



Mankind's Best Friend?

The Science and Controversy Behind the Best Friends Again Program

Quynh Anh Nguyen

Biochem 118Q

4 June 2008

Missyplicity Project



BioArts Int.

- 1998: \$4 million project to clone Lou Hawthorne's dog Missy
 - Border collie and husky mix
 - Funded by John Sperling
 - Assigned to Texas A&M cloning expert Mark Westhusin and team
- Feb. 2000: Genetic Savings & Clone founded in Sausalito, CA
- July 6, 2002: Missy died at age 15 before being cloned
- 2006: GSC shut down

Cloning of Missy



BBC News

- 2005 Seoul National University: Dr. Hwang Woo Suk and team successfully cloned world's first dog, Snuppy
- 2006: BioArts International founded by Hawthorne
- 2007: Hawthorne asked Hwang to clone Missy
 - Missy's DNA flown to Sooam Biotech Research Foundation near Seoul
- Clones:
 - Mira born Dec. 5, 2007
 - Chingu born Feb. 15, 2008
 - Sarang born Feb. 19, 2008

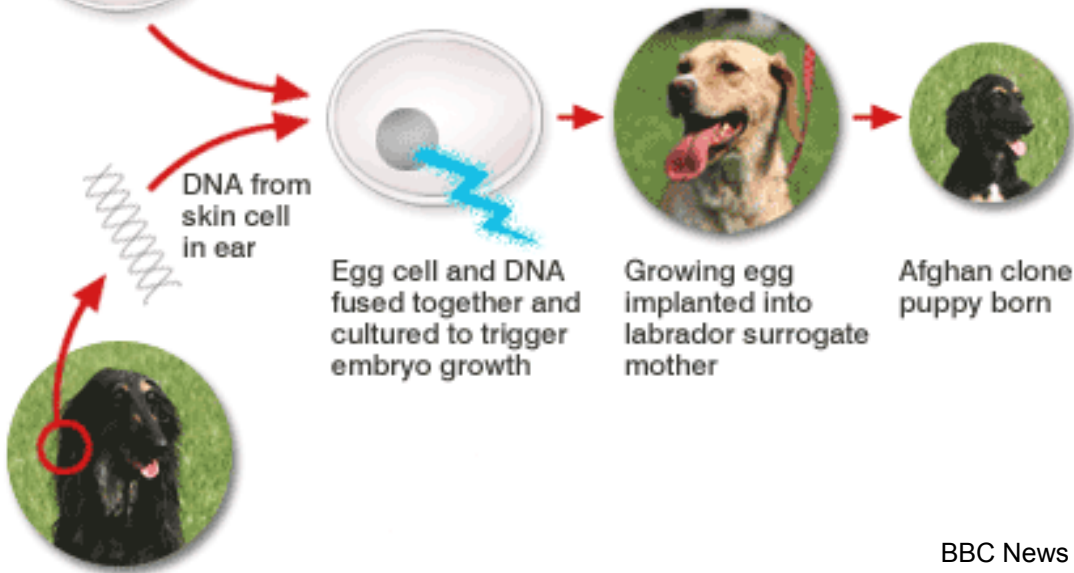


BioArts Int.

Cloning Process

HOW PUPPY WAS CLONED

Empty donor egg from mixed-breed bitch



BBC News

- Pregnancy period is ~ 2 months (60-64 days)
- 25% success rate



Problems with Cloning Dogs

- Poorly understood physiology
- Infrequent estrus: once or twice a year at random intervals
- Immature ova: time window of a few hours to obtain fully mature ova from oviduct
- Opaque ova: permeated with thick, black lipids
- Animal welfare: stricter standards than for cloning livestock



BioArts Cloning Guarantees

- Health and Wellness Guarantee
 - Clone is guaranteed to be free from health problems scientifically linked to cloning for one year. If not, will be replaced at no extra charge.
- Resemblance Guarantee
 - While they cannot guarantee behavioral resemblance, if the client is not satisfied with the degree of physical resemblance to the donor, then BioArts may choose to replace the clone or give a refund.
- Ethics Guarantee
 - All animals involved in the cloning process treated humanely
- Financial Guarantee
 - If the cloning is not successful, client will be refunded full amount



