

BIOMED FOR THE LAYPERSON

updated 2/9/05

The following document is a composite of LPAG members' experiences working in laboratories and breeding facilities across the country.

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HISTORY OF NONHUMAN ANIMAL RESEARCH

The earliest references to animal experimentation were found in the writings of Greek-philosopher-physicians of the third and fourth centuries BC. Aristotle (384-322 BC) was the "first to have made dissections which revealed internal differences among animals" and Erasistratus (304-258 BC) was most likely the first to perform experiments on living animals.¹ Then, during second century Rome, a physician named Galen began to dissect animals because Church protocol did not allow human autopsies. He began to dissect goats and pigs and compared his findings to what he knew about humans. He is now known as the "father of vivisection."² While

¹ Cohen BJ and Loew FM (1984) Laboratory Animal Medicine: Historical Perspectives in Laboratory Animal Medicine (eds J.G. Fox, B.J. Cohen and F.M. Loew) Academic Press, Inc., Orlando, Florida.

² Greek CR, Greek JS (2000) Sacred Cows and Golden Geese. The Continuum International Publishing Group, Inc., New York, New York.

"vivisection" literally means the dissection of live animals, the conventional definition is any research involving live nonhuman animals.

During the 18th and 19th centuries, the use of animals in experimentation slowly became more common and accepted. Animal research is now becoming even more prevalent - it is estimated that the number of rats and mice used in research has been increasing by approximately 20% per year since the use of transgenic models (nonhuman animals whose genes contain genetic material from other species) began and this trend is expected to continue.

NUMBER OF RESEARCH ANIMALS

According to the 2002 US Department of Agriculture (USDA) Animal Care Report,³ the last such report published on the USDA's Animal Care web site, the total number of animals used in research in the United States during that year was 1,137,718. However, this number does not include birds, mice and rats, which make up an estimated 85% of research animals used.⁴ Therefore, estimates indicate that 23-25 million animals are used in research per year in the United States alone. Species of animals reported to the USDA include: dogs, cats, primates, guinea pigs, hamsters, rabbits, sheep, pigs, "other farm animals," and "other animals."

The total number of primates used in research in the United States during 2002 was 52,279. Between 1973 and 2002, the number of primates used in research has ranged from a minimum of 36,202 (1975) to a maximum of 61,392 (1987) per year.⁵

The USDA categorizes animal numbers by whether or not the research involved pain and distress and whether or not pain- and distress- relieving measures were taken. According to the statistics reported by the USDA for 2002, the number of primates used in research with no pain or distress (also known as "Column C") was 25,554.⁶ The number used in research involving pain and/or distress and for which appropriate anesthetic, analgesic, or tranquilizing drugs were used ("Column D") was 25,937.⁷ Finally, the number of primates used in research involving pain and/or distress and no accompanying anesthetic, analgesic or tranquilizing drugs given ("Column E") was 788.⁸

There are several problems with the USDA's current pain and distress categorization system. For example, the categories on the annual report form are not well defined; there is little guidance on reporting by regulatory agencies, and it is not

³ Animal Care (AC), USDA, Animal Care Report, Animals Used in Research, 2002, at 3, *available at* <<http://www.aphis.usda.gov/ac/2002ar/ar2002.pdf>>.

⁴ Library of Congress (2000) Rats/Mice/ and Birds Database: Researchers, Breeders, Transporters and Exhibitors, *available at* <<http://www.aphis.usda.gov/ac/locreport.html>>.

⁵ AC, *supra* note 3, at 10.

⁶ *Id.* at 5.

⁷ *Id.* at 7.

⁸ *Id.* at 9.

clear where to categorize animals who experienced pain or distress despite the use of anesthetics or analgesics. Furthermore, several factors are not reflected in the reporting system, including: intensity and duration of pain and distress, and mitigation of pain and distress via other means besides pharmacological agents. Due to the limitations of this reporting system, the statistics reported in the USDA annual report most likely underestimate the amount of pain and distress all species are subjected to during research. (The USDA sought public comment on proposed changes to the pain and distress classification system in 2000, but the agency has taken no considerable action on this effort to date).

NUMBER OF ACTIVE RESEARCH FACILITIES

According to the 2002 USDA Animal Care Report, a total of 1,087 active research facilities (at 1,961 sites) are registered with the USDA (those with only birds, mice and/or rats are not required to register with the USDA).⁹ The term "research facility" applies to "any school (other than elementary or secondary), institution, organization, or person that uses or intends to use live animals in research, tests, or experiments, and that (1) purchases or transports live animals in commerce or (2) receives funds under a grant, award, loan, or contract from a department, agency, or instrumentality of the United States for the purpose of carrying out research, tests or experiments." Check the Animal Care web site for a current list of research facilities licensed with the USDA.¹⁰

FUNDING FOR ANIMAL RESEARCH

The Public Health Service (PHS) provides a phenomenal amount of funding for animal research and the National Institutes of Health (NIH) is the agency under the PHS that provides the largest amount of funding. It is estimated that half of NIH's budget is spent on research that somehow involves animals. There are also other organizations that fund animal research; most private institutions such as pharmaceutical companies do not receive federal funds.

