Stanley Friedman was born December 11, 1925, in Brooklyn, New York and lived at 349 Crown Street (a building that still stands today). He graduated with honors from Brooklyn Boys High School in 1941, where he belonged to Chemistry Club, Chemistry Service, and Physics Service.
That same year, he entered City College of New York, which at the time was among the nation’s most politically active against Nazis and fascism. By 1943, at the age of 17, Stanley signed up for a three-year hitch in the Navy.
On June 22, 1944, President Franklin Delano Roosevelt signed an act of legislation called the Servicemen’s Readjustment Act of 1944, also known as the GI Bill of Rights. This act authorized payment of all educational expenses for veterans. Millions of veterans of World War II sought out an education paid for by the government. By 1946, spaces were scarce; Stanley applied to many schools but only one—the most distant school he applied to—accepted him. So he went to the University of Illinois at Urbana-Champaign to complete his undergraduate degree.
He thrived here, graduating in June 1948 with honors and a Bachelor of Arts degree in Bacteriology.
The Department of Bacteriology during this period comprised five full-time faculty members and 11 assistants:
F.M. Clark
J.M. Severens
F.W. Tanner
G.I. Wallace
C.M. Wilson
Doris Cook, instructor
“Anecdote: Wisconsin to the Rescue
Professor E. B. Fred was a bacterial physiologist in the Department of Bacteriology at the University of Wisconsin… He became…president of the University 1945-1958. In the late 1940’s at each meeting of the Big Ten presidents he would “attack” George Stoddard, president of the University of Illinois, about the terrible Department of Bacteriology at Illinois which lacked research stature and where research consisted of 1,000 thermal death tubes and oil baths. (George Stoddard had begun his presidency here in 1945, having been attracted to the Urbana campus to “wake up a sleeping giant”)…Finally in 1949, Stoddard had enough of Fred’s needling; so he called in his provost, Henning Larsen, and told him to build the best department of bacteriology in the country. He would have four full professor lines and two assistant professor lines to do the job.”
Ralph Wolfe, History of the Department of Microbiology 1868-2009 (June 2015)
GENETIC, NUTRITIONAL, AND BIOCHEMICAL STUDIES ON THE LUMINOUS BACTERIUM, ACHROMOBACTER FISCHERI

by

Stanley Friedman

A dissertation submitted to the Faculty of Philosophy of The Johns Hopkins University in conformity with the requirement for the degree of Doctor of Philosophy.

Baltimore,
1952
THE MAN WHO PAID KIDS FOR LIGHTNING BUGS

William D. McElroy—soon to become a giant in biological sciences

was chairman. With fireflies abundant on campus, he carried out an experiment that was to become the signature of his career (1947), in which he showed that light emission in extracts of the firefly lantern required adenosine triphosphate (ATP), a recently identified “high-energy” molecule in metabolism (Lipmann, 1941). He had earlier explored this possibility with Robert Ballentine using a different luminous species in a publication from Princeton (McElroy and Ballentine, 1942).
Aliivibrio fischeri is a Gram-negative, rod-shaped bacterium found globally in marine environments. *A. fischeri* has bioluminescent properties, and is found predominantly in symbiosis with various marine animals, such as the Hawaiian bobtail squid. [Wikipedia]

**Scientific name:** Aliivibrio fischeri  
**Phylum:** Proteobacteria  
**Higher classification:** Aliivibrio  
**Rank:** Species  
**Did you know:** Every morning, the squid releases 90% of the *V. fischeri* population in its light organ back into the water. [kenyon.edu](http://www.kenyon.edu)

*Aliivibrio* (=*Achromobacter*) *fischeri*  
Rod-shaped Gram-negative bacterium with bioluminescent properties, mutualistic partner of bobtail squid.
Stanley’s doctoral work encompassed themes that he continued to pursue throughout his career: genetics (documenting recombination with the use of mutants).

1. Genetic: Studies have been made on recombination in these microorganisms. The experiments consisted of mixing suspensions of two mutants, streaking plates from these mixtures at various times, and isolating and testing the characteristics of single colonies from these plates. The results agreed with those of Lederberg and Tatum, working on E. coli, in that both prototrophs and double mutants were found. On the basis of this and other evidence, it is concluded that recombination takes place in these bacteria.
2. Nutritional Characterization of a Luminescent Mutant: Using techniques designed to measure growth and luminescence throughout the life cycle of a culture, it was found that the mutant under study had extremely complex requirements for luminescence, less so for growth. Luminescence would appear only when six specific amino acids were present in the medium, whereas growth would proceed to a maximum in the presence of many different combinations of amino acids. Thus, it appears that there is a very exacting type of synthesis for the luminescent system, whereas growth is not nearly so sensitive.
3. Metabolic Studies: This organism would not grow on high concentrations of fructose as a carbon source unless any one of a large number of amino acids was present. Fructose, in lower concentrations, was found to interfere with the metabolism of glucose. Respiration and enzymatic studies have led us to the conclusion that the primary effect of fructose inhibition is not concerned with carbohydrate metabolism. Indirect evidence permits the postulation that fructose, or some product of fructose metabolism is combining with free amino nitrogen in the cell, resulting in a loss of transaminases which can only be maintained in the presence of their substrates. Experiments are now under way to test this hypothesis.
Stanley’s self-deprecating humor is evident in his thesis
Acknowledgments…

