

Syllabus
METHODS IN FIELD PRIMATOLOGY
Anthropology 574

“The traditional view of the distinction between field and laboratory studies is that field studies, by their very nature, must always be descriptive, inexact, nonanalytic—at best a source of ideas—and that only within the context of a laboratory setting can one make the kind of controlled, precise, reliable, quantitative studies that are required to test hypotheses...there seems to be a basic misunderstanding both about the role of controlled conditions in behavioral research and about what can be accomplished in the field. All of the cherished criteria of scientific research—representative and adequate sampling, reliability, replicability, and so forth—can be met under appropriate field conditions”

— Stuart A. Altmann¹

“You can observe a lot just by watching”

—Yogi Berra²

- Instructor:** Ryne A. Palombit
001 Biological Sciences Building, Douglass Campus
Phone: 848-932-9275
rpalombit@anthropology.rutgers.edu
<http://www.rci.rutgers.edu/~palombit/>
- Office Hours:** Monday 2:00 - 4:00 pm or by appointment
- Sakai Webpage:** METHODS FIELD PRIMAT 01 Sp17
- Class Meeting Times:** Thursday 2:15 - 5:15 pm
- Prerequisites:** Permission of instructor: some background in behavioral ecology &/or primatology
- Textbook:** Martin, P., & P. Bateson. 2007. *Measuring Behaviour*, 3rd ed. Cambridge University Press, Cambridge.
- Optional:**
Setchell, J.M., & D.J. Curtis (eds.). 2011. *Field and Laboratory Methods in Primatology: A Practical Guide*, 2nd edition. Cambridge University Press, Cambridge.
Sterling, E.J., Bynum, N. & Blair, M.E., eds. 2013. *Primate Ecology and Conservation: A Handbook of Techniques*. Oxford University Press, Oxford.

Goal of Seminar

Acquire training & broad background in a range of field methods used in the study of primate behavioral ecology in the field.

Requirements:

Annotated Bibliographies	25%
Short Paper: Compare Methods	25%
Participation:	50%

Requirements Details:

1. *Annotated bibliographies* (25%)

For **two** topics in field methodology, you will compile an exhaustive annotated bibliography of relevant publications & papers.

¹ Altmann, S.A. 1967. Editor's comments. In: *Social Communication Among Primates*, (S.A. Altmann, ed.) pp. 371-378. University of Chicago Press, Chicago.

² Berra, Y. 2008. *You Can Observe a Lot by Watching: What I've Learned About Teamwork From the Yankees and Life*. John Wiley & Sons, New York.

Note: the papers you include can be of two sorts. First, you will, of course, want to include papers that are explicitly method-oriented. This type of paper should be your primary focus. Second, you can choose to also include some papers that are actual empirical studies. These are not “methods” papers per se, but exemplify excellent or not-so-excellent use of the relevant methodology. **Target more recent papers** as much as possible.

Here are topics that can be chosen for annotated bibliographies. If you would like to propose a topic not listed here, let me know and I will evaluate it and let you know. Note: you cannot choose a topic that has already been chosen by another grad, and topics are allocated on a first come, first serve basis. So, as soon as you pick topics, email me. I’ll keep a list of topics taken and remaining on the Sakai site.

Some Annotated Bibliography Topics:

Hormones & other metabolites	Energetics & Thermoregulation
GIS / GPS	Cognition
Experimentation in the field: playbacks (mostly) & other	Measuring / Quantifying Sociality
Audio recording	Parasites
Software & hardware for data recording	Conservation
Immobilization, capture, darting, marking, tagging	Census
DNA sampling (noninvasive)	Ethnoprimatology
Radiotelemetry & Remote Tracking	Questionnaires
Morphometrics (in the field on living primates)	Habituation
Habitat description, soils, etc.	Nutrients & nutrition
	Ethics

If you think of another possible topic, just ask me if it would be suitable for this assignment. **Due via email by 8 May.** Email me it to me as a Word document. At semester’s end, I will distribute all annotated bibliographies to everyone.

Based on past annotated bibliographies, you should aim for 20-25 papers per annotated bibliography. Here are examples of annotated bibliography entries. NOTE: please use this format in your bibliographies, i.e., give the bibliographic reference in **bold face** and then, in the next paragraph, give the annotated comments:

Frantzen, M. A. J., Silk J. B., Ferguson, W. H., Wayne, R. K., and Kohn M. H. 1998. Empirical evaluation of preservation methods for faecal DNA. *Molecular Ecology*, 7: 1423-1428.