The federal government provides a great deal of funding for primate research in particular. Currently, there are eight National Primate Research Centers (NPRCs - formerly "Regional" centers) that fall under the umbrella of the National Center for Research Resources (NCRR is a part of NIH). In 2004, the amount of federal funding awarded to the NPRCs and associated offices was \$177,374,000.¹¹ NCRR/NIH also funds a number of other primate laboratories (see LPAG.org's Bureaucracy and Biomed section for a more detailed discussion). According to the American Association for the Advancement of Science, NCRR was the only NIH center to lose funding in FY 2004; however the National Institute of Allergy and Infectious Disease (NIAID) saw its budget

⁹ *Id.* at 1.

¹⁰ <<http://www.aphis.usda.gov/ac/lists/listr.pdf>>.

¹¹ NCRR, NIH, DHHS, FY 2006 Budget, at 17, *available at* <<http://www.ncrr.nih.gov/newspub/06cjweb.pdf>>.

increase substantially to fund demands for biodefense research (see "Research Conducted on Primates," below).¹²

RESEARCH CONDUCTED ON PRIMATES

Research conducted on primates spans a wide range of fields including human pathologies and diseases (such as AIDS and hepatitis), psychological disorders, toxicology, xenotransplantation (primates and pigs are the species primarily used as cross-species transplant donors), product safety testing, dentistry, biological warfare, drug abuse, vaccines, Parkinson's disease, cloning and many more. Animals are burned, isolated, food deprived, water deprived, poisoned, and irradiated. During AIDS research, monkeys are infected with various SIV and HIV strains and combinations - then disease progression is observed without intervention until the monkeys finally die, having presented symptoms such as diarrhea, dehydration, wasting, and anorexia.

Since the 2001 terrorist attacks on the United States, funding for research to create vaccines and treatments for bioterror agents (such as anthrax, smallpox, botulism, and nerve gas) has increased dramatically. For many researchers, the test subject of choice is the monkey.¹³⁻¹¹

HOUSING CONDITIONS: MONKEYS

- Indoor single housing: monkeys

Title 9 of the Code of Federal Regulations (9 CFR - the USDA regulations that provide the nuts and bolts of the Animal Welfare Act) dictates the sizes of cages for nonhuman primates. For example, a monkey weighing 3-10 kilograms (6.6-22 pounds) is only required to have 4.3 square feet of floor area, and a height of 30 inches.¹⁴ In our experience, research labs do not usually exceed the cage size standards required by law.

Infant monkeys can be housed in isolettes (similar to an incubator), if they are very young, and in cages of 4 square feet in size if they do not require the warmth and protection of the enclosed isolette. Infant monkeys are used in invasive research just as adults are. They can be single-, pair- or group-housed, and cages can easily be modified and connected to one another.

¹² American Association for the Advancement of Science (AAAS) (2004) "NIH Budget Growth Slows to 2 Percent in FY 2004: AAAS R&D Funding Update on R&D in the FY 2004 NIH Budget - REVISED," *available at* <<http://www.aaas.org/spp/rd/nih04p.pdf>>.

¹³ Hirschberg, Rona, Montagne, John, and Fauci, Anthony (2004) "Biomedical Research - An Integral Component of National Security." *New England Journal of Medicine*, 350:2119-2121.

¹⁴ 9 C.F.R. § 3.80, *available at* <<http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi?TITL=9&PART=3&SECTION=80&YEAR=1998&TYPE=TEXT>>.

Stainless steel cages built for individual monkeys are similar in laboratories all around the world. The configuration of the door or the squeeze-locking mechanisms may be different, but all cages are built with three major considerations in mind: ease in cleaning, access to the monkey, and the ability to fit more animals into a room. The typical cage is enclosed on three sides; the top, bottom and front are made of bars. The bars on the top and bottom are either straight bars, or a checkerboard of woven steel wire.

In cages with the woven bottom, it is not unusual or unlikely for bits of desirable food or treats to fall through the cage floor and land in the inaccessible urine pan just inches below the cage bottom. It is also not unusual for a monkey to get her hand stuck in the mesh while trying to retrieve the treat from the pan, the monkey will squeeze her hand through the flooring but once she's grabbed the food, she may refuse to let go. The harder she tries to get her hand back through the cage floor, the more swollen her hand becomes and the less likely it becomes that the hand will fit back through at all. When the monkey is finally found in this condition - working furiously and desperately to free her hand - if it will not slide out with the application of a non-toxic lubricant, she is further traumatized by being lifted off of the rack and having technicians break the cage's bars with a bolt cutter.

