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Finding Aid for JAX Oral History

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Finding Aid
to the
Jackson Laboratory Oral History Collection

prepared by
Susan Mehrtens, Ph.D.

sponsored by
The Acadia Institute
Bar Harbor, Maine

The Jackson Laboratory
Archives
and
The American Philosophical Society
History of Genetics Collection

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1987

The Jackson Laboratory Oral History Collection

is

dedicated to the memory

of

Robert Hudson Kanzler

1931-1986

"Quod coepit memoria eius aluit."
(What he began his memory nourished.)

Table of Contents

List of Illustrations.....	ii
Acknowledgments.....	iii
A Note on Abbreviations.....	v
Identification of Narrators.....	vi
1. Of Genes and Mice: An Introduction to The Jackson Lab's Oral History Collection...1	
2. Makers of the "Mouse House".....	17
3. Jax Behind the Scenes: The Human Side of Doing Science.....	60
4. Images of Jax: Institutional Mission, Identity and Values.....	77
5. From "Little Science" to "Big Science": Growth and Change at The Jackson Laboratory.....	93
6. Jax At Work: Science, Training and Service to the Scientific Community....	114
7. Judging Jax: Strengths, Weaknesses and Aspirations.....	130
8. Conclusion.....	147
Index to the Collection.....	157

List of Illustrations

1. A Timeline of Significant Dates in Jax's History.....viii
2. The Network of Mouse Geneticists in Jax Interviews.....67
3. Jax in 1929: Pen and Ink Drawing by Robert Little:.....91
4. Map of the Campus of The Jackson Laboratory.....92

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Above all, I acknowledge the role of The Jackson Laboratory "family"--staff, Trustees, friends, present and past--whose many efforts on behalf of this project made this oral history possible.

To all these people, I am deeply grateful.

For any errors, omissions, or weaknesses in this collection, I assume full responsibility.

Susan Mehrtens
Southwest Harbor
May 1987

A Note on Abbreviations

AALAS	American Association for Laboratory Animal Science		
AC	Arthur Champlin		
ACS	American Cancer Society		
AEC	Atomic Energy Commission		
AH	Ann Hirschhorn		
AK	Andrew Kandutsch		
AL	Anne Little		
APS	American Philosophical Society		
ARL	Anne and Robert Little		
AS	Allen Salisbury		
AAUW	American Association of University Women		
BG	Bentley Glass		
BS	Barbara Sanford		
BSO	Board of Scientific Overseers		
CCL	C.C. Little		
CCNSC	Cancer Chemotherapy National Service Center		
CRS	Frank Clark, Watson Robbins and Allen Salisbury		
CW	Charity Waymouth		
DaB	David Baltimore	NIH	National Institutes of Health
DB	Donald Bailey	PL	Priscilla Lane
DBe	Dorothea Bennett	RF	Richard Fox
DC	Douglas Coleman	RG	Reginald Gilley
DF	Dale Foley	RL	Richard Little
DH	David Harrison	RoL	Robert Little
EF	Eunice Fahey	RM	Roy McFarland
EG	Earl Green	RP	Richmond Prehn
ER	Elizabeth Russell	RS	Richard Sprott
FC	Frank Clark	RSt	Robert Stanwood*
FL	Fay Lawson	SB	Seldon Bernstein
GS	George Snell	SP	Stephen Petschek
HB	Helen Bunker	TJL	The Jackson Laboratory
HN	Harry Neilson	TR	Thomas Roderick
HW	Henry Winn	VM	Victor McKusick
JB	Jane Barker	WA	William Abbott
JBe	John Beck	WD	William DeLaitre
JC	John Compton	WMA	William and Mary Abbott
JCr	James Crow	WR	Watson Robbins
JD	John Dorey	WS	Willys Silvers
JE	James Ebert		
JF	John Fuller		
JH	Jean Holstein		
JPS	John P. Scott		
JS	Joan Staats		
LAVFW	Ladies Auxiliary Veterans of Foreign Wars		
LHB	Lester and Helen Bunker		
LB	Lester Bulker		
LL	Lloyd Law		
LS	Leroy Stevens		
MA	Mary Abbott		
MB	Murray Brilliant		
MDI	Mount Desert Island		
MLDR	Marie-Louise Duran-Reynals		
MG	Margaret Green		
MGL	Mammalian Genetics Laboratory		
MPAP	Manual of Policies and Procedures		
NAS	National Academy of Sciences		
NCI	National Cancer Institute		

* page references are to unedited transcript

IDENTIFICATION OF NARRATORS

AC Professor of Biology, Colby College; TJL summer student, 1961, counsellor, summer training supervisor, summer investigator

AH M.D., specialty: neurology; TJL summer student, 1953-54; member, TJL Corporation

AK Senior Staff Scientist, TJL, since 1954

AL CCL's daughter-in-law, married to RoL; TJL Trustees, 1970-

AS retired TJL employee, 1937-78

BG Professor emeritus, SUNY Stony Brook; editor, Quarterly Review of Biology; creator of history of genetics collection at American Philosophical Society

BS Director, TJL, 1981-

CW Senior Staff Scientist emerita, TJL, 1953-80; Interim Director, TJL 1980-81

DaB Director, Whitehead Institute, MIT; Nobel laureate, 1975; TJL summer student, 1955

DB Senior Staff Scientist, TJL, 1953-57, and 1967-

DBe Professor of Zoology, University of Texas; Chairman, BSO, 1979-86; Trustee, TJL, 1986-

DC Senior Staff Scientist, TJL, since 1958

DF retired Comptroller, TJL, 1945-73; Associate Director, 1973-75

DH Senior Staff Scientist, TJL, since 1969

EF retired secretary to EG, 1957-75

EG retired Director, TJL, 1956-75

ER Senior Staff Scientist emerita, TJL, 1937-80

FC retired TJL employee, 1929-68 (last of the original employees hired in 1929)

FL Professor emerita, Bard College; TJL administrator, 1983-; research assistant to ER, 1953-59

GS Senior Staff Scientist emeritus, TJL, 1935-73; winner, 1980 Nobel Prize in medicine

HB retired TJL assistant, 1946-86

HN TJL Trustee since 1956

HW Professor of Immunology, MGH; TJL Staff Scientist 1955-65

JB first TJL mouse importer, 1957; summer counsellor, 1958; post-doc, 1967; Staff Scientist 1980-

JBe TJL Trustee c. 1961-86

JC Associate Staff Scientist, TJL, 1985-

JCr Professor of Biology, University of Wisconsin; BSO since 1961

JD retired head of Animal Production, TJL, 1953-85

JE President, Carnegie Institution; TJL Trustees, 1966-80, 81-; Chairman, BSO, 1976-80

JF Professor emeritus, SUNY Binghamton; TJL Senior Staff Scientist 1947-70

JPS Professor emeritus, Bowling Green State University; TJL Senior Staff Scientist, 1945-65

JS retired Librarian, TJL, 1949-80

LB retired TJL assistant, 1937-81

LL Staff Scientist, NCI; TJL staff, 1938-47

LS Senior Staff Scientist, TJL, since 1950

MB Associate Staff Scientist, TJL, 1985-

MLDR Professor emerita, Yeshiva University; widow of Francisco Duran-Reynals, TJL summer investigator, 1942-59

MG Senior Staff Scientist emerita, TJL, 1956-75; wife of EG

PL Research Associate, TJL, since 1951

RF Senior Staff Scientist, TJL, since 1959
 RG TJL night watchman/custodian, since 1957
 RL CCL's younger son
 RoL CCL's elder son
 RM Animal Production supervisor, TJL, since 1950
 RP TJL's third Director, 1976-80
 RS Associate Director of Biomedical Research, NIH; TJL post-doc
 1965-67; Staff Scientist, 1969-80
 RSt TJL administrator, since 1958
 SB Senior Staff Scientist, TJL, since 1956
 SP TJL Trustee, since 1961; Chairman of Board, 1977-81
 TR Senior Staff Scientist, TJL, since 1958
 VM Professor of Medicine, Chief of Physicians, Johns Hopkins
 University Hospital; co-founder and Director of "Short
 Course," TJL, since 1960
 WD TJL night watchman/custodian, since 1959
 WA cook, TJL summer students' dorm, 1964-74; 1984- (Mary, his wife,
 also appears on this tape)
 WR retired TJL General Superintendent, 1936-74
 WS Professor, University of Pennsylvania Medical School; TJL
 summer student, post-doc, staff, summer investigator; member,
 BSO since 1980; Chairman, BSO, 1986-

A TIMELINE OF SIGNIFICANT DATES IN JAX'S HISTORY

- 4 May 1929 TJL founded**
1933 sale of mice begins
1935-37 expansion of staff: GS,ER,LL and others hired
1937 first Annual Report
1938 Rockefeller wing built
EG a summer student
first post-docs taken on
1941 first edition of The Biology of the Laboratory Mouse
Hamilton Station given to TJL
1941-45 TJL turns its energies to the War effort
1943 Aldersea given to TJL
1944 TJL hosts a conference on heredity and disease
1945 Unit 2 built
Rockefeller Foundation funds dog research at Ham Station
1946 GS and Peter Gorer publish H-2 discovery
Unit 3 begun, funded by Rockefeller Foundation
- 23 Oct 1947 Great Mt. Desert Island Fire destroys TJL**
1948 Unit 3 completed
Board of Trustees created
1949 William Murray becomes Assistant Director under CCL
1951 Unit 4
Highseas given to TJL
1954 Mouse Stock building
25th Anniversary Symposium
1955 first large NCI contract to supply mice
1956 CCL retires
1956-1975 EG as second Director
1958 Morrell Park built
stainless steel mouse cages introduced
1960 Morrell Park expansion
first offering of "A Short Course in Mammalian/Medical
Genetics"
1963 TJL names shortened from The Roscoe B. Jackson Memorial
Laboratory to The Jackson Laboratory
divestment of Aldersea
tax case by Kendall Young
1966 second edition of The Biology of the Laboratory Mouse
1971 CCL dies
Library/Conference Center and Unit 5 built
1974 Mammalian Genetics Lab built
1975 second edition of The Biology of the Laboratory Mouse reprinted
IRS review of TJL's tax exempt status
EG retires
1975-76 DC as Interim Director
1975 Morrell Park Annex built
1976-80 RP as third Director
1979 Snell wing
1980-81 CW as Interim Director
1980 GS wins Nobel Prize in Medicine
1981 BS as fourth Director

OF GENES AND MICE: AN ORAL HISTORY OF THE JACKSON LABORATORY
INTRODUCTION

"I was surprised [at]...how old these young [staff members] are.... These are old thinking people right now...They're looking historically already at the place....I guess it's terrific. I would tend to think so, but you could take the other point of view: Maybe "forget the past. Move on."
Tom Roderick

The Jackson Laboratory in Bar Harbor, Maine is an internationally recognized center for the study of mammalian genetics and related basic biomedical research concerning growth and development, cancer, diabetes, heart disease, blood disorders, birth defects, reproductive problems and aging. Its international scientific training program sponsors pre- and post-doctoral students in intern and externships, as well as a summer training course that includes among its alumni many stellar scientists such as Nobel laureates David Baltimore and Howard Temin, and a short course in mammalian/medical genetics co-sponsored with The Johns Hopkins University, that has involved most of the nation's leading geneticists, as teachers and/or students. The Laboratory's Joan Staats Library houses one of the worlds's foremost collections on mammalian genetics, painstakingly created over the last fifty years by the institution's second librarian. The Laboratory is also well known internationally for its provision of 700 strains of genetically defined inbred, mutant, and hybrid mice to researchers in 33 different countries.

A Capsule History of The Jackson Laboratory

The Jackson Laboratory was founded by Dr. Clarence Cook Little in 1929, just five months before the stock market crash ushered in the Great Depression. As Tibby Russell's tape makes clear, this inauspicious timing colored the Lab's later history, as Roscoe B. Jackson had intended to endow the institution, which would have provided Little and his handful of initial researchers a secure livelihood and future. The crash precluded endowment, and the Lab was to experience painful impoverishment for well over a decade. By 1931, the staff was reduced to rooming together, growing their own food on a variety of garden plots on Mount Desert Island, and in Hampden, Maine, and accepting substantial salary cuts. In such desperate straits was born the idea of **selling** the extra mice that were being produced. (The other potential use for the surplus was not well received: At one point C.C. Little served up some fried mice at a party--an event still remembered fifty years later (cf. CRS and MLDR interviews) and apparently never repeated.) Thus was born the mouse production aspect of The Jackson Laboratory's institutional identity.

Ever the optimist and an indefatigable fund-raiser, C.C. Little refused to allow the economic hardships of the nation to hinder the Lab's advancement, and in the years 1935-37, he provided John Bittner, Elizabeth Fekete, Arthur Cloudman, and L.C. Strong with some new colleagues--George Snell, Elizabeth and William Russell, Lloyd Law and George Woolley--all dedicated mammalian geneticists willing to work for paltry wages, with

rudimentary equipment and in unpleasant housing (George Snell started out living in a tent!). The interviews of Tibby Russell, George Snell and Lloyd Law in this collection present vivid pictures of the privations, sacrifices and rewards that research at The Jackson Laboratory meant in the first decade.

Rewards there were: While all the narrators speaking of these early years--Frank Clark, Allen Salisbury, Watson Robbins and the three scientists mentioned above--agree times were hard, the spirit and "family feeling" in the Lab were unmatched at any other time in its history. These were the days of weekly picnics, monthly parties, imaginative games and bathtub gin, numerous inebriations, the ever-encouraging presence of C.C. Little, charismatic, and inspirational, when he wasn't off in New York, Philadelphia, Washington or Detroit, fund-raising. Then, too, there was the exciting discovery by Johnny Bittner, of the mammary tumor "agent" and related work by Strong, Fekete and Cloudman. George Snell and Lloyd Law began unrelated projects in radiobiology and viral fields, while Tibby Russell worked on coat color and pigmentation in mice. To listen to these Jax old-timers tell it, the years 1931-39 were the worst of times, and the best of times.

Then came the War. Few of the employees were called away: C.C. Little arranged for the Lab's resources--minds and mice--to be applied to the War effort. Various scientists turned their talents to projects related to the national crisis, and millions of mice were raised under a government contract and sent to centers

investigating the effects of poison gasses; Swiss mice from Jax were also used to make Japanese encephalitis-B serum (CRS). This contract, and the general inflation accompanying World War II, gave the Lab a measure of prosperity hitherto unknown. It became possible to hire a number of research assistants, George Snell being a central figure in their recruitment, as he notes in his interview. His, Dale Foley's and Lloyd Law's tapes also indicate the expansion in physical plant that began in the late War and immediate post-War period, with the gifts to the Lab of properties like Hamilton Station. A Business Manager, Dale Foley, came on the scene and began tending to the nuts-and-bolts operations that C.C. Little's extraverted, intuitive personality found so distasteful to handle.

Then, when things finally seemed to be getting better-- good projects were bearing fruit, e.g. George Snell and Peter Gorer had just published (in 1946) the first paper identifying the H-2 locus in transplantation immunology; the staff was growing; grants and gifts were increasing; and a new building was underway funded by the Rockefeller Foundation--disaster struck, in the infamous Mount Desert Island fire of 1947. In one memorable October day, the Main Lab was levelled (with no fire insurance); years of research work, especially carefully bred strains of mice, were wiped out (cf. GS and LL interviews); and most of the mouse stocks (except a few that happened to be at Hamilton Station) were destroyed.

A lesser man than C.C. Little might, at this point, have been daunted. But "Prexy" Little was in no way a lesser man. He recognized that tragedy could be a catalyst for greater determination and recommitment, and he made it so. Front page photos in newspapers around the country showed C.C. Little standing on the hillside amid a pile of ashes and charred tree trunks, assuring the world that "Jax" (as it had come to be known locally and internally) would rebuild. The "general assistants"--box washers and mice changers--were called up to clean up the site, taking no little consolation from the fact that the fire had served as the ultimate and final solution to their previously-futile campaign against bedbugs. The scientists were spread around, some going temporarily to New York, others to Hamilton Station. Tibby Russell was deputized to handle the tremendous response from concerned scientists who used Jax Mice and were eager to return breeding pairs to rebuild the Lab's collection. Thus was born the "Inbred Nucleus," a carefully planned, methodically organized and highly monitored group of stocks that was the basis of the Lab's later Foundation Stocks. Her work on the creation and development of this Inbred Nucleus is described by Tibby in her interview (cf. Fay Lawson's too, who covers it as Tibby's assistant).

The fire served to show researchers all over the country how valuable a role Jax had come to have in American biology. It was gratifying to Little, the staff, and early financial supporters of the Lab to see how essential it was, and Little capitalized on this

awareness. Funds increased substantially after 1947, and the Lab grew apace, in staff and physical plant.

Used to "operating the Laboratory out of his hip pocket" (in James Ebert's phrase), C.C. Little eventually came to see that the casual, informal methods he enjoyed in running a nascent research center were hardly adequate to a full-fledged successful institution. To many of the narrators who reflected on Little's reasons for retirement, this may be it: Success put Jax beyond Prexy's wherewithal to "administer." His was not an administrative or managerial personality (more on this in chapters 2 and 8, where this is explored in depth); nor was he egotistically involved in the Lab, so that leaving it was not, for him, impossible. After twenty-seven years as Director, Little retired in 1956.

The Trustees, at that time mostly local, summer or Michigan friends of Little, picked C.C. Little's absolute opposite to be the second Director. In Earl Green there could not be a greater contrast to C.C. Little's gregarious, warm, easy-going, personable manner. Green was a manager, with an eye for detail, and a penchant for organization, that was timely for the Lab at that point. By his own account (cf. his own and DF's interviews) without significant administrative experience in directing a Laboratory prior to coming to Jax, Green had to learn on the scene, and it took him several years before he learned "how to handle it." It was obviously second nature to him, for, in his 19 years, the Lab was shaped into one of the most efficient, tightly-run organizations this side of the Army. In fact, it was not without

justification that James Ebert could refer to The Jackson Laboratory under Earl Green as "Fort Green:" With its uniformly grey paint, a PR Director in the person of a retired Army Colonel, a myriad of ranks and subtitles within the employees, and meticulous regulations regarding the "uniform of the day," i.e. the lab coat, Jax needed only salutes to seem like an Army base.

But things got done. Bills were always paid. Budgets were always in the black. Buildings were built, most notably Morrell Park, the large Animal Production facility that enabled Jax to become a major supplier of inbred and mutant mice; the C.C. Little Library/Conference Center; and the Earl Green Mammalian Genetics Laboratory. Several long-term federal contracts, especially through the National Science Foundation and National Cancer Institute, gave the Lab stable financial resources. New technologies, e.g. radioisotopes, and electron microscopy, were introduced into the Lab. As classical mammalian geneticists like George Snell realized that the nature of their research required input from other disciplines, non-geneticists, especially biochemists, were added to the staff. Compare the interviews of Doug Coleman, Andy Kandutsch, Henry Winn, Tibby Russell, and James Ebert, which discuss this staff expansion.

To monitor the scientific quality of the research and guide the Trustees on the Lab's scientific character, a Board of Scientific Overseers was created. Earl Green was also ceaseless in his concern for improved animal production, especially in the realm of health and hygiene. His concern here was not unwarranted.

In Jax's early days, mouse races, stray mice and children playing with mice (e.g. Jimmy Russell sending mice off the roof in parachutes) were not uncommon. Diseases like mouse pox and typhoid were possible, and could have wiped out Jax's "goose laying the golden egg." Slowly, over the vehement protests of old-timers reluctant to let go of the Jax they had come to love, new stainless steel cages, sanitary conditions, better buildings and stricter quarantine rules were instituted, until, by 1975, the Jax was, relatively speaking, a "closed shop." Compare the interviews of Earl Green, Watson Robbins, Allen Salisbury, Frank Clark, Seldon Bernstein, Tibby Russell, Doug Coleman, and James Ebert for the pros and cons, hurts and hassles of this Animal Health policy.

With growth in staff, physical plant, product and budget, Jax was becoming very much a presence on the local, national and international scene. Inevitably, it became the object of inquiry, first by a local taxpayer, questioning its tax exempt status, and later, by the Internal Revenue Service. Earl Green spent a considerable amount of Directorial energy successfully defending the Lab in these two cases.

In Green's 19 years term, Jax also issued a second edition of its classic, The Biology of the Laboratory Mouse, Green himself serving as its editor when George Snell proved too busy (this despite Green's having no formal editorial training). Responding to various and sundry problems that arose from day to day, Green created a three-volume guide to Jax's operation in MPAP, the Manual

of Policies and Procedures, of which the staff still speaks with mixed emotions (cf. the interviews of DH,DC, JE, RS, RP, and ER).

The nonchalant, "hip pocket" system of C.C. Little had, by 1975, become institutionalized. It had also become intensely polarized. Tibby Russell alludes to this when she speaks of the "exaggerated personalities" manifested by the Lab staff in Green's last years. His "sensation judging" personality--meticulous, on-time, mindful of time, organized, practical, realistic, unimaginative--came hard up against the generally "intuitive perceptive" personalilty of the staff--unaware of time, disorganized, creative, slightly chaotic, impractical, visionary, inventive, imaginative. For the first c. ten years, the "oil" and the "water" co-existed, each side recognizing the other had some merit which the Lab could use. In the last nine years, when each side began to abrade and irritate the other, finally (as the interviews note) actually intentionally provoking and antagonizing the other, the Director-staff relationship deteriorated, until, by 1975, the alienation was profound. The interviews address this: compare Russell's, Coleman's, Harrison's, Green's, Sprott's, Winn's, Prehn's and Bernstein's. What the transcripts don't reveal is the depth of emotion still carried by the memories of those years; on the tapes, voices tremble, words come hard, hurt punctuates each phrase as some of these narrators recall this time when institutionalization came at the price of polarization and alienation.