The purpose of this study is to compare four different preservation methods for fecal samples and to determine how this affects DNA extraction and amplification. The subjects were 22 free-ranging of the Okavango Delta in Bostwana. Samples were collected immediately after defecation using disposable gloves, then a homogenized mixture was obtained by mixing material from the outside and the inside of each sample. Each segment was divided in four parts and preserved in four ways: the first method involved placing about 2g of the sample in a screw-top vial containing 1mL of DMSO/EDTA/Tris/salt solution (DETs). For the second technique, the solution was replaced with 70% ethanol. The third approach required placing the fecal material in ziploc plastic bags and freezing it in a standard commercial freezer at -20 C. Finally, the fourth samples were placed in paper bags and air dried at room temperature. Samples were shipped to UCLA, where extraction and amplification was performed for short, medium, and long mtDNA and nDNA fragments. All preservation methods yielded similar results with mtDNA, regardless of length. Short nDNA was successfully amplified more often when using DETs (42%), followed by drying (35%), then frozen (27%), and ethanol (27%). Medium fragments of nDNA were amplified only with the samples preserved in DETs, and long fragments only with dried and DETs-preserved samples. The authors suggest using DETs for preserving samples in the field, although drying is equally effective for mtDNA. Successful amplification is also affected by the quantity of sample and preservation solution used, and even with the most effective methods multiple extractions are necessary. Since an average of 31% of the samples did not amplify successfully, the authors recommend obtaining at least three to six samples per individual.

Vie, J.C., de Thoisey, B., Fournier, P., Fournier-Chambrillon, C., Gentry, C. & Keravec, J. 1998. Anesthesia of wild red howler monkeys (*Alouatta seniculus*) with medetomidine/ketamine and reversal by Atipamezole. *American Journal of Primatology*, 45: 399-410.

This paper aimed to determine effective anesthetic dosages and capture methods of the wild arboreal red howler monkey in French Guiana. In total, 96 monkeys were captured from flooded forests, most of them being caught by cutting down surrounding trees and eventually the monkeys’ shelter tree. I assume when

the tree fell into the water so did the monkeys, but this was not explained. Some monkeys spontaneously jumped into the water and they were then netted from the boat. Six animals were darted with doses prepared for an average size monkey. In general, darting was not preferred because the canopy was high, the monkeys were not habituated, and the boat was unstable. After capture they were placed into individual cages and left in a quiet place for 1-14 hours.

Estrada, A. and Coates-Estrada, R. 1996. Tropical rain forest fragmentation and wild populations of primates at Los Tuxtlas, Mexico. *International Journal of Primatology* 17(5):759-783.

The authors conducted an extensive study examining the current use of one traditional howler and spider monkey habitat. They surveyed the status of land and land use and censused monkeys in 126 forest fragments in the area. They utilized the IDRISI Geographic Information System to combine satellite area images with topographic maps. With these maps, they were able to establish 0.5 km² grids through which they could analyze components and characteristics of habitat and habitat use by type. Further, they could analyze grid variation by altitudinal gradient to sea level. Compiled data reveal an 80-90% reduction of areas remaining available for howler and spider monkeys. Equally relevant was the discovery that the larger population of each species in the region is divided into isolated pockets of forest surrounded by anthropogenic vegetation with few or no corridor opportunities with the possible exception of residual rain forest vegetation along water features such as lakes, rivers and streams.

Hauser, M. D. & Andersson, K. 1994. Left hemisphere dominance for processing vocalizations in adult, but not infant, rhesus monkeys: Field experiments. *Proceedings of the National Academy of Sciences*, 91: 3946-3948.

Playback experiments were conducted with free-ranging rhesus macaques on Cayo Santiago, Puerto Rico to test which hemisphere is preferentially used to process auditory stimuli. Speakers were placed so they would be directly behind an individual when feeding at a food dispenser. Many different calls were played as stimuli and it was recorded whether the monkey rotated the left or right ear toward the speaker. The authors found that 61 out of 80 adults favored the right ear, and therefore the left hemisphere, in response to monkey calls, while the left ear was favored in response to seabird calls. Infants did not favor one side over the other.

