Cover: Colorless hairtip mutant *Peromyscus polionotus*.
One of two existing photographs. See page 11.
ISSUE # 26

In our last issue (March 98) we discussed the future of Peromyscus Newsletter and requested input and suggestions from our readers concerning what changes we might institute to appeal to a broader reader base. We thank all of you for your continued interest and support. We were gratified to receive a number of constructive comments and ideas. Below are excerpts from some of these:

"I believe that the need for a newsletter continues ..... I guess I would favor having one copy a year published, and for one or two other bits of PN news to be sent on-line" (Bob Rose, ODU)

"Although out of the Peromyscus business for several years, I enjoy the newsletter. Perhaps adding a few web pages to the database site for contributions, news and comment, etc. would suffice." (John Beidler, FSU)

"We face the same problems with RAT GENOME that you face with P. Newsletter ..... A key point is the support of people who use the animal as a research subject, since they outnumber the geneticists, etc. Printing sequences, chromosomal assignments, etc. is useful to us, since they are ready reference material. This certainly serves a function." (Tom Gill, U. Pittsburgh)

"I believe that a newsletter is still pertinent ..... most research involving Peromyscus is 'non-genetic' in scope; hence a newsletter provides information that a database cannot ..... Although it may make the best business sense to produce an annual issue, there have been occasions when the information was so timely that I was able to utilize it almost immediately upon receipt ..... of the options presented, I am most in favor of (summarizing) all the genetic info in one issue to be published every two or three years; change the focus of the intervening issues to ecology, reproduction, behavior, etc. (Alice Bard, Fla. Dept. Eviron. Protect.)

"I'd really hate to see PN disappear ..... Instead of having a subscription cost ...., possibly you could require an entry every other year" (Richard Hill, Mich State Univ.) Dr. Hill also bemoans the increasing difficulty in maintaining wild rodent colonies because of prohibitive costs and red tape.

"I'd like to see (PN) continued as a semi-annual publication. I would welcome more space devoted to ecology, reproduction and behavior ..... you could minimize the list of publications that cite Peros since library searching is so commonplace now that most Investigators can do the same on a more regular basis. On line is probably the way of the future, but I still like the hard copy ...." (Erick Hofmeister, Mayo Clinic)

"I read PN as a general reader .... in conjunction with my editing for Mammalian Species. I also subscribe to Roy Horst's Bat Research News for the same reason ..... what about having a broader base in PN, similar to what Roy has?" (Barbara Blake, Bennett College)

(Continued next page)
We are taking these suggestions to heart and, beginning with this issue, will gradually incorporate many of your ideas. One consistent theme among your comments was that we should broaden the focus to include more material related to field biology and behavior of *Peromyscus* and reduce the emphasis on genetics that has characterized PN until now. In response, we plan to dedicate each fourth issue - March even years - entirely to genetic updates. We will term this our "*Peromyscus* Genome" issue. This bi-annual issue will contain gene lists, the updated linkage maps, accession numbers to GenBank sequences and other information of interest. The other issues will omit this matter except that a catalog of animals and materials available from the *Peromyscus* Genetic Stock Center will continue to be included in each issue. Any particularly noteworthy genetic news will be reported in our "News and Comment" section as it occurs. The "Recent Publications" section, of course, will cite any new published articles relevant to *Peromyscus* regardless of topic. Genetic information will be regularly updated in *PeroBase* on the Internet.

Wally Dawson  
w Dawson@stkctr.biol.sc.edu

***************

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*Peromyscus* Genetic Stock Center  
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* * *
NEWS, COMMENT and ANNOUNCEMENTS

Peromyscus continues to make the news. High profile work by Shirley Tilghman, Paul Vrana and colleagues at Princeton made the cover of the December issue NATURE: GENETICS. This study has also been highlighted in the September 25th issue of SCIENCE (281:1984-1985) and the December 1st NEW YORK TIMES science column. Work by the Princeton group using fetal and placental expression of imprinted genes in Peromyscus maniculatus X P. polionotus hybrids tests the gametic competition hypothesis proposed by David Haig of Harvard University. The hybrids of two species, one monogamous and one not, exhibit size anomalies consistent with the theory, but the results of the Princeton study failed to verify the gametic conflict theory. The implications of imprinting for speciation are discussed.

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The July 6th issue of USA Today carried a three full page spread on Peromyscus and the 1993 hantavirus outbreak in the Four Corners region. It discusses the Native American cultural aspects of the outbreak and resulting conflicting views concerning conventional public health procedures. The feature includes several photos of deer mice.

* * * * * * * * * * * * *

We have a note that Tom Gill is retiring at the end of December. Dr. Gill was editor of Rat Newsletter (now Rat Genome) and for many years has been active in rat genetics.

XXXXXXXXXXXXXXXXXXXX

Gloria E. Salavarria has written an piece entitled "Mouse in the House" recounting her observations of several Peromyscus sp. that she keeps in terraria at her home. We can empathize with her experience with keeping P. leucopus from leaping out of the terraria.