A sick and bitter man, Green retired in the Fall of 1975, taking all the personnel files with him, leaving his successor to

reconstruct them. His successor, as it turned out, was an Interim Director, since Green's permanent replacement was unable to relocate for nine months. The Directorial agenda contained two items felt to be essential by the Board of Scientific Overseers, Trustees and staff: healing of spirit and reanimation of science.

Doug Coleman, as Interim Director (September 1975-May 1976) set about the former, leaving Richmond Prehn to do the latter. For the nine-month interim period, Coleman's own account is the only source in this collection. It was a difficult time for the Lab as an institution, as the Trustees--no longer buffered so carefully by Green--saw for the first time the depth of staff rebellion and resistance, e.g. in regard to the summer student program. Courageously, Coleman refused to give in to Trustees pressure to squeeze his fellow scientists as Green had done, to come up with "volunteers" for the summer program. Nor would he continue the scrimping on scientific equipment that had been a hallmark of Green's tenure. In many things unsuccessful, Coleman did succeed in this: He served notice on the Board that the staff was not easily to be bullied in the future, nor was science to be shortchanged in favor of mouse production.

In summer, 1976, Richmond Prehn, Jax's third permanent Director, began his term, a four-year interval that everyone, including Prehn himself, looks back on now with wonderment (as well as some other, perhaps unmentionable emotions). There is consensus among the c. 40 tapes that mention these years that this was a time of confusion, frustration, dashed hopes and bitter

animosities. Prehn admits his "constitutional indisposition" for the socializing and administration that the Directorship demanded. In his defense, he came to a job that was touted as requiring "scientific direction," not other kinds of direction, and the staff was probably honest when they assured the Directorial candidates interviewed for the job that rigorous meticulous day-to-day supervision was not what they wanted. After "Fort Green," that was surely true. But, as Seldon Bernstein noted, they didn't want it, but they were used to it--they were used to having the "paper clips ordered," as Dorothea Bennett put it. And when they ran out of paper clips, and good administrators resigned in disgust, and the budget ran into the red, and Prehn demanded everyone's resignations--well, it was a time of wonderment.

Prehn had some achievements to his credit. In bricks and mortar, he left the Snell wing and the Morrell Park Annex. He gave science primacy in budgetary allocations, obtaining equipment like a properly outfitted "hot lab," cesium irradiator, and isotope counters. He undertook to update the science at Jax, perceived as having gotten dated and stale under Green, by bringing on board several molecular biologists, and, in his own assessment of his years as Director, he "liberated [the Lab] from the sort of strait jacket" into which it had fallen under Green. By the end of April 1980, The Jackson Lab was "liberated." It was also confused. And, as of May 1st, Director-less: Rich Prehn resigned.

Having just retired the day before, Charity Waymouth was seconded by the Chairman of the Board of Trustees to serve as Interim

Director. Unknown to her then, this job was to last 14 months, and although she might have provided on tape a wealth of information about those months (comparable to Coleman's interview on his Interim Directorship) Waymouth chose to be relatively mute. She notes that she preferred research, endured administration, and although good at handling people (RF), she must have found this "coda" at the end of her career something of a strain. Certainly the Lab was reeling. Four years of Prehn, after the bitterness of Green's later years, an unbalanced budget, the challenge of finding another permanent Director (not an easy task given the way the news of Prehn's departure travelled the scientific grapevine), in addition to the remote location of Jax--all this must have made these 14 months a time of challenge. Certainly Waymouth was glad to turn over the responsibilities of her office to Barbara Sanford, the Lab's current Director.

As an oral **history** project, this collection did not dwell on the contemporary period. The present is usually mentioned in passing and by way of comparison on these tapes, so there is little here on Sanford's administration per se. In the chapters to follow, particularly chapter 5, discussing Jax's evolution from a small band to the second largest employer in Hancock County, the present will appear periodically. In my conclusion, chapter 8, I will use the insights of history to pose some questions to The Jackson Laboratory about its future, but, in the creation of this collection, the corpus of material covered generally the period prior to 1981.

The Background of the Project

This project is the result of the confluence of two phenomena: the activities of The Jackson Laboratory Archives Committee, eager to preserve the history and memorabilia of the Lab while there are still people alive who remember it; and my prior work on an oral history project for the Massachusetts Institute of Technology, which came to the attention of the late Robert H. Kanzler, a Jax Trustee who was also on the Board of the Acadia Institute. The Archives Committee expressed interest in helping with an oral history of The Jackson Laboratory, Mr. Kanzler with funding it, and so it began.

Concurrently with this oral history project, the Archives Committee (Charity Waymouth, Tibby Russell, George Snell, Joan Staats, and Jax's present Librarian, Alison Baker) has been gathering materials--photos, tapes and records--including some mentioned by Charity Waymouth and Anne Little in their interviews for this collection. I anticipate Tom Roderick will turn over the materials he mentions in his interview to the Committee for suitable deposition. This oral history, containing few collateral materials itself, will be immeasurably enriched if used jointly with the audio-visual materials in the Jax Archives, and with Jean Holstein's authorized narrative history of the Lab, The First Fifty Years at The Jackson Laboratory, commissioned for the Lab's fiftieth anniversary.

The Jackson Laboratory Oral History Collection consists of 50 interviews, drawn from the nine constituencies of the Lab--Trustees, and BSO members, scientists, assistants, administrators, support staff, summer students, relatives of C.C. Little, and outside geneticists who are in a position to evaluate

The Jackson Laboratory and its place in the history of American science. The original list of potential narrators was 80 names in length. Some died (including the Trustee sponsoring the project); some refused to be interviewed; some were too far removed for me to reach on the very limited budget we had left upon the death of Mr. Kanzler. The 50 interviews taken, however, offer a good representation of all nine constituencies except assistants and support staff. These potential narrators were mainly women, many of whom seemed very self-effacing, reticent and uncomfortable going "on tape." Almost to a person, this group refused to participate. The few interviews from this group, e.g. Helen Bunker and Eunice Fahey, become that much more valuable for being singular.

This collection of interviews was made possible by grants from Mr. Kanzler, the Sloan Foundation, the American Philosophical Society, The Jackson Laboratory, and members of its Boards of Trustees and Scientific Overseers. The list of potential narrators was created through several consultations with the Archives Committee, plus additional meetings with The Jackson Lab staff, the Librarian, some Trustees and BSO members, over a period of nine months, July 1985-March 1986. Interviews took place from May to early November 1986, on Mount Desert Island (most, at the Lab itself), elsewhere in Maine, and in Boston, New York, San Francisco and Washington, D.C., focussing on themes not represented in the written records or scientific literature otherwise available to researchers.

Five major themes were developed in particular, and form the basis of this Finding Aid, or introduction to the collection:

--the personal, human side of doing science: What's behind the test tubes and southern blots, irradiators and isotope counters, in the hearts and memories of the **people** at work? In many of the 50 interviews, we see the hopes and fears, luck and disaster, camaraderie and commitment that bespeak the humanness of the scientific endeavor. This theme is traced in chapters 2 and 3.

--the values, identity and mission of The Jackson Laboratory: What is Jax? Whither is Jax? Whence came Jax? What drives the Lab in its work? Hard questions, these, posed mostly to a group of scientists and businessmen not used to thinking about such questions, but, in chapter 4, some interesting replies emerge--replies that provoke reflection in the wider context of the general aims and directions of American science in the late twentieth century.

--the evolution of the Lab: How did Jax grow from the stalwart band of C.C. Little's followers in 1929 to a staff of 500 in 1986? Included in chapter 5 is an analysis of the implications of growth on the people involved, as well as an examination of the process of institutionalization that such a change in size requires.

--the Lab's three-fold purpose: The Jackson Laboratory's three-faceted task--research, training and production--has evolved and been carried out over nearly sixty years with varying success. An assessment of Jax at work--its science, teaching and mouse sales--is the subject of chapter 6.

--the Lab's strengths and weaknesses: In chapter 7, the 50 narrators

offer their own views of the Lab's assets and liabilities, and how Jax could be better if...

At this point, by way of conclusion, I offer in chapter 8 some ruminations on the questions raised in previous chapters, and some thoughts of my own about the Lab, after two years' immersion in its historical life.

2
MAKERS OF THE "MOUSE HOUSE"

"...it's the people who are doing science here, and who are really involved in it, who are the Lab, and they determine its success or failure."
Andy Kandutsch

In 1935, when George Snell, fresh from a few weeks of barnstorming in West Texas, drove to Maine to take up his new job at C.C. Little's fledgling institution in Bar Harbor, he stopped at McCloud's garage in Bar Harbor, and inquired of a local person the way to The Jackson Laboratory. The native replied, "Oh, you mean the 'mouse house.'" George found his way to the Lab, as did Tibby Russell, Earl Green, Rich Prehn, and a host of other individuals whose lives have been deeply connected with Jax. While every employee, Trustee and donor could be regarded, to a degree, as a "maker" of the Lab, this chapter focusses on the five figures who appeared consistently in numerous interviews in this collection, and four other people who also appeared frequently, whose job or personality cast them in a central role as a creator of what The Jackson Laboratory has come to be, or represent.

C.C. Little*

The most obvious "maker" of the "mouse house" is, of course, its founder, Clarence Cook Little. No figure, certainly, is more pervasive in the pages of this collection, nor of greater proportions, than "Prexy" Little. Even now, thirty years after his retirement from Jax, and fifteen years after his death, he lives on, larger than life in the memories of those who knew him.

*Most useful tapes: FL,ER,GS,LL,AK,HW,DF,RL,MLDR,ARL,CRS,JF

By all accounts, uniformly, the narrators in this collection who knew Little agree he was, as Seldon Bernstein put it, "a rare man, the most alive man I ever knew." A "fantastic person" (WS), the "greatest man I ever met" (JS), "most impressive" (HW), and "one of the best men that ever breathed" (FC) were how others described him. At least six people (FL,SB,TR,JF,WS,RP) mentioned his charisma "that pulled people where he wanted to go" (SB) and that made one want to "rally around" him (TR). All agree that "Prexy" was a "people person," easy to talk to, and himself equally at ease talking to Presidents and mouse box changers. Having a keen ability to relate to others' feelings, Little was a superb motivator, and "one of the most persuasive men" Henry Winn ever met. He astonished his staff with his ability to remember names. Dale Foley tells one story of accompanying Little on a fund-raising trip to New York, where Little met five women who were the national leaders of the Ladies Auxiliary, Veterans of Foreign Wars, one of the Lab's most faithful donors for some years. Never having seen these women before, Prexy was able to introduce them all to Foley without missing a single name. His persuasiveness is credited by some with helping create the Mount Desert Island consolidated high school: He got up in town and civic meetings to argue for the new school by citing academic needs, but also touching his listeners in their most receptive place by waxing eloquently on the abilities that a new consolidated **basketball team** would have against other teams in the state. Prexy knew how to reach people where they were.

Little's younger son, looking back on his father's life--the bathtub gin parties, the hunting and fishing, and horsing around with the guys, concludes that Prexy probably "was an adolescent" (RL). Many narrators remember him as a party man (LL, JF), telling bawdy jokes (HW), playing Santa Claus (AS,GS,ER), and games with his children (ARL), living life spontaneously, enthusiastically, and, at times, impetuously (JF).

In appearance, Little was a "symphony of incongruity" (FL): a tall, imposing man, with a booming voice and dignified mien, in unmatching suits, and open-toed white sneakers (worn in all weathers and even on fund-raising trips to New York and Boston). When he was at Jax, a cat or two was likely to be draped over him, or crawling across his shoulders as he sat at his desk (RL). Devoted to all things in nature (ARL), Little had a special love for cats, his two favorites--Caesar and Cleopatra--living in his office, which was deeply permeated with the smell of cat urine (RL). Many narrators recall the ubiquity of cats, many polydactylic, around the Lab (with the unfortunate consequence of tapeworm in the mice) (GS,ER,ARL). C.C. Little's interesting collection of dogs provided the basis for the breeds used by the behavior genetics group at Hamilton Station (JF), and his love of trees (DF) may have explained the original siting of the Lab, in the midst of a forest of large old pines (which one Trustee in 1939 urged be cut down as a fire hazard (EG): prescient man!) Allen Salisbury speaks of Little's hunting with him, and many recall his love of fishing (AS,GS). Some claim his love of hunting

and fishing was a reason for his building the Lab in Maine, rather than in New York, Boston or Detroit (GS,CRS,RF).

In placing Jax in its remote location, Little displayed a strong trait in his personality: his independent mind (RL). As Rich Prehn says, "He was not adverse to doing things in unusual and unorthodox ways." Nor was he weak-kneed in holding opinions at variance with the dogma of the day. So he could posit a genetic connection for cancer, support and give an ear to Francisco Duran-Reynals's claim of a viral cause for cancer (when 95% of the scientific community regarded Duran-Reynals as a joke [RL]), and build his new laboratory hundreds of miles from anywhere, confident the appropriate researchers would be drawn to it, appreciating its "less distracting" environment.

Little's Lab--filled with cats, dogs, mice, pea plants, guinea pigs and raccoons (RL,JS,ARL) as well as an interesting mix of scientists and staff people--reflected his wide-ranging interests. The early researchers--Bittner, Fekete and others--pursued Little's interest in finding genetic connections to cancer. Cancer research was of more than intellectual concern to "Prexy" since his father had died a painful death from the disease, leading George Snell to speculate on Prexy's personal involvement in finding its cure. Little took Snell aboard for his interest in x-ray induction of tumors. Beyond research areas, Little was "active on many fronts," setting up the National Cancer Institute, the American Cancer Society, and the peer review system which has become the basis of awarding federal research grants. Some scientists

at Jax today cite Little's interest in cancer, or his concern for genetics as giving them the imprimatur for their own research (AK,JF) as if Little's doing it made it "right" for Jax. In fact, Little had a great variety of interests beyond cancer and genetics. He was generally an "ideas person," interested in all manner of ideas, capable of becoming enthused about almost any topic or project (MLDR). Above all, he tended to see the "big picture" (FL,GS), rather than details.

Nowhere was this clearer than in the way Little set up and ran the Laboratory. Before it was a cancer center or a genetics Lab, it was "a place in which to live as well as work," as Dale Foley recalls Little advising him when he came on board as the Business Manager. So, before dollars and cents, particular fields of science, or commitments to high flown ideas, there was to be a family feeling (FL), close personal commitments (TR), bonds of "personal loyalty and affection" (JCr). Little was as good as his word here: He associated freely with every staff member (JD), took no notice of class or social background (LHB), had no ranks within the "family" (CRS), placed no premium on whether one had the Ph.D., as long as one's science was solid (RL,PL). Everyone recalls Little's omnipresence, wandering everywhere at Jax (JD), getting into everything, from rolling up his sleeves and washing mouse boxes with Watson Robbins and Allen Salisbury (CRS), to doing experiments of his own (RL,AK). The result, of course, was a bonding unique in the annals of Jax: Little was the pater familias (TR,FL,WS), the staff as loyal and personally committed as to a father, a scientific father.

Little's scientific reputation gets a varied press in this collection. All agree basically that he was far too extraverted and "people oriented" to be content to do bench science for prolonged periods (HW). But nearly all also agree that he was intuitive, i.e. very "far-sighted" (AK,ARL), "identifying the important questions" (AK) and "scientifically very brilliant" (RP) in being able to sense what was going to be on the horizon. His article in Science, c. 1918-19, in which he laid out the whole blueprint for transplantation work as it later happened (HW) and his chapter in the first edition of The Biology of the Laboratory Mouse, inspiring George Snell to devote his life to the histocompatibility issue (GS), are two examples of Little's intuitive genius inspiring others to pursue his vision. John Fuller summed it up when he noted Little's "scientific contributions were not remarkable, but he did a great deal for others."

Just what Little's scientific imprint was on Jax is highly debated, reflecting more the interests (and biases) of the narrators than Little's own life: He was "single-minded in his obsession with inbred lines" of mice (JCr); and he was not focussed on any one animal (AK). Don Bailey probably came closest to identifying Little the scientist, when he said, "his attitude to science was a way to have fun."

Science as "a way to have fun" does not suggest Little trivialized it. Nor did he send his scientists into their laboratories merely to "mess about:" His scientific leadership and

influence on the research was subtle, but certainly felt by his staff (cf. ER,LL,GS). George Snell describes him "as the dominant influence in the early years" and "not always sympathetic to staff's projects." Little had "strong ideas" regarding research "which came across some" (GS), and his own interest in the genetics of transplantation while a grad student at Harvard under W.E. Castle became the first project undertaken by the original small group of scientists at Jax (GS,ER). While he was never so blunt as to direct an investigator's work (leading Lloyd Law initially to feel a lack of direction) Little was "encouraging without insisting on particular projects" (ER), and, with his personable, feeling-centered manner, "he had an incredible ability to get his way with people without ever demanding it" (HW).

This was, to be sure, his secret in running Jax. He insisted it be democratic--all staff voted at staff meetings--but he wanted things done his way. So, in staff meetings, he applied his persuasive skill and won people over. Feeling deeply obligated to support his staff, he travelled frequently on fund-raising trips--this in the '30s, '40s and '50s, before jet planes, good roads and fast cars made travel outside Maine a relatively easy task. His fund-raising, interestingly, was concentrated almost entirely in the private sector, among his Michigan and Mount Desert Island summer contacts, or his Boston Brahmin friends and relatives. Although he helped create the federal bio-medical/health bureaucracy in the '40s and '50s, Little himself was reluctant to use federal monies, and loathe to become dependent on them (RL).

Yet he was one of the first three recipients of National Cancer Institute grants (JB).

After the Presidencies of the Universities of Maine and Michigan, creating The Jackson Laboratory was a "liberation" for Little (MLDR). Being independent-minded, and having (in his son's judgment), a problem dealing with authority (RL), Little needed something like Jax--a blank slate on which he could be untrammelled as he wrote his own recipe for a successful research laboratory. At Jax, Little was his own boss, answering to none but the friends he called upon to sit on his Board of Trustees. As Ebert notes, he "was a relatively free-wheeling person who operated the Laboratory out of his hip pocket." When he saw things he disliked, he changed them, leading Tibby Russell to feel that he changed the organization of Jax "over and over." George Snell remembers the staff was never involved or consulted about administrative changes. Significant changes in the upper level organization and administrative structure were made with no staff input whatsoever, and if Little had an overarching vision of the form or shape of the Lab that led him to make these changes, he never shared them with his staff.

When Little spoke of the Lab, e.g. in fund-raising situations, he never addressed details like administration, or nuts-and-bolts running of the place, but rather swept up his listeners in the grand design of science and the larger picture of research and the Lab's role in it (ARL). Always the grand design, the big picture! Little had no interest and little patience for

detail. Realizing this, he hired Dale Foley to keep track of the business end of things. The staff had to make do as best they could. Fay Lawson, for example, assumed she had not been hired as an assistant, when Prexy forgot to send her an appointment letter. Leroy Stevens, after waiting three or four years, had to go ask Prexy when he would hear about his promotion to permanent staff status, only to have it given him on the spot (TR). As Priscilla Lane says, Prexy was "not the world's most organized administrator and things were a little bit nonchalant." And when the Lab got to be a success, and therefore got so big it was growing beyond the "hip pocket" method of administration Little found congenial, he saw the handwriting on the wall, heard the muttered complaints in the hallways, and decided to retire.

Little was not an administrator, and he knew it. His disasters in Maine and Michigan had shown him his distaste for red tape, bureaucracy and paper pushing (RL). The narrators in this oral history agree on his weaknesses as they all echo his strengths. He was inefficient, rather impractical (ARL), non-mechanical (RL), not able or willing to take direction from anyone (RL), impatient with bureaucracy, inept at business (RL), more a visionary than a functionary. More than one person remarked also on Little's inexplicable liaison with the American tobacco industry (DH,JE,HW) which to us today seems flagrantly inconsistent for a crusader against cancer. Yet Little was in all things independent-minded and very much his own man. While we might not find it consistent, for the heavy smoker that he was, his tobacco connection was not out of character.

On his retirement in 1956, Little left a rich legacy, to his Laboratory and to American science in general: the National Cancer Institute, the American Cancer Society, and the peer review system; many inbred strains of mice, and the recognition of their important role in scientific research; a set of important questions that would guide and provoke scientific research for years to come; a Laboratory created to "get away from the bureaucracy of a big university" (BS), with mammalian genetics and cancer research as its goals, and a non-departmental structure for its organization; the love for science and the commitment to quality work in it that guided his hiring and supporting of the early staff; and finally, a wealth of warm memories, both of him and life in his Laboratory. Such memories of such a man--memories warm to the point of being hagiographical, of a man become larger than life--meant that C.C. Little would cast a large shadow over the Lab, and be a very "tough act to follow" for his successor.

Earl Green*

All the narrators in this project that knew both C.C. Little and Earl Green recognize that the two men were exact opposites in personality, style, temperament, appearance and attitude. Since Little was charismatic and so deeply loved, comparisons between the two men are invidious, and to Green's disadvantage. Taking Green on his own terms, without comparison to Little, the narrators all agree on certain personal qualities of Green that stamped the Lab in his term as Director. Many people remark that

* Most useful tapes: RS,JE,JBe,DC,HW,TR,JCr,EF,CRS,DH,EG

Green was firm and fair, bending over backwards to see that everyone at Jax was treated in an evenhanded, fair way (cf. DF,WD,RG,DH,EF). This comes through clearly, too, on Green's own tape, when he describes his careful efforts to see that Margaret, his wife, was treated like the other staff, and not the beneficiary of his own solicitude. Many narrators note Green's sense of humor (or lack thereof) which was called "thin" or subtle (cf. RS,WR,AS,FC,DH) when it was visible at all. Equally characteristic was Green's penchant for quiet, which occasioned many anecdotes on the tapes, e.g. Eunice Fahey's recalling how carpenters were permitted neither radios nor whistling while they worked; Allen Salisbury's memory of Green complaining to him about the noise from the girls in the histology lab, with his unwillingness, in the face of it, to shut his door; and his taking Tinker Bunker in hand and leading him step by step down a staircase to show him how to move quietly (TR). After numerous complaints to Dick Sprott about the noisy shoes of Sprott's post-doc, Karen Stavnes, Green actually bought her a pair of noiseless shoes, which would also not leave black marks on the floors.