ACKNOWLEDGEMENTS

The author wishes to take this opportunity to express his gratitude to Dr. W. D. McElroy, without whose inspiration, impatience, and invaluable help, this work would not have been consumated. Thanks are also due Dr. S. P. Colowick for his constructive criticism of all of the author’s bad ideas.
After receiving his doctoral degree, Stanley left the East Coast again to work at UIUC as a research associate and then postdoc in the laboratory of Gottfried Fraenkel in 1952-53. The editors of Illient, the precursor of the departmental newsletter, remarked only that he “is working with Dr. Fraenkel on the function of the mealworm factor (vitamin B₇). The most salient characteristic of the research associates appears to be their prosperity, since Dr. Friedman has also acquired a new automobile. This enabled him this summer to visit his home in New York and his friends at the Marine Biological Laboratory at Woods Hole, Mass.”
More details appeared in the next issue of Illient...

Dr. W. V. BALDUF - He and his wife spent two months at his cabin at Eaglesnest Lakd near Tower, Minnesota. Time of summer vacation and spare time during this semester is being spent on writing a report covering about ten years research on the insects of rose hips. The report is to be published next year.

Dr. STANLEY FRIEDMAN - is a research associate studying the synthesis and function of cornitine with Dr. Fraenkel.

Dr. G. S. FRAENKEL - Dr. Fraenkel spent last summer in Wood's Hole, Massachusetts at the Maine Biological Station. He has since visited Japan, India, and Israel. In Israel, he will visit with Rachel Galun's parents. He reports that everyone has been treating him very well.
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Resigned February 29, 1956
Carnitine is essential for beta-oxidation of long-chain fatty acids in mitochondrial energy production (acyl-carnitine esters are transported into the mitochondria)

Abbreviations: CPT I, carnitine-palmitoyl transferase I; CACT, carnitine:acylcarnitine translocase; CPT II, carnitine-palmitoyl transferase II; CAT, carnitine-acetyl transferase; CoA, coenzyme A.

http://lpi.oregonstate.edu/mic/dietary-factors/L-carnitine
The Importance of Folic Acid and Unidentified Members of the Vitamin B Complex in the Nutrition of Certain Insects

By G. Fraenkel and M. Blewett
Department of Zoology and Applied Entomology, Imperial College, London, S.W. 7

(Received 2 January 1947)

5. *Tenebrio* requires in addition to folic acid and the other known B vitamins a factor, contained in a charcoal filtrate prepared from liver or yeast extract, which we have named vitamin $B_T$.

Effect and Distribution of Vitamin $B_T$

G. Fraenkel

From the Department of Entomology, University of Illinois, Urbana, Illinois

Received June 29, 1951
Fraenkel arrived at UIUC in 1948. At the same time, UIUC’s Microbiology department began a hiring initiative and soon became arguably the best microbiology department in the country. I. C. Gunsalus, Salvador Luria and Sol Spiegelman were all hired in 1949. All three were elected to National Academy of Sciences, and one, Luria, went on to get a Nobel Prize.

Like Stanley, Spiegelman was born in Brooklyn (December 14, 1914) and attended City College of New York 1939 -- Received BS from City College in physics and mathematics.

Herbert E. Carter was on the Biochemistry Department (Physiological Chemistry) along with William C. Rose, who in 1935 characterized threonine, the 20th amino acid to be identified. By 1954, Carter was Head of Chemistry.

http://www.asbmb.org/uploadedfiles/AboutUs/ASBMB_History/Past_Presidents/1950s/1956Carter.html
LETTER TO THE EDITORS

The Identity of Vitamin B₇ with Carnitine

These data conclusively establish the identity of vitamin B₇ with carnitine.

REFERENCES

2. Fraenkel, G., unpublished data.

Division of Biochemistry,
Noyes Laboratory of Chemistry, and
Department of Entomology,
University of Illinois, Urbana, Illinois

Received November 5, 1951

Carter became an important collaborator on determining the structure of carnitine, which turned out to be a dipeptide of lysine and methionine.

Herbert E. Carter
P. K. Bhattacharyya
Katharine R. Weidman
G. Fraenkel

L-Carnitine
Acetyl-L-Carnitine
With Fraenkel, Stanley published multiple studies on carnitine structure and function.