X-X-X-X-X-X-X-X

Dennis Ruez of the Florida Museum of Natural History has been investigating fossil Peromyscus. The fossil record of Peromyscus is an overlooked area. Although several species have been described based on fossil material, the record is quite spotty. Let's hope that Dennis will help fill in the fossil history

~~~~~~~~~~~~~~~~~~~~~~~

For those who ship small mammals (Peromyscus, Mus, etc.) an article in Lab Animal 27(5):49ff by Terrie Cunliffe-Beamer DVM of Jackson Labs describes how to organize the shipment. It is a useful reference.

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DIRECTOR,

PEROMYSCUS GENETIC STOCK CENTER

Applications are invited for a tenure track appointment as Associate or Full Professor in the Department of Biological Sciences at the University of South Carolina. Responsibilities of this appointment include directorship of the Peromyscus Genetic Stock Center.

The Stock Center (http://stkctr.biol.sc.edu/), supported by NSF since 1985, maintains seven species and 33 mutant strains of deer mice and related species and provides them to investigators in the US and abroad. The Center publishes the PEROMYSCUS NEWSLETTER to a circulation of about 750, and is developing the Peromyscus database, PeroBase, also funded by NSF. In Spring 1999 the Stock Center will move into new state-of-the-art animal care facilities and research laboratories.

Applicants must possess a highly productive, externally funded research program that may be in any of a number of fields including infectious diseases, comparative mapping, molecular evolution, toxicology, population genetics, physiology, or behavior. Research experience with Peromyscus or other rodents, and future use of Peromyscus are expected. Directorship of the Stock Center provides a unique opportunity for career development of individuals interested in Peromyscus research. The candidate must be willing to promote the Stock Center as a national focal point for Peromyscus research.

Applicants should submit curriculum vitae, description of research program, and a letter of intent to: Peromyscus Search Committee, c/o Dr Michael J Dewey, Department of Biological Sciences, 700 Sumter St, University of South Carolina, Columbia SC 29208
An editorial in Science, co-authored by Jim Bull and Holly Wichman addresses the relevance of evolutionary biology to modern science and discuss the implications of resistance its teaching in many high schools.

Three additional species of *Peromyscus* are the subjects of new issues of *Mammalian Species*:


Others are "in the works".

BACK ISSUES. Unfortunately our supply of original back issues of *PEROMYSCUS NEWSLETTER* is becoming depleted. The only issues we still have in adequate supply are Numbers 8, 13, 14, 17, 18, 19, 20, 21, 23 and 24. For others there are either no available copies or fewer than 5 on hand. We have good photocopies of scarce back issues (with covers in the original colors) that can be supplied for $5 each. A complete set of *PN* (Numbers 1 thru 25), including some as the photocopied version, will be provided for $50 including postage.

Calling attention to a paper in *Ecological Monographs* 68:571ff by Ruth Lewellen and Steve Vessey: This paper summarizes 23 years of field data noting the influences of weather and density on populations of deer mice at Carter Woods in northwest Ohio. The comprehensive reference list is potentially useful to many biologists involved in field work with *Peromyscus*

***

MICROSATELLITES

At the Stock Center we frequently receive queries about microsatellite markers useful with *Peromyscus*. In the event that you have or know of microsatellites that work for deer mice and related species, we would like to have the information for our database. We would like to list any primer sequences in a future issue of PN, if there is no objection. Please contact us if you can help. Thanks.
PEROMYSCUS STOCK CENTER

What is the Stock Center? The deer mouse colony at the University of South Carolina has been designated a genetic stock center under a grant from the Special Projects Program of the National Science Foundation. The major function of the Stock Center is to provide genetically characterized types of Peromyscus in limited quantities to scientific investigators. Continuation of the center is dependent upon significant external utilization, therefore potential users are encouraged to take advantage of this resource. Sufficient animals of the mutant types generally can be provided to initiate a breeding stock. Somewhat larger numbers, up to about 50 animals, can be provided from the wild-type stocks.

A user fee of $17.50 per wild-type animal and $25 per mutant or special stock animal is charged. The user assumes the cost of air shipment. Animals lost in transit are replaced without charge. Tissues, blood, skins, etc. can also be supplied at a modest fee. Arrangements for special orders will be negotiated. Write or call for details.