"Black marks on the floors" suggests another Green trait: his meticulousness. Nearly every interview that speaks of Earl Green at all will mention Green's painstaking attention to detail. Some describe him as a "nit-picker" (DF), "demanding" (RSt), and very "compulsive" (RS,HW) in this absorption with details. In 40 years of dealing with scientific administrators, James Ebert concluded of Green, "I have never in my scientific career met a person who put

such great weight on trivia,..." Compare the interviews of Lawson, Sprott, Ebert, Foley, Bennett, Winn, Snell, DeLaittre, Gilley and Stanwood for insights into Green's attention to detail.

Along with an eye for detail went a methodical mind and an ability to be well-organized. A wealth of narrators (e.g. BS,JE,EF,JF,DB) agree that this was one of Green's sterling qualities. Everything he did--from editing the second edition of The Biology of the Laboratory Mouse (EF) to researching weekend weather patterns in the summer to determine the best date for his annual lawn party (RS)--was carefully planned and thoroughly thought-out.

With all his methodical habits and careful planning, Green could be decisive too. The "buck" definitely "stopped" with him, and many people appreciated his "knowing what he wanted" (WD,RG), how he wanted his mouse room run (TR), and his ability to make a decision and stick to it (TR,RSt,DH,RS). He had intestinal fortitude and was able to take the heat (RS,EF).

Very honest, very conscientious and very tactful, Green was a "gentleman of the old school," which made some of the women on the staff feel he was sexist, and uncomfortable with the forceful professional women that were emerging in the late '60s and early '70s, in the heyday of the feminist movement (FL,JB). Men were openly paid more than women throughout his tenure (JS). Yet he had "great charm" (JE), and a "friendly, formal manner" (JE,TR,DH) that some people found "very enjoyable" (RSt).

Not a "social mixer" (JE), Green disapproved of the use of alcohol at the Lab (ER,SB) and was described by some as having an "odd" personality (WR,AS,FC), because of which "he didn't know how to be a good fellow" (WR).

Green's personal qualities were reflected in his approach to science, where meticulousness, organization and love of detail can lead to stifled imagination, lack of inspiration and inability to see the larger picture, to derive meaning and relevance from research. All these strengths, or features of Green's temperament worked against his success in science. Ebert is most clear on this: "Green was a highly organized man, so organized, probably, that he could never have become a great scientist." As a leader of a scientific institution, Green lacked excitement and enthusiasm for science, and an understanding of the nature of science--ever open-minded, vague, unknown, beyond tight organizing and meticulous control. Tom Roderick's interview is useful for indicating Green's own perception of his abilities: He came to Jax with his time given two-thirds to research and a third to administration, and told the young workers in his lab that he found the research hard, the administration easy. It is not surprising, therefore, that over the years, Green became more an administrator, and less a scientist. By the early '70s, he had given up lab work entirely. Science grew away from him, as much as he grew away from it.

"Not tending to think in biochemical terms at all" (ER), Green "certainly adhered to the old-fashioned virtues of classical

mouse genetics" (JCr) that he had practiced years before at Ohio State University, in his work on the genetics of skeletal traits. The big currents of biological research--biochemistry in the '50s and early '60s, and molecular biology in the late '60s and '70s--passed Green by. The new trends in the organization of science--high-tech, and well-equipped labs with large teams of investigators--also failed to appeal to him. He remained committed to classical mouse genetics, focussed on the single investigator, in a small lab with simple equipment, and needing a modest budget. Green's lack of imagination (DBe), and his failure to take the pulse of science on the cutting edge, would be features of his scientific persona for which The Jackson Laboratory would pay dearly.

Perhaps no figure so absorbed the interests and attention of the narrators in this collection as Earl Green. Nearly everyone commented on Green's tenure, in good, bad or neutral terms. The responses fall into two general categories: Those persons whose jobs and/or personalities inclined them to like or need order and organization, who generally appreciated Green, and his role at Jax; and those, usually scientists, for whom order is a less useful, desirable trait. In the former category, for example, the employees, particularly the non-scientists, appreciated his development of a fringe benefits policy: health care, pension etc. (LHB,RSt,WD,RG). These same administrators and support staff narrators praised Green's skill in getting things done--buildings built (Morrell Park, C.C. Little Conference Center/Library, the

Mammalian Genetics Laboratory), physical plant tended, deadlines met (EF,DF,JD). When the National Cancer Institute presented the Lab with a very lucrative contract to breed mice for a cancer-screening program, Green was able to respond effectively, to develop the satellite breeding stations, while planning the Morrell Park facility and tending to the growing problem of animal health. He was ceaseless in his support for the summer training program (AC) and very attentive in his care and tending of the Board of Trustees, taking particular pains to involve them in the Lab's activities, via an elaborate committee structure, and to educate them, and keep them informed via meetings and his Monthly Summaries. Scientists like George Snell and Dick Sprott--men of order and organization themselves--appreciated Green's gathering "up the details that needed to be gathered up at that time" (GS) and his "delivering a good research atmosphere" (RS). Others, less enthused about order (more the intuitive perceptive type that became Green's nemesis) admitted that, when he took over in 1956, Green faced an enormous job, with a "reluctant staff" (AK), and he acquitted himself well, at least for the first c. ten years.

As time went by, apparently, things soured. The narrators will point to particular events, or trends, to illustrate the slow falling out that occurred between Green and the scientific staff. With more perspective, the reader of these oral history transcripts can see the basic problem as one of type: Green was a fundamentally different type of person from 90% of his staff, i.e. scientists, and over time, this type difference so irritated both

be cursed by one man he left in the dark, on shutting out the lights in a men's room (WD, RG); and this same frugal habit was memorialized in the story of the candy machine: Walking down a hallway one day, Green noticed a light bulb overhead, right next to an illuminated candy machine. Why have two lights in one spot? Green called the janitor, had the ceiling light removed, and a higher wattage put in the candy machine, to cast more light into the hall. Fine for the hall, but it melted all the chocolates!

Conservative in all things, money as well as electricity, Green developed a reputation for being tight-fisted (JE, RS). He charged the staff for coffee at seminars, and reined in every grant applicant so tightly that Jax consistently missed opportunities that a more liberal-minded, expansive research attitude would have made possible (RS). According to Dick Sprott (now at NIH, and processing thousands of grant applications yearly) this is a habit Green passed on that Jax still has not overcome.

Jax, under Earl Green, as under Prexy Little, was run in a very paternalistic fashion (DH, DB, JB). Don Bailey goes into some detail on this point: Earl's seeing scientists as children, to be treated as such. When the staff had the temerity to vote against him in a staff meeting a year or so into his tenure (Green not having either the charisma or persuasiveness Little had to win them to his wishes), they lost the vote (AK, DB). Green was still fighting this battle against Lab democracy 26 years later, when he waxes on, in his interview, about how the Lab can not be democratic.

Nor was it to retain its earlier egalitarianism: Ranks came to be instituted (FL) covering all elements of the Lab's employees from Senior Staff Scientist to animal caretakers. The only "rank" of meaning, the promotion to tenure, Green gave too easily (even to the point of tolerating "charlantism" in the opinion of James Ebert), causing the Lab to be locked into an over-tenured staff by 1975, with 27 out of 33 employees (RS) enjoying "such tenure as the Laboratory may provide" (JE).

So watchful on every other front, Green did not fail to oversee the scientific research, leading an otherwise supportive, admiring Trustee, John Beck, to feel that Green "was so careful in his oversight of the science that he stifled it." More than mere oversight, Green "stifled" science at Jax by failing to adapt, grow and respond himself, to enlarge his own scientific vision and to accept that science was tending in new directions. By refusing to see the importance of biochemistry, immunology, and biochemical-related fields, Green made The Jackson Laboratory into a "relatively closed shop" (JE) for all but mammalian geneticists. He could not recognize the needs for space and expensive equipment that these different kinds of science required (a plaintive leitmotif all through Doug Coleman's interview, to which Tibby Russell concurs). By failing to provide good facilities to the "new" scientists, i.e. those who needed more than pencils, some mice and paper (JS), Green "exaggerated the differences between the geneticists and non-geneticists" (ER) that continue to bedevil Jax today.

This same lack of appreciation for work on other animals than the mouse, and outside the purview of classical mouse genetics, spilled over into Green's treatment of the crew at Hamilton Station, aggravated by John Paul Scott's streak of independence (DC, JPS) (perhaps Scott resented Green's paternalism? [DH]) The behavior genetics project at "Ham Station" had, characteristically, developed under C.C. Little, who seemed to encourage anything remotely related to mammals or genetics. Under long-term funding from the Rockefeller Foundation, Scott's (and soon to join him) Fuller's work on the genetics of behavior in dogs was to become the pioneering work in this field, still cited 40 years later by some evaluators of The Jackson Laboratory as the best, most seminal work done at the Lab. Green tried to close down the project at Ham Station, to consolidate everything at the Main Laboratory, and consistently (mentioned by many narrators) he tried to focus the Lab's work on mice. Eventually, he succeeded: Ham Station closed; the dogs, Scott, and later, Fuller, departed; Phil White, whose space-extensive work cloning plants was as pioneering as Scott's and Fuller's in behavior genetics, eventually left also. Only Sawin's rabbit colony remained as a non-mouse activity, by the time of Green's departure.

Throughout his 19 years at Director, Green was consummate in the skill with which he controlled the flow of information to the Board of Trustees (DBe, JE). Rarely did they hear anything Green did not want revealed, and each year he reported another year successfully in the black, mouse sales up--more "bricks and

mortar" tangible accomplishments that the businessmen making up the Board found so satisfying. They regarded Earl Green as a superb administrator and master consolidator (JBe,SP,HN).

This was true. But nothing fails like success: Green consolidated so well, he turned The Jackson Laboratory from an amorphous mass under C.C. Little, to a stone monument to the virtues of efficiency, order and organization. And science cast in stone is dead. The Jackson Laboratory, by the early '70s, had become solidified, and its scientists, intimidated by their Director's compulsiveness. The situation polarized: the staff "played games," sabotaged "Earl's rules," provoking his response. In return, Green grew paranoid (DC), accusing the staff (not unjustifiably) of challenging him, trying to usurp his authority, plotting against him. Criticism of the staff appeared in the Monthly Summaries (DC). The alienation was virtually complete by the time Green retired.

But only Green's body, and the personnel files left the Laboratory (DC,RS). His legacy **still** haunts the place 16 years later. Green's stifling of science; the "skewed Laboratory" (JE) that developed under him; his vision of the Lab as a center for mammalian genetics and his stress on this at the expense of other, newer science (ER); his emphasis on mouse production and "bricks and mortar" rather than investment in science--minds and machines (AK,DC)--all these still cast a long shadow at Jax.

Green can point to a list of solid achievements--animal health reforms (TR) and massive mouse production (RSt,JD), MPAP

and a second edition of The Biology of the Laboratory Mouse (EF), better-running services, e.g. photography, histology, electron microscopy, etc. (JPS); the first Jax mice order book (JD); balanced budgets, and successful defense of the Lab in the tax and IRS cases. But, as a **scientific** Director, of a **scientific** institution, Green served well neither his staff, whom he alienated when his personality became polarized by theirs, nor the science which was Jax's ostensible purpose. The task of restoring both--science and staff relations--fell to the Lab's third permanent Director, Rich Prehn.

Richmond Prehn*

Everyone who addresses the Prehn years agrees that Prehn was hired as a conscious antidote to Green. The Lab did not want another "prissy Director" (in Harry Neilson's terms, quoted by James Ebert). So, in Ebert's words, they got a "swashbuckler" instead. Prehn was blunt (RS), brilliant (DH,JS), complex (JE), charming (DH), imposing (DH), and deeply interested in two great loves--sailing, and science (LL,JCr).

While he could be very decisive (DC,TR), Prehn's was more impetuous a decision-making process than Green's deliberate decisiveness. And while he **could** be charming, when he took the time and trouble, Prehn, by his own admission, didn't really want to do that. So he appeared, to a staff red and raw from several years of battling Earl Green, to be tactless, unfeeling, unable to handle people, radically different from Green's tactful, gentlemanly manner. With such personal qualities, it was questionable

*Most useful tapes: RS,JE,JBe,RP,HW,DBe,JCr,DH

how much Prehn would be able to heal the Director-staff relationship. It is, indeed, questionable whether Prehn was informed of the Lab's experiences over the previous years, to be inclined to want to try to work on administrative and interpersonal activities. He sought a return to the looser administrative style of C.C. Little (which surely had been urged upon him by the Search Committee), but his interpretation of "looser" was, in effect, no management at all. He wouldn't manage himself, but he refused to delegate his duties to others who would (RF,JE). Inefficient with chains of command, he needed to have a good administrative assistant, or Executive Officer, but he never reorganized the administrative structure to create such a position (RF,JE).

Prehn liked to think about science and be in the lab. He was an "idea person," like C.C. Little, but unlike Little, he did not combine that with personable extraversion. Nor was he aware of, or if he was aware, was he sensitive to, Jax's "hallowed traditions" (DH). This was obvious within a few weeks of his arrival at the Lab, when he called for the resignation of the entire staff. "Tenure"--even the ambiguous, vaguely defined tenure of The Jackson Laboratory--was a sacred cow. Another "hallowed tradition" was the participation of the scientists in the administration, via the four Assistant Directors handling research, training, resource, and other areas of Lab activity. Prehn attempted to get the scientists out of these positions (RS). A third tradition was the non-departmental nature of the Lab. Prehn

tried to create departments (TR). This was quickly shot down. He gouged a sacred cow of the Trustees when he criticized and failed to tend carefully the many committees of the Board, all of which he served on ex officio.

Handling administrative materials relating to the non-scientific staff was as much a mine field for Prehn as dealing with Trustees and scientists. Green's leaving created in the employees--especially in the lowest paid manual workers in Animal Production--an "explosion of expectations" (DH), that manifested early in Prehn's tenure in a movement to unionize. Prehn headed this off, by trying to do too much too soon, without proper research, deliberation and evaluation of the costs and long-term economic consequences (RSt). For example, he proposed upgrading pay scales, and giving retirees 50% of health care benefits, too costly a fringe benefit, ultimately, for the Lab to afford. Its rescission made Prehn unpopular, much as his refusal to "cultivate the Board" socially made him unpopular among the Trustees, as he himself later acknowledged (RP,ARL). Far from solving the problems in the staff left from Green's time, Prehn compounded them, adding to those already there ones of his own making (this by his own admission) (RP,RS,RF). Joan Staats summed it up: "There was no hand on the tiller." Or perhaps, too often, the hand **was** on the tiller, but of a Chinese junk, not The Jackson Laboratory.

Prehn's second inherited task--updating Jax's science--met with somewhat more success. When he came before the Search

Committee, he was "believed to be a scientist of major stature" (JE), though by no means the Lab's first choice: its location more or less precludes getting a **first** choice. The Chairman of the Board of Scientific Overseers, James Ebert, made it clear to Prehn that one of the Director's tasks would be the updating of science, leading The Jackson Laboratory in "new scientific directions," to enable it to "cut a wider swath" in science (JE). This Prehn was prepared to do. He liked to ponder science (RP), and although he was not a classical mouse geneticist (ER,JCr), he was regarded by some as a "mouse person" (JE,DH), and seemed like someone who would excite scientific investigators (JBe), and "shake the place up" (DBe).

This, to be sure, Prehn did. He shook the place up and it is **still** reverberating! The staff still talks about his different vision for the Lab (BS), removing its focus on mouse genetics (BS,JCr), to create a small, excellent, mini-university à la the Rockefeller Institute (BS,JCr), stressing more cancer than the mice (RS,BS), downplaying mouse production (DH) and placing fund-raising emphasis on science (RP), rather than Animal Production or bricks and mortar. The geneticists still talk of this time of threat to "their" institution--from the planning mistakes in the Snell wing (ER,DB,RS), to his being hired by the "biochemists" on the staff (the Search Committee having only Coleman and Kandutsch, no "geneticists" on it). His bringing molecular biology to Jax was successful, but costly, and characteristically, he did not contemplate the economic consequences of adding these new staff

people, in terms of institutional support, equipment (JBe) and so forth.

Taking on new staff, adding the Snell wing and the Morrell Park Annex, and buying new equipment without Prehn's being aggressive in fund-raising, all led to Jax's budget falling in the red for the first time in its history. "Gradually Prehn lost the confidence of the Trustees" (JE). By the time of Jax's fiftieth anniversary in May of 1979, many Trustees were beginning to feel Prehn's term had been an "experiment that failed" (JBe). The staff felt the place "had been turned upside down" (JS). Support staff and administrators note that the power vacuum left on Green's departure (DH) was still unfilled, through Prehn's refusal to handle the details of administration. When he resigned (RP) or was fired (RS, JCr), everyone was left to wonder what went wrong. Six years after the fact, at the time of this oral history project, the fifty narrators still aren't sure what to make of that time.

Clearly several factors combined to make the years of Prehn's Directorship a time of great confusion for the Lab. These included: the Lab's condition (an alienated and rebellious staff, an ill-informed Board of Trustees sheltered for years by a coddling Director, a huge complex Animal Production branch used to meticulous attention and appreciation); Prehn's own personality (blunt and argumentative, intellectually aggressive, focussed on science, impatient and naive about people); and external circumstance (advances in science, and increasing pressure on grants and fund-raising).

It was not totally without successes however. Prehn did "move the Lab ahead, to an extent," and was a badly needed antidote to the picky, detail-mania of Green (JE). He got the message out to the Board, and to some of the staff, at least, that The Jackson Laboratory would never become a high-powered institution with the staff it had: Too many staff were "doing their own thing, immovable and untouchable,...piddling around" (RS) for The Jackson Lab to hope to become competitive with the other leading research institutions of the country. Such ambitions were pipe dreams. But, in bringing molecular biology to Jax, Prehn kept it from further stagnation (SB), and got the Trustees to be more supportive and aware of science at the Lab. He is probably correct in his own assessment of his tenure: He succeeded in "liberating the Laboratory from the strait jacket Earl Green had imposed on it" (RP). Perhaps Jax's Nobel laureate sums up Prehn's period most succinctly when he says that while "Richmond Prehn had quite ambitious ideas about growth...it turned out to be a good thing" (GS).

George Snell*

Snell viewed the Prehn years from the vantage point of retirement. He had played his role in "making" the "mouse house" from his arrival in 1935 until his "final" retirement in 1973. Snell's influence on Jax was more subtle than the three figures mentioned above, for two reasons: first, and most obviously, George Snell was not a Director of the Lab, and, secondly, his was

a personality much more introverted and diffident than those of Little, Green or Prehn.

Several narrators describe Snell as shy--"very shy" (HW) and "a shy eccentric" (JCr)--but James Ebert best describes Snell when he notes his "very, very special personality--being shy--diffident is a better word than "shy" for George: He's not really shy" (JE). His former college roommate and friend for some fifty years, Bentley Glass, is echoed by several other narrators when he identified Snell as an "extremely quiet and reticent person" (BG,LL,MLDR). Given his introverted personality (LL), Snell was not a great traveller, and not particularly keen on doing the convention circuit. Henry Winn explains:

...I can remember at least once and I think twice, George going to a meeting,... we all went there, and at some point, George said he was going to go home. And he spoke to Nate Kaliss, who was also there, "You know this topic as well as I do. I'll give you the results and you present it." So he was that kind of person...

Snell did not need others' recognition, approbation, or approval (HW). He was what David Riesman, in The Lonely Crowd, would identify as an "inner-directed" person: He did what he wanted to (HW) and, in his own words, "never felt lonely" (GS). The young men in his laboratory remember him as very generous, straightforward, methodical, very bright, and a great long-range planner (JS). Everyone familiar with Snell--Trustees, support staff and administrators, as well as his fellow scientists--remark on his amazing lack of ego (JBe,JE).

At this point, one might be ready to conclude George Snell was a colorless professorial type hiding out in his lab, a social recluse. Not so. Another whole side of Snell emerges when the narrators describe Jackson Lab parties, at which, apparently, George displayed a fun-loving side, with great inventiveness for games, and an ability for acting. Joan Staats, Fay Lawson, Tibby Russell, and Marie-Louise Duran-Reynals all describe George as the **best** charades player, and "very amusing" in creating games with his mice. The turntable contest he invented, with a lazy susan-type of device he describes on his own tape, was a staple of Lab parties for years, until animal health regulations eliminated games with the mice. He was also a wonderful actor (MLDR). On his own tape, George tells of his enjoyment of "egg soccer," blowing eggs around a table, and Joan Staats and Jane Barker recall George's enjoyment of caroling at Christmas time with other Lab choristers.

The professorial image fits George Snell in two ways, however: First, in physiognomy--white tonsure-like hair, small mustache and lean physique--he could have been a model for a Dr. Seuss character, and second, in his absent-mindedness. Joan Staats illustrates this with two classic "George Snell" stories which I also heard from several other narrators:

I told you that the staff didn't have telephones in the early days, so if you wanted to call someone you went out in the hall to some hall telephone and got the switchboard and said, "I want to talk to so and so." And then so and so was paged and went to his nearest hall telephone and you had your conversation. Well, one day Elizabeth Fekete was calling George Snell. Elizabeth was not on her usual floor, so the squawk box said, "Dr. Snell, Dr. Fekete wants you on the telephone."

So George went to his nearest telephone, he opened the phone booth door and there stood Elizabeth. And he said, "Excuse me, I'm wanted on the telephone," and closed the door....Then there was one time that George had a visitor at the Lab. It got to whatever hours we worked in those days, five o'clock. Whoever was the visitor's host came to claim him and George said, "When we're finished, I'll take him into town." So they sat and talked and some time later they concluded this conversation and walked out into the [empty] parking lot and George said, "Oh, I brought my bicycle today."

