

Enrichment Toys and Tools in Recent Trials

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The author reports his latest research on use of various toys including "Chime Ball," "Active Baby Toy Set," "Turn and Learn Activity Center," "Twinkle Star Ball," "Baby Bell," "Ball in the Tube," "Enviro-Tubes," and the "Food Environmental" dispenser. Several species were studied, including primates, rats, mice, rabbits, hamsters and pigs.

INTRODUCTION:

As part of the Liforce Foundation's Primate Pals project to enrich the environment of monkeys in research labs, I have extended my trials with toys and tools to include other species including rodents, rabbits, and swine.

By extending the trials to research facilities conducting various types of research and which are located in different states and countries, the ecological validity of our findings will be more readily supported.

While some animal behaviorists are optimistic and report great success in enriching animal environments, it continues to be Liforce's findings that, although there is certainly the need for employing enrichment devices such as toys, the overall effectiveness is limited. However, if properly or creatively employed (for example, toys used for short periods and rotated among monkeys), enrichment tools can introduce novelty and change in an otherwise unchanging laboratory environment. Liforce is developing enrichment tools which attempt to encourage or promote the natural behavior of a species.

TEST TOYS (See Figure 1):

Toys used in trials included Ambi's "Active Baby Toy Set #E610" (ball in a tube), and Fisher Price Child Development Toys "Chime Ball #1150," "Turn and Learn Activity Center #156," and "Twinkle Star Bell #1012."



Fig. 1

TEST ENVIRONMENTS:

Subjects and Methods in Lab #1:

While I initiated the tests and supplied the toys, research personnel cooperated by introducing the toys themselves. The collection of data was done by the research employees.

Laboratory #1 is in a U.S. university which conducts psychology experiments with a small number of primates. In December 1988 the Chime Ball and the Turn and Learn were introduced to a group of seven wild-caught primates (six *Cynomolgus* and one Rhesus). Three juveniles were less than two years and four adults were greater than two years. These toys were made available to these individuals for the seven months between December 1988 and June 1989. They were individually housed in steel mesh cages.

In April 1989 a Berchet "Teaching Rattle" #10095 and an Active Baby Toy (ball in tube) were added to the trials, and made available for the two months between April and June 1989.



Fig. 2

RESULTS:

Research staff reported that when toys were first introduced, one juvenile male primate immediately used his canine teeth to remove the seam in the middle of the Chime Ball and during the next few days chewed through one side.

The toys were then removed until a researcher extracted the canine teeth, as he had planned for the protection of staff and students. When toys were reintroduced for periods of one to two days there was less destruction. Other Chime Balls were not damaged.

The Turn and Learns had parts removed to protect the monkeys after they began removing and chewing various parts. However, it did provide a welcome perch and elevation (see Figure 2) and provided some tactile stimulation with two primates who responded to their mirror image on its mirror side.

The first individual introduced to the teething rattle immediately removed the plastic ball in the middle and chewed up the teething part. This toy was removed immediately and not used in any further trials.

One of the Active Baby toys (the ball in a tube which rattles and rolls) was used extensively.

After the seven months, the toys remained structurally sound, some individuals were still interacting with the devices, and they did evoke curiosity and positive stimulation in three juvenile primates. These individuals touched the toys and put some toys in their mouths.

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for several days, the individual will
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SUBJECTS AND METHODS IN LAB #2 — TEST 1:

Laboratory #2 is a U.S. military research facility which uses a variety of species including Rhesus and Cynomolgus monkeys, swine, and rodents in medical research related to military situations. The primates had their canine teeth rounded off but not extracted because management believes that the animals' behavior is affected.

In November 1989, 18 primates (nine adults and nine juveniles between two to three years of age) were observed by animal caretakers six hours per day over three days during two periods each hour except for lunchtime. Subjects were tested over a two week period.

The youngsters were not observed playing with the toys, but some fingerprints were found on the mirror portion of the Turn and Learn which suggests some curiosity was expressed.

Of the adults, three showed no interest at all in the toys; three showed mild interest in the tube with the ball (Active Baby) and the Turn and Learn, and three individuals played with the toys for between one and two hours initially the first day, but showed no interest during observation periods for the remaining 13

days. With the adults, Turn and Learn and the tube with the ball, were used most, although infrequently during the times observed during the morning and afternoon.

Results:

The sergeant in charge reported: “In conjunction, very little enrichment was provided during the two weeks using Fisher Price toys.” However, I believe it was significant that there was no damage to the toys which were considered by staff to be safe and durable. As in Laboratory #1, approximately one third of the individuals appeared to be interested in and interacted with the toys.

