Biosafety Level 3 Laboratories in the US: Common Practices and Operations

Completed MSEH project* by Victoria Catto Pompei to be published by Anderson, Richards and Catto Pompei in 2013 in Applied Biosafety Journal.

*MSEH DEGREE AT ECU IS DISTANCE EDUCATION OR ON-CAMPUS THESIS

FOR THIS PROJECT:
VICTORIA CATTO POMPEI: STUDENT ALICE ANDERSON* , STEPHANIE RICHARDS: ADVISORS, COMMITTEE

A Note: Anderson phased retirement , New **Grad director: Tim Kelley**

BSL-3 LABORATORIES AND VECTOR CONTROL

Bio-Safety Levels refer to the level of safety measures required for work in the space.

- BSL -1
- BSL -2
- BSL -3
- BSL -4

AT ECU NEW LABORATORY IS BSL-2 DR. STEPHANIE RICHARDS IS RESEARCHER

AN ADJACENT LABORATORY WILL BE FOR INDUSTRIAL HYGIENE RESEARCH BY DR. JO ANNE BALANAY

Stephanie will be working with Dengue fever pathogens*, allowed in a BSL-2 laboratory setting.

BSL2 labs usually don't work with viruses, but they can (as with dengue virus).

- Examples of Published BSL-3 work by Stephanie Richards and colleagues:
- "Effects of Incubation Period on Vector Competence Relationships for *Culex Pipiens quinquefasciatus* (Diptera Culicidae) and West Nile Virus.
- "Vector competence of Florida *Culex* and *Aedes* Mosquitoes for Chikungunya Virus"

BSL-3 SAFETY AND SELECT AGENTS

Required:

Specialized ventilation system with negative pressure

HEPA filter for dedicated exhaust.

Equipment to reduce worker exposure (pass through autoclave etc.)

Training for workers

Medical surveillance for workers, and vaccines available.

Some specialized procedures for various select agents (SAs).

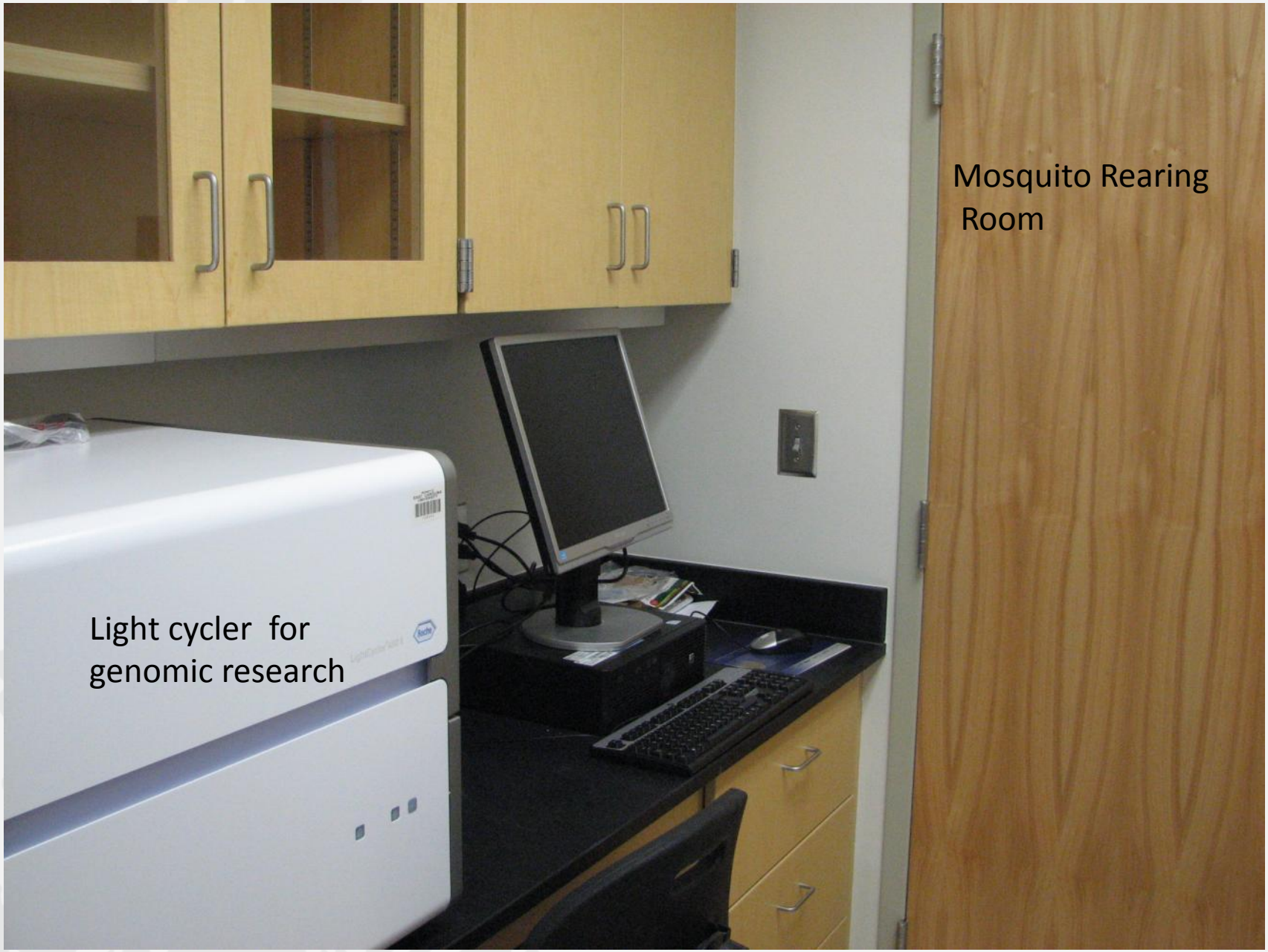
EAST CAROLINA UNIVERSITY NEW BSL-2 LABORATORY