Stocks Available in the Peromyscus Stock Center

<table>
<thead>
<tr>
<th>WILD TYPE SPECIES</th>
<th>ORIGIN</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>P. maniculatus bairdii</em></td>
<td>Closed colony bred in captivity since 1948.</td>
</tr>
<tr>
<td>(BW Stock)</td>
<td>Descended from 40 ancestors wild-caught near Ann Arbor MI</td>
</tr>
<tr>
<td><em>P. polionotus subgriseus</em></td>
<td>Closed colony since 1952.</td>
</tr>
<tr>
<td>(PO Stock)</td>
<td>Derived from 21 ancestors wild-caught in Ocala Nat'l. Forest FL. High inbreeding coefficient.</td>
</tr>
<tr>
<td><em>P. polionotus leucocephalus</em></td>
<td>Derived from beachmice wild-caught on Santa Rosa I., FL. and bred by R. Lacy.</td>
</tr>
<tr>
<td>(LS Stock)</td>
<td>Approximately ten generations in captivity.</td>
</tr>
<tr>
<td><em>P. leucopus</em></td>
<td>Derived from 38 wild ancestors captured between 1982 and 85 near Linville NC.</td>
</tr>
<tr>
<td>(LL Stock)</td>
<td>Approximately 20 generations in captivity.</td>
</tr>
<tr>
<td><em>P. californicus insignis</em></td>
<td>Derived from about 60 ancestors collected between 1979 and 87 in Santa Monica Mts. CA.</td>
</tr>
<tr>
<td>(IS Stock)</td>
<td>Approximately twelve generations in captivity.</td>
</tr>
<tr>
<td><em>P. ayzacetus</em></td>
<td>Derived from animals collected on Sierra Chincua, Michoacan, Mexico in 1986</td>
</tr>
<tr>
<td>(AM Stock)</td>
<td>Approximately ten generations in captivity.</td>
</tr>
<tr>
<td><em>P. melanophrys</em></td>
<td>Originated from a group of animals collected at Zacatecas Mexico during the 1970's.</td>
</tr>
<tr>
<td><em>P. maniculatus X P. polionotus</em></td>
<td>Formerly maintained by R.W. Hill at Mich. State Univ.</td>
</tr>
<tr>
<td>F₁ Hybrids</td>
<td>Sometimes available.</td>
</tr>
</tbody>
</table>
MUTATIONS AVAILABLE FROM THE STOCK CENTER

**Coat Colors**

- Albino c/c
- Ashy ahy/ahy
- Black (Non-agouti) a/a
- Blonde bln/bln
- Brown b/b
- California blonde clb/clb
- Dominant spotting S/+  
- Golden nugget b<sup>0</sup>/b<sup>0</sup> [in *P. leucopus*]
- Gray g/g
- Ivory i/i

**Other Mutations and Variants**

- Alcohol dehydrogenase negative Adh<sup>0</sup>/Adh<sup>0</sup>
- Alcohol dehydrogenase positive Adh<sup>1</sup>/Adh<sup>1</sup>
- Boggler bg/bg
- Cataract-webbed cwbcw
- Epilepsy ep/ep
- Flexed-tail f/f
- Hairless-1 hr-1/hr-1
- Hairless-2 hr-2/hr-2
- Juvenile ataxia ja/ja
- Enzyme variants.

**ORIGINAL SOURCE**

- Sumner's albino deer mice (Sumner, 1922)
- Wild-caught in Oregon ~ 1960 (Teed et al., 1990)
- Horner's black mutant (Horner et al., 1980)
- Huestis stocks (Huestis and Barto, 1934)
- Santa Cruz I., Calif., stock (Roth and Dawson, 1996)
- Wild caught in Illinois (Feldman, 1936)
- Wild caught in Mass. (Horner and Dawson, 1993)
- Natural polymorphism. From Dice stocks (Dice, 1933)
- Wild caught in Oregon (Huestis, 1938)
- Sumner's "palid" deer mice (Sumner, 1917)
- Barto stock at U. Mich. (Dodson et al., 1967)
- Huestis stock (Huestis and Barto, 1934)
- Clemson U. stock from N.C. (Wang et al., 1993)
- Michigan State U. colony (Cowling et al., 1994)
- Egoscue's "non-agouti" (Egoscue, 1971)
- Sumner's original mutant (Sumner, 1917)

**ORIGIN**

- South Carolina BW stock (Felder, 1975)
- South Carolina BW stock (Felder, 1975)
- Blair's *P. m. blandus* stock (Barto, 1955)
- From Huestis stocks (Anderson and Burns, 1979)
- U. Michigan *artemisiae* stock (Dice, 1935)
- Probably derived from Huestis flexed-tail (Huestis and Barto, 1936)
- Sumner's hairless mutant (Sumner, 1924)
- Egoscue's hairless mutant (Egoscue, 1962)
- U. Michigan stock (Van Ooteghem, 1983)
- Wild type stocks given above provide a reservoir for several enzyme and other protein variants. (Dawson et al., 1983).

---

<sup>1</sup> Unless otherwise noted, mutations are in *P. maniculatus*.

<sup>2</sup> Available only as silver/brown double recessive.

<sup>3</sup> Available only as pink-eye dilution/flexed-tail double recessive.
OTHER RESOURCES OF THE PEROMYSCUS GENETIC STOCK CENTER:

* * *

NOW. Highly inbred *P. leucopus* (l20+) are available in limited numbers as live animals or as frozen tissues. Several lines developed by George Smith (UCLA) are currently maintained by the Stock Center.

* * *

Limited numbers of other stocks, species, mutants, inbreds and variants are on hand, or under development, but are not available for distribution. Currently we can supply up to 10 each of the species *P. eremicus* and *P. melanophrys*.

Preserved or frozen specimens of types given in tables above.

Tissues, whole blood or serum of types given in tables above.

Flat skins of mutant coat colors or wild-type any of the species above.

Reference library of more than 2400 reprints of research articles and reports on *Peromyscus*.