SUBJECTS AND METHODS IN LAB #2 — TEST 2:

Other trials at this laboratory began in February 1990.

The four juvenile Rhesus monkeys were given one toy for a 48 to 72 hour period on different days. Little interest after initial curiosity phase was shown, but observation of their behavior with the tube with the ball included putting the toy in their mouths and spinning the ball with their tongues for 10 to 15 minutes at a time.

Six adult Rhesus monkeys were tested and given one toy each for 48 to 72 hours. After about five minutes (the “pick up and look at it phase”) no play was observed thereafter.

Six adult Cynomolgus monkeys under the same test conditions were only interested in Turn and Learn with which they played for 15 minutes after the initial five minute curiosity stage.

The Chime Balls were attempted in “Pig Gang Rooms” but failed to work after the initial push or nudge from a pig because the floors slanted into a trough and individuals could not recover the ball.

The rats began chewing on all toys almost immediately upon introduction so they had to be removed to avoid possible harm from plastic ingestion.

The guinea pigs and mice showed no interest whatsoever in any of the toys.

Results:

With rats, the toys did not appear to stimulate any activity except chewing. Since plastic might be harmful, other less expensive natural materials might be safer and allow them to chew.

Interaction with the toys certainly did not help all of the animals all of the time, but did provide activity and interest for some of the animals some of the time. It would have helped to schedule different types of toys to be rotated among the primates.

SUBJECTS AND METHODS IN LAB #3:

Laboratory #3 is in a medical school of a U.S. university. Primates here are used in experiments which include requiring performance of behavioral tasks. The canine teeth of these individuals had not been extracted.

During two months from December 1989 to January 1990, five adult Rhesus monkeys were observed for the first two hours, and then the observer listened from his office nearby with periodic checks at least every half hour. Toys were given to the males for two months and the females for one month.

Results:

Male #1 was given a Baby Bell. On day one, within the first few minutes he picked it up and for approximately five minutes tried to pull the bell out from between the bars. During the next ten minutes, he threw the toy around his cage. After a total of 20 minutes he stopped using the toy. On day two, the observer heard him throwing the toy around the cage, once in the morning and once in the afternoon. From day three on, there were no observations of toy use, so it is assumed that he stopped using the toy.

Female #2 had no interest in the Chime Ball after her initial five minute inspection.

Female #3 was considered one of the dominant females in the room and was given a Turn and Learn. She aggressively bit the horn on top of the toy and then looked in the mirror for 15 minutes. No further interaction with the toy was observed on days two or three and for the rest of the one-month observation.

Female #4 was afraid of the Turn and Learn. She was usually timid with most new objects. Within a few minutes she looked into the mirror and responded to her reflection. However, after 10 minutes she was never observed showing any further interest.

Female #5 never touched the Chime Bell nor made any attempt to interact with it in any way that the observer could see or hear.

Results:

When this facility used toys in the past, they found the balls were ignored after a short period of time. Mirrors were used more often when they were first introduced, but later were ignored.

This concurs with our experience of finding that when toys were left with an animal for several days, the individual became accustomed to and disinterested in the toy. Rotating the toys has helped to overcome this problem and serve to induce some much-needed novelty in an otherwise boring routine.

SUBJECTS AND METHODS IN LAB #4:

Laboratory #4 is a non-medical university facility which uses animals for experiments in such fields as environmental toxicology and psychology. Rabbits are housed in standard

stainless steel cages for up to one year and two have recently been maintained in a large opaque plastic fish tub with sawdust flooring. Rabbits are all used for the production of antibodies.

A 15 minute trial in February 1990 was made with a Star Ball with the four individually caged rabbits. One rabbit vigorously head-butted and pushed the ball with both forelegs. The other individuals showed disinterest.

The two rabbits in the fish container, who were extremely afraid of people, did not interact while being observed.

DISCUSSIONS:

Rabbits are a difficult species to care for, especially to provide for both their social and behavioral well-being. In the wild they live in dens. Although they are a social animal, in the laboratory environment serious aggression problems do occur when group housing is attempted. Long-term caging on mesh-wire flooring can cause severe pressure sores. More humane housing can be developed utilizing "Den Tubs" discussed later in this article.