2. *Paper: Comparison of Methods* (25%)

You are to find two published field studies dealing with a particular question or topic in primate behavioral ecology. You will critically analyze the methods used to categorize, quantify, and sample the topic in question. The two papers cannot be ones assigned as readings for any of our meetings/discussions. You do not need to additional papers for this assignment. You do not need to pull in other references, but you can do so, if you wish. Paper should be 8-10 pages (double spaced, 1" margins). **Due (via email) on or before April 27.**

3. *Participation* (50%)

ATTENDANCE

Since the seminar meets only once a week and relies heavily on discussion, attendance of all meetings is strongly advised for those seeking to do well in the seminar. Unexcused absences will be detrimental to the participation component of the final course grade. A make-up assignment will be given for each missed session.

READING REQUIREMENT

The single most important aspect of performance is doing *careful reading* all of the assigned readings each week. Do not skim papers. Read them carefully! The quality of your discussion is a function of the care you exercise in reading.

VERBAL CONTRIBUTION

You should come to seminar with a short list of several points you would like to make at some point. These should be a mixture of general and specific points as it is always hard to predict directions discussion will take. But you should "jump in" with points and respond dynamically. That means making points, asking questions.

One thing everyone will do at the beginning of a meeting (before discussion starts) is write on the whiteboard a sentence identifying what you see as the *primary methodological difficulty* in measuring or studying the topic for that day. This can be a difficulty that a method actually solves or one that is partially solved or one that you think has still not been adequately resolved.

LITERATURE SEARCHES

Twice each semester you will do a search of the literature on the topic of discussion and make recommendations regarding papers we should read in class. One of these searches pertains to the session that you co-moderate (see below). Your recommendations don't have to be necessarily based on in-depth analysis of each paper. Rather, you should be able to make a preliminary evaluation based on a quick reading of it.

So, *two weeks* before your moderating date, you should:

- a. email me a list of at least 3 but not more than 5 papers, book chapters, or book excerpts that you've run across that you think are relevant for the discussion (of course, these should not be the papers I've already recommended below [or, updated, on the webpage]).
- b. Be sure that this list provides *complete* bibliographic information for *each* reading
- c. for each paper, explain *in a few sentences* why you recommend it or don't recommend it for as a reading for the seminar. NOTE: *a positive recommendation to read a particular paper does not necessarily mean it will be assigned.*
- d. Please email me a pdf of each paper, book chapter, or book excerpt at the time you email me this list.

CO-MODERATING

Once during the semester you'll serve as a co-moderator of discussion (with me). This means leading the discussion by offering your critical evaluations of the readings. This does not mean simply rephrasing the content of the papers. Rather, take an analytical stance. You should present in writing the following, either on the blackboard or in a handout:

- A. What are the goals of the methodology? What is one trying to achieve with them? What are the variables of interest? This discussion may sometimes also include a brief treatment of the kinds of questions or areas of theory addressed by the methodology (but this should be brief. This course is mostly about methods, not theory)
- B. What specific problems arise when one tries to make this measurements?
- C. What are the specific methodological solutions to those problems?
- D. Present the results of one other relevant, empirical study (not theoretical or review paper) that was *not* assigned as a reading.

If you like, you can take time at the beginning of class to present material (a brief "lecture") or you can present it during the course of the discussion.

A Comment about Philosophy and Ethics

Unfortunately, we don't have time to set aside an entire session for each of these three important topics: philosophical (epistemological) issues that bear upon methodology, ethics, and conservation. For the former, we will at least read a couple papers (Platt, 1964; Hempel, 1966). As far as ethics, it of course informs virtually *every* area of methodology. This is partly because of the Responsible Conduct in Research (RCR) requirement of NSF. So, it makes more sense for us to consider ethical issues with each topic rather than have a separate session on ethics. So, keep this issue in mind when you are moderating and participating in discussion. Do you see ethical problems with a methodology? What solutions are there to these problems? Here are a couple papers and a book that are starting points, and well worth reading. We may discuss at some point in the semester, but in any case, even if we do not, some of the issues are likely to arise in discussion:

- Rudran, R. & Kunz, T.H. 1996. Ethics in research. In: *Measuring and Monitoring Biological Diversity: Standard Methods for Mammals* (D.E. Wilson, F.R. Cole, J.D. Nichols, R. Rudran & M.S. Foster, eds.), pp. 251-254. Smithsonian Institution Press, Washington.
- Wolfe, L.D. 2005. Field primatologists: Duties, rights, and obligations. In: *Biological Anthropology and Ethics: From Repatriation to Genetic Identity* (T. Turner, ed.), Albany, New York: State University of New York Press.
- Fedigan, L.M. 2010. Ethical issues faced by field primatologists: Asking the relevant questions. *Am. J. Primatol.*, 72:754-771.
- MacClancy, J. and Fuentes, A. (eds.), 2013. *Ethics in the Field: Contemporary Challenges*. Oxford, UK: Berghahn Books.

