The Salk Institute for Biological Studies
Sean Adams
Mathias LeBlanc
Johns Hopkins University
Jessica Izzi
Eric Hutchinson
Biomedical Primate Research Center
Jaco Bakker
University of Utah
Mary Dickerson
WNPRC
Casey Fitz
University of Pittsburgh
Julia Klara Oluoch

University of California San Diego
Cory Miller
Massachusetts Institute of Technology & Broad Institute
Monika Burns
NIMH
Krystal Allen-Worthington
SNPRC
Donna Layne Colon
Melissa De La Garza
Kathy Brasky
Central Institute for Experimental Animals
Erika Sasaki
Takshi Inoue
Colony manager
- Resource allocation: breeding, research, sale
- Housing and space management
- Supervision of husbandry staff
- Oversite of animal breeding
- Assist with technical tasks, surgery, research procedures

Breeding manager
- Typically the same person as colony manager or sometimes veterinary staff
- Monitors breeding and pregnancies
- Administers birth control
- Ultrasound
Staffing

Animal Caretaker/Husbandry
- Daily care: cleaning, feeding, enrichment, catching/handling
- Daily health observations and weighing
- Medication administration, treatments
- Training of animals, positive reinforcement
- Infant care

Behaviorist, Behavioral Service Unit
- Role typically filled by another position
  - Veterinarian or Colony manager
- BSU available for consults as needed
Staffing

**Veterinarian**
- Staff management and training
- Research project support and facilitation of implementation
- Surgical and anesthesia services
- Animal health oversight and medical care
- Facility and husbandry program oversight

**Veterinary technician**
- Procedure/surgery prep and support
- Anesthesia monitoring
- Sample collection, triage and case presentation to veterinarian
- Monitor ongoing clinical cases and follow up checks
- Daily health rounds and medication administration
Blood Analysis

Point of care blood analyzer
- Quick results
- Small blood volume (0.1mL)
- Portable

Microtainer
- CBC (0.3mL)
- Chemistry (0.8mL)
Daily Health Observations

- Staff familiar with animals
- Check all animals for abnormalities
  - Systematic check of each animal
    - abnormal behaviors, trauma, lethargy, dehydration, vaginal bleeding, parturition, inappetence, breeding
  - Examine cages
    - abnormal feces, vomit, blood, uneaten chow
  - Record abnormalities
    - Forms, electronic
- Notify vet tech or veterinarian
Daily Health Observations

Identify the animal (cage number, species, and animal ID) and describe the irregular observation using one of the following colony record codes or give a brief description. If an animal’s ID cannot be determined, leave the animal ID blank, but attempt to identify the animal as soon as possible.

<table>
<thead>
<tr>
<th>ROOM #</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initials:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cage #</td>
<td>Animal ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Irregular Observation Form

- Post Form on Room Door
- Husbandry staff fills out form each morning
- Vet staff checks all animals reported for abnormalities

Additional comments:

Colony record codes:

<table>
<thead>
<tr>
<th>MENSTRUATION</th>
<th>ABNORMAL FECES</th>
<th>MISCELLANEOUS</th>
<th>BEHAVIOR</th>
<th>BREEDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>M: regular menstruation</td>
<td>FS: firm stool</td>
<td>T: trauma* (specify location)</td>
<td>NF: new part</td>
<td>L: ejaculate viable</td>
</tr>
<tr>
<td>LM: light menstruation</td>
<td>SF: soft feces/cow pie</td>
<td>L: lethargic*</td>
<td>OG: over-groomed</td>
<td>NoE: no ejaculate</td>
</tr>
<tr>
<td>HM: heavy menstruation</td>
<td>D: diarrhea</td>
<td>V: vomit</td>
<td>P: pacing</td>
<td>use the above code only for animals paired for breeding</td>
</tr>
<tr>
<td>PPM: after birth bleeding</td>
<td>BF: bloody feces*</td>
<td>RP: rectal prolapse*</td>
<td>S: salting</td>
<td></td>
</tr>
<tr>
<td>LPPM: light after birth bleeding</td>
<td>BD: bloody diarrhea*</td>
<td>VP: vaginal prolapse</td>
<td>F: flipping</td>
<td></td>
</tr>
<tr>
<td>HPPM: heavy after birth bleeding</td>
<td>MU: mucus with feces</td>
<td>NE: not eating</td>
<td>(SIB) self-injurious behavior*</td>
<td></td>
</tr>
</tbody>
</table>

* Contact a member of the veterinary staff immediately if bloody feces/diarrhea, trauma, rectal prolapse, pregnant animal with vaginal bleeding, or lethargy.
Weights