Essentially a BSL-3 laboratory, set-up; few exceptions : specialized exhaust HEPA filter

Stephanie Richards at Pass through Autoclave


Windows not allowed in BSL-3
Laboratory set up
Environmental Health
REVCO
BIOHAZARD


Instrument room
Mosquito room
eppendorf
Centrifuge 5810 R


Mosquito Rearing Room
Light cycler for genomic research

MSEH STUDENT STUDY OBJECTIVES

1. Determine actual SOPs in US BSL-3 laboratories
2. Determine effect of three Main variables on SOP

   a. facility type, age, size(Academic, Nonprofit, State, Federal, Private) (decades from1970) (small, med, large)

      1) training

      2) Decontamination

      3) PPE type

      4) Medical surveillance

   b. funding (adequate, inadequate)

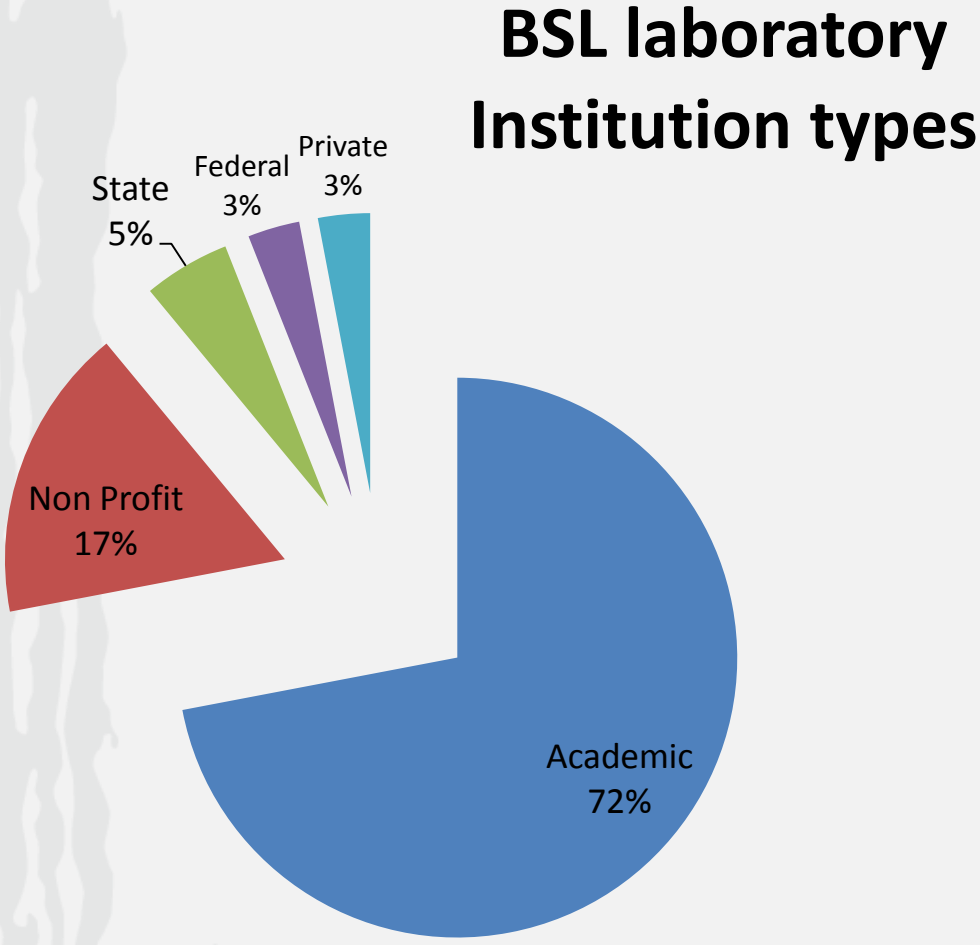
   c. SA status (current, non-current)