Copies of individual articles can be photocopied and mailed. Please limit requests to five articles at any given time. There will be a charge of 5 cents per photocopied page after the initial 20 pages.

Materials are available through the *Peromyscus* Molecular Bank of the Stock Center. Allow two weeks for delivery. Included is purified DNA or frozen tissues from any of the stocks listed above. Several genomic and cDNA libraries and a variety of molecular probes are available. (See next page.)

For additional information or details about any of these mutants, stocks or other materials contact: Janet Crossland, Colony Manager, Peromyscus Stock Center, (803) 777-3107 or peromyscus@stkctr.biol.sc.edu

PLEASE CALL WITH INQUIRIES.

---------------------------------------------------------------------------------------------------------------------

Peromyscus Genetic Stock Center
University of South Carolina
Columbia SC 29208
(803) 777-3107
peromyscus@stkctr.biol.sc.edu
# Materials on Deposit in the *Peromyscus* Molecular Bank

<table>
<thead>
<tr>
<th>Accession Number</th>
<th>Item</th>
<th>Description</th>
<th>Species</th>
<th>Donor</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pr-01</td>
<td>LINE1</td>
<td>pDK62</td>
<td><em>P. maniculatus</em></td>
<td>D. Kass</td>
<td>C</td>
</tr>
<tr>
<td>Pr-02</td>
<td>LINE1</td>
<td>pDK55</td>
<td><em>P. maniculatus</em></td>
<td>D. Kass</td>
<td>C</td>
</tr>
<tr>
<td>Pr-03</td>
<td>ADH1</td>
<td>pADH F72</td>
<td><em>P. maniculatus</em></td>
<td>M. Felder</td>
<td>B</td>
</tr>
<tr>
<td>Pr-04</td>
<td>Mys</td>
<td></td>
<td><em>P. leucopus</em></td>
<td>(Requested)</td>
<td></td>
</tr>
<tr>
<td>Pr-05</td>
<td>SAT</td>
<td></td>
<td><em>P. leucopus</em></td>
<td>(Requested)</td>
<td></td>
</tr>
<tr>
<td>Pr-06</td>
<td>GPGD</td>
<td>pBS clones</td>
<td><em>P. californicus</em></td>
<td>S. Hoffman</td>
<td>A</td>
</tr>
<tr>
<td>Pr-07</td>
<td>MHC PeleI</td>
<td>38dp2</td>
<td><em>P. leucopus</em></td>
<td>M. Crew</td>
<td>A</td>
</tr>
<tr>
<td>Pr-08</td>
<td>MHC PeleI</td>
<td>52ap6</td>
<td><em>P. leucopus</em></td>
<td>M. Crew</td>
<td>A</td>
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<tr>
<td>Pr-09</td>
<td>MHC PeleI</td>
<td>40Bgl</td>
<td><em>P. leucopus</em></td>
<td>M. Crew</td>
<td>A</td>
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<tr>
<td>Pr-10</td>
<td>MHC PeleI</td>
<td>53Pv1</td>
<td><em>P. leucopus</em></td>
<td>M. Crew</td>
<td>A</td>
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<tr>
<td>Pr-11</td>
<td>MHC PeleI</td>
<td>37B2</td>
<td><em>P. leucopus</em></td>
<td>M. Crew</td>
<td>A</td>
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<tr>
<td>Pr-12</td>
<td>MHC PeleI</td>
<td>37B4</td>
<td><em>P. leucopus</em></td>
<td>M. Crew</td>
<td>A</td>
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<tr>
<td>Pr-13</td>
<td>MHC PeleII</td>
<td>α3E23</td>
<td><em>P. leucopus</em></td>
<td>M. Crew</td>
<td>A</td>
</tr>
<tr>
<td>Pr-14</td>
<td>MHC PeleIII</td>
<td>17E2</td>
<td><em>P. leucopus</em></td>
<td>M. Crew</td>
<td>A</td>
</tr>
<tr>
<td>Pr-15</td>
<td>MHC PemaI</td>
<td>pr44</td>
<td><em>P. maniculatus</em></td>
<td>M. Crew</td>
<td>A</td>
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</tbody>
</table>

**Libraries:**

<table>
<thead>
<tr>
<th>Lb-03</th>
<th>lambda genomic</th>
<th>testis</th>
<th><em>P. leucopus</em></th>
<th>M. Crew</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lb-04</td>
<td>cosmid genomic</td>
<td>testis</td>
<td><em>P. leucopus</em></td>
<td>R. Baker</td>
<td>A</td>
</tr>
<tr>
<td>Lb-05</td>
<td>lambda genomic</td>
<td>liver</td>
<td><em>P. californicus</em></td>
<td>S. Hoffman</td>
<td>A</td>
</tr>
</tbody>
</table>

**Frozen Tissue for DNA:**

<table>
<thead>
<tr>
<th>S-01</th>
<th>bairdii (BW)</th>
<th>liver, tail, other</th>
<th><em>P. maniculatus</em></th>
<th>Stk. Ctr.</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-02</td>
<td>subgriseus (PO)</td>
<td>liver, tail, other</td>
<td><em>P. polionotus</em></td>
<td>Stk. Ctr.</td>
<td>A</td>
</tr>
<tr>
<td>S-03</td>
<td>leucopus (LL)</td>
<td>liver, tail, other</td>
<td><em>P. leucopus</em></td>
<td>Stk. Ctr.</td>
<td>A</td>
</tr>
<tr>
<td>S-04</td>
<td>wild-caught SC</td>
<td>liver, other</td>
<td><em>P. gossypinus</em></td>
<td>-</td>
<td>A</td>
</tr>
<tr>
<td>S-05</td>
<td>azteca (AM)</td>
<td>liver, tail, other</td>
<td><em>P. azteca</em></td>
<td>J. Glendinning</td>
<td>A</td>
</tr>
<tr>
<td>S-06</td>
<td>insignis (IS)</td>
<td>liver, tail, other</td>
<td><em>P. californicus</em></td>
<td>S. Hoffman</td>
<td>A</td>
</tr>
<tr>
<td>S-07</td>
<td>inbred PmH1A</td>
<td>liver, other</td>
<td><em>P. maniculatus</em></td>
<td>Jackson Lab</td>
<td>A</td>
</tr>
<tr>
<td>S-08</td>
<td>inbred PmH8</td>
<td>liver, other</td>
<td><em>P. maniculatus</em></td>
