreak Investigation, 3 Credit Course

[redacted] Disaster Certificate Course
Module #2 Acute Disease Surveillance and Outbreak Investigation.
Unit 1-Historical Review and Establishing a Surveillance System
Unit 2-Using and Presenting Surveillance Data
Unit 3-Evaluation of a Surveillance System
Unit 4-The Future of Surveillance: Integrated, Automated, Syndrome-based
Unit 5-Outbreak Investigation

[redacted]
Critical Global Health Issues: Focus on Infectious Diseases
[redacted]
Public Health Emergencies: Emerging Infections and Agents of Bioterrorism
Acute Disease Surveillance and Outbreak Investigation
[redacted]
One Health, from Principles to Practice (2 or 3 credit course)
Instructed in collaboration with Faculty from [redacted]

Mentoring

Role	Trainee	Training Period	Institution, Date and Type of Degree Awarded or Funding	Title of Research Project	Current Position or Source of Support[2]
Past Trainees					
Primary	[redacted] Adam	[redacted]	Resident	Virulence Associated with Outbreak-Related Strains of *Burkholderia cepacia* Complex among a Cohort of Patients with Bacteremia	Private Practice, Atlanta GA
Primary	[redacted] James	[redacted]	Resident	Diagnosis of HSV Encephalitis	Associate Professor, Pediatric Emergency Medicine, Duke University
Primary	[redacted] Richard (pre-doc)	[redacted]	UNC-CH, 2003, MPH Duke MD, 2004	Meningococcal Clusters in the United States	Epidemic Intelligence Service Officer, CDC Atlanta, Ga
Primary	[redacted]rpek, Matthew (pre-doc)	[redacted]	UNC-CH, 2003, MPH Duke MD, 2005	Automated Surgical Site Infection Surveillance	Assistant Professor, Internal Medicine, University of Chicago
Primary	[redacted] Lauren B	[redacted]	Internal Medicine Resident	Surveillance for WNV in the Emergency Department	Former Assistant Professor, Duke University Medical Center and DVAMC, Medical Leave
Primary	[redacted] Brian	[redacted]	Infectious Diseases and Microbiology Fellow	Improved Methods of diagnosing bacteremia	Private Practice, Honolulu, HI

Primary	Caram, Lauren B	2006-2008	ASP-IDSA/Hartford Foundation/ Atlantic Philanthropies Young Investigator Award in Geriatrics IDSA Infectious Diseases Fellow	Prospective Respiratory Surveillance in the Elderly	Former Assistant Professor, Duke University Medical Center and DVAMC; Medical Leave
Primary	Krishnarao, Anita	2005-2007	Undergraduate	Strain Susceptibility of Community-acquired *C. difficile*	Gastroenterology Fellow, Lahey Medical Center, Boston
Secondary	Federspiel, Jerome	2005-2007	Undergraduate	Predictors of Mortality in Coagulase Negative Staphylococcal Native Valve Endocarditis	Assistant Professor, OB-Gyn UNC
Primary	Naggie, Susanna	2005-2007	Chief Resident	Community-acquired *C. difficile*	Associate Professor, Duke University Medical Center and DVAMC
Secondary	Hanson, Kimberly	2005-2006	Infectious Diseases Fellow, MHS	Diagnosis for Herpes virus infections	Professor, Medicine and Pathology, University of Utah
Primary	Rao, Supriya	2006-2008	Medical Student	Automated Influenza-like illness surveillance	Gastroenterology/Internal Medicine, UPenn, Philadelphia
Secondary	Hamilton, Carol D	2006-2007	MHS	Tuberculosis in HIV-infected Tanzanians	Director of Research, FHI-360
Primary	Varkey, Jay	2007-2009	ID Fellow, MSCRP	Pre-symptomatic diagnosis of Respiratory Viral Infections	Associate Professor, Infectious Diseases, Emory University
Secondary	McClain, Micah	2007-2009	ID Fellow, MSCRP	Immunological Response to VEE vaccine	Associate Professor, Duke University Medical Center and DVAMC
Primary	Tsalik, Ephraim	2009-2011	MD, PhD ID Fellow	Improved diagnostics for infectious diseases	Associate Professor of Medicine, MGM, Duke University
Secondary	McClain, Micah	2010-2013	K-08, NIAID, NIH	Immunological Response to VEE vaccine	Associate Professor, Medicine, Duke Universiy and DVAMC
Primary	McClain, Micah	2012-2015	CDA/VA	Respiratory Viral Host Response in the Elderly	Associate Professor, Medicine, Duke University and DVAMC
Primary	Ferguson, Brandy	2006-2008	Medical Student	Bartonella bacteremia in Veterinarians	Assistant Professor, Emergency Medicine, NYU
Primary	Munoz, Beau	2007-2009	Medical Student	Febrile illness in Nicaragua	Surgical Residency, US Navy
Primary	Lyons, Jeremy	2007-2009	Medical Student	Febrile illness in Nicaragua	Orthopedics Residency, San Diego
Secondary	Kirchner, Amy	2007-2010	UNC-CH, DPh	Use of Early Biological Detection Data to Minimize the Consequences of No-notice Infectious Disease Outbreaks	DOD, GEIS
Primary	Gong, Winston	2009-2012	MSc-GH	Geospatial mapping of etiologies of febrile disease in Sri Lanka	Doctoral Student; Epidemiology Johns Hopkins School of Public Health, Baltimore, MD

Primary	[redacted] Ufuoma	[redacted]	MSc-GH	Chikungunya as an etiology of febrile disease in Southern Sri Lanka	Pediatric Resident, Vanderbilt University Medical Center, Nashville, TN
Primary	[redacted] Reeshi	[redacted]	MSc-GH	Etiology of Pediatric Fever in Western Kenya: A Case-Control Study of Falciparum Malaria, Respiratory Viruses, and Streptococcal Pharyngitis	Physician Assistant Student
Primary	[redacted] Megan	[redacted]	T-32, Johns Hopkins Medical Microbiology Fellow	Etiology of Febrile Illness in Low and Middle Income Countries	Associate Professor, Medicine, Duke University, Durham, NC
Secondary	[redacted] Megan	[redacted]	K-23, NIAID, NIH	Multimodal Predictive Models of Febrile Illness in Low and Middle Income Countries	Associate Professor, Medicine, Duke University, Durham, NC
Primary	[redacted] Jason	[redacted]	Medical Student MD 2014	Non-human primate models of S. *pneumoniae*	Research Specialist, Premier Research Durham, NC
Primary	[redacted] Paul	[redacted]	Internal Medicine Faculty KL-2	Geospatial modeling of vectorborne infectious diseases	Assistant Professor, Medicine Duke University, Durham, NC
Primary	[redacted] Ephraim	[redacted]	CDA/VA	Genomic Signatures for Healthcare Associated Infections	Assistant Professor, Medicine, Duke and DVAMC
Primary	[redacted] Gayani	[redacted]	Global Health Fellow; Fogarty Fellow MSc-GH	Epidemiology of acute respiratory tract infections in Sri Lanka	Assistant Professor, Medicine Duke University
Primary	[redacted] Anna	[redacted]	MSc-GH	Molecular and Epidemiologic Assessment of Dengue Fever in Southern Sri Lanka in 2012	PhD Candidate, Emerging Infections Program Duke-NUS
Secondary	[redacted] Steve	[redacted]	K-08	Malaria chemoprevention in children with sickle cell anemia in Western Kenya	Assistant Professor of Medicine and Global Health, Duke University
Primary	[redacted] Chelsea	[redacted]	MSc-GH	Interspecies Transmission of Respiratory Viruses at Lola ya Bonobo, DRC	World Health Organization
Secondary	[redacted] Jelena	[redacted]	MHS Infectious Diseases Fellow	Antifungal MIC and outcomes in invasive aspergillosis	Assistant Professor, University of South Florida Orlando VAMC, Orlando Fla.
Primary	[redacted] JB	[redacted]	Infectious Diseases Fellow	Transmission of Community-Acquired CDAD within Hospital	Private Practice, Chicago, Ill
Primary	[redacted] David	[redacted]	Pediatric Fellow, T-32	Burden and Seasonality of Viral Acute Respiratory Tract Infections among Outpatients in Southern Sri Lanka.	Private Practice, Pensacola, Fla

Primary	[redacted] Gayani	[redacted]	DOM/HYC Bridge Funding	Antibiotic overuse for acute respiratory tract infections in Sri Lanka	Assistant Professor of Medicine and Global Health, Duke University
Secondary	[redacted] Ashley	[redacted]	MD, PhD	Deep Sequencing of Influenza A Virus from a Human Challenge Study Reveals a Selective Bottleneck and Only Limited Intrahost Genetic Diversification.	Completing MD, Duke University
Current Trainees					
Secondary	[redacted] Anna	[redacted]	PhD Candidate	A multiplatform approach to emerging infectious diseases investigation	Duke-NUS; Emerging Infectious Diseases Program
Secondary	[redacted] Sky	[redacted]	MD, MPH	Severe Acute Respiratory Infections (SARI) in Sri Lanka	Global Health Fellow Internal Medicine, Duke University
Primary	[redacted] Chris	[redacted]	MD, MPH	Antimicrobial Stewardship in the VA Health System	Medical Instructor, Medicine, Duke University Durham VAMC
Primary	[redacted] Gayani	[redacted]	K-23	Novel Diagnostics to Improve Antimicrobial Stewardship for Acute Respiratory Tract Infections in Resource-Limited Settings	Assistant Professor of Medicine and Global Health, Duke University
Secondary	[redacted] Annie	[redacted]	DVM/PhD Candidate	Antimicrobial Resistance among Campylobacter coli and potential for interspecies transmission	NC State School of Veterinary Medicine Raleigh, NC
Primary	[redacted] Megan	[redacted]	High School Senior	Procalcitonin and Ventilator Associated Pneumonia	NC School of Science and Math Durham, NC

Invited Presentations:

1. June 30, 2017: June 2, 2017: Presidential Address. Harnessing the Host Response for Real Time Clinical Decision Making in Infectious Diseases. ASM Microbe. New Orleans, Louisiana

2. May 24, 2017: Harnessing the Host Response for Real Time Clinical Decision Making in Infectious Diseases. Precision Medicine World Conference. Durham, NC

3. May 22, 2017: Emerging Antimicrobial Resistance: The Role of Industrial Agriculture. One Health Certificate Program. Durham, NC.