The solid cage sides allow for easier cleaning, and also protect the hands, fingers, and tails of monkeys whose cages are in close proximity to each other. Cages for individual monkeys are often mounted on rolling racks, holding four cages (two above and two below), and pans placed beneath each cage to collect waste. Cages can also be mounted on a wall rack, with a long trough under them to catch waste (some labs are equipped with automatic washing systems which routinely flush waste from the troughs). Cages in close proximity allow monkeys to squeeze a hand out between the bars, and grapple with the hand of a neighbor (it is not infrequent for fingertips to find their way into a neighbor's mouth, and be bitten off). Monkeys in individual cages have been known to engage in affiliative behaviors by reaching out and holding the hand of a neighbor, which is the most amount of physical contact they can get. This may be the only contact with conspecifics (individuals of the same species) that a monkey will have for most of his life.

The doors to the cages usually either slide upward or sideways. Special transfer boxes fit to the doors so that unanesthetized monkeys can be quickly removed from their cages. Most monkey cages are fitted with a 'squeeze back.' The squeeze mechanism is a false back/wall that can be pulled forward in order to press or restrain the monkey at the front of the cage. A monkey is usually squeezed when an injection is required, or when she refuses to jump into the transfer box.

It is legal for two monkeys to be caged singly in the same room and in the same rack so that they cannot directly see each other - as long as there is a mirror on the wall across from them so that they can see each other's reflection. More typically, 10-30 monkeys are kept in windowless, cinderblock rooms. It is not unusual for monkeys of several species to occupy one room.

Monkeys living on the bottom row of cage racks have the further disadvantage of being deprived of light. It has been argued that monkeys living in a lower row cage exhibit more stereotypies (abnormal behaviors) and are less physically active than monkeys living in the upper row.¹⁵

There is an abundance of research that indicates that single caging (the housing of one monkey or chimpanzee alone in a cage) is stressful, causes deleterious effects, and results in stereotypical behaviors such as pacing, circling, hair pulling, rocking and self-biting. Institutions are required to house primates socially whenever possible and provide justification if single instead of social housing is used.¹⁶ However, there are institutions that house primates in single cages without scientific justification. Note the distinction between social deprivation and social isolation.

The University of Minnesota's Student Organization for Animal Rights (SOAR) has collected photos and video of monkeys held in the laboratories on campus as a part of their Primate Freedom Project. The images, released through a Minnesota Government Data Practices Act request, are more telling than any description we could write.

- Indoor and/or outdoor social housing: monkeys

Some monkeys are housed in pairs. Their cages may actually be two smaller cages next to each other in a rack, with the solid sides cut out to allow the cages to connect. Some of these double cages are equipped with sliding partitions, which can be used for breeding purposes. If a female is required to reproduce, either she or the male can be moved to the empty half (the mate is locked over, using the partition) of the double cage and the partition is then removed to allow access. These breeding pairs will remain together for a few days to ensure that the female has become impregnated.

'Gang cages' allow a group of monkeys to live together; gang-cage groups usually consist of only one male each. Their quarters may be one large cage (for example an 8x 10 x 8ft room), but can also be several smaller ones tunneled together. Some facilities have buildings with runs or rooms, each with a 'corn crib' style outdoor enclosure. Sliding doors allow the workers to separate group members or lock them inside or out. These housing conditions usually only have a few perches and/or swings and are typically crowded.

'Runs' (named after enclosures in which dogs would typically be kept - some facilities actually convert dog runs into monkey housing) also allow groups of monkeys to live together. Runs can come in various shapes and sizes and often consist of cinder block, chain link and some perches. These enclosures are also typically crowded.

¹⁵ 9 C.F.R. § 3.81.

¹⁶ Reinhardt, Victor and Annie (2001) Environmental Enrichment for Caged Rhesus Macaques. Animal Welfare Institute, Washington DC.

Some facilities use runs as a temporary housing location, for example as part of a weaning process when infants are removed from their groups and prepared for research.

Finally, some facilities house multimale-multifemale groups of up to or greater than 100 monkeys in 'corrals'. Corrals can cover up to one acre of land, are enclosed with 15-foot metal walls and typically include climbing structures. Corrals may also have an indoor area that is heated during the winter months. Some facilities do not provide an indoor area and, at times, the monkeys are exposed to temperatures below freezing during the winter.

Corrals will typically house breeding groups, but members are often removed from the group for sale to another research facility or to be assigned to a specific research protocol at that institution. Overall, corral housing enables more 'normal' group living in comparison to single cages, runs or gang cages, and the animals are exposed to grass and sunshine, but there are still several captive stressors associated with corrals and the groups should be monitored closely, especially when group members are removed for sale or research.