LIFEFORCE INVENTIONS THAT ATTEMPT TO PROMOTE AND STIMULATE AS WELL AS PROVIDE OUTLETS FOR NATURAL BEHAVIORS:

Subjects and Methods in Laboratory #2 — Enrichment tool test:

"Food environment" is a food dispenser that extends the feeding period by requiring foraging for food. Preliminary observations, which included pretest baseline and behavioral rates, were conducted in Laboratory #2 and we found that eating periods of 15 to 30 minutes can be extended to two to three hours while they forage for their daily food rations.

Following completion of the patent process a future publication will detail our experiences with the "Food Environment."

Subjects and Methods in Lab #4 — Enrichment Tool Test:

"Enviro-tubes" allow mice, hamsters, and rats the opportunity to tunnel, create private "den" areas, have more floor space and have new areas to explore. It is comprised of two lengths of white opaque PVC tubing (one is approximately three to five inches and the other is 11 inches) and one white opaque PVC elbow (see Figure 4). I used 1 1/4", 2", and 3" diameters for the mice, the hamsters and the rats, respectively. Each set can be easily assembled and disassembled in order

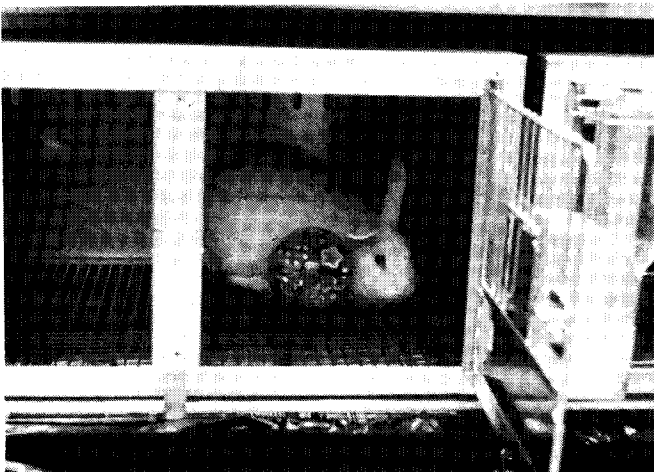


Fig.3

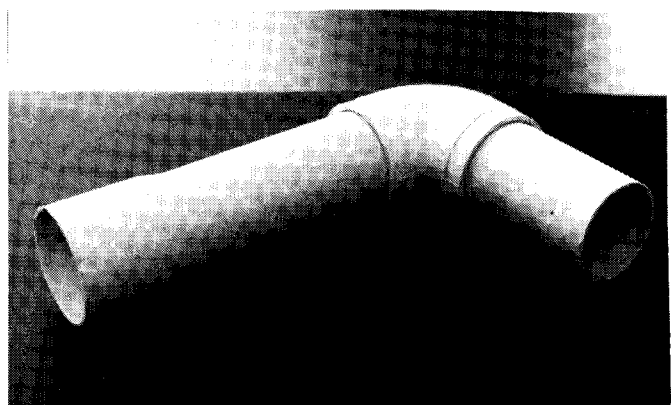


Fig. 4

to allow for the humane removal of animals in the tubes, for different combinations to create environmental changes, for partial use in smaller cages and for easy cleaning (the material has withstood 180 degrees F wash and 200 degrees F rinse cycles).

Laboratory #4 tried the first "Enviro-tubes" in February 1990. The manager of the facility and I put one tube set each with eight mice (breeding colony), one hamster (used in behavioral experiments) and three rats (used in toxicology experiments). Each rat received one piece of tube (two rats were in small suspended cages and one rat was in a standard plastic cage). Each species was observed for approximately 15 minutes during the day. One week later six additional "Enviro-tube" sets were introduced, so each species now had three sets.