4. March 28, 2017: Duke Applied Genomic and Precision Health: Opportunities for a Global Alliance. Duke-NUS Precision Medicine Symposium. Singapore

5. March 6, 2017: Bartonellosis: A Paradigm for the One Health Approach to Emerging Infectious Diseases. Western Veterinary Conference. Las Vegas, NV

6. June 28, 2016: Keynote Address. "Host Response Diagnostics for Infectious Diseases of Global Health Importance", 6th International Conference on the Development of Biomedical Engineering. Ho Chi Minh City, Vietnam

7. June 15, 2016: Human:Bonobo Zoonotic Pathogen Transmission in the Democratic Republic of Congo", 5th International Symposium on One Health Research. Ulaan Baater, Mongolia

8. June 8, 2016: Moderator "Biodefense Challenge to the Warfighter", Medical, Biomedical and Biodefense: Support to the Warfighter Symposium. Durham, NC

9. March 31, 2016: "The Long and Winding Road: Developing Host Response Classifiers for Bacterial and Viral Disease of Global Health Importance", Dengue and Emerging Infectious Diseases Symposium. Singapore.

10. October 8, 2015: "The Biothreat Situation Room: Driving a Revolution in Diagnostics", ID WEEK, San Diego, California.

11. June 6, 2015: "Update on Novel Diagnostics for Infective Endocarditis", 13th Meeting, International Society of Cardiovascular Infectious Diseases. Rio De Janeiro, Brazil.

12. April 24, 2015: "The Near Patient Diagnostic Revolution: Clinical Drivers on a Bumpy Road", 30th Annual Clinical Virology Symposium, Daytona Beach, Fla.

13. May 1, 2015: "Ebola Outbreak 2013-2015: From West Africa to Duke and Back", Duke University, Dept of Medicine Grand Rounds, Durham, NC.

14. November 22, 2014: "Emerging Antimicrobial Resistance: The Role of Industrial Agriculture", 1st Annual China One Health Symposium, Guangzhou, China.

15. November 14, 2014: "The Host Response to Infectious Diseases: A Paradigm for Developing Novel Biomarkers of Health and Disease", Association of Molecular Pathology Annual Meeting, Washington, DC.

16. September 29, 2014: "Host Response Genomics to Distinguish Viral from Bacterial Respiratory Infection", Bill and Melinda Gates Foundation, Advisory Meeting on Biomarkers for Pediatric Community Acquired Pneumonia in Africa, Seattle, WA.

17. February 13, 2014: "University Engagement in Global Health...Security: The Duke Experience", 180th American Association for the Advancement of Science Annual Meeting, Chicago, Ill.

18. January 25, 2014: "A One Health Approach to Emerging Infectious Diseases", Sino-African One Health Meeting, Kinshasa, DRC.

19. November 13, 2013: "Global Health Education: The Duke Experience", American Society of Tropical Medicine and Hygiene Annual Meeting, Philadelphia, PA.

20. October 26, 2013: "Global Health Education: The Duke Experience", Asia-Pacific Academic Consortium on Global Health", Wuhan, China.

21. November 10, 2013: "Developing 'omic Signatures for Early Detection of Infectious Diseases: Applications for Global Health", Duke Global Health Institute, Lunch and Learn, Durham, NC.

22. April 22, 2013: "A Program for Developing 'Omic Biomarkers for Early Detection of Infectious Diseases", Duke: Duke NUS Emerging Infectious Diseases Symposium, Durham, NC.

23. September 11, 2012: "Developing Genomic Biomarkers of Health and Disease: Respiratory Viral Infections", Wellcome-Trust, Advisory Meeting on Respiratory Syncytial Virus, London, UK.

24. June 29, 2012: "The Host Response to Infectious Diseases: A Paradigm for Developing Biomarkers of Health and Disease", UNC-CH, Division of Infectious Diseases Grand Rounds, Chapel Hill, NC.

25. March 17, 2012: "Bartonellosis: A Paradigm of the One Health Approach to Emerging Infectious Diseases", Duke University, Dept of Medicine Grand Rounds, Durham, NC.

26. November 13, 2011: "Update on Respiratory Viral Diagnostics", Gilead Pharmaceuticals. San Francisco, CA.

27. November 12, 2011: "Genomes and Medicine: Community Acquired Respiratory Infections", Genome Forum, Durham, NC.

28. November 02, 2011: "The Host Response to Infectious Diseases: A Paradigm for Developing Biomarkers for Health and Disease", Duke: Duke-NUS Emerging Infectious Diseases Symposium, Singapore.

29. August 4, 2011: "Cohort studies for validation and discovery of biomarker signatures of infection", Novartis Infectious Disease Biomarker Symposium, San Francisco, CA.

30. September 17, 2009: "Financing Healthcare: Who Does the Rationing?", bioMerieux Foundation, Durham, NC

31. April 24, 2009. "Surrogate Markers for Sepsis". 3rd European Conference on Bloodstream Infections, Sorrento, Italy.

32. September 20, 2008: "Demystifying DNAemia", European Society of Intensive Care Medicine. Lisbon, Portugal.

33. June 10, 2008: "Tickborne Disease", Wake County Medical Grand Rounds, Raleigh, NC.

34. June 8, 2008: "Acute Infectious Disease Diagnostics: An Update", Infectious Diseases Grand Rounds. Duke University. Durham, NC.

35. May 20, 2008: Vectorborne Diseases of the Southeastern United States. Neurology Grand Rounds. Duke University. Durham, NC.

36. April 20, 2008: "On the Road to "omic"-based Diagnosis, Risk Stratification, and Therapy". Asia:Pacific Institute, University of Hawaii, Honolulu, HI.

37. March 11, 2008: "Healthcare Associated Infections: Old Bugs with New Tricks", Roche Diagnostic, Pleasonton, CA.

38. February 13, 2008: "Profiling Infectious Diseases. Institute of Genome Science and Policy. Duke University, Durham, NC.

39. November 16, 2007: "Emerging Infections: In our Community?" Roche Molecular Sciences. Pleasanton, CA.

40. October 1, 2007: "Community-Acquired Emerging Infections", North Carolina Infectious Diseases Society, Raleigh, NC.

41. June 18, 2007: "Effect of Changing Susceptibility in Streptococci and Enterococci on Treatment and Outcomes of Infective Endocarditis". International Society of Cardiovascular Infectious Diseases. Heidelberg, Germany.

42. June 14, 2007: Increasing Resistance in Enterococci and Streptococci in Infective Endocarditis. International Society of Cardiovascular Infectious Diseases. Heidelberg, Germany.

43. March 30, 2007: Curbing MRSA: Impact of the Increasing MRSA Threat on Treatment Outcomes in Bacteremia and Endocarditis. Miami, Fla.

44. November 13, 2006: "Emerging *Clostridium difficile*-associated Disease in the Community, North Carolina, 2005. Duke University, Department of Medicine Grand Rounds, Durham, NC.

45. October 28, 2006: *Staphylococcus aureus* bacteremia and Endocarditis: Managing recurrent infections. Infectious Diseases Society of America. Toronto, Quebec.

46. Dec 18, 2005: Clinical Challenges of *Staphylococcus aureus* Bacteremia and Endocarditis. National Foundation of Infectious Diseases. Washington, DC.

47. December 17, 2005: Infective Endocarditis: A Disease in Epidemiological Transition. 45th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, DC.

48. November 15, 2005: Emerging Infections and Agents of Bioterrorism. Worldview Conference. Chapel Hill, NC.

49. October 18 2005: Emerging *Clostridium difficile* Associated Disease in the Community, Infectious Diseases Society of North Carolina, Raleigh, NC.

50. May 22, 2005: Viridans group streptococci: New classification, different pathogenicity and susceptibility profiles. 8th International Symposium on Modern Concepts in Endocarditis and Cardiovascular Infections. Charleston, SC.

51. November 20, 2004: Infective Endocarditis: A Disease in Epidemiological Transition. Rollins School of Public Health, Emory University, Grand Rounds. Atlanta, Ga.

52. October 6, 2004: Community Acquired Pneumonia: An Update. Cape Fear Valley Medical Center, Fayetteville, NC.

53. November 12, 2003. "Emerging Infections", The Carter Society Annual Lecture. Duke University Department of Obstetrics and Gynecology. Durham, NC.