INVASIVE AND INFECTIOUS DISEASE RESEARCH: MONKEYS

Monkeys on invasive, but not infectious, protocols are generally housed in Biosafety Level 1 (BSL-1) buildings. The humans they encounter are usually garbed in some sort of uniform: long-sleeve shirts, long pants, and tall boots for the care-techs; white lab coats and blue surgical scrubs for the research-techs, researchers, vet-techs and veterinarians. All of the humans wear surgical masks over their mouths and noses, one or more pairs of latex gloves on their hands, and eye protection (anything from safety glasses to full face shields).

Monkeys on infectious disease protocols will usually be kept in BSL-2 housing (BSL-3 and BSL-4 house increasingly infectious organisms (e.g. BSL-3 agents are transmissible by aerosol); precautions in these facilities correspondingly increase). This area is usually more restricted and may feature a 'dirty' anteroom, footbaths in front of each animal room door, and can feature an air exchange system with positive air flow (dirty air is pushed out of the building) and HEPA (high-efficiency particle-arrestor) filters which ensure that clean air comes in (directional air-flow is not required). Humans working in these areas will often have to wear a jumpsuit (made of material that is often used to cover sheets of insulation in new houses, and feels like a waterproofed paper towel) over their uniform, a bouffant or surgical hair cover, double (or more) gloves, a thick face mask, and a full-face shield.

CAGE CLEANING PROCEDURES: MONKEYS

Cage cleaning is a loud, wet, and messy ordeal for humans and nonhumans alike. The technician methodically and systematically hoses excrement from the cages while the monkeys attempt to avoid the water by pushing themselves up into the corners of the

cages (where they are still often unable to avoid getting wet). The waste pans are pulled out from under each cage, and their contents are loudly dumped on the floor. When all of the pans in a room are emptied onto the floor, the worker washes all of the waste toward a drain, where it is either collected (to become 'hazardous waste') or washed down the drain. In some labs, the pans are disinfected with chemicals daily. The tech rolls up the hose and moves on to the next room.

Cage washing requires boxing out perhaps half a room of monkeys all at once. The monkeys wait in the steel boxes while their empty rack is rolled out to the cage-washer. The racks are rolled into the huge machine, where they will be washed (just like a dishwasher) and sanitized. After the walls and floor of the room have been sanitized, the rack comes back to the room and the monkeys are usually returned to their original configuration within it. Some monkeys may live in the same room for years, or for the duration of their lives, where they are unable to see anything beyond the door of the room.

Both cage cleaning and cage washing are incredibly loud and wet exercises, both of which can cause monkeys a great deal of observable stress and anxiety, as well as injury to workers.

A TYPICAL DAY FOR A SINGLE-CAGED MONKEY

For caged monkeys, daily life in the laboratory generally includes five components: feeding, cleaning, cage washing, research procedures, and 'enrichment' (see Environmental Enrichment below). Sounds dull? It is.

Usually, the day will start with a quick visit from a veterinarian or vet-tech. The vet will check the animals' conditions and will perhaps say a kind word. When the care-techs arrive, the monkeys may or may not get fed their breakfast of monkey chow right away. If the monkeys get their chow first thing, they are wise to hurry up and eat it before the hosing starts. If the cages are hosed before breakfast, the monkeys may have to wait several hours until the tech is free to feed them.

After feeding and cleaning, the rest of the day is often spent waiting and doing nothing (which can then lead to stereotypies (such as pacing or self-biting). Anxiety is ever-present: vets and vet-techs come and go (which can also be stressful for the monkeys, as these are not always people the monkeys look forward to seeing), roommates leave for veterinary or research procedures, return from procedures, or are fasted in anticipation of procedures. Knockdowns and some procedures are done in the animal room (as opposed to the monkey being taken to a procedure room), which can cause observable anxiety to the subject's neighbors. Care-techs bring or fill enrichment devices, may spend a moment visiting or grooming, and then start the arduous task of cage washing. The day ends with another meal: chow again, and maybe a piece of produce. Some facilities have enrichment technicians whose job it is to only provide enrichment to the animals. Unfortunately, there is often too much work for one person. For example, a facility may have only one enrichment technician

for over 3,000 monkeys (living in various housing conditions) - this obviously does not leave sufficient time for the individual attention that single-caged animals need.

HOUSING CONDITIONS: CHIMPANZEES

- Indoor housing: chimpanzees

Individuals, including infants, juveniles and adults can be housed singly if the research protocol that they are on requires it. Individuals under 55 pounds can be housed in cages smaller than 5x5x7 feet. It is common for adults to be taken from their social groups for a study, and put into isolation cages called metabolism ('met') cages with industrial-strength squeeze backs. They may remain there for the duration of the study, which can be for weeks or months.