Schedule

Preliminary Comment: If you haven't read this seminal paper before or lately, do so (it is on Sakai):

Tinbergen, N. 1963. On the aims and methods of ethology. *Z. Tierpsychol.*, 20: 410-433.

Readings are to be announced one week before the meeting. Below are *some* likely (but not necessarily inevitable) readings.

Readings will be of two types. Often, we'll have papers that focus explicitly on methodology. But sometimes we'll read papers that are empirical studies and we'll read only the Methods and Results sections of the papers.

Jan. 19 ORGANIZATIONAL MEETING

Jan. 26 SCIENTIFIC METHOD Lit Search: • Moderator: Ryne BEHAVIORAL TAXONOMY DISCUSSION HUMAN ETHOGRAM

Platt, J.R. 1964. Strong inference. *Science*, 146:347-353

Hempel, C.G. 1966. Concept Formation. Chapter 7 from *Philosophy of Natural Science*. Prentice-Hall, Englewood Cliffs, NJ.

Martin & Bateson chapters 1, 2, & 3 (for chapter 3, emphasize pp. 335)

Rosenblum, L.A. 1978. The creation of a behavioral taxonomy. In: *Observing Behavior*, Vol. II Data collection and analysis methods (Ed. by G.P. Sackett), pp. 15-24. University Park Press, Baltimore.

Your ethograms of *Homo sapiens*

Feb. 2 SAMPLING BEHAVIOR I Lit Search: • Moderator: Ryne

Martin & Bateson Chapters 3 (pp. 35-41), 4, 5, & 7

Altmann, J. 1974. Observational study of behavior: Sampling methods. *Behaviour*, 49:229-267.

Amato, K.R., Van Belle, S. & Wilkinson, B. 2013. A comparison of scan and focal sampling for the description of wild primate activity, diet and intragroup spatial relationships. *Folia Primatol.*, 84:87-101.

Rose, L. 2000. Behavioral sampling in the field: Continuous focal versus focal interval sampling. *Behaviour*, 137:153-180

Feb. 9 SAMPLING BEHAVIOR II Lit Search: • Moderator: Ryne HARDWARE & SOFTWARE

Martin & Bateson, Chapter 6

Hinde, R.A. 1973. On the design of check-sheets. *Primates*, 14:393-406.

McDonald, M. & Johnson, S. 2014. 'There's an app for that': A new program for the collection of behavioural field data. *Anim. Behav.*, 95:81-87.

Friard, O. & Gamba, M. 2016. BORIS: A free, versatile open-source event-logging software for video/audio coding and live observations. *Methods Ecol. Evol.*, 7:1325-1330.

Pebsworth, P.A. & LaFleur, M. 2014. Advancing primate research and conservation through the use of camera traps: Introduction to the special issue. *Int. J. Primatol.*, 35:825-840.

Rothman, J.M., Chapman, C.A., Twinomugisha, D., Wassserman, M.D., Lambert, J.E. & Goldberg, T.L. 2008. Measuring physical traits of primates remotely: The use of parallel lasers. *Am. J. Primatol.*, 70:1191-1195.

Just Check Methods & Results:

Use of cameras for behavioral measurements:

Engelbrecht, D. 2016. Galagos as avian nest predators in South Africa. *Primates*, 57 (4):455-458.

Loken, B., Spehar, S. & Rayadin, Y. 2013. Terrestriality in the Bornean orangutan (*Pongo pygmaeus morio*) and implications for their ecology and conservation. *Am. J. Primatol.*, 75:1129-1138, doi 10.1002/ajp.22174.

Tan, C.L., Yang, Y. & Niu, K. 2013. Into the night: camera traps reveal nocturnal activity in a presumptive diurnal primate, *Rhinopithecus brelichi*. *Primates*, 54:1-6

Use of photogrammetry:

- Galbany, J., Stoinski, T.S., Abavandimwe, D., Breuer, T., Rutkowski, W., Batista, N.V., Ndagijimana, F. & McFarlin, S.C. 2015. Validation of two independent photogrammetric techniques for determining body measurements of gorillas. *Am. J. Primatol.*
- Lu, A., Bergman, T.J., McCann, C., Stinespring-Harris, A. & Beehner, J.C. 2016. Growth trajectories in wild geladas (*Theropithecus gelada*). *Am. J. Primatol.*, 78:707-719.