54. April 23, 2003: "Acute Disease Surveillance and the Primary Healthcare System", Tennessee Primary Care Association. Nashville, TN.

55. May 15, 1999: Acute Disease Outbreaks and Epidemiological Investigations, Rift Valley Fever and Leptospirosis. Department of Medicine Grand Rounds, Durham, NC.

Participation in academic and administrative activities of the University and Medical Center:

1990-1992, Graduate and Professional Student Council
1990-1993, Duke University Children's Miracle Network, Student Chairman
1990-1994, Duke University Medical Center AIDS Volunteer Network- Co-creator
1990-1994, Medical Student Council
1990-1996, Habitat for Humanity- DUMC Coordinator and volunteer
1992-1993, Medical Student Council Community Service, Vice-President
1995, Department of Medicine Chairman Search Committee
1996-1997, Duke University Medical Center Executive Committee
1996- Present, Department of Medicine, Resident Recruitment

Duke Committees
2000-Present, Division of Infectious Diseases, Fellow Recruitment
2000-Present, Stead Research Scholarship Committee, Co-Chairman
2002-2007, Department of Pathology, Resident Recruitment
2002-Present, Department of Medicine, Resident Recruitment
2002, Division of Pediatric Infectious Diseases, Chairman Search Committee
2005-Global Health Initiative, Education Sub-committee
2005-Global Health Initiative, Service Sub-committee
2005-Tsunami Response Committee
2005-Public Health Degree Program Committee
2007-2009, Clinical program director, Mentored Career Development Program in Biodefense and Emerging Infectious Disease, Southeastern Regional Center for Excellence in Emerging Biological Threats
2007-Duke-NUS Emerging Infections Program Director Search Committee
2008-Present, Academic Council, Faculty Representative
2008-Department of Medicine, Division of Infectious Diseases, Chief Search Committee
2009-Human Vaccine Institute, Faculty Search Committee
2010-Joint Duke Global Health Institute/Biomedical Engineering Faculty Search Committee
2009-Ad Hoc University Committee on Pandemic Flu
2015-2016, Executive Committee of the Academic Council, Duke University
2016-Present, Committee on Facilities and the Environment, Duke University
2016-Present, Committee on Honorary Degrees, Duke University
2016-Present, Academic Council Chair Nominating Committee
2017-Present, Chair, Committee on Facilities and the Environment, Duke University

VA committees
2002-2012, Environment of Care Committee, Durham VAMC
2002-Present, Antibiotic Decision Support Team, Durham VAMC
2004-2014, Biosafety Review Committee, Institutional Review Board, Durham VAMC
2002-Present, Infection Control Committee, Chairman (Hospital Epidemiologist) Durham VAMC
2003-Present, VISN 6 Infection Control Committee
2014, Ad hoc, Ebola Response Committee

Areas of research interest:
Infectious Disease Genomic Medicine Program: This program has been supported since 2005 through NIH, DARPA, Bill and Melinda Gates Foundation, W.G. Coulter Foundation, DTRA, and industry partners. Team Science is practiced by the interdisciplinary group of investigators including clinician scientists, microbiologists, immunologists, mathematicians, statisticians, and engineers. The ultimate goal is the development of a more precise means of guiding anti-infective therapeutics in the acute care setting using multidimensional genomic signatures. Christopher Woods oversees this program through his role as Director, Applied Genomics, Center for Applied Genomics and Precision Medicine.

Other areas of interest.
Molecular epidemiology

Sepsis diagnostics
Global Health Education
Bioterrorism and Emerging Infectious Diseases
Vectorborne Diseases
Community-acquired *Clostridium difficile* infections
Endocarditis

Unique Resources:

The Molecular Epidemiology Research Laboratory (MERL) is a developmental extension of the Durham Veterans Affairs Medical Center Clinical laboratory. The laboratory is supervised by Dr. Bradly Nicholson. The laboratory brings to bear expertise in classical clinical microbiology, epidemiology, clinical research, and molecular microbiology.
The laboratory has developed standardized operating procedures for the collection, processing, and storage of clinical research samples for use in a diverse range of clinical diagnostic studies. For example, the laboratory has directed the sample collection, processing, and detection of diverse pathogens of early phase host response diagnostic development through a series of offsite human viral challenge studies (Human rhinovirus,n=2; Respiratory Syncytial Virus, n=2; and Influenza, n=4) funded by the Defense Advanced Research Projects Agency (DARPA). More than 150 subjects representing over 50,000 aliquots have been handled as part of this diagnostic development program. The laboratory also supports several large, free-living cohort studies for the development and validation of host response diagnostic tests. As an offshoot of a CLIA approved laboratory, the laboratory also participates in Phase II, III, and FDA registration studies with commercial partners.

The MERL uses diverse classical and molecular diagnostic methodologies to identify the etiologic agent in viral, bacterial, and fungal infections. Current technologies include selective media, antigen detection, and specific, broad-range, and multiplex polymerase chain reaction using a variety of amplification and detection platforms. After identification, organisms can be further characterized on site by phenotypic, metabolic, or nucleic acid bases typing techniques such as Ribotyping, Pulsed Field Gel Electrophoresis, or Multi-Locus Sequence Typing (MLST)

The Triangle Acute Infectious Diseases Clinical Research Unit (AIDCRU) is a shared clinical research resource for acute care settings. The primary unit operates at Duke University Health System, but affiliated programs exist at the Durham Veterans Affairs Medical Center and the University of North Carolina Hospitals. The mission of the unit is to coordinate screening and enrollment of patients into clinico-epidemiological studies in acute care clinics, the emergency department, and intensive care units at Duke University Medical Center. The unit was established to focus on the development of a well-characterized biorepository for research into genomic and other host markers of acute infectious disease. The unit includes both a clinical research staff and a supporting molecular diagnostic laboratory.

As a shared resource, the unit is led by Christopher Woods and governed by a group of collaborating investigators from the Duke Department of Medicine (Divisions of Infectious Diseases and Pulmonary/Critical Care) and the Duke Department of Surgery, Division of Emergency Medicine, and the Durham VA Health System.

External support - gifts, grants, and contracts:
Dr. Woods has a dual appointment at Duke University and the Durham VAMC (6/8).

Past

Centers for Disease Control and Prevention (Ryder) Woods (I) [redacted]
Public Health Preparedness and Response Training
UNC-SPH NC Center for Public Health Preparedness

N/A (Woods) [redacted]
CDC/Southeastern Center for Emerging Threats
Seroprevalence of WNV among patients with acute febrile illness in the southeastern US.

5U01 AI066569-02 05 & 3U01AI066569-05S1 (Kingsmore) Woods (Co-PI) [redacted]
NIH/NIAID
Sepsis and CAP: Partnerships for Diagnostic Development
Purpose is to develop plasma protein biomarker-based diagnostics of outcome in sepsis and community acquired pneumonia.

N/A (Woods) [redacted]7
Cubist-Pharmaceuticals
Identification and Susceptibility of Gram-positive Organisms from the International Collaboration on Endocarditis Microbial Collection (*ICE*-Micro)

N/A (Woods) [redacted]
Cubist-Pharmaceuticals
Prevalence of Panton-Valentine Leukocidin and Other Virulence Genes in the Cubist (SAB) Endocarditis Collection and the ICE Collection

N/A (Provenzale) Woods (Co-PI) [redacted]
American College of Gastroenterology
Development of a Comprehensive Molecular Epidemiology Program for *Clostridium difficile*-Associated Diarrhea using a Novel, Automated Surveillance Methodology.

N/A (Breitschwerdt) Woods (Co-PI) [redacted]
CDC-SECEBT
Detection of *Bartonella* Species Infection among a Cohort of Healthy and Sick Veterinarians and Veterinary Technicians

N66001-07-C-2024 (Ginsburg) Woods (Co-PI) [redacted]
Defense Advanced Research Program Agency
Clinico-Molecular Predictors of Pre-Symptomatic Infectious Disease

NIH/NIAID (Haynes) Woods (Co-I) [redacted]
Mentored Career Development Program in Biodefense and Emerging Infectious Disease
Southeast Research Center for Excellence in Biological Defense

MM-1044-08/09 (Woods) [redacted]
Association of American Medical Colleges
Isolation of Clostridium Difficile from Stool Specimens
Clinical laboratories participating in the FOODNET surveillance network will identify stool specimens from patients identified as having community acquired *Clostridium difficile* infection.

N/A (Woods)
Roche Laboratories, Inc. [redacted]
Septi-Fast Study
To the performance of Roche's novel multiplex PCR platform "SeptiFast" for rapid diagnosis of bloodstream infection and rapid identification of etiologic agent in patients presenting to the emergency department with febrile illness.

N/A (Woods)
Centers for Disease Control and Prevention [redacted]
CDC IPA for Lawrence (Larry) Park
The CDC Division of Healthcare Quality Promotion (DHQP), Duke University, and the Durham VA Medical Center are working together to use electronically stored health data for the Veteran's Integrated Service Network (VISN) 6 to improve patient care.

N66001-07-C-2024 (Ginsburg/Woods)
Defense Advanced Research Projects Agency [redacted]
Pilot Study
The primary goal of this program is to develop a host-based diagnostic system capable of detecting respiratory viral infections before onset of symptoms.