- **Frequency**
  - Weekly, Monthly, Quarterly, As needed/indicated
  - Earliest Weights
- **Methods**
  - Sedated, At any procedure
  - Nest box
  - Scale in cage
- **Monitoring trends**
  - Indication of disease
  - Decline/Aging
  - Compare to colony averages
- **Scales**
### Weights

#### Raw Data

<table>
<thead>
<tr>
<th>Id</th>
<th>Date</th>
<th>Weight (kg)</th>
<th>Current Weight (kg)</th>
<th>% Change Relative To Current</th>
<th>Interval (Months)</th>
<th>Remark</th>
<th>Status</th>
<th>Task Id</th>
</tr>
</thead>
<tbody>
<tr>
<td>q1239</td>
<td>2018-10-05 14:05</td>
<td>0.35</td>
<td>0.36</td>
<td>0.37</td>
<td>1.1</td>
<td>0.0</td>
<td>In Progress?</td>
<td>980141</td>
</tr>
<tr>
<td>q1239</td>
<td>2018-10-01 13:04</td>
<td>0.366</td>
<td>0.36</td>
<td>0.37</td>
<td>0.0</td>
<td>Completed</td>
<td>981507</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-09-28 10:53</td>
<td>0.373</td>
<td>0.37</td>
<td>0.37</td>
<td>0.0</td>
<td>Completed</td>
<td>980680</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-09-26 11:48</td>
<td>0.359</td>
<td>0.37</td>
<td>0.37</td>
<td>0.0</td>
<td>Completed</td>
<td>979799</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-09-21 11:56</td>
<td>0.38</td>
<td>0.37</td>
<td>0.37</td>
<td>0.0</td>
<td>Completed</td>
<td>977945</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-09-19 12:59</td>
<td>0.381</td>
<td>0.37</td>
<td>0.37</td>
<td>0.0</td>
<td>Completed</td>
<td>977089</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-09-13 10:57</td>
<td>0.413</td>
<td>0.37</td>
<td>-10.2</td>
<td>0.0</td>
<td>Completed</td>
<td>975056</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-09-13 09:01</td>
<td>0.416</td>
<td>0.37</td>
<td>-11.1</td>
<td>0.0</td>
<td>Completed</td>
<td>974948</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-08-16 08:57</td>
<td>0.41</td>
<td>0.37</td>
<td>-9.8</td>
<td>1.0</td>
<td>Completed</td>
<td>963972</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-08-14 13:22</td>
<td>0.41</td>
<td>0.37</td>
<td>-9.8</td>
<td>1.0</td>
<td>Completed</td>
<td>963078</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-08-08 12:14</td>
<td>0.416</td>
<td>0.37</td>
<td>-11.1</td>
<td>1.0</td>
<td>Completed</td>
<td>960366</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-07-31 13:38</td>
<td>0.396</td>
<td>0.37</td>
<td>-6.6</td>
<td>2.0</td>
<td>Completed</td>
<td>956488</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-07-19 09:01</td>
<td>0.383</td>
<td>0.37</td>
<td>-3.4</td>
<td>2.0</td>
<td>Completed</td>
<td>950757</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-07-17 12:31</td>
<td>0.387</td>
<td>0.37</td>
<td>-4.4</td>
<td>2.0</td>
<td>Completed</td>
<td>949762</td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-07-02 12:15</td>
<td>0.366</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-06-26 13:47</td>
<td>0.365</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-06-22 11:40</td>
<td>0.368</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-06-21 10:45</td>
<td>0.368</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-06-15 10:43</td>
<td>0.387</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-06-11 13:00</td>
<td>0.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-06-04 12:57</td>
<td>0.39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-05-29 14:03</td>
<td>0.391</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-05-24 13:55</td>
<td>0.379</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-05-18 13:24</td>
<td>0.398</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-05-14 12:44</td>
<td>0.397</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-05-10 08:33</td>
<td>0.391</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-05-07 12:13</td>
<td>0.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-04-30 12:08</td>
<td>0.406</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-04-26 09:12</td>
<td>0.389</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-04-24 13:22</td>
<td>0.405</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-04-10 11:45</td>
<td>0.403</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-04-02 13:09</td>
<td>0.408</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-03-29 09:29</td>
<td>0.386</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q1239</td>
<td>2018-03-28 12:10</td>
<td>0.396</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Weight: q1239

![Weight Graph](image-url)
Physical Exams

- Frequency
  - Annual or Twice per year
  - Monthly
  - Pre-assignment assessment
    - Exams prior to assignment to research project

- Sedated
  - Ketamine (10-30mg/kg)
  - Alfaxalone (7-12 mg/kg)
    - Release of multidose vial – became available Aug2018
    - 28 day shelf life after open
  - Isoflurane

- Non-sedated
  - Restrained
  - More difficult to be thorough
Physical Exams

- Other procedures performed while sedated
  - CBC + Serum chemistry
  - Radiographs and Ultrasound
  - Dental cleanings/extractions
  - Tattoo placement/repair
  - Tb testing