**Feb. 16 MEASURING SOCIALITY I:
CONCEPTUAL ISSUES**

Lit Search: Alex

Co-Moderator: Alex

- Kummer, H. 1978. On the value of social relationships to nonhuman primates: A heuristic scheme. *Soc. Sci. info.*, 17:687-705.
- Hinde, R.A. 1979. The nature of social structure. In: *The Great Apes*, (D.A. Hamburg & C.R. McCann, eds.), pp. 295-315. Benjamin Cummings, Menlo Park, California.
- Rowell, T.E. 1993. Reification of social systems. *Evol. Anthro.*, 2:135-137.
- Dolhinow, P. 1994. Social systems and the individual. *Evol. Anthro.*, 3:73-74.
- Strum, S.C. 2012. Darwin's monkey: Why baboons can't become human. *Am. J. Phys. Anthropol.*, 149:3-23.
- Hofmann, H.A., Beery, A.K., Blumstein, D.T., Couzin, I.D., Earley, R.L., Hayes, L.D., Hurd, P.L., Lacey, E.A., Phelps, S.M., Solomon, N.G., Taborsky, M., Young, L.J. & Rubenstein, D.R. 2014. An evolutionary framework for studying mechanisms of social behavior. *Trends Ecol. Evol.*, 29:581-589.

Feb. 23 MEASURING SOCIALITY II

Lit Search: Meg

Co-Moderator: Ryne

- Martin & Bateson, pp. 129-134.
- Dunbar, R.I.M. & Shultz, S. 2010. Bondedness and sociality. *Behaviour*, 147:775-803.
- Hinde, R.A. 1977. On assessing the bases of partner preferences. *Behaviour*, 62:1-9.
- Silk, J., Cheney, D. & Seyfarth, R. 2013. A practical guide to the study of social relationships. *Evol. Anthro.*, 22:213-225.
- Wada, K. & Ogawa, M. 2009. Identifying inter-individual social distances in Japanese monkeys. *Mammalia*, 73:81-84.
- Castles, M., Heinsohn, R., Marshall, H.H., Lee, A.E.G., Cowlshaw, G. & Carter, A.J. 2014. Social networks created with different techniques are not comparable. *Anim. Behav.*, 96:59-67.

Just Check Methods & Results:

- Anzenberger, G., Mendoza, S.P. & Mason, W.A. 1986. Comparative studies of social behavior in *Callicebus* and *Saimiri*: Behavioral and physiological responses of established pairs to unfamiliar pairs. *Am. J. Primatol.*, 11:37-51

**March 2 HOME RANGE, REMOTE MONITORING,
TELEMETRY, GPS**

Lit Search: Daniel

Co-Moderator: Daniel

- Brown, D.D., LaPoint, S., Kays, R., Heidrich, W., Kümmeth, F. & Wileski, M. 2012. Accelerometer-informed GPS telemetry: Reducing the trade-off between resolution and longevity. *Wildlife Society Bulletin*, 36:139-146.
- Burton, A.C., Neilson, E., Moreira, D., Ladle, A., Steenweg, R., Fisher, J.T., Bayne, E. & Boutin, S. 2015. Wildlife camera trapping: A review and recommendations for linking surveys to ecological processes. *J. Appl. Ecol.*, 52:675-685.
- Kays, R., Tilak, S., Crofoot, M., Fountain, T., Obando, D., Ortega, A., Kuemmeth, F., Mandel, J., Swenson, G., Lambert, T., Hirsch, B. & Wikelski, M. 2011. Tracking animal location and activity with an automated radio telemetry system in a tropical rainforest. *The Computer Journal*, 54, doi 10.1093/comjnl/bxr072.
- McLean, K.A., Trainor, A.M., Asner, G.P., Crofoot, M.C., Hopkins, M.E., Campbell, C.J., Martin, R.E., Knapp, D.E. & Jansen, P.A. 2016. Movement patterns of three arboreal primates in a Neotropical moist forest explained by LiDAR-estimated canopy structure. *Landscape Ecology*, 31:1849-1862.
- Strandburg-Peshkin, A., Farine, D.R., Couzin, I.D. & Crofoot, M.C. 2015. Shared decision-making drives collective movement in wild baboons. *Science*, 348:1358-1361.

Just Check Methods & Results:

- Markham, A.C. & Altmann, J. 2008. Remote monitoring of primates using automated GPS technology in open habitats. *Am. J. Primatol.*, 70:495-49.