<td>Jackson Lab</td>
<td>A</td>
</tr>
</tbody>
</table>

1. Location code: A = USoCar SAT 01; B = USoCar CLS 603; C = USoCar CLS 707
2. Not currently available.
EXTINCT GENETIC VARIANTS

Since 1917 about 40 distinct, monogenic coat color and other visible mutations have been detected in Peromyscus. Most of these have been genetically analyzed and formally described in publications such as The Journal of Heredity. Many of these are kept as mutant lines at the Peromyscus Genetic Stock Center.

Between 1917 and 1922 F.B. Sumner described several recessive characters (albino, pinkeyed dilution, yellowing, and hairless-1). Since then, as new mutations were detected in laboratory or field-caught animals, a published report on the mutant would be accomplished, and a stock of the variant animals retained for potential genetic studies. The most recently reported new mutation is California blonde (Roth and Dawson, 1996). Using such traits, Frank Clark, Betty Barto and Bill McIntosh by the 1950's had worked out several linkage groups.

Some of these distinctive variants have been lost. One of these, colorless hairtip (ctp), is shown on the cover of this issue of PN. Most of the pelage color variants are known from P. maniculatus, but "colorless" was recovered from P. polionotus. Wilfred Bowen (1968) obtained it from a second generation hybrid between two P. polionotus subspecies. The pale gray-white trait was inherited as a simple recessive character (Bowen and Dawson, 1969). A stock of these animals were retained at the University of South Carolina until 1978, when the line died out. Other visible traits (dilute, whiteside, post-juvenile nude) and several monogenic behavior variants also no longer exist in laboratory stocks, although these were never kept in the South Carolina colony.

At the Stock Center considerable effort is devoted to maintaining the distinctive mutants, primarily as potential markers for gene mapping. Many of the stocks were accepted "in trust" with the assumption that they would be maintained indefinitely. Some of these have homologs in Mus and Rattus and provide "anchors" for linkage and mapping studies. Nevertheless, the argument is sometimes made that we should "not re-invent the lab mouse" and that there is little value in keeping the color variants for Peromyscus. Indeed, there is relatively little demand for these variants, and, when they are requested, the numbers needed are limited. So the question is: "Should the Stock Center continue to maintain visible mutations??" Many people at several institutions for many years have invested much money, time and effort in preserving these lines, with the belief that they would "someday" be of scientific value. One alternative that we are considering is cryopreservation, particularly of sperm, a technique not yet perfected for deer mice.

Nevertheless, in our estimation, funding to maintain these variants soon may be in jeopardy. Are they worth the effort to save?

References:


**TOPICS**
- TAXONOMY, SYSTEMATICS EVOLUTION
  - [2-3 "Datamasters" = "DMs"]
- GENETICS
  - [2-3 DMs]
- REPRODUCTION, DEVELOPMENT and AGING
  - [3 DMs]
- BEHAVIOR
  - [2-3 DMs]
- METABOLISM, PHYSIOLOGY and BIOCHEMISTRY
  - [3-4 DMs]
- POPULATION BIOLOGY
  - [4-5 DMs]
- ECOLOGY
  - [4-5 DMs]
- *TOXICOLOGY
  - [1-2 DMs]
- *VECTOR BIOLOGY
  - [2-3 DMs]

**REFERENCE and RELATED DBs**
- BIBLIOGRAPHIC MANAGEMENT
  - "Butler Peromyscus Bibliography" Stock Center bibliography
  - ISI Current Contents Zoological Record
  - Agricola Medline

- RELATED GENOMIC DATABASES W/LINKS
  - GenBank
  - MGD
  - RatBase
  - HUGO
  - (Other mammalian)

- ADDITIONAL WEBSITE LINKS
  - Peromyscus Stock Center
  - Smithsonian Natural History
  - American Museum Natural History
  - Sevilleta Reserve
  - Wooten's Beachouse site
  - Others

- OTHER RESOURCES
  - Mammalian Species series
    "Biology of Peromyscus" (J.A. King ed.) 1968
    "Advances in Biology of Peromyscus" (Kirkland/Layne, 1989)
    "Revision of the Genus Peromyscus" (Osgood, 1909)

*Specialized categories.*
Progress on PeroBase

The Peromyscus database project is now being organized with the support of an NSF database grant. This is a report on the progress and plans, together with a request for input.

PeroBase is not strictly a genomic database, but rather encompasses the whole spectrum of Peromyscus research areas. We have selected nine general topical areas in our primary classification (Diagram opposite). Seven of these areas are general academic areas, while two ("Toxicology", "Disease Vector Biology") are more applied. There will be overlap with crosslinks among some of these areas. For example, a set of data may be relevant to both "behavior" and "reproduction" and, hence, could be accessed readily from within either topic page. Data to be inserted into PeroBase will be reviewed by an appropriate "authority" or "referee" that we tentatively refer to as "datamasters" or DMs. These will be individuals who consent on a voluntary basis to review proposed data entries and, initially, to recommend existing data sets for installation in PeroBase. Several such persons at any given time would act as DMs in a particular topic area. We anticipate that many of our readers will assist construction of PeroBase in this role.