- Routine Pathogen Testing
  - Fecal testing
    - Rectal swab for culture
    - Parasite exam
    - Giardia and Cryptosporidium EIA
  - Virology
Tuberculosis Testing

- Frequency
  - Annual
  - Twice per year
  - None
  - Prior to shipping

- Tuberculin Skin Test Location
  - Intradermal
    - Eyelid (0.05ml)
    - Abdomen

- Exclusions
  - <3mo, <6mo, <1year
  - Pregnant or lactating
    - Embryo transfer
    - Late gestation
Tuberculosis Testing

- Never had a positive
- Steps following positive test:
  - Quarantine room/area
  - Sedate animal(s) for follow up testing
    - Retest animal or colony
    - Thoracic radiographs
    - Gastric aspirate – culture and acid fast smear
    - Bronchoaveolar lavage – culture and acid fast smear
  - Inform local veterinary authorities
  - Gamma interferon assay
  - Mycobacterium PCR
- Treatment options:
  - Antibiotic treatment
  - Euthanasia
Quarantine of Acquired Animals

- Where did the animals come from?
- Tuberculosis
  - 30 day or 90 day
  - 3x or 7x
  - Thoracic radiographs
- Measles
- Klebsiella, Pasteurella, Bordatella
- Intestinal parasites
- Other tests
  - Blood work, fecal testing
Identification

- Codes, id numbers (1801, 1802 or 18A, 18B)
- Tattoos
- Microchips
- Neck tags
- Dye
- Shaving
Restraint

- Hand catching
  - gloves
- Nest box
- Tube
  - Blood collection
  - Ultrasound
  - Medication administration
- Chemical

[Images of restraint equipment and animals in a controlled environment]
Caging

- Vertical space
  - Arboreal
- Perches and Ladders
  - Wood
- Nest box
- Hammock
Enrichment

- Establish enrichment program
  - Novel Foods
  - Pocket treats
- Species specific behaviors
  - Social housing
  - Foraging opportunities
- Sharing ideas
Questions?

Casey Fitz
cfitz@primate.wisc.edu
Staffing

Pathology and Clinical Pathology Services

- Necropsy services
- Histology
- Blood, fecal, urine storage, processing and testing
- Tissue collection and storage
- Microbiology
Veterinary Rounds

- Perform/help with daily health observations
- Brief exams, Triage
  - Palpation
  - Skin tent test
  - Traumas
  - Weight
- Blood collection, ultrasound, istat
- Medication administration and dispensing
- Rechecks of ongoing problems
- Medical record entry
  - SOAP
  - Problem List
### Observations Per Animal

<table>
<thead>
<tr>
<th>ID</th>
<th>Date</th>
<th>Location</th>
<th>Id</th>
<th>Date</th>
<th>Feces</th>
<th>Menses</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018-10-12</td>
<td></td>
<td></td>
<td>13:57</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Irregular Observations - Multiple rooms selected

Filter: (DATE(date) = 2018-10-18)

**View: default**

<table>
<thead>
<tr>
<th>Room</th>
<th>Cage</th>
<th>Id</th>
<th>Date</th>
<th>Userid</th>
<th>Description</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>a140a</td>
<td>0002</td>
<td>c1707</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation</td>
<td>44/80g clo</td>
</tr>
<tr>
<td>a140a</td>
<td>0002</td>
<td>c2014</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation</td>
<td>44/80g clo</td>
</tr>
<tr>
<td>a140a</td>
<td>0004</td>
<td>c1854</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: D</td>
<td>Sm amt D dry</td>
</tr>
<tr>
<td>a140a</td>
<td>0004</td>
<td>c2199</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: D</td>
<td>Sm amt D dry</td>
</tr>
<tr>
<td>a140a</td>
<td>0004</td>
<td>c1890</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: D</td>
<td>Sm amt D dry</td>
</tr>
<tr>
<td>a140a</td>
<td>0005</td>
<td>c2069</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: D</td>
<td>Sm amt D dry</td>
</tr>
<tr>
<td>a140a</td>
<td>0005</td>
<td>c2105</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: D</td>
<td>Sm amt D dry</td>
</tr>
<tr>
<td>a140a</td>
<td>0006</td>
<td>c2000</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: SF</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0006</td>
<td>c1906</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: SF</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2157</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2158</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2008</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2095</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2203</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2202</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2201</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2200</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2203</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2204</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2205</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2206</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2207</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2208</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2209</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2210</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
<tr>
<td>a140a</td>
<td>0013</td>
<td>c2211</td>
<td>2018-10-18</td>
<td>07:23</td>
<td>Cage Observation, Feces: FS</td>
<td></td>
</tr>
</tbody>
</table>