March 9 CENSUS & SURVEY, PHENOLOGY

Lit Search: Meg

Co-Moderator: Meg

- Plumptre, A.J., Sterling, E.J. & Buckland, S.T. 2013. Primate census and survey techniques. In: *Primate Ecology and Conservation: A Handbook of Techniques* (E.J. Sterling, N. Bynum & M.E. Blair, eds.), pp. 10-26. Oxford University Press, Oxford.

- Marshall, A.J. & Wich, S. 2013. Characterization of primate environments through assessment of plant phenology. In: *Primate Ecology and Conservation: A Handbook of Techniques* (E.J. Sterling, N. Bynum & M.E. Blair, eds.), pp. 103-127. Oxford University Press, Oxford.
- Meyler, S.V., Salmons, J., Ibouroy, M.T., Besolo, A., Rasolondraibe, E., Radespiel, U.T.E., Rabarivola, C. & Chikhi, L. 2012. Density estimates of two endangered nocturnal lemur species from northern Madagascar: New results and a comparison of commonly used methods. *Am. J. Primatol.*, 74:414-422.
- Morellato, L.P.C., Camargo, M.G.G., Neves, F.F.D., Luize, B.G., Mantovani, A. & Hudson, I. 2010. The influence of sampling method, sample size, and frequency of observations on plant phenological patterns and interpretation in tropical forest trees. In: *Phenological Research* (I.L. Hudson & M.R. Keatley, eds.), pp. 99-121. Springer, New York.

Just Check Methods & Results:

- Brugière, D., Gautier, J.-P., Moungazi, A. & Gautier-Hion, A. 2002. Primate diet and biomass in relation to vegetation composition and fruiting phenology in a rain forest in Gabon. *Int. J. Primatol.*, 23:999-1024.
- DeWalt, S.J., Maliakal, S.K. & Denslow, J.S. 2003. Changes in vegetation structure and composition along a tropical forest chronosequence: Implications for wildlife. *Forest Ecology and Management*, 182:139-151.
- Gilhooly, L.J., Rayadin, Y. & Cheyne, S.M. 2015. A comparison of hylobatid survey methods using triangulation on Müller's gibbon (*Hylobates muelleri*) in Sungai Wain Protection Forest, East Kalimantan, Indonesia. *Int. J. Primatol.*, 36:567-582

March 16 SPRING BREAK • •

March 23 FEEDING I: FOOD CHARACTERISTICS Lit Search: Daniel Guest Moderator: Stan Kivai

- Rothman, J.M., Chapman, C.A. & van Soest, P.J. 2012. Methods in primate nutritional ecology: A user's guide. *Int. J. Primatol.*, 33:542-566.
- Ozanne, C.M.P., Bell, J.R. & Weaver, D.G. 2011. Collecting arthropods and arthropod remains for primate studies. In: *Field and Laboratory Methods in Primatology: A Practical Guide*, 2nd ed. (J.M. Setchell & D.J. Curtis, eds.), pp. 271-286. Cambridge University Press, Cambridge.
- Rothman, J.M., Vogel, E.R. & Blumenthal, S.A. 2013. Diet and nutrition. In: *Primate Ecology and Conservation: A Handbook of Techniques* (E.J. Sterling, N. Bynum & M.E. Blair, eds.), pp. 195-212. Oxford University Press, Oxford.
- Conklin-Brittain, N.L., Knott, C.D. & Wrangham, R.W. 2006. Energy intake by wild chimpanzees and orangutans: Methodological considerations and a preliminary comparison. In: *Feeding Ecology in Apes and Other Primates: Ecological, Physical and Behavioral Aspects* (G. Hohmann, M.M. Robbins & C. Boesch, eds.), pp. 445-465. Cambridge University Press, Cambridge.
- Ang, K.Y., Lucas, P.W. & Tan, H.T.W. 2007. Novel ways of measuring the fracture toughness of leaves and other thin films using a single inclined razor blade. *New Phytologist*, 177:830-837

March 30 FEEDING II: FEEDING BEHAVIOR Lit Search: Christina & Guest Moderator: Shauhin Alavi Dennis

- Aristizabal, J.F., Rothman, J.M., García-Ferriá, L.M. & Serio-Silva, J.C. 2016. Contrasting time-based and weight-based estimates of protein and energy intake of black howler monkeys (*Alouatta pigra*). *Am. J. Primatol.*, 79:1-8.
- Pompanon, F., Deagle, B.E., Symondson, W.O.C., Brown, D.S., Jarman, S.N. & Taberlet, P. 2012. Who is eating what: Diet assessment using next generation sequencing. *Mol. Ecol.*, 21:1931-1950. *Skim over the highly technical laboratory sections.*
- Schülke, O., Chalise, M.K. & Koenig, A. 2006. The importance of ingestion rates for estimating food quality and energy intake. *Am. J. Primatol.*, 68:951-965.