W.H. Coulter Foundation Sub# 26-P3831354 (Ginsburg/Woods)
Duke-Coulter Foundation Translational Partnership [redacted]
Development of a Point-of-Care Diagnostic for Candidemia and Community-acquired Respiratory Tract Infection Nanoprobes Using Molecular Sentinel (Phase I)
The goal of this project is to define a blood-based RNA gene expression signature for community acquired respiratory tract infection (CARI) and candidemia and to utilize a microfluidic-based molecular sentinel nanoprobe chip to detect this signature.

WH Coulter Foundation Sub# 26-P3831354(Woods/Ginsburg)
Duke-Coulter Foundation Translational Partnership [redacted]
Development of a Point-of-Care Diagnostic for Candidemia and Community-acquired Respiratory Tract Infection Nanoprobes Using Molecular Sentinel (Phase II)
The goal of this project is to further define a blood-based RNA gene expression signature for community acquired respiratory tract infection (CARI) and candidemia and to utilize a microfluidic-based molecular sentinel nanoprobe chip to detect this signature.

1K08-AI082283-01 (McClain) Woods (Co-Mentor)
NIH/NIAID [redacted]
Venezuelan Equine Encephalitis Immunology and Vaccine Design
This proposal involves the complete progression from discovery and description of important antigenic regions of the Venezuelan Equine Encephalitis (VEE) virus through the design, construction, and preclinical testing of a new vaccine for prevention of VEE infection.

5R25-TW007734-02 (Merson) Woods (Co-I)
NIH/Fogarty [redacted]
Developing an Interdisciplinary Graduate Curriculum in Global Health
In "Developing an Interdisciplinary Graduate Curriculum in Global Health at Duke University," the Duke Global Health Institute (DGHI) proposes the development of an interdisciplinary Master of Science in Global Health (MSc-GH) degree program that will target undergraduates, graduate and professional students from schools and departments across the University who wish to pursue a dual degree, and medical residents.

N66001-09-C-2082 (Woods)
Defense Advanced Research Projects Agency [redacted]

RSV Challenge
This human challenge study with RSV will focus on model refinement of host-based genomic signatures for the diagnosis of pre-symptomatic respiratory viral infection.

N66001-09-C-2082 (Woods)
Defense Advanced Research Projects Agency [redacted]
Community Acquired Respiratory Disease Surveillance (CARDS)
This second phase focused on validation and model refinement of host-response genomic signatures in a free-living cohort of University students.

N66001-09-C-2082 (Woods)
Defense Advanced Research Projects Agency [redacted]
Interventional Flu Challenge
This human challenge study with Influenza H3N2 focused on model refinement of host-based genomic signatures for the diagnosis of pre-symptomatic respiratory viral infection.

N66001-09-C-2082 (Woods)
Defense Advanced Research Projects Agency [redacted]
HRV Challenge
This human challenge study with HRV focused on model refinement of host-based genomic signatures for the diagnosis of pre-symptomatic respiratory viral infection.

N66001-09-C-2082 (Woods)
Defense Advanced Research Projects Agency [redacted]
Tamiflu- Woods
This Influenza H1N1 challenge study focused on the effect of an antiviral intervention on a host-based diagnostic.

N66001-09-C-2082 (Woods)
Defense Advanced Research Projects Agency [redacted]
Dx Predictors- Woods
This second phase focused on validation and model refinement of host-response genomic signatures in a free-living cohort of Emergency Department patients.

N66001-09-C-2082 (Woods)
Defense Advanced Research Projects Agency [redacted]
Ex Vivo-
The primary goal of this program was to challenge human PBMC with a variety of respiratory viruses (including novel H1N1) to assess the similarity of genomic response to free-living human cohorts.

N66001-09-C-2082 (Ginsburg) Woods (Co-PI)
Defense Advanced Research Projects Agency [redacted]
Assay Development
The effort described here is the second phase of this work which shall focus on targeted biomarker detection sensors. We will evaluate three separate platforms in collaboration with Duke biomedical engineering.

N/A (Woods)
University of North Carolina - Chapel Hill [redacted]
Emergency Response and Preparedness Program
The role of SERCEB's Emergency Response Preparedness Core is to provide educational and preparedness activities for personnel in SERCEB and to encourage and facilitate communication with public health.

N/A (Woods)
[redacted]3

Novartis Diagnostics $[redacted]
Early Detection of Healthcare Associated Infections in the Intensive Care Unit Using the Host Response: A Focus on Healthcare Associated Pneumonia
The goal of this project is to define a blood-based RNA gene expression signature for healthcare-associated and ventilator-associated pneumonia (HAP/VAP).

U54-CK000164-01 (Sexton) Woods (Co-I) [redacted]
NIH/Centers for Disease Control and Prevention
A Four-arm Prospective, Multicenter Study to Assess the Clinical Efficacy, Effectiveness, and Feasibility of Enhanced Room Disinfection with Chlorine and UV light

OPP1017554 (Ginsburg) Woods (Co-PI) [redacted]
Bill and Melinda Gates Foundation
Development of a Non-human Primate Model for Pneumococcal Pneumonia
This program is funded to develop a baboon model of pneumococcal pneumonia for biomarker diagnostic test development and assessment.

N/A (Woods) [redacted]
Duke-National University of Singapore $[redacted]
Interspecies Transmission of Respiratory Viruses at Lola ya Bonobo
To detect interspecies transmission of respiratory viruses between orphaned bonobos and their human caregivers.

N/A (Woods) [redacted]
Duke Global Health Institute $[redacted]
Detection of Human Respiratory Viruses at Lola ya Bonobo
To detect respiratory viruses in orphaned bonobos and their human caregivers.

5UM1-AI104681-03 SUB #27-P2038641 (Woods) [redacted]
NIH/NIAID/Antimicrobial Leadership Group (ARLG)
RADICAL: Rapid Diagnostics for Categorizing Acute Lung Infections (RADICAL I).
A host-based mRNA classifier for differentiating viral and bacterial etiologies of acute respiratory tract infection

NIH/NIAID/DMID HHSN27200003 (Walter) Woods (PI) [redacted]
Vaccine Treatment and Evaluation Unit (VTEU) Protocol 13-0020
A Double-Blind, Randomized, Placebo-controlled, Phase I dose escalation trial to evaluate the safety and immunogenicity of an inactivated West Nile Virus Vaccine, Hydrovax-001, in healthy adults.

N62645-14-0001(Woods/Ginsburg) [redacted]
The Henry Jackson Foundation: Advancement of Military Medicine Naval Medical Logistics Command
Austere environment consortium for enhanced sepsis outcomes (ACESO).
To develop biomarkers for sepsis for use in austere environments.

DARPA W911NF-15-1-0161(Ginsburg) Woods (Co-PI) [redacted]
Biochronicity Grand Challenge: Baseline Bio-molecular Models to Predict Infectious Disease Susceptibility
To determine baseline molecular signatures and shifts during diverse stresses.

W911NF-15-1-0107 subaward 2015A-01 (Tsalik) Woods (Co-I) [redacted]
DARPA/Sage Bionetworks
Resilience to infection: an open innovation challenge to the community

CDC (Dreps) Woods (Co-I [redacted]
S. pneumoniae in Older Adults in Retirement Communities (SOARS)

Ibis Biosciences sub-HR0011-14-C-0083(Tsalik) Woods (Co-PI) [redacted]
Feasibility for Predicting Warfighter Health Using Transcriptional Markers on the MAP Platform
Translating host gene expression signatures to hand held platform.

VA Completed

CDC/Research Triangle International Woods (Site-PI) [redacted]
The Effectiveness of Treatments for Influenza among Hospitalized Patients

Veterans Affairs Career Development Award (McClain) Woods (Mentor) [redacted]
Genomic signatures for detection of upper respiratory viral infections

Veterans Affairs Career Development Award (Tsalik) Woods (Mentor) [redacted]
Detecting hospital-acquired infections using host gene-expression profiles

N/A (Gerding) Woods (site-PI) [redacted]
Department of Veterans Affairs
Clostridium difficile infection in longterm care facilities (LTCF) in VA Medical Centers
Assessment of disinfection procedures in VA LTCF

Present

NIH/NIAID R21 AI132978-01 (McClain) Woods (Co-I) [redacted]
Host-derived biomarker signatures to differentiate acute viral, bacterial, and fungal infection
Expands mRNA biomarkers to be inclusive of patients with fungal infections, including candida and aspergillus.

NIAID/NIH 1K23AI125677-01A1 (Tillekeratne) Woods (Mentor) [redacted]
Novel Diagnostics to Improve Antimicrobial Stewardship for Acute Respiratory Tract Infections in Resource-Limited Settings
To develop genomics-based diagnostics for use in resource-limited settings to improve antimicrobial stewardship.

NIH/NIAID 1R01-AI121378-01 (Crump) Woods (Co-I) [redacted]
Investigating Febrile Deaths in Tanzania (INDITe)
To determine the cause of death in febrile subjects using advanced, standardized methodologies.

DOD BA150703 Woods (PI) 2[redacted]
Novel Host Diagnostics of Febrile Illness in the Warfighter.
Expanding the utility of gene expression signatures to high consequence pathogens: Sri Lanka and Tanzania

NIH/NIAID/DMID HHSN272201300017I (Walter) Woods (co-PI) [redacted]
Vaccine Treatment and Evaluation Unit (VTEU).
To provide a ready resource for conducting clinical trials of vaccines and treatments for infectious diseases.