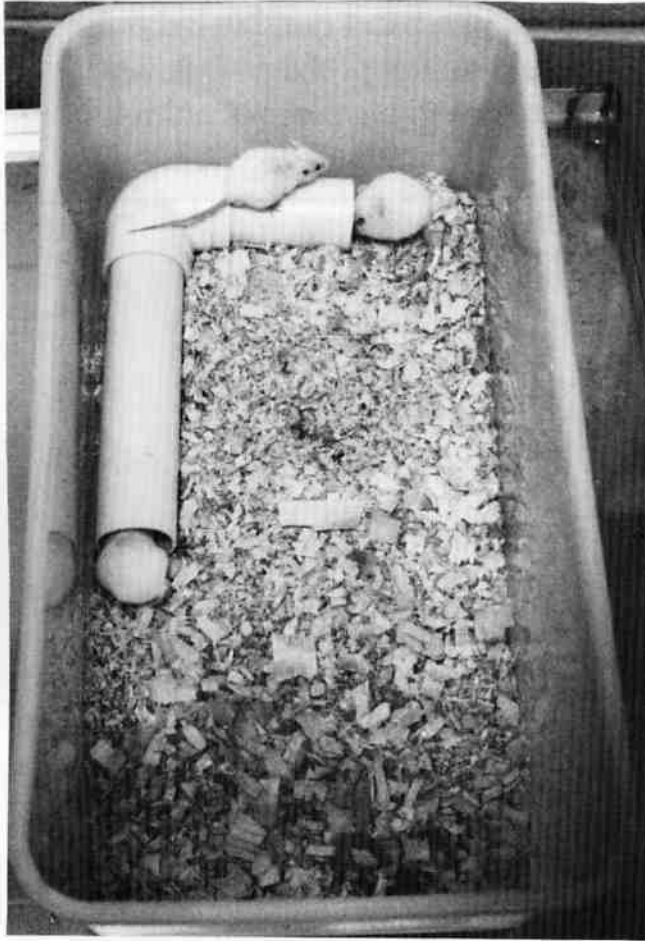


Fig. 5

The mice and hamsters immediately interacted by tunneling through the tubes (see Figures 5, 6, 7). The two rats in the smaller cages pushed the tubes and tunneled through them (see Figure 8). The rat in the plastic cage attempted to bury the 11" tube with sawdust.

When I returned to the facility one month later in March 1990, the supervisor reported only one problem: one rat chewed a small part of the edge of his three inch tube. Neither of the other two rats nor the hamsters or mice had chewed their tubes.

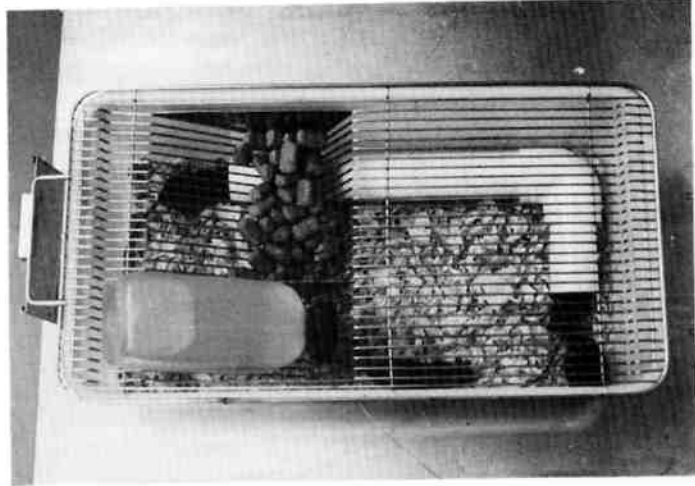


Fig. 6

Occasional observations by the animal caretakers and myself found that all of the animals who had received partial or whole sets interacted with the tubes to the extent that individuals or groups would even sleep in the tubes (see Figure 9).

"Den Tubs" are large opaque plastic waste bins measuring approximately 30 inches in length with 12 inch by 14 inch open tops.

"Den Tubs" were also introduced to rabbits in March 1990 at this same facility in an attempt to provide a habitat for them that might fulfill their natural instinct to burrow and den. During the 20 minute introduction period, when the rabbits were frightened and cautious of my presence, the rabbits almost immediately entered the "den." When startled by any movement they sought refuge in their private "den" home (see Figures 10, 11).

GENERAL DISCUSSION AND CONCLUSIONS:

The enrichment toys and tools appeared to evoke both curiosity and activity in most individuals even though some of the toys did not stimulate some individuals at all.

Observer presence and other distractions disrupted some individual subjects' routine and attending behavior. Further studies could utilize remote video-taping of their interaction with the toys and tools without the presence of people.