The Effect of Substituting Carnitine for Choline in the Nutrition of Several Organisms

G. S. Fraenkel and S. Friedman

From the Department of Entomology, University of Illinois, Urbana, Illinois

Taylor Hinton and Sylvia Laszlo

From the Department of Zoology, University of California, Los Angeles, California

and

Jerre L. Noland

From the Medical Laboratories, Army Chemical Center, Maryland

Received July 16, 1954

This study is the outcome of the collaboration among workers in three different laboratories. The results with the insect larvae Palorus and Lasioderma were obtained by Fraenkel, those with Drosophila by Hinton and Laszlo, those with the German cockroach by Noland, and those with a choline-less strain of Neurospora by Friedman.

The carnitine used in this study was prepared by P. K. Bhattacharyyya, natural L-carnitine according to the method of isolation reported by Carter et al. (3), and synthetic DL-carnitine according to Carter and Bhattacharyyya (2).
...but what may have been Stanley’s most important contribution to understanding carnitine was demonstrating the reversible acetylation of carnitine in the presence of ATP, Mg++ and CoA by an enzyme in extracts of pigeon and sheep livers, thereby supporting the hypothesis that carnitine plays a pivotal role in oxidation of fat (Friedman and Fraenkel 1955, cited >160 times).

Reversible Enzymatic Acetylation of Carnitine

S. Friedman and G. Fraenkel

From the Department of Entomology, University of Illinois, Urbana, Illinois
Received June 15, 1955

Summary

1. An apparent inhibition of enzymatic acetylation of PAB by carnitine has been found to be due to an enzyme which is active in the acetylation of carnitine.

2. This enzyme, which is found in both pigeon and sheep liver extracts, seems to catalyze the following reaction:

   \[ O\text{-acetyl}carnitine + CoA \rightleftharpoons \text{acetyl CoA} + \text{carnitine} \]

3. The possible importance of secondary esters in group-transfer reactions is discussed.

Abbreviations: CPT I, carnitine-palmitoyl transferase I; CACT, carnitine:acylcarnitine translocase; CPT II, carnitine-palmitoyl transferase II; CAT, carnitine-acetyl transferase; CoA, coenzyme A.
With an impressive set of accomplishments, Stanley was hired as an assistant professor in the Department of Entomology at Purdue University in 1958.

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<th>Purdue University</th>
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<td>Purdue University</td>
<td>1962-1963</td>
<td>Associate Professor, on leave to Ross Institute of Tropical Hygiene, London</td>
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<td>Purdue University</td>
<td>1963-1964</td>
<td>Associate Professor</td>
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…”Stan was not fond of his days at Purdue. He never discussed it at all until I landed at Purdue and even then in not much detail…”

Jonathan Neal, Associate Professor and Head Advisor Insect Biology/ Purdue Entomology 127E Smith Hall, PhD UIUC Entomology 1987


But Purdue is where, in 1959, he began his work on trehalose metabolism in *Phormia regina*, the black blow fly.
Trehalose is an alpha-linked disaccharide comprising two α-glucose units linked by an α,α-1,1-glucoside bond. It’s the main sugar in insect hemolymph as well as the major carbohydrate fuel source for insect flight. Among its many other functions in plants, animals and bacteria are protein stabilization and defense against anoxia and other forms of stress.
It’s also where his work with student William S. Bowers netted him a paper in *Nature* demonstrating the tradeoff between synthesis of circulating (trehalose) and storage (glycogen) carbohydrates in insect fat body from UDP-glucose.

**Mobilization of Fat Body Glycogen by an Extract of Corpus Cardiacum**

W. S. BOWERS* & S. FRIEDMAN

Department of Entomology, Purdue University, West Lafayette, Indiana.  
*Present address: Entomology Research Division, Insect Physiology Laboratory, U.S. Department of Agriculture, Beltsville, Maryland.