Proposed entries will then be forwarded to "Central Database Management" for acceptance, editing, formatting for database consistency, identifying appropriate links and references, and formally entering the data. This will be a function of the personnel of the Peromyscus Genetic Stock Center. Of course, one advantage of an electronic database compared to print media, is that updating becomes and ongoing process as additional information is developed. Review and revision of information in the database will be accomplished either on recommendation of external DMs, or by central editors. The Stock Center will identify an editor and assistant editors to maintain PeroBase, as well as to communicate with the external DMs. A major concern will be to maintain an attractive "look" and easy accessibility. The database will maintain an index to readily access a particular reference or dataset. The index will be an on-line list of topics, or can be reached by a query word.

Bibliographic management will be a major function and will begin by incorporating the extensive 7000+ reference list created by Bruce Buttler, and will be enhanced with recent references in Peromyscus Newsletter, and various on-line services (Medline, Agricola, etc.). There will be links to various mammalian genomic databases and to GenBank. There will also be ready links to websites particularly relevant to Peromyscus, e.g. major American museum collections.

Technical management of PeroBase will be accomplished through the Universiy of South Carolina Computer Science Department. The database will be mounted on a Unix platform using SyBase "commercial-strength" software. Care will be taken that PeroBase is accessible through all major internet providers and search engines.

We trust that PeroBase will prove a useful resource. We invite your comments and participation. If a PN reader would like to serve 2-3 years as a datamaster in his/her area of expertise, please contact us.

Wallace Dawson & John Rose
CONTRIBUTIONS

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A STANDARD LABORATORY TEST WITH ZINC PHOSPHIDE ON
PEROMYSCUS MANICULATUS

In 1993, deer mice were implicated as the reservoir for hantavirus which caused an outbreak of adult respiratory distress syndrome, and ultimately, several deaths in the four-corners area of Colorado (Timm and Howard 1994). Douglass and others (1996) found that deer mice are prevalent in a variety of habitats in Montana and that the mice they captured ranged between 0% and 30% seropositive for the hantavirus per sampling grid. Winters (1998) writes that “between 100,000 and 200,000 people are affected (by hantavirus) worldwide every year”.

Cases of hantavirus are occurring from North America to South America with reports of cases found on the Internet from Alberta, Canada to Argentina, South America (Taggart 1997 and Nickerson 1998). Methods to control deer mouse populations and educational programs about hantavirus and its prevention are ways to alleviate potential outbreaks of hantavirus. Zinc phosphide was tested as a rodenticide to collect efficacy data for the Environmental Protection Agency (EPA) for reregistration and to add deer mice (Peromyscus spp.) to the bait label.

The objective of this research was to determine the efficacy of a 1.82% zinc phosphide wheat bait and a 2.0% zinc phosphide oat great bait for controlling deer mice. The treated wheat bait and the treated oat bait were not tested simultaneously, but were both 3-day, 2-choice tests. The second choice food used in the test was a mixture, recommended by the EPA and their Office of Pesticide Programs (OPP), called rat and mouse challenge diet (EPA 1980).
Table 1: 1.82% Wheat Bait and 2.0% Oat Groat Bait on Deer Mice (Peromyscus maniculatus)

A. 1.82% Wheat Bait

<table>
<thead>
<tr>
<th>Group</th>
<th>Sex</th>
<th>No. dead over sample size</th>
<th>Treated Bait Cons</th>
<th>Group II</th>
<th>Sex</th>
<th>No. dead over sample size</th>
<th>Treated Bait Cons</th>
<th>Group III</th>
<th>Sex</th>
<th>No. dead over sample size</th>
<th>Treated Bait Cons</th>
<th>Total Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>F</td>
<td>10/10</td>
<td>N/A</td>
<td>II</td>
<td>F</td>
<td>4/10</td>
<td>0.31</td>
<td>III</td>
<td>F</td>
<td>8/10</td>
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<td>0.38</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>10/10</td>