According to 9 CFR, the legally required cage size for an adult chimpanzee is 5x5x7 feet, with 25 square feet of floor space. If two chimpanzees live together, they must have an enclosure double this size. The law does not require that they live in groups of more than two, nor does it require that the chimpanzees have access to the outdoors. Like monkeys, the reality of laboratory caging for chimpanzees runs the gamut from the minimum requirements, to corrals that exceed the minimum standards.

A typical chimpanzee colony resembles a human prison. Chimpanzees in groups of two or more spend their days with the same cell-mates, waiting for humans to bring food, hoses, enrichment, dart guns or syringes (full of Ketamine or Telazol). The indoor cells may or may not be attached to an outdoor area. Both are typically made of steel and concrete, designed for ease of cleaning and access to the chimpanzees. A weighted, human-controlled door between the two allows humans to decide when the chimpanzees can move in or out.

- Outdoor housing: chimpanzees

Luckier chimpanzees live in compounds with larger social groups. Despite the less-restrictive environment, individuals still live at the whim of human caretakers who decide group composition (including pregnancies, births and the raising of infants), research protocols, diet, entertainment, and the day-to-day routine. Although chimpanzees in compounds are often used for breeding purposes, they too can be taken from their groups and used in an invasive experiment.

INVASIVE AND INFECTIOUS DISEASE RESEARCH: CHIMPANZEES

Chimpanzees on invasive protocols, such as HIV vaccine studies, live in biocontainment. Interpretations of biocontainment can vary between laboratories: some provide no outdoor access and tiny (if any) social groups of infected individuals; others provide outdoor enclosures, but limit human access to the area.

CAGE CLEANING PROCEDURES: CHIMPANZEES

Many of the cleaning and husbandry procedures are similar to those described above in the monkey housing section, but on a much larger scale. Cages or cells are sprayed out at least once daily. Many chimpanzees 'paint' with feces on the walls of their enclosures; the cages must be hosed from top to bottom. Often, individuals will hang from the ceiling or wall of the cage in order to escape the stream of water. Some refuse to move, or block the spray with their bodies. Others demand drinks from the hose. In cages made from concrete or from steel bars, surfaces remain wet long after the care-tech has finished his/her work.

Often, chimpanzee cages are not portable as are cages for monkeys, so care-techs are required to sanitize cages (by entering them and either scrubbing with brushes or using a high-powered pressure washer) at least once every two weeks. Chimpanzees are shifted to adjacent cells for these procedures.

A TYPICAL DAY FOR A LABORATORY CHIMPANZEE

The daily routine of chimpanzees in the laboratory is much the same as that for monkeys. After cage washing and feeding, days are spent waiting, doing nothing, or interacting with cage-mates.

Individuals may be separated from group members for a brief period of time to take part in a behavioral research project, or to be a training subject. Operant conditioning, or behavioral training using established signals and positive reinforcement, is very popular in the labs these days; individuals are taught to present body parts for inspection or injection, to enter a transfer box, and other tricks. Care- or enrichment-techs may visit for a play session or to deliver treats. Other chimpanzees may be removed from their social group and placed in an isolation cage in preparation for their use in a biomedical procedure.

ENVIRONMENTAL ENRICHMENT

Environmental enrichment is required of all laboratories (at present, the AWA does not require daily enrichment, only that the center provide a 'plan' for environmental enrichment). For monkeys in cages, enrichment usually comes in the form a few different devices: forage boards, puzzle feeders, and fleece/grooming board. Inside the cage, a monkey may have a small, rubber dog toy, but cage toys can impede the smooth functioning of the squeeze mechanism (the false back reaches to the floor of the cage, and toys can keep the back from sliding forward, or if the toy is larger than the monkey, can prevent immobilization), so some researchers refuse to allow toys in the cage. Devices are hung, hooked, or locked onto the front of the cage. A forage board is a small tray covered in AstroTurf; the turf is periodically sprinkled with seeds and is allegedly designed to simulate 'natural' foraging behavior. Puzzle feeders come in many designs; all with the goal of creating a challenging game the monkey has to solve to obtain a desired treat or food. Fleece boards are steel frames covered with a

fleecy material, designed to replicate the hair of a conspecific in order to give the solitary monkey something to groom. Fleece boards often contribute to the darkness of bottom-row cages. Enrichment devices can be costly, so in most labs not every nonhuman primate has a contraption on her cage.