5UM1-AI104681-03 (Fowler) SUB #27-P2038641 Woods (PI) [redacted]
NIH/NIAID/Antimicrobial Leadership Group (ARLG)
Rapid Diagnostics for Categorizing Acute Lung Infections (RADICAL II).
Validation of viral and bacterial host genomic signatures for respiratory tract infections.

Emergency Medicine Foundation (Limkakeng) Woods (Co-I) [redacted]
MicroRNAs to Identify Myocardial Ischemia During Stress Testing In The Emergency Department

NIH/NIAID/DMID HHSN272201300017I (McClain) Woods (Co-I) [redacted]
Host-based genomic signatures for diagnosis of acute Valley Fever

NIH/NIAID HHSN272201300017I (Walter) Woods (PI) [redacted]
Vaccine Treatment and Evaluation Unit
Targeted Reduction of Antibiotics using Procalcitonin in a multi-center, randomized, double-blinded, placebo-controlled non-inferiority study of azithromycin treatment in outpatient adults with suspect lower respiratory tract infection (LRTI) and a procalcitonin level of <0.1 ng/mL (TRAP-LRTI)

DARPA HR0011-15-2-0057 (Welty-Wolf) Woods (Co-I) [redacted]
Title: Novel Dialysis-Like Therapeutics in Sepsis-induced Shock and Organ Failure
Major Goal: to translate novel, dialysis like therapeutics into a treatment for patients with severe sepsis and multiple organ dysfunction.

Industry Sponsored Clinical Trials

Duke University lists aggregated effort assigned to the following eligible industry-sponsored clinical trial projects. Each of these individual projects has a varying need of effort depending on the type of activity currently in progress such as protocol development, start-up, patient recruitment, enrollment, follow-up, monitoring, data analysis, publication, and closeout. Faculty determine each project's need and adjust their effort between projects within the total aggregated effort assigned to the clinical projects.

Nabi-1407 Clinical Trial (Woods, Site PI) [redacted]
Site-Durham VAMC
Initial Safety and Pharmacokinetics Trial of Immune Globulin to *Staphylococcus aureus* Capsule Polysaccharide (Altastaph™) in Subjects with *S. aureus* Bacteremia and Persistent Fever

Theravance-00784 (Woods, Site PI [redacted]
Site-Durham VAMC
A Phase 2, Randomized, Double-blind, Parallel-Group, Multinational Trial of Intravenous Telavancin™ (TD-6424) for Treatment of Uncomplicated *Staphylococcus aureus* Bacteremia.

Theravance-0019 (Woods, Site PI) [redacted]
Site-Durham VAMC
Site-Duke (Co-PI)
A Phase 3, Randomized, Double-Blind, Parallel-Group, Multinational Trial of Intravenous Telavancin™ Versus Vancomycin for Treatment of Hospital-Acquired Pneumonia with a Focus on Patients with Infections Due to Methicillin-Resistant *Staphylococcus aureus*

DCRI (Walter) [redacted]
University of Maryland
Rapid Response to Flu Outbreak (DMID 09-0032)

DCRI (Walter) [redacted]
University of Maryland
DMID 09-0053 Sanofi 1 vs 2 adults

Roche Diagnostics [redacted]
Evaluation of the Clinical Utility of the cobas® MRSA/SA Test for Detection of *Staphylococcus aureus* and Methicillin Resistant *Staphylococcus aureus* From Nasal Swabs

GenMark Diagnostics, Inc. (Woods, Site PI) [redacted]
A Multi-Center, Prospective Clinical Trial to Evaluate the Clinical Performance of the GenMark Sample to Answer Platform System for the Detection of Respiratory Viruses in Nasopharyngeal Swab Samples.

Cubist Pharmaceuticals, Inc. (Woods, Site PI) [redacted]
A Randomized, Double-Blinded, Active-Controlled Study of CB-183,315 in Patients with *Clostridium Difficile* Associated Diarrhea

Novartis Pharmaceuticals Corporation (Woods, Site PI) [redacted]
Multi-center, Randomized, Evaluator-blind, Active-controlled, Parallel-group Design to Determine Safety, Tolerability, and Efficacy of Multiple Daily Administration of LFF571 for 10 days in Patients with Moderate *Clostridium difficile* Infections.

EPOCH/Qiagen (Woods, Site PI) [redacted]
Performance of the Artus MRSA QS-RGQ MDx

EPOCH/Qiagen (Woods, Site PI) [redacted]
Performance of the Artus *T. vaginalis* QS-RGQ MDx

EPOCH/Qiagen (Woods, Site PI) [redacted]
Performance of the Artus ESBL/CRE QS-RGQ MDx

Roche Molecular Systems (Woods, Site PI) [redacted]
LIA-CDIF-373 Cobas Cdiff Nucleic Acid Test for use on the cobas Liat System: Clinical Performance Evaluation

Patents
PCT Application No. PCT/US2010/036257,
"METHODS OF IDENTIFYING INFECTIOUS DISEASE AND ASSAYS FOR IDENTIFYING INFECTIOUS DISEASE"
Filed 5/26/2010, Patent Pending
09/20/2011 International Publication Date
Patent Inventors: Geoffrey S. Ginsburg, **Christopher W. Woods**, Lawrence Carin, Aimee Zaas, Joseph Lucas, Alfred Hero

PCT Application No. PCT/US 14/214,853
"BIOMARKERS FOR THE MOLECULAR CLASSIFICATION OF BACTERIAL INFECTION"
Filed 03/15/2014,
Patent Inventors: Ephraim L. Tsalik, Vance Fowler, **Christopher Woods**, Joseph Lucas, Geoffrey Ginsburg, Sun Hee Ahn

PCT Application No. PCT/US 2016/040437
"METHODS TO DIAGNOSE AND TREAT ACUTE RESPIRATORY INFECTIONS"
Filed 07/01/2015
Patent Inventors: Ephraim L. Tsalik, Ricardo Henao Ricardo, Thomas W. Burke, Geoffrey S. Ginsburg, **Christopher W. Woods**, Micah T. McClain

PCT Application No. PCT/US 62/454,260
"NASOPHARYNGEAL PROTEIN BIOMARKERS OF ACUTE RESPIRATORY VIRUS INFECTION AND METHODS OF USING SAME
Filed 02/03/2017
Patent Inventors: Thomas W. Burke, Ricardo Henao Ricardo, Erik Soderblom, Joseph Lucas, **Christopher W. Woods**, Geoffrey S. Ginsburg

Clinical activity - type of practice and estimate of time commitment:
½ ID clinic day every other week Duke
½ ID clinic day VA weekly
Infectious Diseases Consults (VAMC)-2 months annually
General Medicine Wards (VAMC)-4 weeks annually

Nelson, Emma <emma_nelson@fws.gov>

Your CITES Permit Request - 69393C

7 messages

Nelson, Emma <emma_nelson@fws.gov> Wed, Mar 28, 2018 at 9:23 AM
To: "Elizabeth Petzold, Ph.D." <elizabeth.petzold@duke.edu>

Dear Ms. Petzold,

We received your application for a Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) permit for the exportation of biological samples derived from the bonobo (*Pan paniscus*) for scientific purposes. The processing of your application cannot be completed because:

- In the Congolese CITES export permit, they list the source code R for "ranched". Can you please confirm whether the samples you are looking to re-export were obtained from the specimens taken in from the wild or specimens born at the orphanage?
- Although you provide a copy of your U.S. CITES import permit 17US217642/9, we need the cleared copy of the U.S. CITES import permit used to import the samples.
- Please provide cleared copies of Congolese CITES permits 6918 and 6919. Block 14 must be complete as well as a cancelled stamp on the face of the permit when cleared through the U.S. port of entry.
- Please clarify the description of what you are requesting to export. You states under Question 2 under Quantity "70". However, under the type of sample you state "199 serum aliquots from 70 bonobos". Please clarify how many vials, etc, you will be exporting including the mL quantity in each vial.
- Under the U.S. Endangered Species Act, in order for a permit to be issued for a an endangered species, the applicant must show how this activity will enhance the propagation or survival or the species in the wild. This includes either how this activity itself enhances the propagation or survival of the species in the wild; or how your organization has contributed directly (i.e. sending staff to the range states, etc.) or indirectly (i.e. financial contributions that will significantly increase a organization's ability to provide on the ground conservation). With direct or indirect contributions by your organization, we will need to see the historic, current, and future contributions to the enhancement of the survival or propagation of the species in the wild, including any contracts or agreement for financial contributions. Although you mention in your application that you will be assessing human/bonobo interspecies spread and how this effects the species through human encouragement, please elaborate on how this information will be provided for management purposes or how it will be utilized in bonobo release programs.
- No processing fee was included with your application. If you are claiming a fee exemption under 50 CFR 13.11(d), please submit documentation to show that you are a Federal, state, local, or tribal agency or acting on behalf of these agencies.

Please provide the information and documentation indicated. **Any response must be in written form and combined into one reply.**

If we do not receive the information requested above within **45 days** from the date of this e-mail, your application will be abandoned and administratively closed. Once the file is closed, you would need to submit a new application and all required fees. If you have questions, you may contact me at Emma_Nelson@fws.gov or at 703-358-2296. Please reference your file number,**PRT-69393C**.