HUMORAL involvement in the carbohydrate metabolism of *Periplaneta americana* (L.) has been reported by Steele¹, who demonstrated a 150 per cent increase in blood trehalose and a drop in blood glucose following injection of an aqueous extract of the corpus cardiacum. The work recorded here, conducted as part of an overall investigation of the regulation of sugar utilization in the South American cockroach, *Blaberus discoidalis* (Serville), confirms the rise in trehalose, but reveals also a significant increase in blood glucose and a concomitant decrease in fat body glycogen.
And in a second *Nature* paper, Stanley documented that how mosquito larvae can filter and use particulate matter ingested in an aqueous medium (work done while he was on leave at the Ross Institute of Tropical Hygiene).
In 1965, when Fraenkel’s retirement provided an opportunity to return to UIUC, Stanley applied for the job and was hired.
“Dr. Friedman, newly arrived on the staff, comes here from Purdue University where he was Associate Professor of Entomology. During his tenure in that position (1958-1964), he was chosen as a Research Fellow by the Ross Institute of Tropical Hygiene at the London School of Hygiene and Tropical Medicine, and spent the year 1962-1963 working in London, England on the metabolism of Anophelines. His present interests include studies of metabolic interconversions in Diptera and the general problem of aging in insects. He obtained his Ph.D. in Biology at the John Hopkins University in Baltimore, Maryland in 1952 and was on the staff of this department as a Research Associate with G.S. Fraenkel from 1952 to 1955. He has returned here to succeed Dr. Fraenkel in the position of Insect Physiologist. He is married and has four children, each of whom has distinguished himself in some branch of biology. The youngest, Matthew Arnold, is a poet of some renown.”
Entomology Newsletter 1966
Message From Head of Department:
Last year Dr. Stanley Friedman joined our staff and began directing graduate students interested in doing work on the biochemistry of insects. We felt that his acquisition would complement the work of Drs. Fraenkel, Chadwick, Larsen and Willis in insect physiology and lead to better integration of toxicology into these basic studies. Judging from one year of experience the results are very encouraging, but more evident is the fact that a highly stimulating atmosphere has developed for both staff and students interested in these areas of study.
Dr. Stanley Friedman
Stan is continuing his research activities on the mechanisms of metabolic interconversions in Diptera. He has just completed two articles on the enzymes involved with trehalose metabolism which will appear in Volume 7 of Methods in Enzymology published by Academic Press. He is also getting involved along with his graduate students on the effects of insect hormones on intermediary metabolism in insects.
Entomology Newsletter 1966

He spent a great deal of this past semester developing the new graduate level course in Insect Physiology. What started out to be a half semester of teaching turned into a very full semester of insect biochemistry. Stan is anxiously watching the progress of the construction of the new building with the anticipation of moving into his own permanent quarters.

Travel for the Friedman family this past year consisted of an extensive trip in June by car through the northeast and back across Canada with time out for some research discussions at Woods Hole, Massachusetts. Stan also attended the Federation meetings at Atlantic City, New Jersey last spring. All of the biologically distinguished children of the Friedman clan seem to be well acclimated to life in Urbana and we are all looking forward to the first published poems of Mathew Arnold.
Entomology Building / Justin Smith Morrill Hall

Morrill Hall was completed around 1964, [1] and houses the School of Life Sciences. [2] It cost $1,965,515 to construct, with $170,000 coming from the National Science Foundation, $693,015 from the National Institutes of Health, $932,500 from State appropriation, and $170,000 from University funds. [3] Upon completion, it offered the Department of Entomology and other biology departments, six stories with a penthouse. It also "feature[d] vertical aluminum panels which give it an exterior appearance unlike that of any other on campus". [4]

While known simply as the Entomology Building during construction, before it was completed, the building was renamed the Justin Smith Morrill Hall in honor of the sponsor of the Land Grant Act that made the University possible. [5]

[1] Note that the "Entomology" listed in major building projects since 1949 on ui urbana-cham campus - 1961 as having been completed in 1961 was most likely Burrill Hall, since a campus map from 1963-1964 (undated, but shows PAR (1963 completion), but not FAR (1966 completion) gives the building name of the modern Morrill Hall as "Entomology", yet a newspaper article that states that the building will be completed later that month gave the name as Entomology Building and stated that it had been officially named as the Smith Morrill Hall
[2] Building sign "Morrill Hall / School of Life Sciences" and personal tour of building
[3] Newspaper article, unknown date, photo shows it almost complete and caption says "completion is scheduled for this month", so would put it around 1961 or so.
[5] Campus Map from around 1963-1964 (undated, but shows PAR (1963 completion), but not FAR (1966 completion)
In September 1964, plans were announced to build a $2 million addition to Morrill Hall.
By June 1965, the Daily Illini reported that the addition, near completion, would cost $4.5 million and wouldn’t be completed until March 1966 (the addition “tripled the size” of the building…
The newly completed Morrill Hall, complete with “vertical aluminum panels”, graced the cover of the 1967 department newsletter but, consistent with a pattern established early on, Stanley’s entry was rather spare, consisting only of a list of publications for the year…
Dr. Stanley Friedman
Activities were limited to some similar to those pursued in the previous year. Not many changes around home except that we are all one year older. Attended meetings of various scientific societies throughout the year and learned much to help both research and teaching. Took summer vacation in the Missouri valley and found it lovely.

Stan has published a number of articles this year on the effects of hormones on metabolism. Our faithful editor only had to retrieve his request for newsletter activities from the wastebasket three times this year before Stan gave in to my nagging and wrote his usual 20 words or less.