Snell was the first scientist at the Lab to go off in his own directions in research (ER). Previously, the small band C.C. Little had collected had studied the genetics of cancer centering around Bittner's discovery of the mammary tumor "agent." Fresh from two years of radiation genetics work at the University of Texas, Snell was ready to apply these techniques--done on *Drosophila* in Texas--to mice. Aware that teaching was not his "kettle of fish," George felt "there just was no other place where I could do the work I wanted to do"--mammalian genetics, which, he felt, "had a real future" (GS). After working with radiation genetics for a while, Snell sensed Prexy's lack of enthusiasm for it, and cast about for a promising topic that would provide long-term challenge. He found it in a chapter Little had written on transplantation genetics for The Biology of the Laboratory Mouse. This was to be the beginning of Snell's life work, for which he won the Nobel Prize in 1980: identification of the histocompatibility loci in the mouse. In this enormous project, Snell received tangible and moral support--just how much is conjectured by many narrators on these tapes (cf. JE and LL)--from a British scientist Peter Gorer. Lloyd Law feels Gorer's contribution to the H-2 discovery, in 1946, was considerable, such that, had he lived, he would have shared the prize with Snell. In

his own interview, Snell remarks that our taping in May 1986 was almost exactly on the fortieth anniversary of the publication of the H-2 discovery jointly by Gorer and Snell (GS).

About a year after Gorer had returned to England and the H-2 paper had been published, Snell suffered a year's setback in the loss of all his mice in the '47 fire. Such tragedies were daunting in a field where advances were slow. All the narrators who mention Snell at all note the glacial pace of the research he undertook. Entailing the breeding and crossing of strains and the creation of congenic lines (LL) and self-training in immunology (GS), Snell's progress was to be measured not in months or even years, but in five, seven or ten year intervals, as the breeding lines were patiently developed and applied so as "to pinpoint individual loci. They were like a group of people all wearing the same mask. The problem was to rip the mask off, and get the individuality, and that's what I thought should be possible by these methods" (GS).

Describing himself as "specialist in my talents, a generalist in my interests," Snell felt he got into "just the right line of work, at the perfect place" (GS). Not a "techniques person," Snell found the mathematical basis of genetics appealing in a way genetic engineering would not be. Having to rely on collaborators with technical ability, e.g. Marianna Cherry, Snell appreciated the labor-saving machinery that began to appear even in the relatively bare mammalian genetics labs in the '50s and '60s. Henry Winn, an immunologist brought by Snell to The Jackson Lab

from Cal Tech, saw Snell's lab for the first time and thought it an "unfurnished lab" (HW).

Snell plugged away, supported on the same NCI grant for over twenty years, manifesting intense ambition, but of a completely introverted sort (JBe). "Waiting many years for his work to bear fruit" (BG), Snell was "very persistent and consistent...working at...a relatively high pitch...ignored by most of the scientific community" (JE) since he was "up in the woods in Bar Harbor, ...[and] was operating in a highly innovative way" (JE). A scientist more extraverted, or needing more recognition than Snell might have given up, but Snell persevered doggedly, while he maintained an active supply of his congenic lines for other researchers and fielded technical questions about them from their users (JS). He also was a mainstay of the summer students training program (AC) and, in his interview, he mentions some of the memorable students he worked with and their achievements (GS).

Very few of his fellow geneticists, or Jackson Lab colleagues, suspected Snell would win the Nobel Prize. "Most of the world felt [Snell] was wasting his time for most of his career" (RS). Several narrators in this collection confirm this, e.g. Lloyd Law, Doug Coleman, Henry Winn and John Paul Scott. Doug Coleman, in fact, probably from familiarity, or over-exposure to George's work ("he H²-twoed us to death" [DC]) never regarded H² as a major breakthrough. James Ebert recalls an Assistant Professor at Hopkins in the early '50s, John Cushing, being the first he remembers to predict that Snell's would be landmark

research (JE). Even 35 years after the initial publication of the H-2 discovery, when time, and subsequent application of the basic research had shown its significance, few people thought of Snell, but J.P. Scott notes "When other people produced things based on his work, they couldn't give a Nobel to these people without giving one to George." So The Jackson Laboratory enjoyed its first (possibly its only?) Nobel Prize winner.

Many narrators link Snell's success with the particularly congenial (for him) atmosphere of The Jackson Lab (RS,PL). Protected loyally by Earl Green for 17 years (JE), allowed to "do his own thing without interference" and given the enormous animal resources only Jax could offer, Snell was in his element (RS). Snell himself describes Jax as the perfect place for him, and Dick Sprott regards George Snell as typifying what The Jackson Lab is good at: allowing researchers to follow their own narrow interests, outside the mainstream, for an entire lifetime (RS).

If The Jackson Laboratory impacted so favorably on Snell, what impact did he have on Jax? As was mentioned, he was an active supporter of the training program, and while not a teacher in the sense of stand-up lecturer, examiner and paper-grader, Snell was an inspiring and successful mentor in the one-on-one organization of Jax's summer program (AC). On a mundane level, he was respected by the animal caretakers, "general assistants" and administrators for having a large animal colony and maintaining it well (RSt), and for being mindful of practical necessities: Through Snell's involvement and endorsement, the box changers were able to get

their first bottle-washing machine (WR,AS,FC). His winning the Nobel Prize gave the Lab international recognition and excellent material to use in later PR and fund-raising campaigns. Within the Lab, Snell serves as a model for what can happen at Jax, for the kinds of things it does well, as Sprott noted. In this way, Snell can inspire. But one would do well to consider the changed landscape of science over the past 40 years, and wonder if the introverted ambition of a Snell--wrapped up in his own inner motivation, only marginally interested in the outside world and disinclined to "sell" his ideas to granting agencies--would survive in the aggressively entrepreneurial atmosphere of current science. Have the George Snells of modern science been rendered obsolete, or unlikely to survive (i.e. get funded)? If so, is American science the poorer for it? These questions will be considered in chapter 8.

Elizabeth Russell*

Tibby came to the Lab two years after George Snell, in 1937. Originally, she was without official position, brought to Jax as William Russell's wife, but she participated in the research of the Lab, in an unpaid capacity, until she and Russell divorced, and he moved to Oak Ridge, in 1947 (ER). During those ten years, she had four children in rapid succession, whose presence is alluded to only in passing on these tapes, by Seldon Bernstein and Jane Barker, who note her son Jimmy's presence in the Lab (and his fondness for parachuting mice from the roof (SB), and Tibby's 10

*Most useful tapes: FL,ER,WS,AH,JB,SB,AC

to 5 hours in the Lab, due to the demands of motherhood (JB). Given Tibby's enormous presence in the Lab and her great stature nationally in American science, it is noteworthy that some of her most creative work was done amid a very hectic personal life.

Except for C.C. Little, no figure in this oral history collection is more colorful, beloved and the subject of more memorable anecdotes than Tibby Russell. If Little was the pater familias of the clan, then Tibby became, in time, its mater. A "memorable personality" and a "wonderful person" in the eyes of Nobelist David Baltimore (who had her for a sponsor in his Jax summer student experience), Tibby was a "very motherly sort of person, a nurturer" (AH), interested in people in a personal sort of way that Ann Hirshhorn finds unusual in a great scientist. Tibby herself confirms her "people person" nature when, on her tape, she mentions that her motivations in doing science were the travel it allowed and the opportunity to work with other people (ER).

Being very generous (HW), always accessible (WS), very bright (WS,FL), and willing to help others (WS), Tibby became one of those rare individuals with the capacity to transform others' lives. Many narrators in this collection (cf. FL,WS,AC,JB,SB) look back on Tibby as the crucial figure, or a major influence on their lives. In some cases, she literally redirected the whole course of a person's career (WS), gave them a greater sense of their ability and potential (FL), and opened doors that otherwise would have been closed (FL,WS,JB,SB). She arranged jobs, fellowships, grad

school positions, post-docs, leading Fay Lawson to describe meeting her as "the luckiest break in my life." Tibby approved books for publication (WS) and grant applications for funding for her former students (FL). She worked her vast network of scientific and academic contacts on behalf of those she found promising. And she did all this intuitively: Several narrators note Tibby's intuitive sense both of science (more on this below) and people. Jane Barker:

There were several people that she supported over the years that I always thought, "Well, I don't know whether they're going to make it in science or not." And she's been right: They have.

Tibby's intuition had another manifestation in the personal realm: in her appearance and that of her immediate environment. Her office always looked like a tornado had just blown through, prompting Barbara Sanford to order her to keep her office door closed (BS, quoted by JB). Usually dressed in a lab coat full of holes, blue sneakers and often with hair dishelved, Tibby looked every inch a cleaning lady, which is what Fay Lawson mistook her for at their first encounter (FL). Being an "intuitive perceptive" type, Tibby had no eye for the details of daily living, nor was she ever on time with anything (JB), causing Earl Green (ever the clock-watcher) no end of anguish.

Lest one begin to think of Elizabeth Russell as a distracted den mother, the assessments of Seldon Bernstein and David Harrison as to her sharp intellectual abilities, incisive mind, love of argument and reputation as a "man eater" on the scientific

conference circuit should be kept in mind. Tibby was sweet, supportive, jovial and fun-loving, but also very serious about her work, and not one to suffer fools gladly. Many narrators recall her slam-bang fights with various colleagues, e.g. Eva Eicher, in public meetings (JB), leading David Harrison to conclude she was not one to be easily intimidated.

As a scientist, Tibby's theme song throughout her forty-year career has been the "mouse as a paradigm for mammalian genetics" (BG, JB). Jane Barker describes her as "a great banner waver for the mouse," and notes how Tibby brought many M.D.s into her lab as summer investigators to demonstrate the utility of the mouse models of human diseases (JB). Not surprisingly, at one of the Lab's innumerable parties over the years, Tibby appeared dressed as a mouse (FL,ER).

As a colleague, Tibby played a catalytic role at Jax. With her powerful intuition, applied in scientific realms, she would readily see connections between her research and what others of her colleagues were doing, catalyzing many collaborative projects (AH,JB). She also had hunches that panned out in solid research projects that kept her lab humming and proved inspirational for students like Will Silvers.

Silvers also notes Tibby's open-mindedness: She considered new techniques a challenge, and was the first to use radioisotopes at Jax (being exiled to the MacIntosh greenhouse in doing so, as her colleagues were fearful of the possible effects of radiation on them (JS) and the stocks). Fay Lawson recounts a memorable

incident of working with Tibby in the greenhouse on a snowy winter night, and coming out into the blackness to see a red aurora borealis (possibly made redder by their having stared at the red of Iron-59 for hours before) which caused Tibby to look up, lose her balance, fall into the snow, and spill the mice she had been carrying all over her and her fur coat.

Tibby also set up the first importation facility for Jax, by funding Jane Barker, in her first job for the Lab, to tend and observe for a summer some mice sent from England, and kept in isolation at the Barker family's cottage on Sebago Lake.

As a researcher, Tibby's science was distinguished by its solid substance (causing her to be elected to the National Academy of Sciences and to win many awards and prizes) but also by its enthusiasm and excitement. She conveyed this to all who came in contact with her. As a high school student with virtually no knowledge of biology, ill-equipped then to evaluate Tibby, her work, or Jax, Nobelist David Baltimore came away from his weeks of contact as a summer student imbued with Tibby's sense of "sheer joy in research." Her lab staff--most of them long-term research assistants of great faithfulness--shared her joy and were stimulated by her evident delight in every discovery, however small or inconsequential it might be (JB).

Her lab was democratically run and relaxed (more so than Earl Green appreciated, causing **him** to scold her assistants when they came late, left early, or took too long a coffee break: Tibby was "casual" about such things [JB]). To hear multiple people tell it,

Tibby was a disaster in hands-on operations: She **could** do it (WS) but she was messy (FL,JB) and inept, leading her staff to chase her out of the lab, and to try to protect her when she ventured forth to do an experiment herself:

It usually involved something like very "hot" radioisotopes, and Tibby wasn't the neatest person in the lab, as you can imagine.... Tibby came down the hall, into the laboratory... and I looked and behind her there came Ellie McFarland with the geiger counter, who was obviously monitoring Tibby and the radioisotope, to be sure that none of it was spilled en route, or didn't go down the sink drain, or somewhere else inappropriate; Mary Norwood, with a mess of chem wipes, so that she could clean up any spills, Jan Southard, who, I think, had a bottle of radiac wash, was coming behind her, and the whole crowd--it was a complete line... (JB)

Not at all competitive, Tibby gave her summer students first authorship on any papers they jointly published, which Ann Hirshhorn found unusual. Tibby was very open-minded about her staff's pursuing research projects of their own (DH,FL,WS) and she was always willing to listen, help out and offer advice as research progressed.

The camaraderie in her lab was so warm that most workers found it hard to leave at the end of the day. They knitted and gossiped during coffee breaks, socialized at parties her assistants threw in West Tremont, held inter-lab "home brew" competitions, their SWIGAMITI (an acronym for its makers: Seldon, Will, Gail, "Mike" (Fay Lawson) and Tibby) being judged consistently the best (FL,SB), and had Lab-wide parties to celebrate the conclusion of successful research projects, like the Hoxie party (FL,ER,SB).

How was Tibby Russell a "maker" of the "mouse house"? Some ways have already been mentioned, e.g. her pioneering in new tools, like radioisotopes, her role as "mother" in a subtle psychological way; her central place as the premier trainer of students in the summer program, and her PR work on behalf of the mouse. She was also central as a teacher/adviser to the Animal Health division when they created the clean mouse facilities at Morrell Park. She represented the Lab in 1958 at an International Commission on Laboratory Animals Conference in Paris, where proper animal health guidelines were developed. She served as Scientific Director of The Jackson Laboratory, 1953-59, at the same time as she was building the Inbred Nucleus, the core of Jax's mouse stocks, created after the fire of '47. Finally, she was a most active stimulus to scientific creativity at Jax, in her wide-ranging interests, her intuitive ability to see connections and her willingness to undertake collaborations (JB,DC,RS). Only the three Directors discussed above, and George Snell, for his notable research, can be compared to Tibby Russell in terms of personal impact on the Lab.

Other Makers of the "Mouse House"

Several other figures emerge from this collection as noteworthy. As was noted in the brief history of the Lab in chapter 1, the two Interim Directors, Doug Coleman and Charity Waymouth, played significant roles in the difficult transition periods between Directors, although neither appears frequently in the transcripts of their colleagues. Rich Prehn notes that Doug

Coleman took upon himself some of the difficult, thankless tasks that probably would have been better left to the permanent Director (e.g. replacing the personnel files; firing Basil Eleftheriou) while other "hornets' nests"--like the reorganization of the summer training program--rooted in the annual calendar--couldn't be left for Prehn to handle. By standing up for his colleagues' needs and sensitivities, Coleman succeeded, in good measure, in mollifying the staff, and in horrifying the Trustees, for which he earned (as he notes on his tape) their "golden boot" award.

Charity Waymouth was as much an unsung hero as Coleman, enduring the purgatorio of administration for 14 months, more or less as a consequence of her retiring the day Rich Prehn left. Less ambitious than Coleman to clear the decks for the new Director, Waymouth was content to hold Jax together and work toward fiscal solvency (Prehn left with a fund drive incomplete, and there was red ink for several years thereafter [JBe]). Regarded as an able handler of people (RF), Charity worked to heal some of the resentments left by Prehn's preemptory treatment of the staff. The full story of her tenure, however, remains to be told. It is the most notable lacuna in this collection.

A central figure at Jax for 30 years was its Business Manager/Comptroller, Dale Foley. Tom Roderick's interview mentions Foley's significant (but often forgotten) place in the local history not only of the Lab, but of Bar Harbor and Mount Desert Island. Foley was on many boards, civic clubs, and an influential

person in the creation of the consolidated high school. Sent to the Lab by Judge Norman Shaw, a close friend of C.C. Little's, to be Little's "detail man" in the pesky business matters Little found so distasteful, Foley over time became one of the three figures that support staff and administrators cite as the men who ran the Lab: Earl Green, Watson Robbins and Foley (cf. CRS,TR,ER,DF,WD,RG,RSt). Certainly as the major fiscal expert at Jax over three decades, Foley had a knowledge of its financial realities that put him at center stage. Roderick is one of the few scientists interviewed who mentioned Foley. Roderick notes not only Foley's presence but his uncanny ability to understand scientists' needs. With no scientific training himself, Foley seemed able to anticipate, plan and provide for the scientists as no other administrators have been able to do since he retired. Characteristically, Foley's own interview reveals little of his own role. He has the quiet, unassuming manner of the native Mainer. Instead, he spends most of his interview describing the "unsung heroes" of Jax among its Trustees and donors--Joe Gerrity, Eleanor Jackson Warren (Roscoe's daughter), the Rockefeller family, John Killduff, and others. Foley deserves to be included in this group himself, as he was clearly a maker of the "mouse house."

Watson Robbins is another figure whose role at Jax was significant. Unlike Foley, sitting with his adding machines and ledgers, Robbins was out with the "boys," from the time he was hired as a mouse box washer in 1937 until he retired as "General

Superintendent." A reading of the c. 2,500 pages of transcripts in this collection will reveal the degree to which Robbins was a colorful character and widely loved. Robert Stanwood's tape in particular provides several vivid anecdotes of Robbins's impetuous energy and determination, which the final part of Tibby Russell's tape confirms: Robbins combined intense energy, dedication, native ability and an extraverted personality to rise to a position of considerable authority at the Lab. Deeply loyal to C.C. Little, Robbins reveals on his tape, his willingness to talk back to Earl Green when Green railed at Charlie Dunbar's lawn mowing method. The support staff knew they had a champion, protector and advocate in Robbins, and their affection and respect for him are obvious in the collection.

Robbins's cohort, and contemporary in terms of vintage (they both came within seven months of each other [CRS]), Allen Salisbury is, by all accounts, the most colorful character ever to work at the Lab. With his expressive, mobile face and strong features, a thick Maine accent, and booming voice, Salisbury was well endowed to be humorous. Adding to this a fine eye for the funny, and an incomparable story telling ability, he is everybody's choice as the funny man of the Lab. When C.C. Little retired his Santa Claus costume, Allen Salisbury inherited the role. Like many Mainers, however, Salisbury clams up when confronted with a tape recorder, so his own contributions to this collection are not half so amusing as the anecdotes others tell of him. Eunice Fahey, for example, remembers Salisbury as Jax's quick-

witted stockroom supervisor, to whom all researchers made application for any supplies they needed. "... there was a kind of standard exchange between Allen and Dr. Green if Dr. Green entered the store and Allen was not behind the counter. Dr. Green would pound the counter and call: 'I'd like a little service around here!' Allen's answering boom from behind the shelves: 'You're gettin' about as little as we can manage.'"

Little's charisma, Green's organization, Prehn's stimulation, Snell's science, Russell's promotion, Foley's administration, Robbins's energy, Salisbury's humor, and the dedicated attention of its two Interim Directors--all these have been some of the influential elements in making the "mouse house" the place it is. These individuals, plus all the employees and Trustees of The Jackson Laboratory, have played a role in creating Jax as a place for doing science. A deeper look at the human side of doing science is the theme of chapter 3.

JAX BEHIND THE SCENES: THE HUMAN SIDE OF DOING SCIENCE

"Research is not like it's portrayed in Scientific American, where things happen and you find out something and that leads to something else the next day, and something else on the following day... frustration is part of doing any kind of research."

Arthur Champlin

"... I think that's what you're supposed to do in science--have fun."

Donald Bailey

A distinctive feature of the oral history approach is that it conveys information colloquially, as a conversation between two people, without the formalism of a written speech. In an oral history interview of a scientist, especially when the interviewer is not a specialist in the field, the opportunity is at hand to see the scientist as a human being, to reveal the person behind the myths.

Myths? What myths? Perhaps because of literary and movie images of scientists--the Dr. Franksteins and Dr. Strangeloves--and perhaps because American lives have been so transformed in recent generations by the results of science--atomic energy, vaccines, computers, TV, organ transplants--as a nation, we have come to think of scientists rather like gurus of some powerful cult (science) whose rituals (the "scientific method") place the scientist as a man apart ("man" advisedly: there's still chauvinism in the profession, as these tapes reveal). And as the possessor of special powerful knowledge couched in highly technical language, the scientist is often thought of as a man **above** the layman, a myth scientists do not care to dispel. James Crow embodies this attitude, as he discusses the Friday evening science lecture to the Jackson Lab Trustees given by a scientist on the Board of Scientific Overseers:

It's sort of a game, if you can say something meaningful to a group of laymen, and they ask questions, and the questions are good lay questions, but they reflect almost total ignorance of what is really going on.... it's just possible if they knew real science, they'd be less impressed than they are...

What are some other similar "myths" we as a culture have about science and scientists? The life-and-death, high-stakes competitive images we get from the media of scientists toiling in their labs to be first out with a cure for AIDS, or the mad scientist obsessed with delusions of Promethean power, convey the idea that scientists are solemn, purely logical and rational, objective and open-minded. The scientist, it is felt, is an "ideas" man, not dealing with feelings, opinions or other people. People aren't part of science--the lone scientist toils amid his test tubes producing a marvel every other day; nor is science regarded as a political activity. Luck, chance, hunches or accident have no place in the carefully planned pre-meditated experimentation that is the scientific method; rather than luck, or hunches, competition and a progressive attitude invigorate science, and produce the great discoveries.

Conversations with 36 scientists in this oral history project either explode these myths, or offer thoughtful commentary debating their validity. These interviews also provide us a peek behind the scenes at a major research Laboratory, to see how scientists really spend their days, go about their work, and think about science, and themselves, as scientists.