Best,

Emma G. Nelson
Senior Biologist
U.S. Fish and Wildlife Service
Division of Management Authority
5275 Leesburg Pike,
Falls Church, VA 22041
(703) 358-2296

Elizabeth Petzold, Ph.D. <elizabeth.petzold@duke.edu> Mon, Apr 9, 2018 at 9:23 AM
To: "Nelson, Emma" <emma_nelson@fws.gov>
Cc: "Elizabeth Petzold, Ph.D." <elizabeth.petzold@duke.edu>

Dear Emma,

Thank you so much for your review of our application. I am happy to help provide some clarity and additional information. I have responded to each of your questions below. We have reached out to Inspector Martin at JFK US Fish & Wildlife for the cleared permits you request in #2 and #3. I will send these as soon as we have a response from Inspector Martin. Please do not hesitate to reach out again if you have any additional questions

Thanks so much!

Liz

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Elizabeth Petzold, PhD

Program Manager - Infectious Diseases

Center for Applied Genomics and Precision Medicine (CAGPM)

Duke Global Health Institute (DGHI)

Office: (919) 613-5172 | Cell: (919) 452-1605

From: Nelson, Emma [mailto:emma_nelson@fws.gov]
Sent: Wednesday, March 28, 2018 9:24 AM
To: Elizabeth Petzold, Ph.D. <elizabeth.petzold@duke.edu>
Subject: Your CITES Permit Request - 69393C

Dear Ms. Petzold,

We received your application for a Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) permit for the exportation of biological samples derived from the bonobo (*Pan paniscus*) for scientific purposes. The processing of your application cannot be completed because:

- In the Congolese CITES export permit, they list the source code R for "ranched". Can you please confirm whether the samples you are looking to re-export were obtained from the specimens taken in from the wild or specimens born at the orphanage?

[Elizabeth Petzold, Ph.D.] The DRC is the only country in the world that has bonobos in the wild, and Lola ya bonobo (LYB) is the only sanctuary for bonobos in the country. When bonobos are confiscated by the DRC police (typically from poachers engaging in the illegal wildlife trade or for bush meat), they are taken to LYB for care and rehabilitation. The primary goal of the sanctuary is to rehabilitate the animals and release them back into the wild, although sometimes this is not possible due to the extent of injuries, and/or inability to care for themselves. While at the sanctuary, the bonobos are kept in their usual wild conditions, and since bonobos have multiple interactions daily, it is not uncommon for babies to be born there. Therefore, specimens were taken both from rescued animals and also from babies that were born at the orphanage.
~~~~~~~~~~~~~~~~~~~~~~

- Although you provide a copy of your U.S. CITES import permit 17US217642/9, we need the cleared copy of the U.S. CITES import permit used to import the samples.

[Elizabeth Petzold, Ph.D.] I have attached the Form 3-177 which indicates a 'CLEARED' stamp at the bottom of the form. I also reached out to Inspector Martin at JFK for cleared copies of the document, since this was not included in the shipment paperwork that arrived here.

- Please provide cleared copies of Congolese CITES permits 6918 and 6919. Block 14 must be complete as well as a cancelled stamp on the face of the permit when cleared through the U.S. port of entry.

[Elizabeth Petzold, Ph.D.] I also reached out to Inspector Martin at JFK for cleared copies of the documents, since this was not included in the shipment paperwork that arrived here.

- Please clarify the description of what you are requesting to export. You states under Question 2 under Quantity "70". However, under the type of sample you state "199 serum aliquots from 70 bonobos". Please clarify how many vials, etc, you will be exporting including the mL quantity in each vial.

[Elizabeth Petzold, Ph.D.] I was not completely clear what this question was asking for, so I apologize for the confusion. We would like to export 199 vials of serum, which were taken from 70 bonobos (some bonobos had multiple blood draws over several months). Each vial contains approx. 1ml of serum.

- Under the U.S. Endangered Species Act, in order for a permit to be issued for a an endangered species, the applicant must show how this activity will enhance the propagation or survival or the species in the wild. This includes either how this activity itself enhances the propagation or survival of the species in the wild; or how your organization has contributed directly (i.e. sending staff to the range states, etc.) or indirectly (i.e. financial contributions that will significantly increase a organization's ability to provide on the ground conservation). With direct or indirect contributions by your organization, we will need to see the historic, current, and future contributions to the enhancement of the survival or propagation of the species in the wild, including any contracts or agreement for financial contributions. Although you mention in your application that you will be assessing human/bonobo interspecies spread and how this effects the species through human encouragement, please elaborate on how this information will be provided for management purposes or how it will be utilized in bonobo release programs.

[Elizabeth Petzold, Ph.D.] As an initial screen, we are planning on conducting a serological assay that identifies antibodies against all known viruses to infect humans, on both human and bonobo samples. If potential causative agents are identified, additional assays such as confirmatory serological assays or sequencing-based molecular assays will be conducted to better characterize the pathogen and host response on a serological and sequence level. Our findings will help shed light in the interspecies spread of viruses, which will not only be informative for understanding the interplay of zoonotic pathogens across species, but also for the management of the bonobos and their caretakers onsite. For instance, if a particular pathogen is identified and associated with a cluster of bonobos/humans, specific assays can be incorporated into regular surveillance to monitor further activity and to help limit spread of disease within the sanctuary.

- No processing fee was included with your application. If you are claiming a fee exemption under 50 CFR 13.11(d), please submit documentation to show that you are a Federal, state, local, or tribal agency or acting on behalf of these agencies.

[Elizabeth Petzold, Ph.D.] With the permit application, I enclosed a personal check for $100, dated Dec 2 2017 (check # 1825), and it cleared on Jan 22 2018 under 'FWS Region 9 payment'. My bank statement is attached for confirmation.

Please provide the information and documentation indicated. **Any response must be in written form and combined into one reply.**

If we do not receive the information requested above within **45 days** from the date of this e-mail, your application will be abandoned and administratively closed. Once the file is closed, you would need to submit a new application and all required fees. If you have questions, you may contact me at Emma_Nelson@fws.gov or at 703-358-2296. Please reference your file number,**PRT-69393C**.

Best,

Emma G. Nelson

Senior Biologist

U.S. Fish and Wildlife Service

Division of Management Authority

5275 Leesburg Pike,

Falls Church, VA 22041

(703) 358-2296

---

2 attachments

Cleared permit - Form 3-177.pdf
90K

CITES Check 1825 - SECU statement .pdf
29K

Elizabeth Petzold, Ph.D. <elizabeth.petzold@duke.edu> Tue, Apr 10, 2018 at 10:12 AM
To: "Nelson, Emma" <emma_nelson@fws.gov>
Cc: "Elizabeth Petzold, Ph.D." <elizabeth.petzold@duke.edu>

Dear Emma,

Please find attached all the cancelled permits (US & Congo).

Thanks so much,

liz

~~~~~~~~~~~~~~~~~~~~~~~~

Elizabeth Petzold, PhD

Program Manager - Infectious Diseases

Center for Applied Genomics and Precision Medicine (CAGPM)

Duke Global Health Institute (DGHI)

Office: (919) 613-5172 | Cell: (919) 452-1605

From: Elizabeth Petzold, Ph.D.
Sent: Monday, April 9, 2018 9:24 AM
To: 'Nelson, Emma' <emma_nelson@fws.gov>
~~~~~~~~~~~~~~~~~~~~~~~~

Cc: Elizabeth Petzold, Ph.D. (elizabeth.petzold@duke.edu) <elizabeth.petzold@duke.edu>
Subject: RE: Your CITES Permit Request - 69393C

Dear Emma,

Thank you so much for your review of our application. I am happy to help provide some clarity and additional information. I have responded to each of your questions below. We have reached out to Inspector Martin at JFK US Fish & Wildlife for the cleared permits you request in #2 and #3. I will send these as soon as we have a response from Inspector Martin. Please do not hesitate to reach out again if you have any additional questions

Thanks so much!

Liz

~~~~~~~~~~~~~~~~~~~~~~~~

Elizabeth Petzold, PhD

Program Manager - Infectious Diseases

Center for Applied Genomics and Precision Medicine (CAGPM)

Duke Global Health Institute (DGHI)

Office: (919) 613-5172 | Cell: (919) 452-1605

From: Nelson, Emma [mailto:emma_nelson@fws.gov]
Sent: Wednesday, March 28, 2018 9:24 AM
To: Elizabeth Petzold, Ph.D. <elizabeth.petzold@duke.edu>
Subject: Your CITES Permit Request - 69393C

Dear Ms. Petzold,

We received your application for a Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) permit for the exportation of biological samples derived from the bonobo (*Pan paniscus*) for scientific purposes. The processing of your application cannot be completed because:

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- Please provide cleared copies of Congolese CITES permits 6918 and 6919. Block 14 must be complete as well as a cancelled stamp on the face of the permit when cleared through the U.S. port of entry.

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[Elizabeth Petzold, Ph.D.] I was not completely clear what this question was asking for, so I apologize for the confusion. We would like to export 199 vials of serum, which were taken from 70 bonobos (some bonobos had multiple blood draws over several months). Each vial contains approx. 1ml of serum.

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Please provide the information and documentation indicated. **Any response must be in written form and combined into one reply.**

If we do not receive the information requested above within **45 days** from the date of this e-mail, your application will be abandoned and administratively closed. Once the file is closed, you would need to submit a new application and all required fees. If you have questions, you may contact me at Emma_Nelson@fws.gov or at 703-358-2296. Please reference your file number,**PRT-69393C**.