Entomology Newsletter 1969 (cover)
The cover this year depicts some of the complexity of research instrumentation in the field of Entomology today. We have tried to indicate on the cover some of the equipment that we have available. We feel that we have the outstanding Department in the country and are in a position to offer to students the very best facilities to study Entomology. Insects are being used more and more to study biochemical, physiological, behavioral and ultrastructural phenomena. The Department now completely housed in new facilities boasts the finest in modern equipment and staff and we encourage you to send your students to the University of Illinois. We must, of course, give credits to our stalwart band of researchers who so willingly posed for the editor for this year's cover. At the sintillation [sic] counter is Dr. Stan Friedman, actively engaged in the study of biochemistry of insects. At the electrophysiological set-up is Willard Woodward, a student of Dr. James Sternburg, working on the effects of DDT on chemosensory receptors. At the automatic tritrator is Bill Campbell, graduate student of Dr. Clyde Kearns, working on cholinesterase. Standing at the constant temperature cabinets is Gary Eertmoed, a student of Dr. Richard Selander, who is actively engaged in a research program on the study of diapause and behavioral relationships in the Meloidae beetle). The electron microscope is where your fearless editor works on the ultrastructure of sensory receptors.
Dr. Stanley Friedman

Stan was unusually cooperative this year, being one of the first to return his faculty questionnaire. He shared with us his annual verbosity on his yearly activities writing "none" to all questions except for publications.

I am delighted to report that "none" freely translated means that Stan has enjoyed a full year of activity. He continues his very active research program on the metabolic effects of hormones and was involved in seeing Benson and Chang, two of his graduate students, finish their research.

Stan made his annual pilgrimage to the Federation Meetings in Atlantic City and did take the family into Missouri Valley again for a summer vacation.

Publications:

This past year has been spent much like the last few, enjoying the weather, culture, and academic and research facilities of the C-U area. Early this summer we took a trip through the Smoky Mountains and ended our drive eastward at Cape Hatteras - unbelievable, if one likes sand beaches. Frank Chang was back for two profitable months during the summer, finishing some work on his thesis and generally cleaning things up.

Our own time has been devoted mostly to studies on regulation of the enzymes involved in sugar metabolism, although we are becoming more and more intrigued (as might be expected of someone my age) by the possibilities involved in work on aging.


Entomology Newsletter 1971

Stanley Friedman

Research this past year has been interesting in that old lines have proven fruitful and new lines have been undertaken. Ernie Dunwoody is working on synthetic processes involved with the induction of resistance in houseflies, Jerry Freier with the nutrition and biochemistry of host parasite relationships, using *Aedes aegypti-Plasmodium gallinaceum* as a model system, Ken Capps (a student in the Zoology Department) with “stuttering” in protein synthesis during aging in adult *Phormia regina*, and I with the control of active sites on enzymes concerned with the maintenance of carbohydrate levels in *Phormia*.


The end of last summer was spent camping, collecting, and generally learning about and enjoying the ecosystems of the American West. Since that time there has been work on a number of projects, including a start at re-evaluating the role of carnitine in Tenebrio molitor, the animal in which Fraenkel discovered the importance of vitamin B₇. These past few months physical activity has been limited by a leg broken in a biking accident, but complete recovery is in sight, and with it, hopefully, a summer of research on carnitine, trehalose metabolism in the company of Andrew Chen, and host parasite studies with Jerry Freier.
The deep affection and admiration he had for his mentor and friend is abundantly evident in the newsletter tribute to Fraenkel...

I cannot close this without a more personal indication of the high esteem in which he is held by his colleagues and especially myself. He is always available for conversation, a good story teller, a better listener, a loyal friend, and a man with interests which transcend science; knowledgable in art and literature, an accomplished amateur musician and musicologist, (26,27) he is a true Renaissance man. I, and all of us in the department, look forward to the pleasure of his company for many years to come.

Stanley Friedman
Stanley already shared teaching responsibilities with Fraenkel in Entom. 301 (now IB401) but in 1973 he took over full responsibility for Entom. 424, Insect Physiology.
Entomology Newsletter 1973

Stanley Friedman
This past year has been spent retooling for further work on the control of trehalose metabolism, and starting a new investigation into the function of carnitine (Fraenkel's Vitamin B\textsubscript{T}) in *Tenebrio*. The Entomology 424 class (all six of us) also completed a study on the enzymatic basis for feeding behavior in *Sarcophaga* which was begun last year and is important enough to be published in a Festschrift issue of the Israel Journal of Entomology dedicated to Dr. Fraenkel on his 70th birthday.

One month of the summer was used for a camping trip through eastern Canada, doing some collecting and generally trying to learn something about the flora and fauna of northeastern North America.
Dr, Friedman's Lab: Left to right. Jerry Freier, Stanley Friedman, Andy Chen and Louise Shively.


3. **Christmas Party**

This year's yuletide gathering was held December 17th at the home of Dr. and Mrs. Metcalf. Numerous bug-type revelers invaded the Metcalf home and established a focus near the bar. A holiday atmosphere was provided by decorations such as pine rope nestled across the fireplace which was also accented with red and gold tinsel garland. Mistletoe was hung in a prominent spot. Chris Maier spent most of the evening standing beneath this wonderful plant explaining to all passing ladies the tradition for which it is famous as well as the unique morphological features recently garnered from his plant taxonomy course. The most unusual decoration was a paper chain approximately 18 feet long, graciously donated by the Delcomyn's. This handmade chain was the product of Drs. Price and Sanborn. According to the tradition, as related by Mrs. Delcomyn, each link represents a can of beer. Must have been some evening putting that chain together.

