Directory of Axolotl Colonies

Dr. John B. Armstrong
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Our colony was started about five years ago with gifts of animals from L. DeLanney, H.C. Dalton and R.R. Humphrey. We now have about 200 mature animals of various genotypes, most of which have been bred in our own laboratory. We have animals carrying all the standard color markers (albino, axanthic, melanoid and white) and animals known to be heterozygous for the following mutations affecting development: premature death, p; phocomelia, ph; ascites, as; and the cell lethals r and x. The colony is supported by the National Research Council of Canada, and the funds are intended, in part, to maintain the colony as a genetic resource. In the next year or two we hope to expand our size somewhat, and perhaps add a few additional mutants to the collection. The breeding stock will be used for our own research and to provide spawnings containing known genotypes for other investigators. Because of the limited size of the colony, we will not normally be able to provide mature animals.

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Dr. J.C. Beetschen
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Two species are bred in the laboratory, the more numerous being Pleurodeles waltlii (about 3,000 adults and metamorphosed juveniles ranging in age from 10 years to 6 months old, at the present time); Axolotls are bred too, but in much smaller numbers (about 350 adults and juveniles more than 6 months old, at the present time).

Pleurodeles are usually grouped in medium- or large- sized tanks, in running water. Spawnings occur in autumn and winter.

They have been laboratory-bred in Toulouse since 1960 and are an inbred strain originated from brother and sister animals brought from the "Laboratoire d'Embryologie de la Faculté des Sciences de Paris" (Professor L. Gallien). The "ascite caudale" (ac) mutant was discovered in that strain in 1964. Now, most of the population has a mixed origin, since several laboratory-bred animals were crossed in 1963, 1966, 1972, with wild imported Portuguese mates and gave rise to several "families".

An important stock of +/ac and ac/ac animals is kept for studies on the ac maternal effect. There are also experimentally induced triploid and tetra-

ploid adults, whose several physiological characteristics are investigated and compared to those of diploid sisters and brothers.

Included among the adults, two strains which contain useful chromosomal markers are maintained.

Older animals are usually sacrificed for biochemical work, especially for extraction of liver nuclear non histone proteins.

Axolotls are from several origins. A white (d/d) strain (= "G" strain) was developed from one spawning, which was given in 1963 by Professor Gallien and the animals were inbred since that time. Some of those "G" animals were also crossed in 1974 with dark Axolotls obtained from Dr. Signoret (Caen), who himself got their strain from Dr. Humphrey's laboratory in 1964. Other d/d and D/d animals were obtained from such D/d parents and are fertile adults. We still keep about 25 "pure" dark animals too.

Finally, three albino (a/a) larvae of spawning n° 4263 from the Indiana University Axolotl Colony were obtained in October 1976. They grew to adults (one male, two females) and the first population of albino larvae, born July 25th 1978, is being reared. One a/a female was previously crossed with a d/d male (February 1978), the a/a male being still immature and suspected to be sterile, and a pigmented progeny of that cross is also being reared.

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Dr. L.E. DeLanney
Jackson Laboratory
Bar Harbor, Maine 04609

With respect to the request in the last Axolotl Newsletter for information on axolotl colonies, insofar as composition is concerned, our colony is essentially as described in American Zoologist 18 (DeLanney, L.E. - Immunogenetic Profile of the Axolotl, 1977).

With respect to location, the DeLanney axolotl colony is now quartered at The Jackson Laboratory, Bar Harbor, ME 04609, where it will be returned to full strength. We shall continue the program of developing truly inbred histocompatibility lines and an active research program will be pursued.

With respect to supplying others, the two moves, west and east, have reduced the colony such that it will probably be a year before we can offer assistance to others.

We are now anxious to accumulate information on the spontaneous appearance of tumors or other neoplastic growths on axolotls. If you should note abnormalities, we will appreciate hearing from you about them. The kinds of data we'd like to have are: 1. Brief description of the abnormality. 2. Age, size, etc. of the animal. 3. Date first observed. 4. Genealogy or other

background known about the animal, including whether the animal was spawned in your laboratory or was from another source. 5. Regimen, experimental or otherwise, to which the animal was exposed. 6. Whether you have siblings in your colony in the event transplantation of the abnormality is in order. 7. Whether you will be willing to release the animal to us or whether it will be submitted to the Registry of Tumors of Lower Animals at the Smithsonian.