The current regulations and policies regarding environmental enrichment are weak, and institutions basically self-regulate when it comes to this issue (many institutions have no means of enforcing their own policies, and enrichment standards vary within institutions and between care-techs). For example, if an institution decides that the single caged animals will receive some form of enrichment only one time per week, according to the regulations, that is acceptable. LPAG knows that this is not acceptable. The USDA has failed to update and clarify its regulations pertaining to the psychological well-being of nonhuman primates. The public comments regarding these standards are on record; the objections of many biomedical researchers to improved enrichment standards can be found on the International Primate Protection League web site.¹⁷

PROBLEMS WITH NONHUMAN ANIMAL RESEARCH

Laboratory conditions in no way reflect the normal life of any species. As previously mentioned, monkeys and chimpanzees may be kept alone in small cages, a life vastly different from their relatives in the wild who roam freely with family and friends. Infants are often removed from the mother at an early age - some studies remove infants from their mother at birth - this is referred to as 'maternal deprivation.' The result of maternal deprivation is the exhibition of extremely abnormal behaviors by individuals who can become incapable of socialization and, in the case of females, can result in the inability of individuals to raise their own offspring. It is also very common for large facilities to 'wean' infants from their mothers at 4-6 months of age. In the wild, offspring often stay with mothers/maternal groups for years, if not for life. These unacceptable weaning practices can lead to extreme depression (and even death) of the infant. The effects of unnatural housing on individuals must also affect the outcome of research projects.

There are other problems with using animals in order to solve the health problems of humans. Different species have different biological reactions to disease, viruses, compounds, and so on. Experimental results between dogs and cats differ, as do some results between different strains of mice; therefore it is not practical to apply nonhuman animal results to humans. As an example of the inherent problems with animal research, consider that of the tiny number of drugs that pass animal safety tests and progress to human safety studies, only 33% of those drugs originally given to humans based on the results from animals are shown to have even the potential of being effective for their intended use; those drugs continue on to further human trials, where only one will succeed to full approval.¹⁸

¹⁷ McGreal, Shirley (December 2000) "Primate Welfare Proposals Upset Experimenters," IPPL News.

¹⁸ Kenneth Getz & Deborah Borfritz, *Informed Consent: A Guide to the Risks and Benefits of Volunteering for Clinical Trials* (Boston: Centerwatch, 2002): at 30.

If animal research is so problematic, why does it continue? One major problem is that the funding for alternatives to animal research is minimal. This lack of funding greatly inhibits the development and advancement of alternatives. The word 'alternatives' refers to methods that either replace the use of animals, reduce the number of animals used, or refine the techniques used in order to decrease pain and distress to the animals (these are known as the Three R's). Alternatives include in vitro tests ('in test tube'), clinical research, epidemiological research, computer based programs (such as comparing chemical structures of two products to determine safety), and cell and tissue cultures. Education and a healthier lifestyle can also be considered an alternative. Finally, even when alternatives are available, it is notoriously difficult to get institutions to start utilizing new methods after years of using the same techniques.

An important stride in the use of alternative methods occurred at the end of 2000, when a bill known as the ICCVAM Authorization Act was passed.¹⁹ This bill made the Interagency Coordinating Committee for the Validation of Alternative Methods (ICCVAM) an official standing body of the government. ICCVAM validates alternative methods and subsequently recommends these validated alternatives to government agencies (such as the Food and Drug Administration). It is then the responsibility of the government agencies to strongly recommend that the alternatives be used by the institutions that receive funding from that agency. It is important to point out that animal tests have never undergone the vigorous validation process that alternatives must go through. Furthermore, the results of alternative methods are most often compared to animal results. Overall, passage of the ICCVAM Authorization Act was an important victory for animals.

Another issue that ties in directly to the under-funding of alternatives is the fact that nonhuman animal research is essentially a business and a powerful structure. Private institutions, such as facilities that breed animals for research and those companies that make equipment and caging for animals, depend on animal research in order to stay in business. Finally, many of the people who receive federal funding and perform research depend on that money for a living, and for the future success of their career. With all of this money at stake, there is not much incentive for finding alternatives to animal research.

OPPOSITION TO NONHUMAN ANIMAL RESEARCH

Animal research, in general, continues to be accepted by the public today. According to results of a recent survey commissioned by the Medical Research Council (located in Great Britain), approximately 84% of the public accepts the use of animals in research "if the right conditions apply, such as that suffering is minimized, or the research is medical research, or addresses life-threatening disease. For many of

¹⁹ Pub. L. No. 106-545 (2000).

these, a precondition was that the experiments were for medical research and that there was no alternative available."²⁰

Acceptance of animal research declines when pain is involved in the research and may also decline according to the species used. For example, a survey of approximately 5,000 members of the American Psychological Association indicated that support for research on primates that involves pain and death is 17.7% while it increases to 34% when the subjects are rats. Furthermore, 63% of those surveyed indicated support of research with primates that involves caging or confinement, but 96% support observational studies using primates.²¹

In 2001, the Doris Day Animal League commissioned Zogby International to conduct a survey pertaining to chimpanzees. It was found that the American public overwhelmingly believes that chimpanzees should be protected by some of the same rights extended to children. Furthermore, according to DDAL, "[n]ine out of ten Americans feel it is unacceptable to confine chimps to government-approved cages" and "80 percent believe the government should pay for permanent retirement to a primate sanctuary for chimps who are no longer used for laboratory or experimentation purposes."²²

CONCLUSION

Despite the decline of public support for research that involves primates, the number of monkeys and nonhuman great apes housed in laboratories and used for research has remained steady over the past 30 years. We've tried to provide you with information to show that every aspect of research involving nonhuman primates includes some sort of moral or scientific dilemma that must be addressed and solved. It is now up to you, the public, to insist that the use of primates be stopped and alternative methods be developed and implemented in order to truly help humans.