Dr. Metcalf: An uncensored tape of the limericks he recited at the going away party for Keith Solomon.

Mrs. Metcalf: One free visit from an interior decorator.

Dr. MacLeod: A copy of the book, *Entomology, Love It or Leave It*, and from the seminar class--directorship of a school for training attack dogs.

Dr. Selander: Also a copy of *Entomology, Love It or Leave It* and the Rap Brown Peace Prize.

Dr. Friedman: Head of the committee to study why there are so many committees and a book on *The Dynamics of Public Speaking* by R.M. Nixon.
Stanley Friedman
The year has been a very profitable one in many ways. With Jerry Freier I have been learning a great deal about host parasite relationships using the mosquito side of the bird malaria cycle as a model system, and Andrew Chen and I have been making inroads into the role of the corpus cardiacum in the control of trehalose metabolism. The little time I have to myself has been spent detailing the enzymes involved in the synthesis and degradation of trehalose. I have also had the pleasure of once again working with Morris Seligman, who is now here as a colleague and is doing a very interesting study on the metabolism of pyruvate by fly sarcosomes and the part played by carnitine (Dr. Fraenkel’s Vitamin B₇) in its oxidation. This past summer my family and I went camping and collecting through the southwest, and I look forward this year to spending a sabbatical term in the Department of Protozoology at the Hebrew University in Jerusalem.
Our sabbatical semester in Israel was highly instructive and enjoyable, both scientifically and culturally. Our travels took us into primitive desert areas as well as arid lands which had been converted to intensive agricultural activity, and we feel that we learned a great deal about the pressures shaping their entomological problems.

With regard to laboratory experience, I had the pleasure of working in the Department of Protozoology at the Hadassah Medical School in Jerusalem on a phlebotomine transmitted protozoan, *Leishmania tropica*. I am hopeful that some of the insights into vector and host parasite relationships that I gained from the people in that laboratory will stand me in good stead in my own future pursuits.

Publications:
Entomology Newsletter 1977 (Stanley)

REPORT FROM THE DEPARTMENT HEAD

This year's offering should probably be entitled “The Better Late Than Never Newsletter.” As you can see, it arrives a full one year and three months later than it should have, and, under new supervision. The reason for this is simply that there have been so many things happening that it has been difficult to find the time to put it all together. Probably the most important event of the year, and the one which has taken much of the time which would normally have been devoted to getting this publication in the mail, has been the Centennial Celebration. This formal and informal get-together of alumni, present faculty and students of the department turned out to be a resounding success, and to those of you who were not able to make it, we tender our regrets. We hope that you will be able to live the event vicariously through some of the enclosed pictures and other information we have incorporated in the newsletter. It was, indeed, an “old home week” and at the risk of becoming maudlin, I must confess that I felt a great deal of pleasure in the company of all of my old colleagues and friends; and, in fact, a sense of pride in a department which has, over the years, developed such a consistently high level of students.
The quality of the product has a direct relationship to the quality of faculty and none better exemplifies this than the four individuals pictured on the cover of our newsletter. The picture on the top left is that of Dr. Stephen A. Forbes, who founded the Illinois Laboratory of Natural History in 1877 and was the guiding light and first head of our department. On the right is J.W. Folsom, a major force in insect biology, whose tenure in the department lasted from 1900 through 1923. On the lower left is Professor W.V. Balduf, in whose name the Balduf Award for graduate research is given each year, a member of the faculty from 1922 through 1957. The last is Professor William R. Horsfall, who was appointed to the Entomology Faculty in 1947 and continues to serve our department in spite of his retirement at the end of this past year …These scholars have been chosen to embellish the cover of our 100th anniversary newsletter because their lives encompass the entire life of our department, but it is safe to say that every one of our faculty has been responsible for the reputation of the department through individual research and direct interaction with one or more of our 350 plus degree recipients since the beginning of this century.
A new faculty member, Dr. Stewart H. Berlocher, who comes to us from Dr. Guy Bush's lab at the University of Texas, is deeply involved in general problems of speciation and if the success of his seminar this past semester is any indication, his addition to our staff will light up many corners of systematics hitherto hidden from our students.

As a antepenultimate item, I entreat you, each of our alumni, to make use of the blank page at the back of the newsletter to provide us with information about yourself to be included in our 1978 issue. We are as interested in hearing from and about you as you are about us.