<td>N/A</td>
<td></td>
<td>M</td>
<td>6/10</td>
<td>0.31</td>
<td></td>
<td>M</td>
<td>6/10</td>
<td>0.33</td>
<td>0.32</td>
</tr>
</tbody>
</table>

B. 2.0% Oat Groat Bait

<table>
<thead>
<tr>
<th>Group I</th>
<th>Sex</th>
<th>No. dead over sample size</th>
<th>Treated Bait Cons</th>
<th>Group II</th>
<th>Sex</th>
<th>No. dead over sample size</th>
<th>Treated Bait Cons</th>
<th>Group III</th>
<th>Sex</th>
<th>No. dead over sample size</th>
<th>Treated Bait Cons</th>
<th>Total Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>10/10</td>
<td>N/A</td>
<td>F</td>
<td></td>
<td>9/10</td>
<td>0.63</td>
<td>2.27</td>
<td></td>
<td>M</td>
<td>6/10</td>
<td>0.62</td>
<td>0.62</td>
</tr>
<tr>
<td>M</td>
<td>10/10</td>
<td>N/A</td>
<td>M</td>
<td></td>
<td>9/10</td>
<td>0.91</td>
<td>2.26</td>
<td></td>
<td>M</td>
<td>6/10</td>
<td>0.62</td>
<td>0.76</td>
</tr>
</tbody>
</table>

C. Wheat Bait and Oat Groat Bait Comparison

<table>
<thead>
<tr>
<th>Wheat Bait</th>
<th>Oat Treated Bait</th>
<th>Sex</th>
<th>Cons</th>
<th>Sex</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>0.64</td>
<td>F</td>
<td>2.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.65</td>
<td>M</td>
<td>2.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.64</td>
<td></td>
<td>2.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The study took place at the National Wildlife Research Center’s (NWRC) Animal Research Building. A breeding colony was established from 10 breeding pairs purchased from the University of South Carolina, Columbia.

All mice weaned from the breeding pairs used in this test were held, sexes separate, under standard laboratory conditions (i.e., temperature, humidity, lighting, etc.) Comparable to those of the animal testing room until they were of adequate weight for use in tests (15-40 g).

Sixty animals (30 of each sex) were randomly selected from the total population available for each test. The mice were all weighed, ranked by weight using 10 weight classes so that each class contained 3 animals. Each mouse in the 10 weight classes was randomly assigned to one of the two concentrations [control (0.00%) and treatment (1.82% for wheat bait or 2.0% for oat bait)] for a total of 10 animals per sex, per each concentration, or a total of 20 animals per each group. A third group was a repetition of the second group. The animals were acclimated to their assigned group and test conditions for 3-days before exposure to the treated baits and the OPP rat and mouse challenge diet.

Mortality rates from the 1.82% wheat bait test on females were 4/10 = 40% and 8/10 = 80% in groups II and III (Table 1, A.), respectively, taking 1 to 2 days to die. The male group mortality rates were 6/10 = 60% for both groups II and III (Table 1, A.), taking 1 to 3 days to die. The overall mean mortality rate for this test was 60%. No control animals died.

Mortality rates from the 2.0% oat groat bait test on females were 9/10 - 90% and 8/10 = 80% in groups II and III (Table 1, B.), respectively, taking 1 to 3 days to die. The male group mortality rates were 9/10 = 90% and 6/10 = 60% for groups II and III (Table 1, B.), respectively, taking 1 to 4 days to die. The overall mean mortality rate for this test was 80%. No control animals died.

The total consumption from the mice on the wheat grain test was less than the total consumption from the mice on the oat groat test: \( \bar{x} = 0.38 \) g of wheat for the females, compared to \( \bar{x} = 0.62 \) g of oat groats for females; \( \bar{x} = 0.32 \) g of wheat for the males, compared to \( \bar{x} = 0.76 \) g of oat groats for males (Table 1, A. And B.), respectively. The mortality rate for the wheat bait was below the 70% efficacy rate set by the EPA for laboratory studies (EPA 1982) and would not be adequate for the rodenticide reregistration. Since the mice were thought to be discriminating against the wheat bait, another test was run to determine if Peromyscus preferred oat groat baits over wheat baits. The females consumed an average of 2.27 g of oats over 0.64 g of wheat when the two baits were presented side by side. (Males ate 2.26 g of oats over 0.65 g of wheat (Table 1, C.).

LITERATURE CITED
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**PEROMYSCUS LEUCOPUS AS A POSSIBLE BIOINDICATOR OF AROCLOR 1254 CONTAMINATED SITES.**

A number of hematological, immunological and biochemical parameters were measured in *Peromyscus leucopus* pups born from dams exposed to a single dose (300 mg/Kg body weight) of Aroclor 1254. In one experiment the pups were weaned at 3 weeks and examined at 6 weeks of age, in a second experiment the pups were kept with their mother for 4 weeks at which time they were examined.