GLOSSARY OF BIOMEDICAL RESEARCH TERMS

ALAT/LAT/LATG = The American Association for Laboratory Animal Science certifies laboratory animal employees, primarily caregivers and veterinary technicians. The employees are certified by passing a multiple-choice test. There are 3 levels of certification: Assistant Laboratory Animal Technician (ALAT), Laboratory Animal Technician (LAT), and Laboratory Animal Technologist (LATG).

BIOCONTAINMENT = The means by which biohazardous substances are safely sequestered. Biosafety Levels (BSL) employ a variety of means of biocontainment:

²⁰ Medical Research Council, MORI Survey on Animals in Medicine and Science; Survey Results, *available at* <http://www.mrc.ac.uk/index/public-interest/public-consultation/public-mori_animal_use_survey/public-results_of_survey.htm>.

²¹ Plous, S (1996) "Attitudes toward the use of animals in psychological research and education: Results from a national survey of psychologists." *American Psychologist*, 51:1167-1180.

²² Doris Day Animal League, Zogby International, 2001.

BSL-0 is the containment level at which we all live; BSL-1 is the level at which most laboratory primates are contained. BSL-1 is appropriate for the containment of microorganisms, which do not cause disease in humans; workers wear some protective gear and regularly disinfect rooms and cages. BSL-2 requires more precautions: workers wear more protective gear, possibly including a face shield, sterile outer-garments, and HEPA (high efficiency particulate air) filters clean the air coming in and out of the building; BSL-2 houses nonhuman primates with infectious diseases like HIV or Hepatitis. BSL-3 and -4 house subjects infected with agents that are known to be transmitted by inhalation and are lethal to humans; physical containment requirements are very strict and include waterproof walls and ceilings (precluding the use of acoustic tiles) and controlled directional air-flow.

BOXING = When non-human primates are removed from their home cage, they are often "boxed", i.e. moved into a portable container for transport. A monkey transfer box is generally about 1.5x2x3 feet in dimension; an ape box is much larger. Both are built to fit to the front of a cage. Some individuals are trained to enter the box voluntarily; others are forced into the box with squeeze mechanisms.

BREEDER = Usually refers to a female with a solid history of producing healthy offspring. A 'breeder' may not be used for invasive research.

CAGE WASHER = Sort of like a mini-car-wash for laboratory animal cages. Racks of dirty cages are placed into the cage washer and are cleaned with hot, pressurized water and chemical cleaners or sanitizers. Federal regulations require that cages be sanitized or cage-washed every two weeks.

CARE STAFF = Employees whose primary responsibilities include cleaning animal areas, feeding the animals, providing enrichment, and monitoring animal health.

CHOW = Commercially prepared biscuits of food fed to most non-human primates in laboratories. Nutritionally complete, but not very tasty.

DART/BLOW GUN = A pressurized "blow gun" used to deliver anesthetic to an animal from a distance. A needle and syringe with anesthetic is placed into a long tube, and forced out by pressurized CO₂, driving the needle into some part of the animal's body (a large muscle, such as the thigh, when done correctly). Darting is a terrifying and painful procedure for the target.

DRESS OUT = Put on protective clothing and equipment to enter a biocontainment area. This usually includes a facemask and face shield (or other eye protection), latex gloves, hair and boot covers, and a sterile, disposable suit (such as Tyvek) covering the uniform.

ENVIRONMENTAL ENRICHMENT = Forage boards and fleece boards are examples of environmental enrichment. Environmental enrichment is a general term for attempts to alleviate the boredom and monotony of captive non-human primate's life, allow

them to express natural behaviors, and prevent or treat abnormal behaviors such as self-mutilation. Enrichment consists of anything from social companions, food treats, toys, or destructible items, to additions to the cages such as perches, swings, and ropes, or devices which challenge the animals to obtain food or other desired objects.

FLEECE BOARD = A device used to allow singly-caged non-human primates to exhibit grooming behavior, also used primarily with monkeys. A fleece board is a metal square to which a piece of fleece or lamb's wool is secured. The plate with the fleece is attached to the outside of the monkey's cage, allowing the monkey to 'groom' the fleece through the bars. Food treats, such as honey and seeds, are sometimes placed on the fleece to encourage the monkey to use the device.