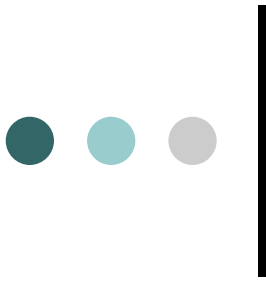
Patent Rights

- BioArts International given sole, worldwide license for cloning of dogs, cats, and endangered species
 - Rights include permission to employ foundational nuclear transfer cloning technology developed for cloning Dolly



Auction Information

- Registration begins May 21
- Qualifications:
 - At least 21 years old
 - Have a living dog or gene banked tissue from living or deceased dog
 - Bank reference with available cash, assets, or credit line \geq \$250,000
- 10% internet bidding Buyer's Premium



Auction Number	Starts	Ends	Starting Bid
1	Wednesday June 18th, 6:00am PST	Thursday, June 19th, 6:00am PST	\$100,000
2	Wednesday June 18th, 10:00am PST	Thursday, June 19th, 10:00am PST	\$120,000
3	Wednesday June 18th, 2:00pm PST	Thursday, June 19th, 2:00pm PST	\$140,000
4	Wednesday June 18th, 6:00pm PST	Thursday, June 19th, 6:00pm PST	\$160,000
5	Wednesday June 18th, 10:00pm PST	Thursday, June 19th, 10:00pm PST	\$180,000



Essay Contest



BioArts Int.

- Win a FREE clone of your dog
- Write 500 word essay about why they should clone your dog
- Deadline: Tuesday, June 10 at 12 noon PST
- Computer will select 200 semi-finalists at random and winners will be selected by BioArts and a panel



Controversies

- Principal Scientist Dr. Hwang Woo Suk was indicted for fabricating data on cloning human embryos
 - “I know the association with Dr. Hwang is going to be controversial... Our main concern is simply he’s the best when it comes to dog cloning.” - Lou Hawthorne



Social Benefits?

- Reduce pet overpopulation: by adding knowledge about canine reproduction, will help accelerate development of low-cost, non-surgical, drug-based contraceptive and sterilization methods
- Repopulate endangered species
- Replicate superior working dogs
- Support human health: provide new insights into human physiology and diseases



Concerns

- Cloned animals suffer serious health problems and often die
- Invasive, exploitation of animals
- Need to focus on protecting the animals and land that remain, not saving endangered animals through cloning
- The money could be used elsewhere
- ““People believe they're going to get their pet back through cloning, but the new cloned dog won't know the old pet's tricks ... It's a false promise to say you can get your pet back.” – Arthur Caplan, Chairman, Medical Ethics Dept. University of Pennsylvania
- "Many people consider pets to be part of our families. If we get used to cute cloned puppies, will some people expect cute cloned babies next?" – Marcy Darnovsky, Center for Genetics and Society





Sources

- Best Friends Again. Retrieved May 26, 2008 from <http://bestfriendsagain.com/>
- BioArts International. Retrieved May 26, 2008 from <http://www.bioarts.com/index.htm>
- Roush, W. (March 2005). Genetic Savings and Clone: No Pet Project. *Technology Review*. Retrieved May 28, 2008 from <http://www.technologyreview.com/Biotech/14215/>
- Barron, J. (May 21, 2008). Biotech Company to Auction Chances to Clone a Dog. *The New York Times*. Retrieved May 26, 2008 from <http://www.nytimes.com/2008/05/21/us/21dog.html>
- Brown, S. (May 30, 2008). Marin startup BioArts offers to clone dog for contest winner. *San Francisco Business Times*. Retrieved May 30, 2008 from <http://www.bizjournals.com/sanfrancisco/stories/2008/05/26/daily30.html>
- (August 3, 2005). S Korea unveils first dog clone. *BBC News*. Retrieved May 30, 2008 from <http://news.bbc.co.uk/2/hi/science/nature/4742453.stm>
- Lopatto, E., & Lim, B. (May 21, 2008) South Korea Stem Cell Faker Hwang Will Clone Dogs for Cash. *Bloomberg*. Retrieved May 30, 2008 from <http://www.bloomberg.com/apps/news?pid=20601124&sid=aY87xpbzcfCI&refer=t>
- *Why Oppose Cloning?* Retrieved May 30, 2008 from <http://www.nopetcloning.org/index.shtml>
- Lee B., Kim M., Jang G., Oh H., Yuda F., Kim H., Shamim M., Kim J., Kang S., Schatten G., Hwang W. (2002). Dogs cloned from adult somatic cells. *Nature*, 436, 641.