The older pups showed significant decreases in: body weight, ratio of spleen weight to body weight, number of white blood cells and lymphocytes, and number and percentage of monocytes. They also showed significant increases in: stimulation index in response to the mitogen phytohemagglutinin (PHA), percentage of peripheral blood neutrophils and liver EROD induction. Pups sacrificed at 4 weeks of age showed even more significant differences. Their body and liver weights, percentage and number of lymphocytes, and serum antibody titers were lower than those of their controls; while their ratio of spleen weight to body weight, the concentration of the mitogen concanavalinA (ConA) needed to elicit the maximal proliferative response, the percent of neutrophils in their peripheral blood and their liver EROD, PROD and BROD activities were significantly higher than those of the controls.

Should the results prove consistently reproducible, pups could be used as biomarkers of contaminated sites. Females could be captured at the sites, bred in captivity with normal males, the vulnerable parameters identified in this study measured in their offspring and compared with a data base collected from normal pups.

Further studies using decreasing doses of exposure to Aroclor 1254 should define the threshold of sensitivity of this possible biomonitor.

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CONSERVATION EFFORTS FOR ENDANGERED ALABAMA BEACH MICE
(Peromyscus polionotus ammobates)

This report is to summarize ongoing research and conservation efforts for the federally endangered Alabama beach mouse (Peromyscus polionotus ammobates). This research is aimed at evaluating potential differences in life history variables between the mice found in areas that include designated critical habitat and those occupying the unprotected coastal scrub habitat. Beach mice regularly use both habitats, but the roles of these habitats relative to beach mouse ecology and management are poorly understood.

Capture-recapture data were collected from a series of grids at Bon Secour National wildlife Refuge from December 1994 to February 1997. From these grids, we produced information on survivorship, population density, reproductive output, body mass, and home range size. Telemetry data was collected to provide more detailed information on homerange and habitat use. These variables were compared between the beach dune and scrub habitat. Bimonthly survivorship values for both habitat types were at or above the population maintenance value of 0.52 (Sankaran, 1993). Population density was 25% lower in the scrub than in the beach dunes and there were no differences in mean body mass of adult males between habitats. While the number of subadults captured was much higher in the beach areas, the proportion of subadults recaptured as adults was not different between the habitats. Analyses of homerange sizes between habitats is being completed, however, no significant difference in homerange size between sexes was found.

Detailed microhabitat maps have been digitized in ArcView GIS which will allow homeranges to be overlaid. From this, we will determine habitat use versus availability to elucidate information critical to understanding the microhabitat requirements of this species.

Additional research included characterization of burrow site selection. Radio collared mice were located in their burrow where a suite of biotic and abiotic variables were measured including plant species richness, plant diversity, burrow aspect, dune height, and soil moisture, temperature and compaction. The same variables were measured for 10 randomly selected points within 20 m of the burrow. Multivariate statistical techniques will be used to determine the most important factors influencing burrow site selection. After gathering data on movement patterns, a burrow trap was used to trap exclusively the inhabitants of a burrow to provide information on the social organization of beach mice. Burrows have generally been located within 1 meter of the dune crest and on a slope of 20 degrees.

We also have been actively involved in a cooperative re-establishment effort with the U. S. Fish and Wildlife Service. In March 1998, preparations began to relocate Alabama beach
mice to previously occupied habitat within Gulf State Park, Baldwin County Alabama. House mice (*Mus musculus*) were trapped and removed from the release site, and beach dunes were fertilized to promote vegetative growth. Starting in April 1998, beach mice were captured on private property which was scheduled for development. These mice were released into Gulf State Park, and a supplemental feeding regime was initiated and continued through the summer period of low food availability. Gulf State Park will be trapped in Fall 1998 to assess the status of this new population.

**LITERATURE CITED**


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RECENT PUBLICATIONS