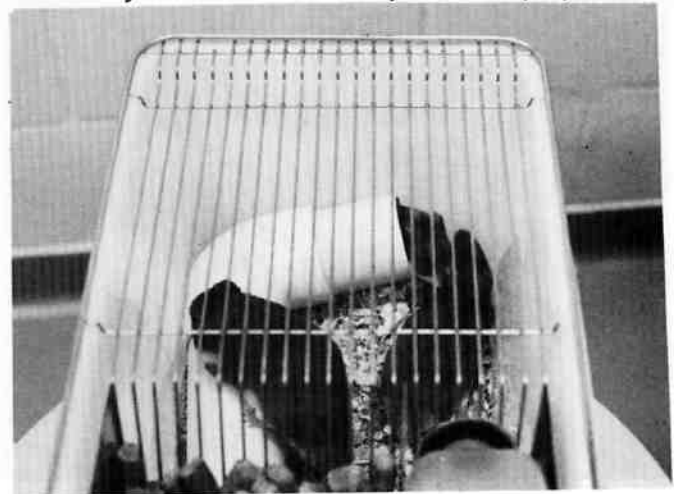


Fig. 7

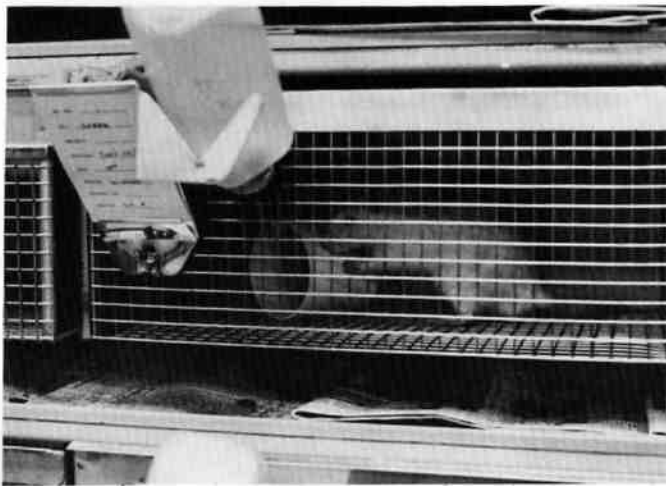


Fig. 8

Even the most durable enrichment toys were not problem-free when used with a variety of the non-human animal personalities. Under most conditions, with caged primates, the toys were safe and durable, but did not deteriorate. Even though some animals chewed the plastic, with one individual chewing through the side of a Chime Ball, no harm came to any animal. However, there remains the possibility of an individual being injured through plastic ingestion. There was the case of one out of the seven primates who showed no more evidence of such chewing.

Unfortunately, one rat out of the ten subjects ingested a small part of a tube's edge. If this problem continues the tubes may need to be made stronger: of heavier plastic, or metal, for example. Even though with all other species "Enviro-tubes" have been safe and durable in these initial trials, the tubes may not be feasible with rats.

The toys tested only interested some individuals for a brief period of time, although we have found that re-introducing a toy or rotating them can bring renewed interest.

It remains to be seen whether the "Enviro-tube" would need to be rotated. I strongly suspect not because the tubes could provide stable features of environment such as private areas for sleeping. But if a facility did not use the full three piece set, perhaps rotated, different single sections would be helpful.

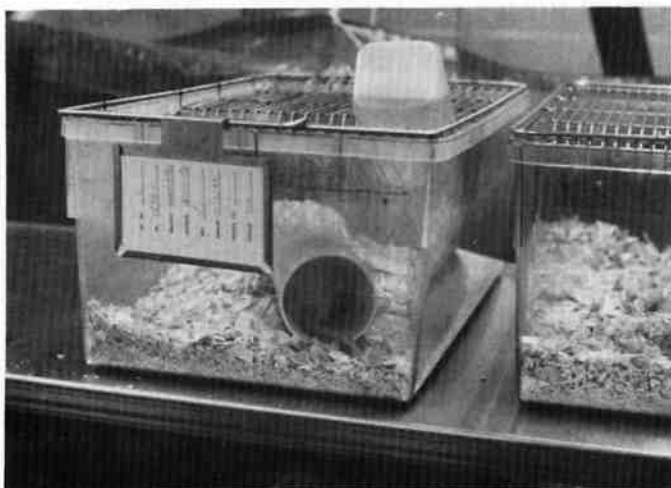


Fig. 9

Some animal routines provide important comfort and are necessary. Major changes such as the removal of their sleeping quarters can be stressful and should be avoided.

It was consistent to find that approximately 1/3 of each of three primate populations studied in laboratories #1, #2, and #3 were interested in some toys provided whereas 2/3 of the individuals showed almost no interest.

Although it is impossible to completely fulfill the social and behavioral needs of primates and other animals confined in research laboratories, the Lifo Foundation is dedicated to reducing their boredom, stress and suffering by giving them behavioral toys and tools until they are no longer kept in captivity as "animal models."

“...Even the most durable behavioral toys were not problem-free when used with a variety of animal personalities...”