Survey Participants

US NIH REGISTERED IBCS: 754
FINAL SURVEY GROUP: 359

ONLINE SURVEY THROUGH “SURVEY MONKEY”

Results



Of respondents, percent of institution types in US NIH registered BSL-3 Laboratories.

TABLE 5. SIGNIFICANT X^2 COMPARISONS OF 5 BSL-4 FACILITY TYPE VARIABLES VS. 5 SAFETY CHARACTERISTICS

MEDICAL SURVEILLANCE

PERSONAL PROTECTIVE EQUIPMENT TYPE/USE

DECONTAMINATION FREQUENCY/ TYPE

WASTE TRANSPORT/TYPE OF WASTE

TRAINING TYPE

Highlights of Research Survey:

1. Most Facilities opened in 1990s and 2000s.
2. Older laboratories were significantly more likely to use both reusable and disposable PPE (such as clothing).

3. FACILITIES OPENED IN THE 2000S USED SIGNIFICANTLY MORE PAPRS.

4. LARGER FACILITIES ALSO HAD GREATER USE OF PAPRS.

5. DECONTAMINATION TYPE DIFFERED DEPENDING ON SIZE OF FACILITY, AND WHETHER IT WAS ADEQUATELY FUNDED. AUTOCLAVE, CHEMICAL DECONTAMINATION, AND INCINERATION WERE USED DIFFERENTLY: INADEQUATELY FUNDED OR SMALL FACILITIES USED INCINERATION WITH AUTOCLAVING AND SOME TRANSPORTED WASTE TO OTHER FACILITIES FOR DECONTAMINATION .

SA AND NON-SA FACILITIES SHOWED GREATEST DIFFERENCES:

1. MORE TRAINING COMPONENTS WERE USED FOR RESEARCHERS AND STAFF.
2. SAFACILITIES USED AUTOCLAVE AND CHEMICAL STERILANT
3. SA FACILITIES USED DISPOSABLE PPES
4. SA FACILITIES MORE LIKELY TO USE PAPRS

5. SA FACILITIES MORE LIKELY TO USE COMPLETE BASELINE AND FOLLOW UP SERUM SAMPLES FOR MEDICAL SURVEILLANCE OF WORKERS.

DISCUSSION AND CONCLUSION

The authors conclude that though increasing US capacity to do BSL-3 work advances the study of infectious disease, there are risks.

- Low number of responses from FED, STATE, and private= unknown practices.
- Continuing funding for older facilities difficult.
- Training for support staff often neglected.
- Certification needs standardizing.

- **SA-USING LABS MUST BE REGISTERED WITH USDA-APHIS OR CDC**

  MORE RESTRICTIVE ACCESS (EG. FINGERPRINT, CODES ETC.)

  MORE HANDS-ON TRAINING

  MORE MEDICAL SURVEILLANCE FOR STAFF

ABSA (BIOLOGICAL SAFETY) GROUP ALSO ASSESSING MEDICAL MONITORING AND IMMUNIZATION

RESULTS ALSO SHOW NEED FOR MORE ENFORCEMENT OF STANDARDS

NEEDED STANDARDIZATION OF PROCEDURES AND PROTOCOL INCREASES SAFETY FOR WORKERS AND THE PUBLIC

NEEDED STANDARDIZATION OF PROCEDURES AND PROTOCOL WILL INCREASE SAFETY FOR WORKERS AND THE PUBLIC.

DIFFICULT IN GOVERNMENTAL FLUX.