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Dr. William R. Forbes
Biology Department
Indiana University of Pennsylvania
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At present, we have about 125 adults, 150 animals about 7 months of age, and between 300 to 400 larvae ranging in age from 2 months to 4 months. We have both darks and whites, and no mutant stock since our present interest is in behavior rather than development. If all goes well, as it has this past year, we should have the capability to supply animals to others, as we have this summer, but for research purposes only.

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Dr. James D. Hoerter
Department of Natural Sciences
Stephens College
Columbia, Missouri 65201

I have at the present a colony of 17 animals which I maintained for our undergraduate research program. At the present time, I do not maintain any particular strains or mutants.

Although students are encouraged to develop their own research plans, they are able to pursue certain aspects fo my research which involves regulation mechanisms for cell number and cell shape during organogenesis in the early developmental stages. I am using triploids as a tool to investigate this problem.

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Drs. Antone G. Jacobson and
Gerald W. Eagleson
The University of Texas at Austin
Department of Zoology
Austin, Texas 78712

We have approximately 40-50 adults at any one time which include both the white strain and dark strain of Ambystoma mexicanum. Stocks were

originally supplied as four adults (2 white; 2 dark) by Dr. Armstrong at the University of Ottawa. We have also come across a black strain which seems to lack iridophores and xanthophores and contains only melanophores of white and black pigment. This "strain" was the result of the mating of two dark axolotls which had recessive genes for the white strain.

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Dr. J.T. Justus
Arizona State University
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Tempe, Arizona 85281

Currently, I have about 250 animals. The genes known to be present or those which may be present are listed below, along with reference numbers to Dr. Humphrey's records since most of the parents or grandparents of these animals were in the Indiana Colony:

Genes	Humphrey Spawning Numbers
v	3382
h	4423
c	4175, 4193, 4305
ax	?
albino	4209
Wistar	4178
an	3382 and a Tompkins animal at Tulane

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Dr. Jan Löfberg
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Box 561
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Sweden

At the Institute of Zoology, Uppsala University, we have a very small axolotl colony consisting of two dozen animals. These animals are the progeny of an inbred population maintained since the 1950:ies. One animal is largely unpigmented, appears sterile and may be of the albino type. We keep the animals to get embryos in which we study the early morphogenesis of the nervous system.

As for myself, I study the migration of neural crest cells in the embryonic extracellular matrix by TEM and SEM. I would be interested in acquiring a mating pair producing offspring of the albino type with deviating neural crest cell migration patterns.

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Dr. Pat G. Model
Albert Einstein College of Medicine
Department of Neuroscience
Kennedy Center
Bronx, New York 10461

We have 200 breeding animals and (always) 20-30 larvae that are being raised as replacements for the colony.

We are carrying the d, a, ax, m, anf f genes.

Care data: The animals are maintained at 16.5°C with a light cycle of 10 hrs on, 14 hrs off. They are fed beef liver strips 3X/wk and are changed into fresh water 3 or so hrs later. We make our own spring water: it is a more or less 25% Holtfreters. Our breeding season is about 10 mos long with a lay-off usually late summer - early fall. We expect to get 2-3 spawnings during a season from an ace female and we can usually use a good male every 2-3 weeks.

Colony records:

A. 1256 eggs in a single spawning, of which 96% were viable. The usual is 200-500 eggs per with the % viable being highly variable.

B. 41 good spermatophores at a single go by the colony super stud.

C. And last but not least, a 14 yr old male provided 6 spermatophores to a young and nubile female and thus became a father at a very ripe old age.

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Dr. Lennart Nelson
University of Umeå
Department of Zoophysiology
S-901 87 Umeå
Sweden

Here in Umeå we just have a small colony with 75 axolotls. They are kept in 40 litres aquariums with 10 animals in each. The axolotls are fed twice a week with chopped oxheart.

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Dr. Ilkka Peräsalo
Department of Zoology
University of Helsinki
Arkadiankatu 7, Helsinki 10, Finland

We have an axolotl colony of the wild type in our laboratory consisting of 46 individuals. We received the stock of young animals in January 1976 from Prof. C.O. Jacobson, Inst. of Zool., Univ. of Uppsala, Sweden via Prof. Eino Kulonen, Inst. of Medical Chemistry, Univ. of Turku, Finland.