If The Jackson Laboratory oral history tapes reveal anything about science, they show that it is **not** solemn, "all work and no play", and Jax has few "dull Jacks." A constant theme of this project is the fun-filled atmosphere of Jax, and the commitment to science as a source of fun, enjoyment and excitement. The non-scientists at Jax speak often of the practical jokes--dead fish under tables (EF), pails of water over doors (RSt), switching lunch pails (TR), fights with the dog chow (RL)--by various "general assistants" (and now nearly completely gone, due to OSHA, Workmen's Compensation and other regulations). Several employees, especially Watson Robbins, and "Tinker" Bunker, had well-deserved reputations for such humorous high jinks (cf. RSt,EF,TR,CRS,RL). Within individual labs, more than sober science occupied the minds and energies of the scientists: witness the attention given by Tibby's crew to their "home brew" SWIGAMITI, and its successful competition against the booze of other labs (FL,SB). Lunch time frisbee and football (RF), mouse races in the halls (LHB), the hilarious "Lab Lovelies" no-win softball team (FL,ER), potluck suppers celebrating baby showers (ER), Christmas caroling in winter (JB,EF), summer student musicales parodying the staff (DB)--all portray an institution full of laughter, relaxation and fun. It was, in its earliest years, committed to parties: The older staff recall the monthly parties in winter (GS,CRS) and weekly picnics in summer (MLDR), with organized games--mouse wheels and egg soccer (GS)--and THE game, charades, at which George Snell was a champion (MLDR). Allen Salisbury would autoclave lobsters and

clams (FL); all the employees--oblivious to ranks--would prepare salads for Annual Meeting (SB); and drinking to a state of thorough inebriation was not unheard of (FL,CRS,RL). At one cocktail party, at least, narrators recall fried baby mice being passed around as an hors d'oeuvre (MLDR). Even in the '60s, the staff enjoyed weekly Thank God It's Friday parties at Aldersea, where they relaxed, "shot the breeze" (SB) and "let their hair down" (JB). Most of the partying is gone now, but for the annual Christmas party and summer outdoor fete, but the joy of science, the "just plain fun [that is] reward day to day" (TR) remains. Several narrators are very open about their feeling that their work is all the fun of a hobby: "It's still fun to do research. It's like having a hobby that you enjoy--..." (JB) and "It's fun to do detective work all the time." (TR) And many speak of the "thrill" of discovery (TR) and the "rewards," e.g. of achieving live young from frozen semen or embryos, or addressing an international congress (RF). To the committed scientist, in a successful project, the momentum of his work can be overwhelming (JCr). Don Bailey, for example, speaks of waking at 4AM, and thinking about his experiments, not because he must, but because it is so absorbing, interesting and challenging, that he wants to. Bailey sums up the attitude of many Jax scientists:

When you work in an area where there's lots of competition--they do it for money as well as for fame, and it's too bad, because they aren't having fun. And I think that's what you're supposed to do in science--have fun.

In this same interview, when Bailey speaks of Earl Green's paternalistic leadership of Jax, we are given a view of the scientist that many non-scientists might find surprising, perhaps even shocking: the scientist as child-like. Bailey imputes to Green, and obviously agrees with, the view that scientists are like children (Barbara Sanford, coping with the "Great Paper Towel Crisis," seemed inclined to agree) in their tantrums, egocentric attitudes, impatience, and child-like curiosities. But, the layman might sputter in disbelief: Aren't scientists supposed to be logical and rational, objective and cerebral, full of ideas and hypotheses, rather than passions and opinions? This is the image that the scientific method encourages and scientists would have the lay public believe, but numerous insights on these tapes indicate that, as Andy Kandutsch admits:

Scientists... are not much different from everybody else. I used to think that logic prevailed. If you had logic on your side, you were going to win, and that's not necessarily so: You can have logic, evidence, everything, and you still lose--ultimately I think you will win with logic, but you sure aren't going to win right away--you can't change people's minds, necessarily, with logic.

The reason for this is that scientists are no more objective, unbiased, or immune to dogmatism than non-scientists. Consider leading scientists like C.C. Little and John Kidd, clinging to an epidemiological philosophy based on Koch's outmoded postulates, refusing to see the connections between smoking and cancer (HW,JE,DH). The long-held derogation of statistics and statistical forms of proof was equally a blind spot. Marie Louise Duran-Reynals

recalls the suffering her husband, Francisco, endured for years, in the face of scientific dogmatism, that maintained viruses did not cause cancer (MLDR). In this, the Jackson Lab staff was no better than their fellow scientists elsewhere in refusing adamantly to consider Duran-Reynals's evidence with an open mind. Richard Little recalls his father's acknowledgment of this:

Francisco was laughed out of a number of scientific places. I mean that it wasn't that this might be a theory; it was that it wasn't, and this guy was a quack. Of course, that's not true: Look at what they're finding now, with what viruses do. My father and Yale were the only two places that Francisco felt at home. And I remember my father saying, "I don't care what the people at the Lab say, he's going to stay."

As Andy Kandtusch admits, "there is a lot of dogma in science." Tom Roderick recognizes this as the liability of the trained "initiate," the full-fledged scientist: He has acquired all the trappings of legitimacy and respectability in his discipline, including the "orthodoxy" of the day. It is for this reason that Roderick finds young neophytes--students and those new to the field--so important: They are "without the burden of knowing the dogma... fortunately, we didn't know the dogma... If you know the dogma, you may be biased and that's one of the great things about these students... They are completely fresh..." (TR). This dogmatic commitment to orthodoxy leads to the ignoring, denigration or ridicule of the innovator. Like Francisco Duran-Reynals, George Snell was ignored by the majority of scientists for most of his career (RS). In their refusal to conform to the

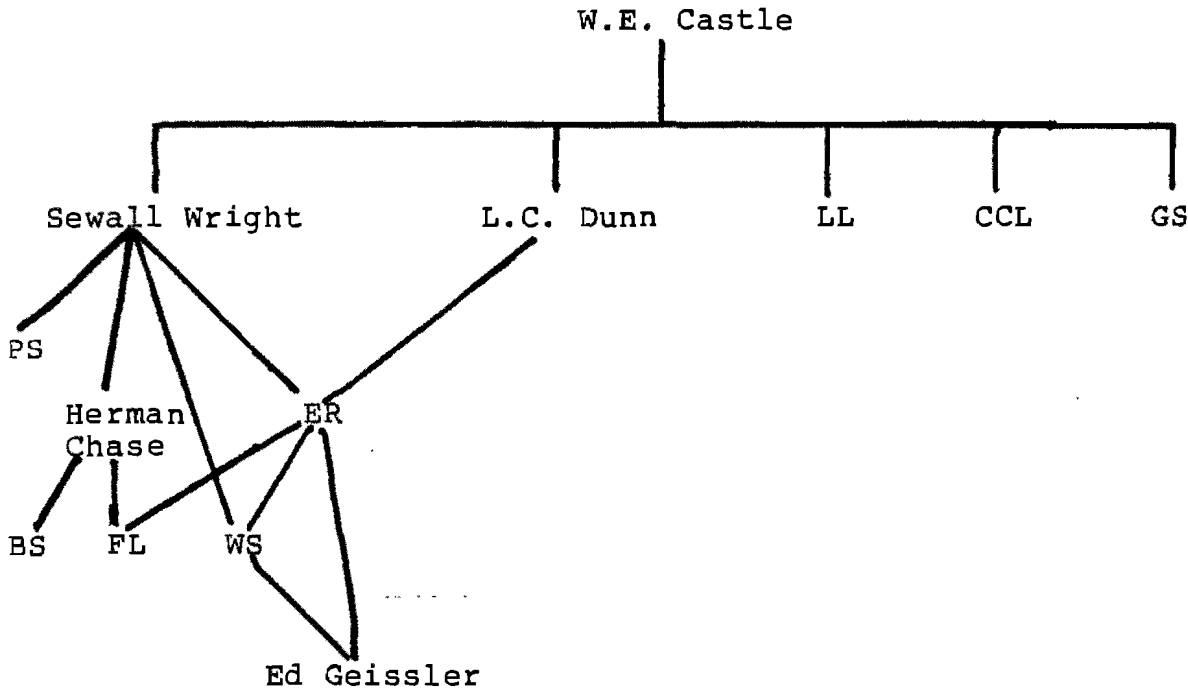
"group think" of the day (HW), or to jump on the "scientific bandwagon" (JCr), Snell and Duran-Reynals paid the price for independent thinking.

Why the "bandwagon" and "group think"? Don Bailey suspects it is another very human quality laymen never consider a motivation of scientists: feelings of anxiety about being left out or left behind (DB). Science is no more devoid of feelings, passions and opinions based on visceral reactions than any other endeavor. It only **purports** to be. We see, in these interviews, the deep feelings a scientist can come to have for an animal species after years of working with it (RF); how intensely scientists can feel when faced with even momentary frustration, e.g. the locked paper towel closet (BS); the deep emotional commitments to wrong-headed theories various sides can manifest, e.g. Peter Medawar's coming to Johns Hopkins in the midst of the controversy over his claim that pigment granules' spread was infectious--then a "very sensitive subject in Baltimore" (JE). David Baltimore credits The Jackson Laboratory with showing him science as a human activity, long before his own experience as a scientist confirmed it:

The whole notion of science as a human activity, rather than something on paper, was not available to us [at Swarthmore College]. It was a lesson that I've never forgotten, that when people say denigratingly, "You're being ad hominem," they're wrong: ad hominem is, in fact, the way you have to be.

As a human activity, engaging people fully--with feelings and drives, as well as reason and intellect--science is also full of politics. By "politics" we don't mean Democrats and Republicans or presidential elections, but more the fundamental meaning of "politics" as power interactions between people, including networks

and hierarchies, organizations and connections that control money, prestige, jobs, awards, recognition and other forms of economic or social advantage. Given its location "up there in the woods in Bar Harbor" (JE) and the "inward-looking minds" (JBe) of most of the Jax scientists, one might expect to see little or nothing of this side of science in these interviews, but no: The collection is replete with examples of the networks of science, personal, national, and international. Careful examination of the tapes of Tibby Russell, Lloyd Law, George Snell, Barbara Sanford, John Paul Scott, Fay Lawson and Will Silvers allow us to develop a "genealogy" of mouse geneticists going back to W.E. Castle and the famous "Founders Club," as pictured in Illustration #2:



Illus.2 "The Network of Mouse Geneticists Mentioned in Jax Interviews"

In this very personal network, we see the interweaving of connections, clustered especially around Tibby Russell and Sewall Wright (with many, many other persons involved: only the ones mentioned on the tapes are included here). As Art Champlin, a Jax former summer student himself, noted: "the network of science [is] ... really very fascinating, and you don't realize it until you start to become a part of it." "You start to become a part of it" by becoming a graduate student (or, in the cases of Silvers, Lawson, Barker and other narrators in this collection, coming to The Jackson Lab as a summer student) of some professor who subsequently serves as your "major professor" or "mentor." As many tapes in this collection attest, Tibby Russell played that role for a wealth of future mouse geneticists--many more than Illustration 2 indicates. In playing such a central role in this "old boy network," Tibby opened it up to more than just men; compare her tape and Jane Barker's.

That such networks were political--in the sense of dispensing power, jobs and positions--is made clear in Will Silvers's interview, and also when James Ebert speaks of the typical process of finding a new Director:

...Prehn's coming on as Director was interesting in another way and that is that it is very rare for the Directorship of a major organization to go to someone who has overtly applied for the job... ordinarily, major jobs are filled by very careful letters to leading individuals who--and you set out with half a dozen names in mind who you'd like to have... my guess would be that we must have written to a minimum of 60 or perhaps 90 major individuals in the country... I suppose we had, at one time or another, a list of prospects numbering 100 or so in that range...

Ebert makes clear that jobs like the Directorship of The Jackson Laboratory are filled through the grapevine, the advertisements being pro forma, "for legal reasons." Ebert's description of the process of finding a Director--sending letters all over the country--points up the **national** nature of the politics of science.

National networks are mentioned in this collection, especially with reference to the Trustees and BSO members. People like James Crow and James Ebert, as members of NIH Study Sections, various committees and commissions (e.g. the BEAR Committee investigating the biological effects of atomic radiation) powerful organizations like the National Academy of Sciences, the American Philosophical Society, or the National Science Foundation, become arbiters of the nation's scientific future. Crow offers an example of how scientists investigating a particular problem (i.e. chemical mutagens) can participate in the political process leading to civic debate, Congressional legislation and alteration of public awareness--politics indeed.

Science is not above being embroiled in international politics too. Seldon Bernstein notes Robin Bannerman's arranging for the abduction of the hemoglobin deficient mouse from its origins in East Germany, after the Communist government refused to share its discovery with the West. Henry Winn notes the ubiquity of scientists' politicking to win the Nobel Prize, the ultimate accolade of international science, and George Snell's unique, apolitical attitude to the whole process.

Personal, national, international--on every level, science is a political activity, pervaded by considerations of power, prestige, and prizes. One attraction of The Jackson Laboratory for many of its scientists was the relatively apolitical atmosphere within the Lab: lacking really meaningful hierarchies within the staff (their titles are relatively meaningless in terms of power) and departments to compete with one another for space, budgets and perquisites, Jax has few incentives for political types to function. As we shall see in chapter 4, "political types" are rare at Jax. But, while Jax in itself is not heavily political, it exists within the scientific networks outside and its scientists recognize that science is not an activity that can be carried on in isolation. Many staff members acknowledge this, none more bluntly than Tibby Russell, who was quick to identify her two motivations for doing science: the chance to travel (i.e. to conventions, conferences, etc.) and the chance to work with people.

The image of the lone scientist toiling with his test tubes--if it ever was a valid picture (perhaps for clandestine science like Dr. Frankenstein's)--is certainly true no more. Ever larger teams in science--where assistants, graduate students and post-docs can number into the dozens--are definitely the current trend. George Snell recognizes this when he notes, with concern:

...if there's anything I wonder about now, it's a need for sizeable teams for a great deal of work, and that, I think, that must change the situation somewhat. I worked with a group but it was a small group of people...

Uniformly in this collection we see the older Jax scientists share Snell's concern that research is becoming a big-team endeavor. Don Bailey, with experience at Jax going back into the '50's, expresses the independence characteristic of the "veteran" Jax researchers:

...see, I have a different attitude about doing science. I don't like to go into an area where there are lots of other people... I like to try doing something that's quite different, that no one else has thought of, and, in that way, keep my independence and not be frustrated by what other people are doing... so I don't feel quite that pressure that I think I see other people feeling when they compete in large laboratories,...

But Bailey also notes the younger scientists new to Jax, having come from large labs, with big teams, are taking a while to feel comfortable with Jax's smaller teams and greater independence--its legacy from the days when mouse genetics required nothing more than a mind, a pencil and some mice (JS) and "a little laboratory was all you needed" (DH).

Another mythic image of science which many laymen derive from reading about it in the "popular" scientific journals like Scientific American is that science consists in the smooth accretion of knowledge, new discoveries coming with every day in the Lab. Like movies that encapsulate months of life by showing calendar pages falling away, so journal articles tend to compress months, years or decades of painstaking, slow effort. Since science is a real life activity, it is never streamlined, rarely smooth, and only **some** times gratifying. Art Champlin:

There are frustrations that go along with doing any kind of research, and things that don't work; things that you think should work better than they do, or there are problems getting the animals that you want--numerous things that can happen, but that's part of doing research,... Research is not like it's portrayed in Scientific American, where things happen and you find something and that leads to something else the next day, and something else on the following day... There are a lot of things that go on that just don't have normal fruition, and frustration is part of doing any kind of research.

At least ten of Champlin's colleagues (HW,TR,RL,GS,RF,DH,DB,JB,BS,JCr) echo his view that science is full of frustrations: "the result of your feeling you're on to something and you realize later you aren't (HW); when lab experiments involving six months of twelve-hour days go bad due to poor technical advice about what kind of cap vials to use (RF); or when the "Eurekas" you long for from a project take a long time in coming (TR). The most pervasive cause for feeling the rough, frustrating side of science cited in the Jax interviews is the current funding crisis, that a scientist can work hard, have good ideas, be on the trail of something that looks promising, and still not be funded (BS; cf. DH,JB,DB). The long-term impact this might have on American science is explored in chapter 8. As James Crow notes, while research "may seem glamorous to the layman, in reality it is slow, painstaking, difficult and ambiguous."

It is also unpredictable. Despite the standard scientific protocols calling for careful planning and methodical experimentation, science is full of the quirks of fate that are manifest in any creative process. We see several of these in this

collection. For example, Barry Whitney's finding an alpha thalessemic mouse on his third try, then examining another 3,000 mice with no luck. Even more fortuitous is Seldon Bernstein's serendipity in finding a mouse with an ovarian teratoma, for which Leroy Stevens had been looking for nearly ten years. Let Seldon tell the story:

One day, I was in my laboratory and I took up a new project... and sent my assistant out to the mouse room: "Get me some mice that we are going to discontinue, for I just want to refresh my memory on the distribution of lymph nodes and how to find them."... And she went out to the mouse room, and ... pulled off the shelf a couple of mice that were from the stock to be discontinued. In fact, that whole stock probably would have been destroyed within the space of two or three days.... So she brought this creature in, and I began to do the dissection on it, and I said, "I don't know what's wrong with this mouse, but, by God, I think it's got an ovarian teratoma." Well, I had never seen a teratoma in my life, but I said, "I think that's what it is." I don't know how I knew that.... I had known Roy was looking for it, but Roy had never seen one... And I took it to Roy and he was excited, to say the least.

Seldon then reflects on the sheer **luck**, the incredible odds, of this sort of thing happening:

... if one looks at the probability of this happening, it is impossible for it to happen. First of all, the mice have to be of a certain age, in development terms, to have an ovarian teratoma. My assistant could have gotten males. She could have taken animals from a totally different stock. I could have seen the teratoma and not recognized what it was--any of those things and it would have been gone. And now, it's become one of the most useful tools in embryogenesis and Roy has gone on and done marvelous things with it ever since.

Then he muses on the internal structure of The Jackson Lab, making such "luck" a little more probable:

...we were all close knit, interested in what the other person was doing, always had free time to walk in and shoot the breeze with, drink a cup of coffee together and argue about science... there were no doors.

Nor were, or are, there departments. Everyone connected with Jax agrees that one of its biggest assets is its lack of departments, allowing a hematologist to work with an embryologist, for their mutual benefit.

Other elements of structure and atmosphere can foster, or dampen "luck" and creativity. For Andy Kandutsch, the key to such fostering is to "... just sort of keep things fairly loose, and broad, and keep the opportunities open to do any kind of thing, keep the possibilities to attempt anything open." James Ebert had this same idea of loose, free open inquiry in mind when he described Earl Green's personality as too organized to allow greatness as a scientist. The scientific personality--intuitive, speculative, imaginative, ingenious, flexible, adaptable--isn't well suited to the bureaucrat's neat little pigeonholes and deadlines. Nor does it respond at optimum when faced with the intense pressures, frustrations and worries that now seem to plague the profession: the current environment of science "is very disruptive; it's very discouraging, and there's sort of a general tension and nervousness all through the scientific community... It interferes with progress in laboratory research, when people are distracted and tense over a situation like this [i.e. the funding crisis]" (BS). The extent to which an institution can thrive as a "dedicated institution," limited in its lines of inquiry, and its scientists limited in their range of "tools," amid the pressures of the new scientific environment nationally is explored in chapter 8.

As an institution consciously dedicated to mammalian, i.e. mouse, genetics (BS,ER,FL,DB,BG,JCr), The Jackson Lab is more

conservative in its sense of its origins than most research institutions. A wide range of narrators agrees on this point: To Richard Fox, Jax has changed "only cosmetically over time." James Ebert speaks of the "general conservatism of The Jackson Laboratory [being]... a relatively closed shop except to geneticists." Priscilla Lane feels that, while The Jackson Laboratory has changed over her 36 years there, it "is slower to change than some places." Perhaps this more-than-usual conservatism is the result of location. Henry Winn sees this connection:

...every small town is like this,... the best reason for doing something is "We've always done it that way." And ... I do see a lot of that here....

This "general conservatism" of The Jackson Lab has served to keep it in touch with its origins. To what extent it is also a hindrance to Jax's achieving a position of scientific leadership, and whether this is even a goal toward which Jax might appropriately aspire is discussed further in chapter 8.

A final issue on the subject of the human elements of doing science is the debated claim that science thrives best in a highly competitive atmosphere. The 36 interviews in this collection with scientists inside and outside Jax, break down exactly along territorial lines: scientists within Jax uniformly dislike competition, find it hampers creativity and destroys the fun. Don Bailey, cited above, is most adamant on this point. He is joined by myriad others--Fay Lawson, Andy Kandutsch, Jane Barker, Tibby

Russell, Priscilla Lane, Seldon Bernstein--all of whom appreciate Jax's close, cooperative atmosphere (cf. BS, EF, JPS, TR, JCr, HW, RL) with no locked doors (SB), little pressure to "publish or perish" (SB, ER), great collaboration (CRS, SB, TR, JB, PL) and a feeling of "... a large family of people working..." (AC; cf. DF, RL).

Scientists outside Jax are either ambivalent, e.g. Lloyd Law, feeling the lack of pressure has its good and bad points, or like David Baltimore and Dick Sprott, in being bluntly critical.

Baltimore:

...this has got to be paramount, ... that science is a competitive world today, and the people that spend more time at it, do better. The people are better organized, committed and more involved.... whether they [i.e. Jax] have created an atmosphere that will be appropriate for exploiting the opportunities 5, 10, 20 years from now, is where I have a significant doubt.... They would have to be much more high-powered in their general outlook, and have a really strong group of people...

Sprott concurs:

Whether they [i.e. Jax] can make the conversion to where they are something very high-powered, I do not know. But they won't do it with that staff. And I think at the core of it, that was what Rich was about.... Rich was saying you will never do that with this staff. In the long run, he wanted them all gone.

Both Sprott and Baltimore, sitting respectively at NIH in Washington, and the Whitehead Institute at MIT, see the changing environment of science, and wonder how Jax will cope in a world very much of "publish or perish," problem-oriented funding, goal-directed research, and little tolerance for the "laissez-faire" attitude common at Jax. Just how Jax will manage will be at least in part the result of its values, mission and institutional identity, the subject of chapter 4.