I intend to try to continue the practice of having some sort of get-together at the annual meeting of the Entomological Society of America. Whether it is breakfast or cocktails has not yet been decided, but I shall notify you all as soon as we have taken a step in that direction.
These past two years have been hectic. Having been accorded the singular honor of headship of our department, I have been trying to make my way through the morass of bureaucratic interaction among faculty, school, and college. My success is attested by our continued existence as a viable department. On the brighter side, Andrew Chen and I have completed some research on the hormones involved with insect blood sugar homeostasis (for which he won this year's Balduf Award), and Andrew has now graduated. Malethu Mathew has been trying to work out a perfusion technique which should be of great assistance in measuring fluxes of compounds in the blood of certain insects, and Tai-fang Hsueh and I are doing a taxonomic characterization of a highly regulated enzyme directly involved with energy utilization. I have also had the pleasure of being associated this year with Dr. Hiro-Aki Yanagawa of the Sericultural Institute in Tokyo, who is working with me on some of the biochemistry of blood sugar synthesis. And, Dr. Maria Rosales-Sharp has brought to our laboratory some of her expertise in the culture of the malarial protozoan in and out of mosquitoes, so we hope to be able to gain some insights into the relationship between the definitive host and causal agent of malaria.
Once again it is my pleasure to be given the opportunity to write a few paragraphs concerning the department and its doings over the past two years. It doesn't seem that long since I have been in communication with you, perhaps because it is so easy to pick up the threads of relationships with old friends. If the get-togethers at the national meetings of the Entomological Society, both this year and last, are any indication, I have the feeling that we all take pleasure in seeing one another. The mixers have been enormously successful; they have given me the opportunity to see many of you (certainly over 100 were in attendance both this year and last), and, more important, have given many of our older graduates a chance to meet, speak with, and in view of the positive comments I got, be impressed with our new students. If any of you were at the meetings and could not get to the mixer, I hope that you will make up for it this year in Atlanta. We will be looking for you.
Entomology Newsletter 1980
MESSAGE FROM THE HEAD

Which leads me to some moments of mixed proselytization and pride. The ESA is the entomological society, for better or worse, its activities reflecting the membership, and vice versa. It is beset with many problems these days, with CAST and ARPE just a sample of the excellent opportunity for polemic. I do not, at this time, intend to take advantage of you by writing about these subjects without having to face rebuttal, but I do wish to make the plea that, if you are not presently a member, you join immediately. Voting membership in the ESA is a prerequisite for giving vent to any viewpoint. And viewpoints we must all have, since our futures and that of this organization are tied together. In looking at the program of last year's national meeting, I was both amazed and proud of the fact that so many present and past department members were prominent in the scientific sessions.
Well, enough of that. There are a number of changes within the department that you should be aware of, some sad, others happy. Peter Price has left us, but to make us feel somewhat better, we have obtained the services of another Cornell graduate, May Berenbaum. Ms. Berenbaum is one of Paul Feeny's students, working on secondary plant compounds and their importance in establishing Insect-host relationships. **We are, without exception, very excited that May decided to join us, and I am certain that those of you who will not be able to meet and speak with her in Atlanta will become aware of her work through the journals within the near future.** She will be on the campus by the middle of August, so if you have any students who are interested in working in the area of ecology, send them around to talk. [By December 1980, I had joined ESA and traveled by van to Atlanta for the annual meeting)
Stanley Friedman
Most of my activity these days centers around those same things we have all found to be fun over the years: teaching, research, administration (?) I am still trying to give reluctant graduate students some grounding in Insect Physiology, and in my more effective moments, show students in Agriculture that Applied Entomology can be fun as well as business. With regard to research, work with Nen Sharp has convinced me that we can aseptically rear and infect with *Plasmodium berahei* large numbers of *Anopheles stephensi*, and from the mosquitoes isolate massive numbers of sporozoites, Hopefully, we can use these to establish a source of uncontaminated material for large scale vaccine production. This work is being supported by WHO. Our studies on trehalose metabolism are also progressing, with the development of a fly midgut preparation which should permit us to gain some understanding of the kinetics of sugar movement across the gut wall. Administrative activity you all know about, and I am certain that the less said the better.

Publications:
The Hexapod Herald

April 8, 1983

Key to The Entomology Faculty - University of Illinois

1. Speaks more than 500 words per minute, corrects your grammar unnecessarily efficient, female. 2

1' Speaks normal to slowly variable, male. 3

2. Jeans usually, preocular lenses always, headband absent. 4

2' Jeans never, glasses only while typing or reading, headband present. H. Berenbaum

3. More than 6.5 feet long, speaks slowly. 5

3' Less than 6.5 feet long, variable. J. Willis

4. Setae absent on upper labium. 6

4' Setae present on upper labium. 7

5. Nocturnal, flannel shirt, sloppy, found at Treno's. N. Berlocher 8

5' Diurnal, double knit, neater than above, never found at Treno's. S. Friedman

6. Capitular (head) setae less than 2 inches long. 9

6' Capitular (head) setae more than 2 inches long. M. Kosan

7. Absent, Capitular setae curly. 10

7' Present, setae straight and erect, associated with tropical fish. J. Sternburg