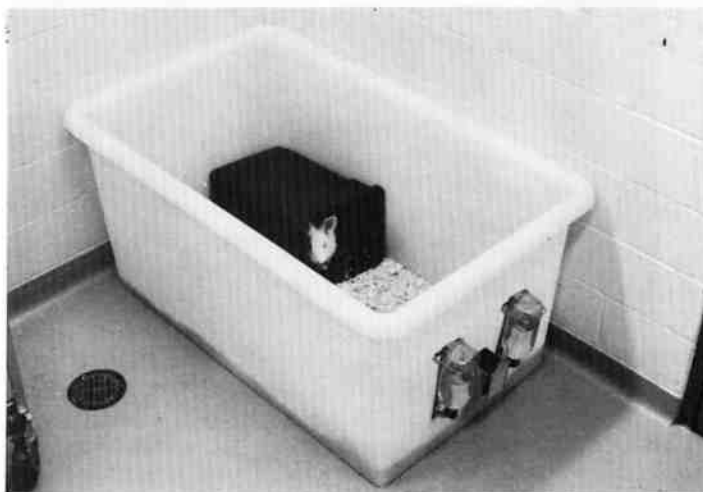


Fig. 10

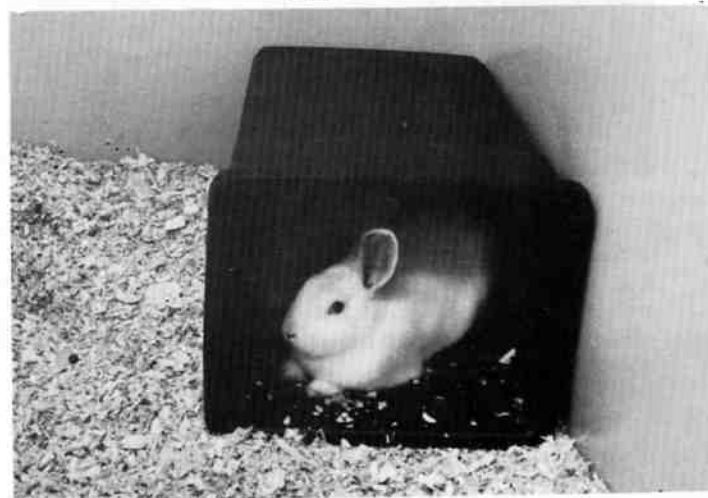


Fig. 11

While some research personnel are cautious but willing to implement improvements for the animals' well-being, our progress has been hindered in many cases by the reluctance of some researchers to work with an organization that does not conduct animal research. There is the need for "watch dog" organizations, such as Lifeforce, to provide their expertise and to represent the concerns of both the public and the animals. We also hope to help foster in the research community a new spirit which recognizes both the needs and rights of animals.

Enrichment tools can provide for some of the species-specific behavioral needs such as foraging for food (primates and other species) and denning (mice, rats, rabbits, etc.).

A general enrichment program may be possible utilizing species-specific as well as individual needs and interests in a laboratory setting.

“...behavioral toys and devices did appear to invoke both curiosity and activity...”



Peter Hamilton

**Founder and Director
Lifeforce Foundation
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Peter Hamilton is the founder of the Lifeforce Foundation, an ecology organization formed in 1980 to raise public awareness of the interrelationship of human, animal and environmental problems.

Peter was born and raised in Vancouver and pursued an art career after attending Vancouver City College. His art, music and poetry focused on human problems such as pornography, racism and world hunger. An exposure to animal suffering led him to extend his circle of compassion and ethical concerns to, as Peter puts it, "include our fellow creatures with whom we share this planet."

Peter has been responsible for reducing and ending some cases of chronic confinement of primates in research laboratories and exposing the plight of primates in vivisection laboratories. He provided better methodology for eye experiments at UC San Francisco, which ended the restraint periods of up to six weeks; was instrumental in ending chronic chairing at the University of British Columbia; and had baboon B43 released after four months of continuous restraint at the University of Western Ontario.

Lifeforce trains investigators to work in a responsible, peaceful manner to improve the health research system so people and animals need not suffer. Their "Alert for Life" campaign informs the public that they can confidentially provide information about any unethical or scientifically unsound experiments and lab practices with people or animals.

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For further information, including information about "Enviro-tubes," "Food Environment," and "Den Tubs," Peter Hamilton is always happy to respond from The Lifeforce Foundation, Box 3117, Vancouver, BC, V5C 2K4.