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Dr. J. Signoret
University de Caen
Caen, France

The origin of the animals in the colony is a set of two spawnings at the Indiana University Axolotl Colony. Specifically, spawnings #1907 and 1908 (December, 1962). After a tourist class flight on Air France, and a stopover in Signoret's kitchen sink, the animals were settled at the University of Caen. Initially, there were 90 DD and 54 dd (pigment genes). The last axolotl from the original Bloomington spawning died in July, 1976. Although advanced in age (14 years) and sterile, it was honored and respected throughout its later years. Presently, the axolotl colony at Caen consists of approximately 200 animals. In addition to the above pigment alleles, the gene s (short toes), the gene a (albinism), and possibly the gene mi (microphtalmic lethal) are maintained in the colony.

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Dr. J.M.W. Slack
Imperial Cancer Research Fund
Mill Hill Laboratory
Burtonhole Lane
London, NW7, England

Complement on 14 August, 1978

Axolotls (Ambystoma mexicanum)

Breeding stocks : 28 males (14 white)
35 females (16 white)

Young animals : 16 (all black)

Young animals for regeneration experiments :
8 normal
10 triploid.

Spanish salamanders (Pleurodels waltl)

Breeding stocks : 5 males (tetraploid)
5 females (tetraploid)

Larvae : 13

Clawed toad (Xenopus laevis)

Breeding stocks : 10 male
7 female

Common frog (Rana temporaria)

Young frogs : 8

Common newt (Triturus vulgaris)

Breeding stocks : 3 male
4 female

Alpine newt (Triturus alpestris)

Breeding stocks : 2 male
2 female.

The colony is maintained to support experimental work on early embryogenesis, limb development and limb regeneration. The breeding stocks are used for

egg production, but the animals will not necessarily mate naturally and we make considerable use of artificial fertilization methods.

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Dr. David L. Stocum
Department of Genetics and Development
University of Illinois
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We currently have 20 dark and 10 white animals capable of breeding plus another 20 white and 10 dark immature animals, for a total of 60 breeding animals. These animals all came as eggs from the Indiana colony over the last two years (we unfortunately did not keep a record of the spawning numbers). Spawnings from these animals are being used for limb regeneration studies.

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Dr. R.M. Thomas
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England

We have white animals, inbred for five generations, hyper-pigmented whites, a few blacks and ---- (the most cherished of all our axolotls) two beautiful golden albinos.

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Drs. R. Verhoeff-de Fremery
Hubrecht Laboratory
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Utrecht, The Netherlands

At the Hubrecht Laboratory we maintain an Axolotl colony consisting at the moment of: 310 animals; i.e., 150 couples and 10 males. Some of them are six years old; all the others are three or one years old. All of them belong to the Dutch strain (see: Developmental studies on an apparent cell lethal mutant gene u t in the Mexican Axolotl, Ambystoma mexicanum. R.R. Humphrey, G.M. Malacinski and H.M. Chung. Cell Differentiation 7, no. 1/2, 47-59, 1978).

We also have 8 albino Axolotls. They do not represent a pure line and they are not complete albinos. The eyes are pigmented and the heads of some of them are more or less pigmented. The pigmentation of the eggs is normal. The larvae become gradually white only after hatching. They originated from a crossing of a black male (Dutch strain) with a white female, which we

got as a present from an Institute in Israel in 1971. The origin of this female is unknown to us.

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Dr. Hugh Wallace
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England

Size: 9 adults at present - reduced by red-leg and disinclined to breed, perhaps for the same reason.

Origins: (1) Humphrey's mating 3228, some of which I brought here and crossed with

(2) Specimens obtained from local dealers and maintained in the Zoology department here

Genes: d from both stocks; m from (1); D and M from (2); a novel recessive lethal pl for peg leg from (2); allelic differences between stocks at about 7 incompatibility loci

pl is not sex-linked and not linked to d or m but I can't say much else about it, as the disease struck when we started to investigate it. Homozygotes are first recognized by retarded arm development and rarely grow more than 3 fingers on small inflexible arms. Most of them swell up and die at 30-50 mm. (2-3 months old in our conditions) but a few survive 6 months. They resemble descriptions of ph and s homozygotes, but not closely enough to identify pl with either of these mutations.

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Dr. Hae Moon Chung
Seoul National University Axolotl Colony
Dept. Biology
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A small number of sexually mature axolotls have been raised, and will eventually be bred to establish a large scale colony. Three spawnings are represented in the colony: I.U. spawning #'s 4319 (dark); 4350 (white) and 4359 (dark).

Commercial brine shrimp eggs are not available in Korea. Any suggestions for a substitute food would be welcome.

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Additions to the above directory are welcome, and will be published in the next (Spring, 1979) issue of the Newsletter.