IMAGES OF THE JACKSON LABORATORY:
 INSTITUTIONAL MISSION, IDENTITY AND VALUES

"I hope The Jackson Laboratory will continue to be in the forefront in mammalian genetics, bringing forward new ideas and approaches to answer important questions in basic genetics and developmental biology, and to find out more about what goes on in cancer and other diseases. I have the same sort of dream for The Jackson Laboratory as C.C. Little had." Barbara Sanford

"...don't go to any dedicated institution, because a dedicated institution is simply too narrow. It won't attract good people, because they want a broader area to look at, and it's a misreading of what's going on. And I think Jax has suffered from that." David Baltimore

This chapter explores those aspects of The Jackson Laboratory's institutional identity that might influence its response to the challenges posed by the competitive environment of science and the funding crunch. Specifically relevant in this regard are narrators' articulation of Jax's mission (which, as David Baltimore noted, is closely tied to Jax's history and origins), the staff's sense of its identity (which will be contrasted with how outsiders see the Lab), and Jax's set of values (including a sketch of the type of personality likely to be attracted to Jax).

Jax's Institutional Mission

Multiple narrators--staff, Director, Trustees and BSO members--were quick to identify Jax's mission: "C.C. Little founded it to be a center for the study of mammalian genetics, with science, education and animal production of ... inbred strains of mice... exploiting the mouse, to do very good science" (DBe). Barbara Sanford identifies this "sense of mission and common goals" as "one of The Jackson Laboratory's greatest strengths" and notes that it was explicitly part of her agreeing

to take the job of Jax Director that Jax return to this mammalian genetics focus, after Rich Prehn had sought "a different vision for the Laboratory... without concern for a common focus or any special emphasis on mammalian genetics and development" (BS). Tibby Russell sees Jax's mission linked with responsibility: as the premier center for mammalian genetics, with its reputation as the provider of special strains of mice, it has become incumbent on Jax to try to meet the special needs of researchers requiring new or unusual mouse strains, particularly those modelling human diseases. Other Jax staff describe the Lab's mammalian genetics mission as "unique" (DH) and "great" (DB). The non-geneticists on the staff however (represented most articulately in this collection by Andy Kandutsch) are less enthused about the mammalian genetics orientation. Kandutsch notes that C.C. Little had peas, guinea pigs, hamsters, dogs and cats at Jax, a fact confirmed by many other narrators (cf. JS,RL,ARL) which leads Kandutsch to argue that Little saw Jax's mission much more broadly than it is currently interpreted. Lloyd Law, one of the early staff in the '30s, agrees: Little's purpose for Jax was the "study of disorders of inheritable diseases."

However much the non-geneticists might wish to broaden the Lab's mission, it is seen by outsiders as a "dedicated institution," in David Baltimore's phrase. As such, in Baltimore's view, [it is]

...simply too narrow. It won't attract good people, because they want a broader area to look at, and it's a misreading of what's going on. And I think Jax has suffered from that. I think they're trying to get away from it, but it's very difficult. Difficult to undo history, probably because the strength of the Laboratory, the raison d'etre of the Laboratory, focusses on its history.

A Jax Trustee, and former summer student, neurologist Ann Hirshhorn agrees that Jax is dedicated to mammalian genetics, but she recognizes the pressures of changing times and feels Jax must be ready to adapt as may be necessary without feeling constrained by its founding tenets. James Crow envisions a situation in which Jax could have the best of both worlds: the focussed mission and a more diverse staff:

...I don't think there's any danger of that [i.e. classical mouse genetics] flagging and it doesn't require 90% of the staff to do that... I think the Lab can go on with ... an influential minority [in mouse genetics].

Will Jax try Crow's suggestion? How narrowly will Jax define its mission in the future? Whether Jax's sense of mission will hinder it from adapting to new environments in science, or whether it will feel unconstrained by its founding tenets, as Hirshhorn hopes, remains to be seen.

Jax's Identity

Internal:How Jax Sees Itself.

Over a dozen narrators (cf. RF,AC,WS,FL,DF,RL,RS,SB,GS,JS,HW,AK,JB,AS,FC,WR,ER) when asked to describe Jax succinctly, referred to it as a family: "One of the very happy features of working at the Lab has been... it's one big family" (GS). "...just one big family" (WR,AS,FC). Abundant evidence appears on the tapes to support this, e.g. the Lab's giving no-interest loans to staff, and sending a Lab representative to the home of an employee in time of sickness or death, to offer comfort and support (DF); the Lab-wide mourning at the time of Charlie Green's death (RL); the

lack of rivalries and the general respect people felt for each other (RF); the fierce, personal loyalty and sense of dedication felt by the staff toward C.C. Little and the Lab (SB,BS); the awareness everyone had of the others' strengths and weaknesses (ER); the democratic, egalitarian atmosphere (LL, CRS,AK); the great camaraderie and esprit (WS), reflected most intensely in the Lab-wide social functions (JS,HW); the feeling of belonging people had, symbolized in acts like Tibby Russell lending Henry Winn (then a brand-new staff member) her house for two weeks (HW,AK); the Lab blood bank, set up by Allen Salisbury (CRS); the Lab's collecting employees' garbage (SB,ARL); growing their own food (ER); coping together in times of adversity (AK); and helping generously a fellow staff member when problems arose (HW). This sort of environment was recognized by Dick Sprott as very special:

...the place was like a family. That's what made that place special. There was no other place like that in the world. That's all gone, there's no way to get that back, but that is what made it special.

"That's all gone," Sprott says. Not everyone at the Lab would agree it's all gone. People like Jane Barker see vestiges of it yet in the socializing that goes on and in the personal caring, cooperation and support that the staff still manifests (JB). When Barker introduced her former NIH boss to her lab group at Jax--including a climb up Champlain Mountain, movies and pizza in the evening--he concluded: "I can see why you like it here. It's a family." But, while it may seem more a family than the huge impersonal environment at NIH, to the earliest staff like Tibby

Russell, who remember how it was forty years ago, "it's too big to be a family now" (ER). Some Little loyalists, like Allen Salisbury, claim the family quality left when Prexy retired. Others date the decline in family aura to the time of growth and the institution of ranks and administration (WS). Joan Staats sees it date from the hiring of the first Morrell Park worker.

Six narrators whose lives have been deeply affected by Jax in a personal way bear witness to the family-like effect Jax has had on them. Fay Lawson came to Jax fresh from college, with no particular career goals, and found herself, within six years, getting a Master's degree, embarking on a Ph.D., with fellowships arranged for her, and whole new horizons opening up: "The quality or nature of the support the Lab has given me has been superb. The Lab represented really, in my life, a chance, a turning point" (FL).

Will Silvers arrived at Jax as a Hopkins undergraduate to participate in the summer students program. As he notes in his interview, little did he realize how profoundly his life would be redirected when he applied for that first summer, that Jax would, in fact, give him a new sense of self-confidence, change his career goals from medicine to research, send him to grad school at Chicago, provide the opportunity to meet his wife, arrange post-docs, jobs and help him publish a book.

Ann Hirshhorn credits the Lab with giving her "real direction" to her life. Her first summer's work as a college student confirmed her interest in science, and her work with the newly-

discovered "funny foot" mouse--soon to be recognized as the dystrophic mutant--was a precursor to her later medical specialty in neurology. The "very personal, caring environment" of Jax was so meaningful and valuable to Hirshhorn that she has maintained contact with the Lab every summer for some thirty years.

David Baltimore arrived at Jax as a high school student, turned off by his high school biology course. He was turned on by the "sheer joy of research" he saw manifested by the Jax staff, and the memories of the pleasure that scientific research could mean were enough to sustain him through the difficult college years to follow. Baltimore credits Jax with helping him learn to think genetically and giving him an awareness of the nature of experimentation. Its role in his life was "inspirational," and his gratitude to Jax "enormous."

Like Will Silvers, Art Champlin can thank Jax for a career in research rather than medicine. His college senior year summer's research at Jax helped Champlin decide not to pursue an M.D. but to continue on in biology. Also like Silvers, Champlin met his wife at Jax, when she was Tibby Russell's summer student. He has spent some part of the last twenty-five summers at Jax, and both his teaching at Colby College and his own research have been enriched by his relationship with the Lab.

Richard Fox came to Jax for a two-year post-doc in 1959, two years turning into twenty-seven. Like many Lab staff, Fox never worked anywhere else. Working for years at Hamilton Station, Fox came to the Main Lab, gave up his research on rabbits, and took on

a whole new job in genetics quality control when Hamilton Station was closed. Job changes paralleled significant personal change: Fox lost his wife in 1980, and received "heavy support" from the Lab both at the time of Sally's death and subsequently, when he contemplated remarriage. Clearly, for Fox, Jax's impact on his life has gone beyond being merely a job.

These six individuals span a thirty-year period, from the early '50s to mid '80s. All recount in detail an interaction with an institution whose impact was far more than the usual internship, summer course, or job tends to be. For them, Jax was "family." For Fox, still an employee at the Lab, Jax is still family. Its unique atmosphere--a je ne sais quoi to me when I first began this oral history project--could be described as "familial," for want of a better word: How else to explain the personal quality of the interaction, the sense of collective past, the heritage of shared experiences, the fun-filled camaraderie, the familiarity between staff, with the tolerance for mutually-recognized strengths and weaknesses (ER)? The pater familias is gone; the older members of the tribe dispersed; the intense closeness fading, but, as Fay Lawson says, it is "still a caring environment," with a Director who is

very compassionate and warm and caring, and, if anybody could restore to the Jackson Lab that feeling that Prexy had here, she would be the one. She's the kind of lady who gives not a second chance or a third--you can have a 24th chance, and all the understanding and warmth."

that is, all the qualities one seeks in the head of a family.

External: How Jax is Seen by Outsiders

The narrators in this collection who were local natives--Frank Clark, Watson Robbins, Allen Salisbury, John Dorey, Lester Bunker, Roy McFarland, Robert Stanwood, William DeLaittre, Reginald Gilley and William Abbott--were asked how their friends and neighbors regarded the Lab. George Snell recalls natives' reference to it in 1935 as the "mouse house," and this appellation is confirmed by the native-born narrators. "Mouse house" and "mouse factory," Jax was seen as very good for the local economy by the businessmen of Bar Harbor (JD,RSt,RP,WD,RG,CRS,JF), but many natives manifest a suspicion of the new and non-native brought in by "people from away" that is characteristic of the Mainer. More than one narrator recalls the skepticism locals felt about the Lab's effectiveness: Joan Staats recalls

You'd hear a lot of things like, "If they found a cure for cancer out there they'd never admit it because they'd all lose their jobs." You'd actually hear things like that.

Time, and perhaps improved communication and educational levels among the natives have mitigated this. George Snell's Nobel Prize also helped to make the natives feel some measure of pride in Jax's achievements.

How **scientists** outside view the Lab is quite different from the natives, much better informed as to both the nature of scientific research, and Jax's role in it, but no less critical. As previous quotes from David Baltimore, Dick Sprott and Lloyd Law have indicated, where narrators within Jax looked in the mirror and

saw a warm, caring environment, the outside scientists saw quite a different image: "dated," "narrow," threatened by bioengineering, "isolated," with an atmosphere inappropriate for exploiting the opportunities of the future (DBa). Sprott saw Jax as a place "doing its own thing" (as it always has) but this "thing" has become an "ancillary" thing, no longer central:

Virtually, almost all of the best mammalian genetics certainly, mouse genetics, stems from The Jackson Laboratory, ... For a 30 or 40 year period, you had no credentials in mammalian genetics unless you put in time there. The problem now is it's not a set of credentials you need any more.

And Sprott notes the Lab's antiquated attitudes:

I think the Lab has an unparalleled atmosphere for doing certain kinds of research. It has support facilities that are not as good as it thinks they are, but which are still quite good to make a scientist's life very easy. It could be a lot better if they were to step into the 20th century... The equipment's there. The people who will translate that equipment into an understanding at a bench level of what those scientists do with what is there--that's what is not there. The high-powered kind of person who can walk into them and say, "Everything you are doing in this laboratory by hand can be done a hundred times faster, more accurately some other way." They don't even know about it.

This failure to come into the 20th century and attract the high-powered person may be the cause for Lloyd Law's complaint that the Lab failed to exploit its strengths:

...they probably could have used some of those mutants a lot better than they did there... for the most part, I think people ran away with the material, and although The Jackson Laboratory got some credit for establishing and characterizing them [i.e. the mutants], I think they should have had more credit for their scientific work that was done.

James Ebert echoes this when he notes Leroy Stevens's failure to exploit his position as the world's discoverer of the teratomas:

... but Stevens--this may have been an Earl Green problem, in part, I don't know--but Green was very reluctant to see modern cell biology and so on come into the Laboratory, and I think maybe Stevens was brainwashed at some point or other, or maybe he just did it to himself, but that field has exploded and there have been enormous contributions from others, which have left him back at the gate. He was one of the true pioneers, ... but in truth, he got to a certain point, and then kept on doing the same thing over and over again...

While Ebert sees this as possibly a consequence of Earl Green's dampening of scientific enterprise in fields outside classical mammalian genetics, Law feels the problem is rooted in the "laissez-faire type of condition" that prevails at Jax, wherein the staff "took it easy a little bit, and didn't publish too much, weren't recognized as they should have been" (LL). Law also sees the cause for staff relaxation as partly environmental:

I think that they get into their little cocoons and enjoy the water and the woods and the fishing and the isolation, and the other thing is that I think they don't travel enough.... I go mostly to cell biology or cancer meetings, and very few people from the Jackson Lab ever go to those meetings... I just have that feeling that they are isolated--...

Law also offers an old-timer's view of Jax, in the heyday of its "family" time, very much as odds with the fond memories of Russell and Snell: Law recalls cliques and rivalries, favoritism and jealous guarding of scientific "turf," and a laissez-faire attitude even then that he found very distasteful. Apparently the "one big happy family" image most of the tapes portray was not uniformly experienced by everyone. Dorothea Bennett mentions changes now underway at Jax that suggest the family feeling may become diluted even more by the tougher tenure policy, causing more staff turnover, tension and pressure to perform. Perhaps Law's

desire to see laissez-faire eliminated and Baltimore's and Sprott's call for a more high-powered staff will eventually be realized. If so, such changes are likely to have serious ramifications to Jax's value system.

Jax's Values and the Type of Personality Suited to Jax

Both internally and externally, Jax is recognized as a fairly conservative place, "heavily into a whole lot of traditional values" (RS). Particularly since Green's time, it has been very conservative fiscally (RS, JBe), and several scientists feel its values have become more economic since C.C. Little retired (TR, DBe). Dorothea Bennett feels this subtle shift reflects a trend in the values of science generally, in which it is now acceptable for scientists to be implicated in business. Rich Prehn saw this as a source of controversy: science versus mouse production. Despite all the attention given to mouse production, Bennett feels the values remain "primarily scientific." Barbara Sanford sees high value at Jax put on dedication, pride and a sense of belonging by all the employees, non-scientists as well as researchers, and a personal loyalty that fosters in the employees strong opinions (which they don't hesitate to share) about how Jax should be run. From the Trustees' viewpoint, John Beck speaks of Jax's "stress on substance more than eclat," and its "emphasis on minds more than machines."

When the staff were able to articulate the values of the Lab at all (many had never reflected on this issue, and some were vague at even what was meant) they spoke of the desirability of

cooperation (GS,RF), equality (LL,AK), collaboration (WS) and interaction in a non-confrontational atmosphere (DBe,AK,RF), compassion, warmth and caring (FL), independence (JB), intellectual humility (DH), and a wholesome environment far from the "rat race" (DB).

Closely related to the institution's values is an unspoken image of the personality type likely to fit in and be happy at Jax. No one directly painted the following portrait in toto, but there is considerable consensus as to its configurations, when all the interviews are surveyed on this point.

First--because, as Lloyd Law noted, it's a factor one can do nothing about--is the location of the Lab and the significant role this plays in limiting the range of potential staff members. The Lab personality is both sensitive to and appreciative of nature (LHB), a clean environment and the presence of Acadia National Park (DH), able to endure the rigors of the Maine winter (DB,RS), and "able to handle the physical and intellectual remoteness" (JCr)--"isolation" was an oft-repeated word on these tapes--with a lifestyle suitable to the general conservatism of both Maine and the Lab itself (RS, JCr). Dick Sprott dismissed one potentially dynamic candidate for the Lab Directorship on this basis:

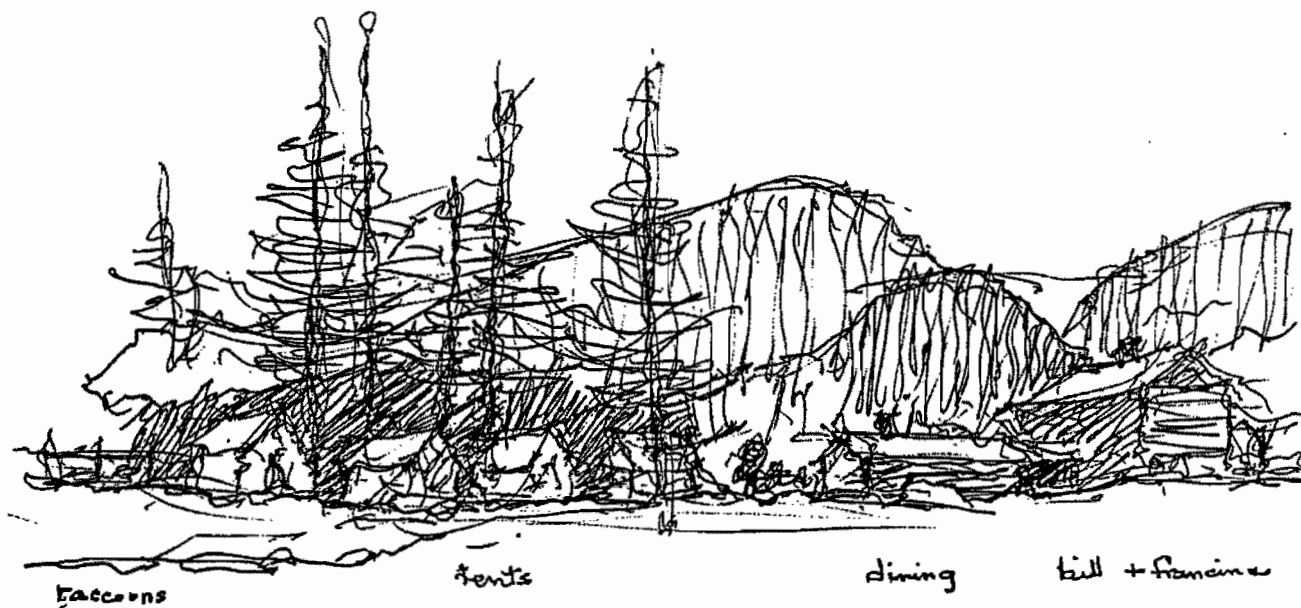
The Island is not the sort of place that is going to tolerate a flaming homosexual and one of the candidates for Director... had that as his problem... Whether he could have possibly survived there for very long, I'm not sure.

Besides a fairly "straight" lifestyle, the Jax personality tends to be more the "turtle" than the hare, as Ann Hirshhorn puts it. Not a go-getter entrepreneur extravert out to conquer the world, the Jax scientist is quieter, steadier (AH), easy going and able to work well with others (LB), with less egotism than one finds in the big city, high-pressure world (JBe). Rather self-contained, tending to be a loner (RS,DBe,DB), or at least an introvert (PL), the Jax scientist is the sort of person who likes "... cross country skiing and hiking and sailing and ... sitting around the fire talking, who [isn't] alarmed at the possibility of missing the ballet or the opera, or not finding gourmet restaurants open in winter" (BS). He or she is non-confrontational and less aggressive and competitive than his or her peers elsewhere. Ambitious in the introverted sense (JBe, JCr)--like George Snell, completely self-directed and not needing constant external recognition, attention or reward--the Jax scientist must be able to generate his or her own ideas (JPS), and be sensitive to Jax's "very hallowed traditions" (DH), some of which tacitly ban abrasive intellectual arrogance, any behaviors that seem aggressive, competitive or intimidating (DH) within the "family". The result, as Henry Winn and Dick Sprott note, is that

... there are some types of individuals that would never fit into the Lab [which] deprives you of a certain type of criticism--constructive and adverse--but it's needed. (HW)
 ...a really high-powered person may be a little too far out for that place,... (RS)

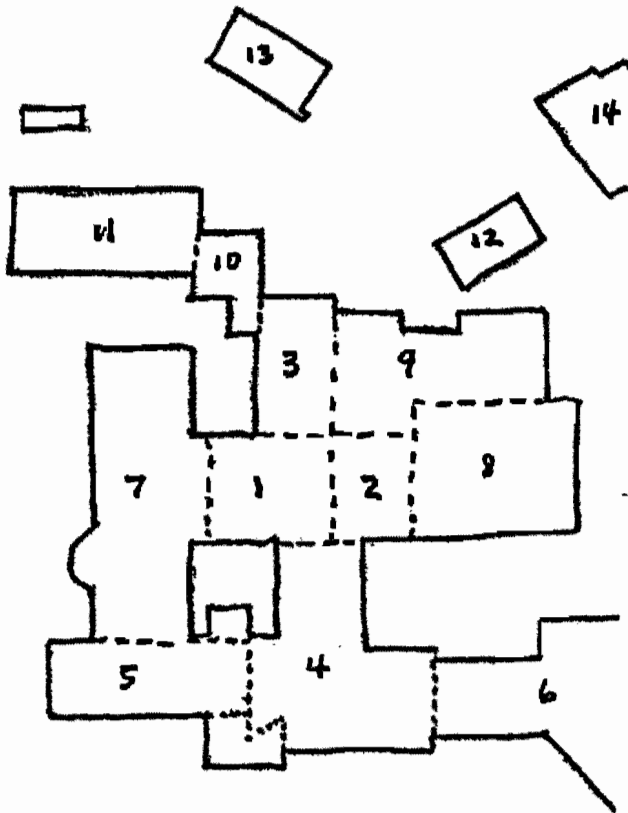
In terms of doing science, the foregoing personality traits spill over, to make for a scientist who "prefers to work at another kind of pace" (PL), e.g. John Compton, who notes on his tape that this was the deciding factor leading him to come to The Jackson Laboratory. Self-confidence is a must, to be a scientist at Jax, due to the lack of security in funding and the absence of "real" tenure a la universities and colleges (DB). Additionally, the Jax scientist feels no need to jump on the latest scientific bandwagon (JCr); rather, he or she turns inward, to work with Lab colleagues, in close, cooperative collaborations and interactions (DC).