Just Check Methods & Results:

- Phillips, C. & Lancelotti, C. 2014. Chimpanzee diet: Phytolith analysis of feces. *Am. J. Primatol.*, 76:757-773.
- Mallott, E.K., Malhi, R.S. & Garber, P.A. 2015. High-throughput sequencing of fecal DNA to identify insects consumed by wild Weddell's saddleback tamarins (*Saguinus weddelli*, Cebidae, Primates) in Bolivia. *Am. J. Phys. Anthropol.*, 156:474-481.
- Codron, D., Lee-Thorp, J.A., Sponheimer, M., de Ruiter, D. & Codron, J. 2006. Inter- and intrahabitat dietary variability of chacma baboons (*Papio ursinus*) in South African savannas based on fecal δ^{13} , δ^{15} , and %N. *Am. J. Phys. Anthropol.*, 129:204-214.
- Gilby, I., Pokempner, A.A. & Wrangham, R.W. 2010. A direct comparison of scan and focal sampling methods for measuring wild chimpanzee feeding behaviour. *Folia Primatol.*, 81:254-264

April 6 PARASITES Lit Search: Christina & Becca Co-Moderator: Christina Becca

- Gillespie, T. 2006. Noninvasive assessment of gastrointestinal parasite infections in free-ranging primates. *Int. J. Primatol.*, 27:1129-1143.
- Greiner, E.C. & McIntosh, A. 2009. Collection methods and diagnostic procedures for primate parasitology. In: *Primate Parasite Ecology: The Dynamics and Study of Host-Parasite Relationships* (M.A. Huffman & C.A. Chapman, eds.), pp. 3-27. Cambridge University Press, Cambridge.
- Cringoli, G., Rinaldi, L., Maurelli, M.P. & Utzinger, J. 2010. FLOTAC: new multivalent techniques for qualitative and quantitative copromicroscopic diagnosis of parasites in animals and humans. *Nature Protocols*, 5:503-515.
- Smiley Evans, T., Barry, P.A., Gilardi, K.V., Goldstein, T., Deere, J.D., Fike, J., Yee, J., Ssebide, B.J., Karmacharya, D., Cranfield, M.R., Wolking, D., Smith, B., Mazet, J.A.K. & Johnson, C.K. 2015. Optimization of a Novel Non-invasive Oral Sampling Technique for Zoonotic Pathogen Surveillance in Nonhuman Primates. *PLOS Neglected Tropical Diseases*, 9:e0003813, doi 10.1371/journal.pntd.0003813.

Just Check Methods & Results:

- Alados, C.L. & Huffman, M.A. 2000. Fractal long-range correlations in behavioural sequences of wild chimpanzees: A non-invasive analytical tool for the evaluation of health. *Ethology*, 106:105-116.
- Duboscq, J., Romano, V., Sueur, C. & MacIntosh, A.J.J. 2016. Network centrality and seasonality interact to predict lice load in a social primates. *Scientific Reports*, 6:22095.
- Gilardi, K.V., Gillespie, T.R., Leenertz, F.H., Macfie, E.J., Travis, D.A., Whittier, C.A. & Williamson, E.A. 2015. *Best Practice Guidelines for Health Monitoring and Disease Control in Great Ape Populations*. IUCN SSC Primate Specialist Group, Gland, Switzerland. *Just read Section 4, pp. 16-23.*

April 13 HORMONAL & OTHER METABOLITES Lit Search: Melanie Co-Moderator: Melanie

- Behringer, V. & Deschner, T. 2017. Non-invasive monitoring of physiological markers in primates. *Horm. Behav.*, doi <http://doi.org/10.1016/j.yhbeh.2017.02.001>.
- Heistermann, M. & Higham, J.P. 2015. Urinary neopterin, a non-invasive marker of mammalian cellular immune activation, is highly stable under field conditions. *Scientific Reports*, 5:16308.
- Kalbitzer, U. & Heistermann, M. 2013. Long-term storage effects in steroid metabolite extracts from baboon (*Papio* sp.) faeces – a comparison of three commonly applied storage methods. *Methods in Ecology and Evolution*, 4:493-500.
- Higham, J.P. 2016. Field endocrinology of nonhuman primates: past, present, and future. *Horm. Behav.*, 84:145-155, doi <http://doi.org/10.1016/j.yhbeh.2016.07.001>.
- Beehner, J.C. & Whitten, P.L. 2004. Modifications of a field method for fecal steroid analysis in baboons. *Physiol. Behav.*, 82:269-277.