Best,

Emma G. Nelson

Senior Biologist

U.S. Fish and Wildlife Service

Division of Management Authority

5275 Leesburg Pike,

Falls Church, VA 22041

(703) 358-2296

Cancelled permits.pdf
683K

Elizabeth Petzold, Ph.D. <elizabeth.petzold@duke.edu> Tue, Apr 10, 2018 at 4:52 PM
To: "Nelson, Emma" <emma_nelson@fws.gov>

Dear Emma,

I meant to ask, there are human samples in the bonobo shipment – do we have to declare these on the permit as well? We will ship 199 bonobo samples, and 93 human samples.

Thanks so much

Liz

~~~~~~~~~~~~~~~~~~~~~~~~

Elizabeth Petzold, PhD

Program Manager - Infectious Diseases

Center for Applied Genomics and Precision Medicine (CAGPM)

Duke Global Health Institute (DGHI)

Office: (919) 613-5172 | Cell: (919) 452-1605

From: Nelson, Emma [mailto:emma_nelson@fws.gov]
Sent: Wednesday, March 28, 2018 9:24 AM
To: Elizabeth Petzold, Ph.D. <elizabeth.petzold@duke.edu>
Subject: Your CITES Permit Request - 69393C
~~~~~~~~~~~~~~~~~~~~~~~~

Dear Ms. Petzold,

[Quoted text hidden]

Nelson, Emma <emma_nelson@fws.gov> Wed, Apr 11, 2018 at 3:13 PM
To: "Elizabeth Petzold, Ph.D." <elizabeth.petzold@duke.edu>

Good afternoon Ms. Petzold,

Thank you for your response. I will review the information soon. In regards to your most recent email, no, human samples are not regulated under these laws thus, they will not have to be listed on the permit.

Best,
Emma

Emma G. Nelson
Senior Biologist
U.S. Fish and Wildlife Service
Division of Management Authority
5275 Leesburg Pike,
Falls Church, VA 22041
(703) 358-2296

[Quoted text hidden]

Nelson, Emma <emma_nelson@fws.gov> Thu, Apr 12, 2018 at 9:03 AM
To: "Elizabeth Petzold, Ph.D." <elizabeth.petzold@duke.edu>

Good morning Ms. Petzold,

I have reviewed the additional information provided and I have only a few additional items that need to be addressed.

- Seeing as you are exporting serum samples, from my review it seems that those samples were likely imported under Block C of Congolese CITES Export Permit 5918. Please confirm or if this is not the case, please clarify. If the samples you are looking to re-export were imported under both Congolese CITES permits, please let me know how many samples that you are re-exporting came in under which permits.
- The issuance date of the Congolese CITES permits are illegible. For the Congolese CITES permits that were utilized to import the serum (as address in the point above), please provide a copy where the issuance date is legible.
- Bonobos are listed as Appendix I of CITES. As such, before we can issue a CITES re-export certificate, we must either see a copy of the Singapore CITES import permit or see confirmation from the Singapore Management Authority that a CITES import permit will be issued.

Please provide the information and documentation indicated. **Any response must be in written form and combined into one reply.**

If we do not receive the information requested above within **45 days** from the date of this e-mail, your application will be abandoned and administratively closed. Once the file is closed, you would need to submit a new application and all required fees. If you have questions, you may contact me at Emma_Nelson@fws.gov or at 703-358-2296. Please reference your file number,**PRT-69393C**.

Best,
Emma

Emma G. Nelson
Senior Biologist
U.S. Fish and Wildlife Service
Division of Management Authority
5275 Leesburg Pike,
Falls Church, VA 22041
(703) 358-2296

[Quoted text hidden]

Elizabeth Petzold, Ph.D. <elizabeth.petzold@duke.edu> Thu, Apr 12, 2018 at 1:06 PM
To: "Nelson, Emma" <emma_nelson@fws.gov>

Dear Emma,

Thank you for your email. My responses are below, and I have attached an un-cancelled copy of Permit #6918, where you can read the issuance date. I am also attaching the draft CITES permit for the Singapore AVA CITES import permit. Please let me know if you need anything additionally. Thanks so much.

Best wishes

Liz

~~~~~~~~~~~~~~~~~~~~~~~~

Elizabeth Petzold, PhD

Program Manager - Infectious Diseases

Center for Applied Genomics and Precision Medicine (CAGPM)

Duke Global Health Institute (DGHI)

Office: (919) 613-5172 | Cell: (919) 452-1605

From: Nelson, Emma [mailto:emma_nelson@fws.gov]
Sent: Thursday, April 12, 2018 9:04 AM
To: Elizabeth Petzold, Ph.D. <elizabeth.petzold@duke.edu>
Subject: Re: [EXTERNAL] RE: Your CITES Permit Request - 69393C

Good morning Ms. Petzold,

I have reviewed the additional information provided and I have only a few additional items that need to be addressed.

- Seeing as you are exporting serum samples, from my review it seems that those samples were likely imported under Block C of Congolese CITES Export Permit 5918. Please confirm or if this is not the case, please clarify. If the samples you are looking to re-export were imported under both Congolese CITES permits, please let me know how many samples that you are re-exporting came in under which permits.

[Elizabeth Petzold, Ph.D.] This is correct. The serum samples that we are requesting to import are covered in Block C of permit #6918. Permit #6919 covers other specimen types.
~~~~~~~~~~~~~~~~~~~~~~~~

- The issuance date of the Congolese CITES permits are illegible. For the Congolese CITES permits that were utilized to import the serum (as address in the point above), please provide a copy where the issuance date is legible.

[Elizabeth Petzold, Ph.D.] I have attached the original permit #6918 (un-cancelled) here.

- Bonobos are listed as Appendix I of CITES. As such, before we can issue a CITES re-export certificate, we must either see a copy of the Singapore CITES import permit or see confirmation from the Singapore Management Authority that a CITES import permit will be issued.

[Elizabeth Petzold, Ph.D.] The AVA in Singapore requires a copy of the CITES export permit before they allow an import permit to be issued. Therefore, I cannot send the Singapore CITES permit yet. However, I am attaching the draft (online) CITES import permit application that has been prepared, and that will be submitted upon issuance of the US re-export permit.

[Quoted text hidden]
[Quoted text hidden]

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2 attachments

Export PERMIT CITES 6918.pdf
668K

Draft CITES import application_6 Oct 2017.pdf
118K

Checking Account [redacted] Detail

View your online statement for this account.

Quick Links
Overdraft Request
Order Checks
Dispute Transaction
Statement Options
Substitute Check Policy Disclosure
Help With This Page

Beginning Balance [redacted]
Activity Toda [redacted]
Assignment/Hold [redacted]
ATM Deposits Pendi [redacted]
Overdraft Funds [redacted]
Available Balance [redacted]
Current Balance [redacted]

Primary Overdraft Account [redacted]
Primary Overdraft Funds Available [redacted]
Secondary Overdraft Account #: N/A
Secondary Overdraft Funds Available: N/A
Current Year Interest Earned YTD [redacted]
Prior Year Interest Earned [redacted]
Interest Rate: 0.25 %

Check #	Post Date	Effective Date	Description	Debit	Credit
1761	1/22/2018	1/22/2018	Check With Image INCLEARING CHECK	$60.00	
1825	1/22/2018	1/22/2018	ACH Debit FWS REGION 9 PAYMENT [redacted]	$100.00	

End of History

USFWS Form 3-177
(Revised: 03/10)
O.M.B. No. 1018-0012
(Exp. Date: 09/30/2019)

U.S. FISH AND WILDLIFE SERVICE

DECLARATION FOR IMPORTATION OR EXPORTATION OF FISH OR WILDLIFE

1. Date of Import/Export (mm/dd/yyyy): 03/03/2017	7. Name of Carrier: BRUSSELS AIRLINES
2. Import/Export License Number: ******	8. Air Waybill or Bill of Lading No.: Master: [redacted] House: [redacted]
3. Indicate One: ☑ import ☐ export	9. Transportation Code: A License No. State or Province:
4. Port of Clearance: NY	10. Bonded Location for Inspection: JFK / SN 501
5. Purpose Code: S	11. Number of Cartons Containing Wildlife: 3
6. Customs Document Number(s): [redacted]	12. Markings on Cartons Containing Wildlife:

13. (indicate one) ☑ U.S. Importer ☐ U.S. Exporter DUKE UNIVERSITY MEDICAL CENTER BRAD NICHOLSON 508 FULTON STREET DURHAM, NC 27705 919-286-0411 BRAD.NICHOLSON@DUKE.EDU 13b. Identifier Number: ID Type:	14. (indicate one) ☐ Foreign Importer ☑ Foreign Exporter ECOLE DE SANTE PUBLIQUE UNIVERSITE DE KINSHASA REENA DOSHI ESP/UCLA DRC PROGRAM REP DEM DU, CD 14c. Identifier Number: ID Type:

15. Customs Broker, Shipping Agent or Freight Forwarder: World Customs Brokerage inc
15b. Identifier Number: ID Type:
Phone Number / Fax Number / Email Address: [redacted] 15c. Contact Name: [redacted]

Species Code	16a. Scientific Name 16b. Common Name	17a. Foreign CITES Permit Num. 17b. U.S. CITES Permit Num.	18a. Description Code 18b. Source	19a. Quantity/Units 19b. Total Monetary Value	20. Country of Species Origin Code (ISO Code)	21. Venomous Live Wildlife Indicator
PPAN	PAN PANISCUS BONOBO	6918 17US217642/9	SPE R	70.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6918 17US217642/9	SPE R	239.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6918 17US217642/9	SPE R	486.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6918 17US217642/9	SPE R	631.00 NO $ 1	CD	☐

Knowingly making false statement in a Declaration for Importation or Exportation of Fish or Wildlife may subject the declarant to the penalty provided by 18 U.S.C. 1001 and 16 U.S.C. 3372(d).