Dedicated to a mission in mammalian genetics, its self-identity that of a quasi-family, its values low key, almost familial in tone, its quintessential personality introverted, independent, "turtle"-like, non-competitive--this is the image these fifty tapes present of The Jackson Laboratory and its staff. Returning to the question posed at the end of chapter 3--will Jax be able to adapt and respond positively to the challenges of a tight-money, competitive scientific world?--this image would not lead one to be particularly sanguine.



Illus. 3--Jax in 1929: Pen and Ink Drawing by Robert Little

THE JA



LEGEND

1. Unit 1
2. Unit 2
3. Unit 3
4. Unit 4
5. Unit 5
6. Library/Conferen
7. Snell wing
8. Mammalian Geneti
9. Animal Research
10. Boiler
11. Chiller
12. Cloudman Lab
13. Safety/Engineeri
14. Lab Animal build.
15. Importation faci.
16. Importation trai
17. Summer lab

One narrator, Victor McKusick, devoted nearly his entire interview to an exposition of the summer "short course" in mammalian/medical genetics, now looking to its 28th repetition in the summer of 1987. McKusick's is thus the most informative source for the history and nature of this aspect of Jax's training program. When McKusick and John Fuller created the "short course" in 1959, it was designed to introduce the then-barely-known field of genetics to medical school professors and other "teachers of teachers," so as to spread genetics awareness as widely and effectively as possible. A joint endeavor of The Johns Hopkins University and The Jackson Laboratory, the short course has been of major importance, both to the Lab and to American medical education in the last quarter century. It has served to bring the stellar figures in genetics to the Lab (either as teachers or students of the course--in some cases, as both!) It has fostered a better awareness of genetics in a whole generation of M.D.s--American and foreign; and a greater awareness of the value of the mouse in research for a large number of biomedical clinical researchers. Finally, as McKusick, Bentley Glass, Jane Barker and James Crow point out, the short course has led to many stimulating contacts and collaborations between Jax staff and outside scientists. Jane Barker, for example, recalls Tibby Russell collecting hordes of physicians in her lab each summer, who would study her mouse models of human diseases. As a most successful educational effort of The Jackson Laboratory, the short course is a valuable service to the scientific community. Jax also distinguishes itself in a service capacity in other ways.

Service to the Scientific Community

In chapter 5 we noted Jax's retention of the organismic view, in face of the trend toward molecular reductionism. Seldon Bernstein lamented this trend. Many others did too, and Don Bailey and Dorothea Bennett are among the geneticists who see Jax performing a valuable service in the scientific community by keeping its focus on the organism. Don Bailey:

I've always felt you have to come back to the organism in some way, because... you can't find out at the molecular level what you can at the cellular level... but the molecular biologists now don't think this--... this might be carried over in the schools in such a way that you don't have people coming up through our training [who] understand about levels that are higher than molecular,... staff coming here are learning about... classical genetics--... it's an education for them, and they're anxious to learn what we do have here...

Besides this "intellectual" service, keeping an idea, or perspective alive and viable for the fashion-following researchers to return to in the future, Jax serves the needs of science in the 700 different strains of inbred and mutant mice (JD) it makes available to researchers in 33 different countries each year. Tibby Russell is explicit about this responsibility Jax has: "... it's up to us to find a way of meeting that need,..." and in her career spanning nearly five decades at Jax, Tibby faithfully assumed this responsibility, working diligently to exploit all the mutants as they turned up. John Dorey, retired head of Animal Production, notes what this sometimes entailed, when a mutant was particularly useful to researchers, but in short supply:

...the model [mice] for muscular dystrophy... For several years... were in short supply. The Muscular Dystrophy Association of America, who was supporting some of the research with this mouse model, established

a program with the Laboratory whereby the number of animals available weekly were rationed. They had to be rationed because there wasn't enough to go around; they were very difficult to reproduce. We would call the MDAA headquarters each week and announce the number of mice available and they would tell us whom to send them to and how many. And this went on for several years until we got our production colony to a point where they no longer had to ration them.

Meanwhile, Tibby and her colleagues were developing methods--ovary transplants, artificial insemination etc.--to increase propagation of the "funny foot" mouse (Tibby's original name for this mutant). In such ways has The Jackson Laboratory's Animal Production side served the needs of biomedical research.

This history of service dates to before 1933, when Jax gave away surplus mice. In dire economic straits in '33, Jax began to sell its mice, when George Woolley prevailed upon Prexy Little to do so (CW). World War II saw Jax serve national research needs by providing Swiss mice to create Japanese encephalitis-B serum (WR). After 1955, the Lab gave up providing non-inbred mice and its production came to focus on the inbred-congenic, recombinant and hybrid mice and on mutants, like the dystrophic mouse mentioned above.

Besides providing mice, the Lab has also served by pioneering a wide range of techniques. As was noted earlier, narrators mentioned Wes Whitten's technique of in vitro fertilization as a notable Jax scientific achievement. Many of his colleagues have been equally ingenious in freezing semen and embryos, rendering strains of mice into DNA, and now, working on a transgenic mouse resource--all further ways to serve their fellow scientists.

While all this dedicated effort might seem to be indisputably appropriate for Jax, it has not been without its critics, and this

collection is full of debate about the proper role and place of Animal Production in a research Laboratory. Partly this is the issue of the proper role of business in science, and the problem of economic versus scientific values that such a liaison can pose, which we discussed in chapters 4 and 5. Partly, however, it's a problem related to the consequences of having an enormous, valuable animal colony, vulnerable to a host of diseases and dangers that mandate strict rules for quarantine and importation restrictions. The debate is starkly cast on these tapes. Listen to Andy Kandtusch:

... then they said, well, they've got to have a strict quarantine... so you can't bring in other mice, and, for example, you couldn't bring in viruses. Now viruses were real important for studies of cells... you couldn't do somatic cell genetics here, for many years, because you couldn't bring the viruses in.... That meant... we could not participate in that large area of research... when you're trying to answer problems, you should be able to use any tools you can get, if it's viruses, human cells, other animals--you should have access to these things, that the more you limit the tools you can use, the more you limit your ability--... It's always been to protect the mouse stocks,... That's why they gradually eliminated all the other animals and restricted importation... It did create a limitation.

and, on the other side, Seldon Bernstein:

... the rules and regulations now for the isolation and quarantine and slow introduction of new stocks... While it delays what happens here, and one has to be patient if one is to work here, I believe... are absolutely essential...

SM: You don't think it ties up scientific research?

SB: Oh, sure it does.... That's one of the prices you pay.

Earl Green, holding fast to the view of Jax as a mouse genetics Lab, supported Bernstein's view. Rich Prehn, trying to pry Jax out

of the "strait jacket" that was Green's legacy, lightened up the restrictions, recognizing "it's very difficult to do science in a vacuum. You have to be able to bring in necessary materials." And so Jax has loosened some of its rules under Barbara Sanford, but still cautiously, and still with restrictive importation policies, based on concern to protect the mice.

Protecting the mice might be a useless preoccupation in the future if the speculations by several narrators are realized. In this collection, we hear two BSO members, a staff scientist and an outside observer all suggest that Jax's millions of mice might become a memory in decades to come, as scientific discoveries overtake classical breeding techniques:

...as genetics has become more molecular, for many studies it is just as easy to work with human cells as with mouse cells. Thus, it is just as easy to clone human genes as it is mouse genes and I think most would agree that the time spent in sequencing the mouse genome would be better spent on the human... (WS)

we can take one mouse, and use its liver and its spleen, and get enough DNA from that mouse to do 500 experiments. Thus one mouse is reduced to a test tube of DNA in solution... and the cages of mice... are no longer needed for breeding.... You don't have to buy a mouse from Jackson... These factors may well influence the mouse sales,... but we don't really know how much it will impact... (DBe)

[Jax will be remembered for]... its being a repository for genetic strains of mice, but... how long that's going to last is really questionable, as I can perceive, 10 to 20 years from now--the inbred strains and all the mutants will probably be of no use. (DB)

David Baltimore is perhaps the bluntest in seeing Jax's mouse stocks threatened:

... getting more mutants is really critical. But that may... have changed already... Because the ability to make mutants is coming.... with the right transplacental treatment with EMU, you can get about one mutant mouse at any given locus,... That's much

more productive than waiting for them to come before your eyes, and secondly, looking for mutants visually, which is usually what Jax has been doing--...you're looking at a small spectrum of the overall possibilities... there are the directed mutagenic approaches,... which have a tremendous strength,... Mouse stocks are... important... but, as they become more important, more and more people will have them, or will be able to derive them, and they will become less critical, and the institution will become less critical as it becomes more central to what's going on... one of these days, some company is going to put out blots of recombinant inbred strains, and you won't need Ben Taylor, you just order a blot.... we'll be able to identify the genes and their alleles using molecular techniques, and we'll never have to look at a mouse.

At this point, beginning to wonder at Baltimore's sense of biology, I asked: "... you don't see a day when you never have to have the body of the mouse?" And Baltimore reassuringly replied: "No, I don't see that day. At that day, biology is dead, because biology is the study of animals and types of organisms, not the study of molecules." Baltimore is sure that Jax will continue to play a significant role in biology, given biology's newly restored interest in animals, but

whether they [i.e. Jax] have created an atmosphere that will be appropriate for exploiting the opportunities 5, 10, 20 years from now, is where I have a significant doubt.... They would have to be much more high-powered in their general outlook, and have a really strong group of people who can bridge those disparate disciplines.

"They would have to ... have a really strong group of people"--Baltimore's critical assessment of Jax's staff was echoed by other outside observers. Chapter 7 addresses the narrators' sense of Jax's strengths and weaknesses.

JUDGING JAX: STRENGTHS, WEAKNESSES AND ASPIRATIONS

"We actually all need more space..." Fay Lawson
 "I do think, at times, a little more space in spots would be
 helpful." Richard Fox

"I think that the worst change that has occurred in this
 institution has been that we've got too much space, and I think it
 has been a detriment to the institution." Doug Coleman

As the quotes above indicate, not everyone interviewed for this project felt the same about Jax's strengths and weaknesses. All the narrators were asked to identify what they perceived as the institution's assets and liabilities, and then were asked what they wished for Jax, if anything were possible: how they would change the institution. This chapter reviews the fifty sets of responses, noting particularly the divergence of views between the in-house and external narrators.

Jax's Strengths

There was more consensus on the assets of Jax than on its weaknesses. Four features, in particular, were cited by six or more narrators as attractions or positive qualities.

Locale. No less than 11 narrators regarded positively Jax's being in Maine, on Mount Desert Island (GS), near Acadia National Park (DH), in a rural, clean, safe environment that was good for kids (cf. LL,AK,JBe,DC,RF,BS,JB,PL). Andy Kandutsch described it as "isolated," an adjective the external narrators will also use, but as a pejorative. Andy regards it as positive. Several "outdoor types" on the staff mentioned location as an asset for the wealth of athletic opportunities Mount Desert Island allows. Priscilla Lane is particularly eloquent:

... do you know what this island has? It has mountains, it has lakes, it has cross country trails that are superb cross country skiing, and that are excellent for horseback riding. It has some of the best sailing and cruising waters in the world. It also

has a very nice lake called Long Pond which is one of the best lakes for small boat sailing in the world. It is just great. There is everything here.

Trustees John Beck makes the same point, in his interview, when he acknowledges the quality of life being so much higher on Mount Desert Island than in New York City:

... for somebody who enjoys working hard and playing hard, there's no place like it in the world. You are in God's country.

Beck's "working hard" has produced another of Jax's assets, its mice.

Mouse Genotypes. Eleven narrators (RS,LL,RF,DBa,BS,AC,JD, DBe,JCcr,RP,EF) mention Jax mice, the wealth of mutants, the care and quality of the mouse production and the high level of scientific effort that goes into identifying, defining and characterizing new strains and mutants. As Rich Prehn notes, Jax is the "world's biggest supplier of mouse genotypes." Several narrators noted the "solid source of income" the mice represent, making them both an economic, as well as a scientific asset. However much molecular genetics may change the future, in terms of mouse supply and use (as Baltimore, Bennett and Bailey speculated about in chapter 6) for the moment, Jax mice can be regarded as a unique institutional asset.

Lack of Departments. Another unusual, if not unique, feature of Jax, felt to be a strength by the seven narrators who mentioned it, is the absence of scientific departments at the Lab. (Apparently within the last few years, administrative activities have been departmentalized, "breaking up good working teams," and getting a good drubbing by the support staff personnel interviewed in this project; cf. WD,RG,RSt,RM). On the scientific level, absence of departments means two things: administratively, all the

scientists report to the Director, with no intermediary (implying the staff size must remain "small," i.e. under c. 50); scientifically it means, as Art Champlin says (having himself to operate in a college setting with departments):

...[at Jax] you don't have people separated into departments. Departmental barriers can be very great, and there aren't departmental barriers here, and that's a very positive thing.

Tom Roderick concurs with Champlin, that lack of departments "is the beauty of the place." Why? Because it makes possible a cluster of closely-related features frequently cited by narrators as another strength of the Lab.

Cooperation, Interaction and Lack of Politics. Since they are not artificially divided into departments, the staff feel no competition among themselves for facilities, Directorial favors, funding etc. Cited by several narrators as a Lab feature going back to C.C. Little, non-departmentalization sparks a level of cooperation and makes possible a free interaction rarely found at other institutions. Henry Winn still appreciates this extraordinary sharing and helpfulness he experienced twenty years ago:

...I think the most obvious strength for me,... is the ease with which you could collaborate with people formally, informally, to get their views, which was just fantastic.... So if I wanted to run an analytical technique or something, I'd go to Andy Kandutsch and he'd tell me how to do it. He'd spend an afternoon helping me set up a column, and ... It was something that he just would do for you.... like a neighbor holding the other end of the saw or something. But this extended throughout the Laboratory; it was very easy to get information, and if you wanted to collaborate, you could....

If you wanted to politick, you couldn't. The "Hamilton Station crowd" tried it and failed. We saw in chapter 4 the apolitical, non-competitive nature of the Jax personality. Politicos didn't come to, or didn't last at Jax. As Fay Lawson notes, without departments, lacking institutional perquisites, with each scientist generating his own grants, there was nothing to politick for. Andy Kandutsch cites this as one of the Lab's most attractive qualities:

... one of the things that most attracted me here was the apparent absence of a lot of politics. I think there was some... the Hamilton Station crowd wanted to have some kind of degree of independence, but that never became serious. I never saw much evidence of politicking or that it really benefitted anybody here very much. It always seemed to me to be a very fair place to be, one where you didn't have to get out and politick.

Six features were cited by 4 to 6 narrators each as other positive attributes or assets:

--strong research assistants. Lacking undergraduates and graduate students, as one would find in a university setting, the Jax has instead relied on long-term professional assistants, at least since World War II, when (as George Snell mentions on his tape) the Lab became wealthy enough to begin to hire them in numbers. The result is an unusual degree of close collaboration between scientist and assistant, and a high level of professionalism on the part of these non-doctoral personnel. Tom Roderick, David Harrison, Margaret Green, and other scientists interviewed mention their assistants co-authoring papers with them. Tom Roderick, in fact, credits his assistant, Norman Hawes, with the initial success

in their project to find bridges as a sign of chromosomal inversions:

... a research assistant can be such a fundamental part of your laboratory environment... Norm Hawes came to the Lab right out of his graduate program,... he was from Maine and he wanted a job here,... I brought Norm in ... so he sat there day in and day out, looking for these bridges... I went out to Berkeley to teach for a semester, and Norm kept on going back here... and [he] would send me letters every so often, in his typical low-keyed humor. One day, he sent me a letter that said, "... by the way, we had an inversion."

Roderick's research assistant, working independently, had made the find that developed into a major success for Roderick subsequently.

--solid financing or funding. With a grant funding success rate now of 50% (compared to 25% nationwide [FL]), all the narrators that mentioned funding agreed that Jax is in a strong financial position. Its endowment, now at c. \$11 million, is also growing, and mouse sales; though predicted to decline (JE,DBe) remain strong. Trustees and the current Director concur that Jax "is financially strong" (JBe).

--quality of staff. Six narrators--all within Jax and none of them scientists--cite the high quality of the research staff. Previous quotations from external evaluators have indicated the differences of opinion that exist on this score. The current Director (BS) and a BSO member (JCr), several research assistants (PL,LB,HB) and a retired administrator (FL) felt the staff was a strength at Jax.

--quality of research. Jax's research efforts got high marks from two Trustees (AH,JBe), a research assistant (HB), an administrator

(FL), a summer investigator (AC), and a retired administrator/staff member (JF). As with the quality of staff, there was debate on this point, as we shall see when we consider weaknesses.

--the shared focus on the mouse. For mouse geneticists, The Jackson Laboratory is Mecca. There's no place else like it in the world, and on these tapes, they wax eloquently about the tremendous gratification entailed in working with dozens of other people focussed on the same species (cf. especially WS,DB). But the cohesiveness this creates can be appreciated even by non-geneticists, with little prior interest in the mouse, like Henry Winn, who arrived at Jax in 1955, an immunologist with no background in either mice or genetics:

... there was this emphasis on the mouse and that's not really bad. It doesn't imply that that's narrow. I mean, everybody has his little window that he's looking through and since we were all looking, so to speak, through the same window, it was very, very helpful. In seminars... people could... point out there was indeed an ... explanation for what you were looking at,... but still, when somebody says, "What strain?" that always impresses me. "What strain?" They're all mice!

This common "window" gives the Jax staff more cohesion than it would otherwise have.

--exchange with the outside world. Four narrators mentioned the wide range of contacts Jax has with the wider world. Richard Fox, a former Jax scientist-turned-administrator, has truly been around the world, in France and China, on Lab business. Barbara Sanford cites this strength in reference to the summer conferences, the short course and visiting investigators who come from many foreign

countries. While Jax may be "remote"--John Compton refers to it as an "outpost"--it has more cosmopolitan an interchange than its location would suggest.

Other strengths given one to three citations included: a good reputation (RF,FL), staff freedom from control or direction (RF,GS,JB), staff loyalty (BS,FL,JCr,) Jax's small size (AC), the Snell wing (DC) (but some staff, especially the geneticists, saw its design as poor [ER,DB]), sharp-eyed animal caretakers (JBe), a good Development Officer (JE), devoted Trustees (JE) and a good library (JBe). Contrast this assessment of strengths--especially location and quality of staff and research--with the citation of weaknesses.

Jax's Weaknesses

There was less consensus on the Lab's weak points than there was on its strengths, but six areas were cited repeatedly, by six or more narrators, as problems.

Location. Only two narrators who mentioned the site as a problem actually live on Mount Desert Island, Barbara Sanford and Robert Stanwood. The Director saw the location as problematic for the "insular mentality" it seems to spawn, with its tendency to "reinvent the wheel" and waste energy and resources as a consequence. A native of Mount Desert Island who went to Boston for training after high school, and then returned to the Island and has no desire to leave it, Stanwood is now in charge of shipping mice at Morrell Park. For him, the location has its drawbacks because it intensifies the pressure in his work:

Shipping is a pressure job because you have to meet deadlines. We're a long ways from market and we have to really work at a frenzied pace to get the supply out.

The remaining 12 narrators for whom location is a weakness were all "from away," some having experienced the environment for a time, e.g. Henry Winn's ten-year stay, Lloyd Law's half-dozen intermittent years. Law is most critical about the potentially pernicious effects the natural beauty can have, lulling Jax staff into "cocoon" from which they travel reluctantly and work desultorily. Others (e.g. JE, BG, JCr, AH, WS, VM, DBe) focus on the implications Jax's location has on recruitment. Dorothea Bennett:

...[Jax's] recruiting is really predicated not on going after the best person in the country, which is true of most other places, but more on going after the best person in the country who is willing to live in Bar Harbor,... This is an obvious weakness,...

Speaking about recruiting a Director, James Ebert notes that "You have to cast a wide net because, after all, Bar Harbor is not everyone's cup of tea."

While all the critics of Jax's location saw it as a definite weakness, they all agreed it was one the Lab could do nothing about: none suggested relocating the Lab, because they all recognized that doing so would alter its fundamental character.

Lack of Endowment. The second most commonly cited weakness, lack of endowment, was seen as a problem not only in terms of financial vulnerability in a time of growing uncertainty about federal funding, but also because of its potential impact on recruitment. Given the location, which--as was just noted--makes

it hard to get the best people, Jax is further hampered in finding quality personnel by its lack of endowment. Dorothea Bennett again:

If the Jax had a really big endowment, it would be wonderful, because it would permit it to weather all of these ups and downs of government funding... And it also would make it much better for recruiting, because it seems another trouble this place has in recruiting is that any guy who's good, and is thinking of The Jackson Laboratory is also being recruited by other places.... if our endowment were sufficient so you could say to this young scientist, "Never mind that the roof can fall in on federal grants, our endowment can pick up your salary for the rest of your life." There is no question that he would find us more attractive.

Jax's Retirement Policies. The Lab's several retirement plans--different, apparently, for scientists, administrators and support personnel--come in for a drubbing in this collection. Many cite the unfortunate circumstance of a George Snell retired (by a combination of Lab policy and federal grant procedures) while still in his prime and able to do superlative science. The flip side of premature superannuation for the scientist is the thirty-plus-year veterans on the support staff who have to hang on for another 18 or 20 years to retire at age 65, with consequent problems of refreshment, renewal, retraining, and adjusting as administrations come and go. Robert Stanwood:

It seems as though we should have a better retirement program. The non-salary employees have a different plan from the staff... It would be nice to be able to retire before age 65, after having worked for upwards of 30 years,...