FORAGE/TURF BOARD = A device used to allow caged non-human primates to exhibit foraging behavior. Primarily used with monkeys. A forage board is generally a flat metal plate, which can attach to the outside of a monkey's cage. Secured to the metal plate is a piece of artificial turf (such as AstroTurf), into which small seeds are sprinkled. The monkeys must pick through the turf to obtain the seeds, somewhat approximating foraging for small food items in the wild.

INVASIVE RESEARCH = Any biomedical research involving experimental infection with a pathologic agent or experimental surgery.

KETAMINE = Widely used in anesthesia and immobilization of nonhuman primates in research labs. Can be used in conjunction with Valium (diazepam) to offer more sedative effects. Nonhuman primates may experience nightmarish hallucinations during recovery, but recovery is generally considered to be quicker than with other agents. Ketamine is also believed to have a wider safety margin than other anesthetic drugs available. Costs for research labs may also be a factor - immobilizing drugs are needed in large quantities and appropriate alternatives are more expensive and/or not considered as reliably safe in terms of survival rate. Ketamine is not used very much in humans because of the horrible hallucinations experienced in recovery.

KNOCKDOWN = When an individual is anesthetized for a procedure.

LIXIT = An automatic watering device commonly used in laboratories. Lixits are attached to a main water line so that when properly functioning, water is available at all times. By pressing a small lever, fresh water is delivered through a spout. If lixits malfunction, the animals are without water, so lixits must be checked daily by animal care personnel.

MATERNAL DEPRIVATION = When an infant is removed from his mother and raised without her.

METABOLISM (MET) CAGE = Used in labs and zoos for giving treatments like injections to nonhuman great apes, and for the easy collection of urine and feces; also allows for simple monitoring of food and water intake. They are large hydraulically or

mechanically driven squeeze cages (see below). They meet the standard cage space requirement for an ape (5x5x7 feet), but because of this restrictive size should not be used like some labs do for isolating or housing apes for long periods of time while on treatment.

NON-INVASIVE RESEARCH = When research subjects are used for behavioral studies, for example.

POLE-AND-COLLAR = A technique used by research staff in order to move a primate from one location to another, for example. The primate is trained to allow a collar to be put over his head and around his neck and then a pole connects to the collar, allowing the person to "steer" and control the monkey. This technique is not used with apes due to their strength.

PRESENT (e.g. for injection) = With proper conditioning, a monkey or ape can be trained to cooperate with a procedure such as a blood draw, injection of anesthetic, or medical exam by "presenting" certain body parts.

PROTOCOL = The methods used to carry out the study. For example, a study's protocol may include chairing, restricted diet, or weekly knockdowns.

RESTRAINT CHAIR = A chair that holds the primate's head, arms and legs in place. This restraint would allow a person to perform various procedures on the subject.

SELF-MUTILATOR = A nonhuman primate who is known to attack his own body parts with such ferocity that he does physical damage.

SEMI-INVASIVE RESEARCH = An experiment which affects the physiology of a subject but does not depend on disease transmission or surgery. For example, a diet study would be semi-invasive. **S.I.B.** = Self-injurious behavior; includes wounding or hair pulling.

SOCIAL DEPRIVATION = A research subject is confined alone in a cage, but may have conspecifics caged in the same room. Subjects may have a social relationship with room-mates, but will have no physical contact with them.

SOCIAL ISOLATION = A research subject is confined alone in a cage and alone in a room, and has no opportunities for socialization.

SQUEEZE CAGE = A single cage that allows a person to pull the back wall of the cage forward in order to squeeze the animal against the front wall. The squeeze-back is typically used in order to give an individual an injection, for example.

STEREOTYPIC BEHAVIOR (STEREOTYPIES) = Abnormal, compulsive behaviors that are an expression of the stress that primates in labs experience. Stereotypies are often a direct result of trauma, confinement, and isolation (i.e. the deprivation of many of an

individual's social, emotional, intellectual, and physical needs). Some nonhuman primates exhibit highly repetitive and abnormal behaviors, involving abnormal locomotion (pacing, flipping, circling) or other movements (including but not limited to eye-poking, saluting, slapping, floating limbs (the individual momentarily fails to recognize a hand or foot as part of his own body). Finger or penis sucking, eating or smearing feces, excessive masturbation, and self-mutilation (see above) are also common stereotypies. Once a primate develops a stereotypical behavior it is very difficult to eliminate it.

STUDY = An experiment to which a research subject is assigned.

TELOZOL = This is the trademark name of tiletamine-zolazepam. It is widely used in veterinary medicine as an anesthetic/immobilizing agent, especially with dogs and cats. It is not as commonly used with nonhuman primates because of its more prolonged recovery period than Ketamine. In recovery, thrashing around is likely, but in private veterinary practice it may be preferred over Ketamine because of Telazol's lower incidence of vomiting. Often Telazol is used with halothane, a gas anesthetic. The dosage range for different weights of animals is more varied than with Ketamine.

TRANSFER BOX = see BOXING.