22. I certify under penalty of perjury that the information furnished is true and correct:
Filed Electronically 03/07/2017 - Confirm Num: [redacted]
No Fees Required

Action/Comments:

Wildlife Declared
Wildlife Inspected: [redacted]
Service K-9 Utilize
Inspected By: [redacted]

U FISH & WILDLIFE SERVICE S
N *Electronic Filing* T
I CLEARED A
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Date: 03/28/2017

U.S. FISH AND WILDLIFE SERVICE

USFWS Form 3-177
(Revised: 03/10)
O.M.B. No. 1018-0012
(Exp. Date: 09/30/2019)

DECLARATION FOR IMPORTATION OR EXPORTATION OF FISH OR WILDLIFE

CONTINUATION SHEET

13. Name of Importer/Exporter:
DUKE UNIVERSITY MEDICAL CENTER BRAD NICHOLSON
8. Air Waybill or Bill of Lading Number: Master: [redacted] House: [redacted]

2. I/E License Number:
******

Species Code	16a. Scientific Name 16b. Common Name	17a. Foreign CITES Permit Num. 17b. U.S. CITES Permit Num.	18a. Description Code 18b. Source	19a. Quantity/Units 19b. Total Monetary Value	20. Country of Species Origin Code (ISO Code)	21. Venomous Live Wildlife Indicator
PPAN	PAN PANISCUS BONOBO	6919 17US217642/9	SPE R	929.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6919 17US217642/9	SPE R	753.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6919 17US217642/9	SPE R	178.00 NO $ 1	CD	☐
PPAN	PAN PANISCUS BONOBO	6919 17US217642/9	SPE R	222.00 NO $ 1	CD	☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐

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Filed Electronically 03/07/2017

U FISH & WILDLIFE SERVICE S
N *Electronic Filing* T
I CLEARED A
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E E
D S

Date: 03/28/2017

Apply for New Licence

CITES Permit

Permit Details

Category of Permit * ○ Plant ◉ Animal

Appendix * ◉ APP I & II ○ APP III

Appendix I & II Species * ○ Export ◉ Import ○ Re-Export

Description Type * ○ Live ○ Manufactured Products ◉ Parts

Category Type * Mammals & Wild Animals

Purpose of Transaction * S, Scientific

Application selected under 'Plant' and 'Animal' will be processed and issued by Plant Health Section (PHS) (http://www.ava.gov.sg/AgricultureFisheriesSector/ImportExportTransOfPlants/ (http://www.ava.gov.sg/AgricultureFisheriesSector/ImportExportTransOfPlants/)) and Wildlife Section (WS) (http://www.ava.gov.sg/AnimalsPetSector/CITESEndangeredSpecies/ (http://www.ava.gov.sg/AnimalsPetSector/CITESEndangeredSpecies/)) respectively.

Appendix of the Convention (I, II or III) in which the species is listed. For the latest CITES Appendices, please refer to the official CITES website:- http://www.cites.org (http://www.cites.org)

Transport Details

Application Error(s)

Airway Bill No./Bill of Lading No.

CLOSE

Flight No./Vessel No.

Permittee

Name * Wang Linfa, Duke-NUS Medical School

Singapore Address

Applicant Address Copy

Mailing Address Copy

Postal Code * 169857 Retrieve Address

Please enter postal code and click on Retrieve Address button

Block/House Number 8

Street Name * COLLEGE ROAD

Floor Number

Eg. 05-01 Key in: 05

Unit Number

Eg. 05-01 Key in: 01

Building Name Duke-NUS Medical School

Care Of Programme in Emerging Infectious Diseases

Note: Permitee should be filled with a valid/registered company's name and address for corporate applications

Consignor Details

Name of the Consignor * Christopher W. Woods

Address Line 1 * 40 Duke Medicine Circle, Clinic 1K,

Address Line 2 Durham, NC 27710, United

Address Line 3

Application Error(s)

CLOSE

CLOSE

Address Line 4

Address Line 5

City

State

Country of Last Export/Re-Export * UNITED STATES

Postal Code

Consignment Product Details

Scientific Name and Common Name (Genus and Species) * Please Select

Appendix * II

Description * SERUM

Source * W, Wild

Quantity * 199

Unit * VIALS

Marking 199 vials of Pan paniscus (Bonobo) serum

Country of Origin * UNITED STATES

Permit Number (from Origin) *

Date of Issue (from Origin)

Application Error(s)

Country of Re-export * Please Select

CLOSE

CLOSE

Permit Number (from last re-export) *

Date of Issue (from last re-export)

Remarks

Add Reset

S.No		Scientific Name and Common Name (Genus and Species)	Appendix	Description	Source	Quantity	Unit	Marking	Country of Origin	Permit Number (from Origin)	Date of Issue (from Origin)	Country of Re-export

Delete

Application

Collection Option * ○ Collect from AVA Counter ○ Self-Print

Note:
For more information on printing of watermarked permits/certificates and a list of compatible watermark printers, please refer to the Public User Guide for Watermark Printing (https://licence1.business.gov.sg/guidelines/web/help-internet/15.-print-certificate-with-watermark). 'Self-print' is only applicable for CITES import permit which must be printed using a compatible watermark printer.

Emergency Contact

S.No		Salutation *	Name *	Designation	Contact No. *	Ema
1		Please Select			+65	

Application Error(s)

CLOSE

Delete Add New

CLOSE

Type of Service

Type of Service * Normal Express

Previous Next Save as Draft Save as Draft & Exit

CONVENTION SUR LE COMMERCE INTERNATIONAL DES ESPÈCES DE FAUNE ET DE FLORE SAUVAGES MENACÉES D'EXTINCTION

PERMIS / CERTIFICAT

[X] EXPORTATION
[ ] REEXPORTATION
[ ] IMPORTATION
[ ] AUTRE :

N° 6918

Original

2. Valable jusqu'au: 11/07/2017

3. Importateur (nom et adresse)
CHRISTOPHER WOODS
DURHAM VIA MEDICAL CENTER
508 FULTON STREET, DURHAM, VA 27705
TEL : 919-286-0411 FAX : 919-613-7434

4. Exportateur (nom et adresse, pays)
ECOLE DE SANTE PUBLIQUE
UNIVERSITE DE KINSHASA
ESP/UCLA DRC PROGRAM

REP. DEM. DU CONGO

3a. Pays d'importation: USA

5. Conditions particulières
Transport aérien conforme aux normes IATA.

Pour les animaux vivants, ce permis ou certificat n'est valable que si les conditions de transport sont conformes aux Lignes directrices pour le transport des animaux vivants ou, en cas de transport aérien, à la Réglementation IATA du transport des animaux vivants.

6. Nom, adresse, cachet/sceau national et pays de l'organe de gestion
Organe de gestion CITES / RDC
7e Rue Limete
Q. Industriel n° 17
KINSHASA / GOMBE
Commune de Limete
République Démocratique du Congo

5a. But de la transaction (voir au dos): S.

5b. N° du timbre de sécurité: CD 1174947

	7./8. NOM COMMUN ET NOM SCIENTIFIQUE (genre et espèce) DE L'ANIMAL OU DE LA PLANTE	9. Description des parties ou produits marques ou numéros d'identification (âge/sexe si vivant)	10. Annexe et source (voir au dos)	11. Quantité (y compris l'unité)	11a. Total exporté/ quota
A	BONOBO Pan paniscus	ECHANTILLON SANG	IR	77	
B	BONOBO Pan paniscus	ECHANTILLON SANG TOTAL	IR	265	
C	BONOBO Pan paniscus	ECHANTILLON SERUM	IR	534	
D	BONOBO Pan paniscus	ECHANTILLON PLASMA	IR	694	

	12. Pays d'origine ★	N° permis	Date	12a. Pays de provenance	N° certificat	Date	12b. N° de l'établissement ★★ ou date de l'acquisition ★★★
A							
B							
C							
D							

★ Pays dans lequel les spécimens ont été prélevés dans la nature, sont nés et ont été élevés en captivité ou reproduits artificiellement (seulement en cas de reéxportation)
★★ Uniquement pour les spécimens de l'Annexe I nés et élevés en captivité ou reproduits artificiellement à des fins commerciales
★★★ Pour les spécimens pré-Convention

13. CE PERMIS EST DÉLIVRÉ PAR L'AUTORITÉ SUIVANTE:

LE DIRECTEUR-CHEF DE SERVICE,

Dieudonné KALO-ka-KALO

KINSHASA — Lieu

12 JAN 2017 — Date

CITES 1174947

Timbre de sécurité, signature et cachet officiel

14. APPROBATION DE L'EXPORTATION:

15. Connaissement/Lettre de transport aérien:

Bloc	Quantité
A	
B	
C	
D	

Port d'exportation | Date | Signature | Cachet et titre officiel

CITES PERMIS / CERTIFICAT N° 6918