This problem is, of course, related to Jax's location, in that, being

one of the best employers in Hancock County--even in the whole of eastern Maine--Jax is a hard place to leave. The natives--familiar with generations of hard, seasonal employment, full of vagaries and "unsteady" at best--appreciate the regular paychecks, good fringe benefits and level of material security that Jax provides. So, once hired, they work devotedly, and, lacking advanced training or higher education and realizing their options are few, they stay, for decades. In my initial naivete, as I set out to create the narrator list for this project, I planned to interview all Jax employees of 25 years of more. Impossible! There are dozens of them! When Watson Robbins, Allen Salisbury and Frank Clark sat down with me for our four-way interview, they calculated they represented over 120 years of employment, collectively, at The Jackson Laboratory. They are not unusual. Hence, the frequency with which retirement, as an issue, was raised by narrators as something that Jax needs to reconsider.

Lack of Students/Post-docs. Both scientists, BSO members and Trustees mention Jax's need for more students, especially academic year students and post-doctoral fellows. There was not a scientist who did not wish to have more post-docs around the Lab. James Ebert went so far as to specify the ideal ratio of three fellows to every staff scientist. Jax's current number isn't even close to the reverse--one post-doc for every three staff! This led John Paul Scott to conclude that Jax "... tends to be a rather poor place intellectually, because you don't get the stimulation of students,..."

Jax finds it hard to get students, in Will Silvers's opinion, again because of location:

...I think that even those who enjoy living here realize that one of their biggest handicaps is the availability of good students. If The Jackson Laboratory was situated in Boston or Philadelphia or, for that matter, within easy commute of any first-rate university, I think you would find it very attractive to students.

Silvers sees a further ramification beyond lack of students in the consequent lack of training of future generations in classical genetics: Because Jax is off in the boondocks, few students come; few get the classical genetics orientation (which is available almost nowhere else); so the field suffers as well as the institution. Were he alive, C.C. Little would grieve.

Dependency on Federal Funding. Little would be even more upset at Jax's current funding situation. His son Richard was quoted in chapter 5 regarding Little's attitude about becoming dependent on federal monies. A half-dozen narrators share Prexy's sense of the dangers of such dependency. Earlier in this chapter, we quoted Dorothea Bennett's acknowledgement of the Lab's sensitivity to the "ups and downs of government funding..." Prexy would not have had it so: He fed the Lab from many "troughs," to use Seldon Bernstein's colorful phrase. Seldon is joined by John Beck, George Snell, Eunice Fahey, David Harrison, as well as Dorothea Bennett, in hoping to see the Lab diversify its funding sources. In this effort, however, James Ebert notes Jax's mouse production is a liability:

... there is a point where the mouse resource becomes a negative factor, because many foundations will see the mouse resource making a profit, ... there are

foundation officials who feel the Laboratory is well enough off. So it takes a very innovative kind of approach to foundations.

As well as an administration willing to get out and hustle.

Jax's Administration. Hustling for money Jax's administration may do, but by the staff it is seen as too big, out of touch with the needs of science (since so few administrators are now scientists), inefficient and unaware of or unconcerned about the Jax geist--the special spirit of the place (which is not surprising, since so few of the current administration have been at Jax very long). Tom Roderick notes Earl Green's predicting just what has, in fact, befallen Jax in its administrative make-up (cf. Green's own tape here too):

...[Earl Green] used to appoint members of the staff to administrative positions.... and we'd complain about the detail that we had to do and he said to... me, "You may not like all that,... but the day that you don't have it... you'll see that you want it very, very badly, because you'll have no say in the Lab,"... we don't have that now and I think we're ailing for it in a real way.

Andy Kandutsch agrees with Roderick's feeling the Lab is ailing because scientists have no administrative input:

I would try more scientist participation again,... It's not that we would necessarily be more efficient, but I just think that being in science isn't like being in business, I mean, there's more to it, and there's a better sense, too, of science,... a feeling that you have control, that science is controlling the destiny of the Lab--... I don't... know where direction is coming from now. It may be perfectly fine direction--... but it isn't ours.

We will return to this issue of the scientist-as-administrator in chapter 8, when I offer my own insights into The Jackson Laboratory derived from these two years of contact and fifty interviews.

Seven other weaknesses of the Lab were mentioned by three or more narrators each:

--Jax is outmoded/dated in its science. All the external narrators shared this view, recognizing that the current bandwagon is molecular biology, and Jax is only beginning to grapple with it. For most of the Jax staff, "bandwagons" hold little or no allure. As Dick Sprott notes, this is fine, as long as their funding isn't affected.

--Importation regulations are too restrictive. Andy Kandutsch was most eloquent on this point, shared by two other in-house narrators, neither of them scientists (FL,JS). Lawson noted Jax's current plans to improve importation facilities and several narrators, including Kandutsch himself, admit this has been liberalized in the last few years.

--Jax is too far from universities. The key issues here are those mentioned earlier--students and collaborators--plus the lack of lectures and other cultural activities a university provides.

--The Jax staff is weak. Unanimously, the external narrators criticized the quality of the staff. "Mediocre" (JE), "not high-powered" (DBa,RS), "good journeymen scientists" (JE) and other such phrases were used repeatedly (cf. LL). The staff is also cut too closely from the same mold. Henry Winn:

... the fact that there are some types of individuals that would never fit into the Lab deprives you of a certain type of criticism--constructive and adverse--but it's needed...

The socially astute Dick Sprott is more blunt:

... a high-powered person would be attracted there [i.e. to the Lab]... because of the lifestyle. If

you got somebody who was high-powered... [he] would intimidate some of them [i.e. the Jax staff] but not all of them.... There has to be a certain amount of "Will this person fit within certain real kinds of limits?"... and a really high-powered person may be a little too far out for that place,...

David Harrison refers to this also, when he recalls Earl Green tactfully telling him, early in his career at the Lab, to cool his "aggressive" manner, but Harrison recalls he was only acting as he, and all his peers, did as grad students at Stanford. The Jackson Laboratory, however, is not a Stanford.

--The Board of Scientific Overseers review mechanism is uncritical, or poorly organized. The three narrators vocalizing this concern--two Trustees (JE, JBe) and a former Director (RP)--see the current process as too rushed, or requiring a level of independence from the Director that has not always been forthcoming. James Ebert:

The Board of Scientific Overseers ...[is] too often put in a position where it has to make a quick judgment in time to make a statement at the Annual Meeting... meeting and then ... having to give a report to the Trustees immediately, sometimes results in a kind of pablum, a kind of general endorsement, without as hardnosed a view of the Laboratory as one might have, or want to have. And also, the format doesn't really permit the Board of Scientific Overseers to look intensely at any one individual. It doesn't allow you to say the kinds of things the Director of the Laboratory needs, to effect a change in it,...

This, from a former Chairman of the Board of Scientific Overseers.

A similar view comes from a Trustee: "... getting them [i.e. the BSO] to do critical work is a challenge" (JBe). Compounding a weak staff is another weakness, cited by four narrators.

--Lack of staff turnover. As we noted earlier, most Jax staff come and stay for the rest of their lives. For the support staff, this is

from lack of alternatives to Jax's steady employment and good "fringes." For scientists, it is more a combination of congenial conditions and an atmosphere conducive to "piddling" (to use Dick Sprott's word). But this weakness is likely to disappear, as Jax implements a tougher tenure policy, designed to move people up or out (DBe). This will bring in fresh blood, new ideas and make the staff hustle more than heretofore.

--The Directorship. Three scientists and a former Director, Rich Prehn, saw weaknesses relating to direction of the Lab. While one reference was made to the "inaccessibility" of Sanford (TR), the other criticisms related to the nature of the office, i.e. its scientific focus was being diluted by the Director's having to attend to a business as well (mouse production); and the "placental theory" of Earl Green, with a plethora of Trustee committees, presented a nightmare for a Director to cope with. Prehn was particularly pointed in his feeling that the Director-Trustee relationship at Jax was problematic. He admitted readily it was one problem he never solved, never was constitutionally prepared to solve, but he looks back on his tenure deriving some satisfaction from the belief that he left the conundrum a little closer toward solution for Barbara Sanford.

There were some dozen more weaknesses mentioned by one or two narrators, some--as the opening quotes to the chapter indicate--absolute opposites: too much space, too little space; too tense an atmosphere, too relaxed an atmosphere; underbudgetting and waste of money. Others included: low pay, precarious salaries

hinging on grants, a lack of "stars" on the staff; lack of scientific direction, poor quality in the science, too narrow an institutional focus, poor PR, lack of attention to the training programs, lack of imagination, inertia, need for better education of the Trustees, and "inbreeding" of the Trustees by having positions pass on through families.

Aspirations for Jax

When I asked all the narrators another standard question--what would they wish for Jax?--many immediately would repair the weaknesses they had identified, e.g. give it a huge endowment, many post-docs, a more spacious physical plant etc. But others provided quite unexpected replies. Twenty were particularly noteworthy.

Three respondents would wave their magic wand and make Jax the smaller, closer "family style" place they fondly recall from years ago. Another three would return to it a scientist-run administration, where the Lab's destiny was in the hands of those understanding science. Two would bring back the relaxed atmosphere they remember before the days when budget cuts made things tense. Two (both connected with Animal Production) would upgrade the animal facilities. Two others would split the Directorship, to have one for science, one for "business."

Responses from single individuals ranged from wanting to see more long-range planning, to becoming more independent of mouse sales, to being five minutes from a major airport. Rich Prehn would hire ten staff of the stature of C.C. Little, and Barbara

Sanford and Henry Winn, when presented with the possibility of waving their magic wand, creating anything they wish at Jax, forbore to do so.

What to make of all this? Obviously, perceptions of the Lab, particularly with regard to its weaknesses, differ widely, those outside the institution having a much more critical view of it than most of its own staff and administration. If, as Dick Sprott says,

... as long as a person [at Jax] can continue to get funded, he can do his thing forever. That's why Rich couldn't move that Laboratory in some other direction: There were too many people there doing their thing forever. That allows the rare person, like a George Snell, to do what he did and it also allows somebody else to piddle for years.

and if Tom Roderick is right that Jax's long-range (i.e. 15-20 year) planning is weak, is the Lab going to be in a position to handle the challenges of the future? Will it be able to adapt? Will it have the flexibility and wise direction that would enable it to do so? These sorts of questions form the basis of the conclusion, in chapter 8.

8
CONCLUSION

"... institutions get a life of their own,..."

James Ebert

"Those who cannot remember the past are condemned to repeat it."

George Santayana, The Life of Reason (1905-6)

Earlier chapters left us with several questions to consider in this conclusion. Before doing so, we might note a feature of oral history interviews that, by now, after numerous quotations from these Jax tapes, is probably obvious: Based as they are on personal reminiscence, oral history interviews are not objective. Particularly is this true when the narrators, or the subjects they treat, are controversial, or when old "hatchets" remain "unburied," or reputations of the dead or living might be at stake, or where partisans feel defensive about various issues. Although I was not aware that Jax's history was full of partisanship and controversy when I began this project, I soon discovered that every one (and more) of these caveats obtain for this collection: It is replete with personal or hidden "agendas." Besides the obvious lack of objectivity of family members speaking of their relatives' achievements, e.g. Marie Louise Duran-Reynals, Richard and Robert Little (which Robert Little points out forthrightly on his tape), we can see here a variety of narrators fighting old wars (cf. EG,JPS,DC,RS,RP), venting current frustrations (cf. WD,RG,RSt), presenting pieces justificatives for past actions (cf. JE,DC,RP), and defending the present Lab administration (cf. FL,JB,DBe). In handling these materials, therefore, users would do well to read between the lines, keeping in mind the multitude of motivations behind what is said, so as to handle the information here judiciously. These interviews are a gold mine of data, with considerable pyrite--fool's gold--intermixed.

Now, to the questions raised in chapters 2,3 and 7 that were left for further discussion here. They are of two types: those relating specifically to The Jackson Laboratory and those that transcend the Lab's experience and address issues of general concern to American science. Taking first those pertaining to Jax alone, we asked, in chapter 3 about the desirability of Jax trying to be a leader in science and its viability as a dedicated institution, and in chapter 7, about its potential for adaptability, in the face of present challenges and the inevitability of future change. Let's consider these three questions in turn.

James Crow is probably right when he dismisses the possibility that Jax might be a leader in science, at least as it is currently configured: large teams, millions upon millions of dollars of sophisticated equipment, with enormous institutional support à la MIT--all this is certainly beyond the capacity, present and future, of The Jackson Laboratory. From what I heard repeatedly on these tapes, I suspect that even if Jax were suddenly to be heir to a billion dollars, it still would not become a leader in science, by reason of location: It is off the beaten track and takes more effort to get to, and from, than Labs in or near major cities. This is a liability to leadership not likely (or desirably) eliminated. I never really heard narrators complain about the Lab's non-leadership. What I heard thrashed around frequently was the question of its mission: How should Jax define its purpose? What should it strive for and what should be its role, granted it cannot be a leader?

Should it be a follower, i.e. a follower of the science of the day? Some voices on these tapes thunder out loudly "NO!" These are mostly mouse geneticists, most forcefully represented in this collection by Seldon Bernstein (ironically never himself formally trained in mammalian genetics). Other narrators are more ambivalent: Jax shouldn't blindly follow the trends, but it shouldn't totally ignore them either. It has to find a middle way, some sort of compromise between being true to its heritage of classical mammalian genetics--with its valuable organismic view--and being current in its use of molecular biology's tools and techniques. James Crow seemed to have a sense of the form such a compromise might take when he acknowledged that Jax need not have "90% of the staff to do that [i.e. mammalian genetics], just an influential minority," to keep Jax's legacy alive, while allowing other scientists a wide range of interests and tools. In other words, its mission can remain ostensibly mammalian genetics without being exclusionary.

As to what the Lab should strive for, in terms of staff and science, there was great diversity of opinion. Among the Jax staff, it seems to me, the "laissez-faire" attitude decried by Lloyd Law still lives. Dick Sprott and David Baltimore have the same impression. The Jax staff seem more concerned to hire people that "fit" than to hire people that are high-powered, first-rate and likely to emerge as "leaders in their fields" (JE) (but who would also be intimidating to their Jax colleagues). Most assuredly, the scientists at Jax **don't** want a Director who will "shake

the place up" or "lower the boom." Numerous interviews confirm Dick Sprott's claim that they want "hands off" direction, leaving them free to "piddle." I understand James Ebert's concern for, and commitment to, high quality. I share Ebert's view. I doubt that many, or most, of The Jackson Laboratory staff do: Its consequences would be too intimidating, as Dick Sprott says. It seems to me, however, that no institution can hope to thrive, or survive, in science's current challenging environment, without a firm commitment to hiring the highest quality in staff and demanding the most rigorous standards in their work. If the present predicament of science suggests anything, it is that "piddling" will not pay.

If Jax can broaden its range of interests, to become a "dedicated institution"-plus, and if it can put teeth in its tenure policy, to keep on only the most promising and phase out the unproductive staff (what Dick Sprott referred to as the "deadwood") over the next decade, it is likely to be in a good position to adapt to the changes many narrators see coming in the biological sciences. Ann Hirshhorn's suggestion that Jax hold to its mission "unconstrained by its founding tenets" is good advice. If a joint Trustee-BSO-staff committee can undertake some really long-range (20-25 year time frame) planning, including consideration of "worst case" scenarios (e.g. mouse sales disappearing as an income source) and taking advantage of the wealth of intuitive foresight among the staff (e.g. Don Bailey), Jax is likely to weather the coming challenges well.

Several questions in previous chapters transcend The Jackson Laboratory, addressing such issues as the place in modern science for a George Snell-type, and the possible implications of the funding crisis for American science. These are related issues. George Snell represents the classical picture of the scientist-introverted, intellectual, intuitive, methodical, so wrapped up in his bench work that his interest in, or awareness of the outside world is marginal at best. It was suggested in chapter 2 that this classic image, like the rest of science, may be changing.

The current atmosphere of science is competitive and entrepreneurial: Those succeed who are better at selling their ideas to foundations and federal funding sources. "Selling" in this context means more than making discoveries and generating papers. Barbara Sanford's interview makes that clear: "Now people realize that, no matter how bright you are, no matter how hard you work, you may still lose your funding."

"Selling" implies being in the "right" (i.e. currently-valued) fields, with the "right" (i.e. human-related, or clinically-applicable) projects, knowing the "right" (i.e. well-connected, powerful) people. Science in such an entrepreneurial environment puts the scientist at the phone and word processor as much, or more, than at the bench: "Hired hands" do the actual experiments, in large teams of grad students and post-docs. Where would a George Snell fit here? Would foundations and federal agencies be ready to support off-beat research with no likelihood

of immediate payoff--indeed, with seemingly no use whatsoever (remember that the vast majority of Snell's contemporaries "thought [he] was wasting his time for most of his career" [RS])? With the current funding crisis creating ever increasing pressures on researchers to demonstrate tangible signs of success within granting periods (c. four to five years), would work like Snell's be possible, i.e. fundable? Probably not.

If the George Snell model of scientist is obsolete, what might the complexion of science become? Will it be more commercial, or marketable? more short-range in scope, looking to immediate results? less speculative or far out? less tolerant of the unconventional and unorthodox? Will the development of science in the future be blighted by the demise of the independent, non-glamorous, inner-directed Snell-like figure, prepared to stand alone and pursue his own interests? Will Dick Sprott be successful in his "fight to make sure that type of research continues to get funding too"? These sorts of questions--on styles of doing science and the types of research tacitly being encouraged by current funding mechanisms--deserve a wider forum for discussion than they have yet received in the scientific and foundation communities, because they address America's intellectual role in science for decades to come.

A question asked of all the "old-time" Jax staff who knew C.C. Little was how they thought he might react if he were alive and saw The Jackson Laboratory today. Responses generally suggested he would be pleased, proud, perhaps amazed, to see how

far his original Lab and scientific activity had come. From these 50 tapes--with their images of C.C. Little and of his institution--I have a very different sense of his reaction. I think Little would be disturbed to see the Lab so dependent on federal funding. With his unconventional, iconoclastic temperament and his dislike of bureaucrats, I think he would find Jax uncongenial and hidebound. Given his wide range of interests, C.C. Little would not appreciate a single-minded focus on mice and mouse genetics. Most of all, having heard over and over again of Little's ability to reach all manner of people with his message, I think Little would regret the development of C.P. Snow's "two cultures" at The Jackson Laboratory.

Thirty years ago, in describing the twentieth century intellectual landscape, the scientist C.P. Snow decried the formation of the "two cultures" of science and humanism, neither able to reach out and communicate effectively with the other. This communication barrier has grown in the last two decades, with increasingly serious results as ethicists, the legal profession and physicians view the ever-widening gulf between the abilities of science and the capability of humanity to cope with them. The Jackson Laboratory has experienced the growth of these two cultures and indeed; at one point, their polarization under Earl Green. Many tapes make this clear, without using Snow's terminology. Since C.C. Little's day, there has arisen a second value system at the Lab, beside its original set of scientific values. These are not so much economic values--as many tapes

suggest--as they are "administrative" values. Both sets of values--scientific and administrative--derive not from any conscious awareness, but from an innate personality orientation, what I called in chapters 1 and 2, the "intuitive perceptive" personality of the scientist and the "sensation judging" personality of the administrator (these labels are not my invention, but standard typological usage in psychology).

C.C. Little and Rich Prehn were scientists, first and foremost, with the "intuitive perceptive" personality and value system that implies. They valued the imaginative, creative, speculative, inspiring, ingenious and tended to be careless about detail, flexible about timetables, open-ended in scheduling and so forth. Earl Green and Barbara Sanford are primarily administrators, with "sensation judging" personalities that value realistic planning, the practical, down to earth, and sensible. They are organized, and can work within deadlines, to get things done efficiently. It is surely superfluous to note that Trustees tend to understand, appreciate and share the values of the administrative type, and to roll their eyes (as several did before me, when talking of the Prehn era) when referring to the intuitive perceptive, or scientist, type.

C.C. Little succeeded, up to a point, in being a scientist in administrative shoes, because the Lab in his day was small and could be run without an administrative personality. The Lab is no longer small. It will never be small again. Of this, all the narrators agree (albeit with some regret from the old timers). More

than this, it has an enormous, and valuable, business sideline in the Animal Production activity, which surely needs an administrator's (not a scientist's) direction. So it is likely a C.C. Little type would not be able successfully to run The Jackson Laboratory.

But if this oral history project suggests anything, as it looks back on Jax's lessons from the past, it suggests that the **Lab needs scientific leadership** every bit as much as it needs administrative attention. The scientists need a figure who shares their values and world view, who understands the nature of their work, and what they are about. The Lab itself--off in the boondocks and espousing an institutional mission many in the wider scientific community regard as passe--needs a scientist-leader who can formulate scientific goals, provide scientific inspiration and help keep Jax current (as much as that might be possible, given staff and orientation). To find the complete scientist/administrator, who is, as Dorothea Bennett put it, "also willing to live in Bar Harbor," is probably impossible. These interviews have led me to conclude that Lloyd Law and Ann Hirshhorn are probably right when they call for a "Scientific Director" (LL) and for Jax's considering the example of many museums, who are hiring joint Directors--one for art, one for corporate affairs (AH). Such a pairing would provide Jax with both the administrative expertise, and the scientific sensitivity it needs to face the challenges posed by funding cuts, the uncertain future for mouse sales, and the changing environment of science.

The Jackson Laboratory is now at a point where the decisions it makes in the near future will be significant for the long term. In this oral history project, 50 pairs of eyes have looked back on Jax's institutional past. Their hindsight can provide the leaders of the Lab--facing now some momentous decisions--with valuable foresight, lest, by failing to remember its past, The Jackson Laboratory be condemned to repeat it.