Just Check Methods & Results:

- Muehlenbein, M. & Watts, D. 2010. The costs of dominance: Testosterone, cortisol and intestinal parasites in wild male chimpanzees. *BioPsychoSocial Medicine*, 4:1-12.
- Douglas, P.H., Hohmann, G., Murtagh, R., Thiessen-Bock, R. & Deschner, T. 2016. Mixed messages: Wild female bonobos show high variability in the timing of ovulation in relation to sexual swelling patterns. *BMC Evolutionary Biology*, 16:140, doi 10.1186/s12862-016-0691-3.

**April 20 IMMOBILIZATION, CAPTURE, DARTING, Lit Search: Becca Co-Moderator: Becca
DNA**

- Cunningham, E.P., Unwin, S. & Setchell, J.M. 2015. Darting primates in the field: A review of reporting trends and a survey of practices and their effect on the primates involved. *Int. J. Primatol.*, 36:894-915.
- Stone, A.I., Castro, P.H.G., Monteiro, F.O.B., Ruivo, L.P. & de Sousa e Silva Júnior, J. 2015. A novel method for capturing and monitoring a small neotropical primate, the squirrel monkey (*Saimiri collinsi*). *Am. J. Primatol.*, 77:239-245, doi 10.1002/ajp.22328.
- Jolly, C.J., Phillips-Conroy, J. & Müller, A.E. 2011. Trapping primates. In: *Field and Laboratory Methods in Primatology: A Practical Guide*, 2nd ed. (J.M. Setchell & D.J. Curtis, eds.), pp. 133-146. Cambridge University Press, Cambridge.
- Goossens, B., Anthony, N., Jeffery, K., Johnson-Bawe, M. & Bruford, M.W. 2011. Collection, storage, and analysis of non-invasive genetic material in primate biology. In: *Field and Laboratory Methods in Primatology: A Practical Guide*, 2nd ed. (J.M. Setchell & D.J. Curtis, eds.), pp. 371-386. Cambridge University Press, Cambridge.
- Glander, K.E. 2013. Darting, anesthesia, and handling. In: *Primate Ecology and Conservation: A Handbook of Techniques* (E.J. Sterling, N. Bynum & M.E. Blair, eds.), pp. 10-26. Oxford University Press, Oxford.

April 27 EXPERIMENTATION

Lit Search: Dennis

Co-Moderator: Dennis

Martin & Bateson, pp. 86-92.

Janson, C.H. & Brosnan, S.F. 2013. Experiments in primatology: From the lab to the field and back again. In: *Primate Ecology and Conservation: A Handbook of Techniques* (E.J. Sterling, N. Bynum & M.E. Blair, eds.), pp. 177-194. Oxford University Press, Oxford.

Zuberbühler, K. & Wittig, R. 2011. Field experiments with non-human primates. In: *Field and Laboratory Methods in Primatology: A Practical Guide*, 2nd ed. (J.M. Setchell & D.J. Curtis, eds.), pp. 207-224. Cambridge University Press, Cambridge.

Cuthill, I.C. 1991. Field experiments in animal behaviour: Methods and ethics. *Anim. Behav.*, 42:1007-1016.

Just Check Methods & Results of:

Crockford, C., Wittig, R.M., Seyfarth, R.M. & Cheney, D.L. 2007. Baboons eavesdrop to deduce mating opportunities. *Anim. Behav.*, 73:885-890.

Carter, A.J., Marshall, H.H., Heinsohn, R. & Cowlshaw, G. 2012. How not to measure boldness: Novel object and antipredator responses are not the same in wild baboons. *Anim. Behav.*, 84:603-609.

Rahlf, M. & Fichtel, C. 2010. Anti-predator behaviour in a nocturnal primate, the grey mouse lemur (*Microcebus murinus*). *Ethology*, 116:429-439.

Film:

Viewing of the film of Hans Kummer's field experiments with hamadryas and olive baboons.