8. Emeritus. 11

8' Non-Emeritus. 12

9. Capitulum with a fring of long circumlateral setae, associates with cyclorrhapha. G. Fraenkel

9' Active early in morning, rare, associates with nematocera. W. Horsfall

10. Glabrous at apex. 14

10' Non-Glabrous at apex. 15
At last year's National Meetings, a number of alumni asked about friends from whom they and we had not heard for some time. **We decided to make some inquiries, and this Newsletter contains the fruit of those endeavors.** You will find news of many of your old friends and lost colleagues written in their own inimitable styles (edited slightly) from pages 41 to 79. I have taken a great deal of pleasure in reading of all of these doings, and it may be that our collection of information will lead some of you to pick up your pens and write to people you remember fondly, but with whom you have not maintained contact. Please notify anyone you know who has not responded that we would appreciate hearing from her/him, and that we will again be asking for a paragraph in about three years*. 

Now to business about our current departmental activities. The past few years have been full of prizes and awards for both senior and junior faculty. Here are some of the more interesting ones:

May Berenbaum 1984 Presidential Young Investigators Award (only 3 given in Ecology this year in the entire U.S.). A five year award for young scientists of significant achievement and great promise.

Fred Delcomyn 1983 Fellow of AAAS

Gottfried Fraenkel 1980 Honorary Doctorate - University of Tours, France 1984. Honorary Doctorate - Hebrew University, Jerusalem, Israel

Joseph Larsen 1984 Brigham Young University Distinguished Visiting Professorship

Robert Metcalf 1983 Founder's Award, Society of Environmental Toxicology and Chemistry

*The 1984 newsletter was the last edited by Stanley*
Our lives as members of the School of Life Sciences have been somewhat changed with the advent of a new director, Dr. S. Kaplan, most recently head of the Microbiology department. With this move, we welcome J.R. Larsen back into the departmental fold as a full-time member and look forward to his assistance and support over these next several years.

Things in Life Sciences are complicated by both the financial problems which every public university is presently facing, and the academic problems incurred by the strong turn toward molecular biology which is being taken in every segment of the biological sciences. We are sensitive to these latter needs and have been involved in extended departmental discussion, leading to a new graduate course in insect genetics, into which we hope to incorporate an entomological understanding of the utilization of genetic engineering in pest management (Hugh was hired three years later)

“Jumping” Genetics

Geneticists once believed that every gene had a particular place, or locus, on a chromosome. But Barbara McClintock’s discovery almost a half century ago changed that genetic theory. Working with maize, she found that some genes move—or jump—both within and between chromosomes. “We now know that every organism has a variety of ‘jumping’ genes, or transposable elements, perhaps 10-15% of the total genetic complement,” says Hugh M. Robertson, assistant professor of Entomology.

One such family of transposable elements is named mariner, which was first discovered in Drosophila mauritiana, a fruit fly restricted to the island of Mauritius, by Dan Hartl’s lab in 1985. In a serendipitous discovery in 1991, other researchers discovered a related transposable element in the cecropia moth, Hyalopilia cecropia.

Intrigued by these similarities, Dr. Robertson used a new molecular technique, called PCR (polymerase chain reaction), to extend the search for mariner elements to a variety of organisms. His preliminary results were recently published in the journal Nature.

The mariner element (approximately 1300 nucleotide base pairs long) contains a gene that encodes a transposase which allows mariner to “jump.” In comparing (continued on page 8)
We have, as well, a number of other matters of academic interest to report. Our advanced course series in Pest Management is now on line: Dr. J. V. Maddox is teaching Insect Pathology with great success; a course in Biological Control, run by Dr. Kogan and, now, Dr. Irwin (see below for vitae) will be given next year; and, last, but not least, Modeling of Insect Ecosystems is being taught by Bill Ruesink. We have also instituted a course in Chemical Ecology, given by Drs. Berenbaum, Metcalf, and David Seigler, the latter a Professor of Plant Biology, who recently obtained a joint appointment with us (see below for vitae).

As far as the well being and growth of the department is concerned, we are more than holding our own, although it appears that our medical entomologist, Barry Miller, who was hired to take the place of Duane Gubler (presently head of a CDC section in Puerto Rico), is also in the process of being lured away by the Federal government to service in CDC at Fort Collins, Colorado. There will be no replacement for him at this time, and the future remains cloudy with respect to the position itself.
Stanley’s research in the 1980s involved a range of topics and a diversity of old (mosquitoes blow flies) and new (microsporidia, caterpillars) organisms.


Dietary self-selection of an optimal protein:carbohydrate ratio

**Nutrient self-selection: can insects select a nutritionally optimal diet if given a choice?**

5th instar larvae of *Helicoverpa zea* (corn earworm) reared on artificial diets

<table>
<thead>
<tr>
<th>Intake (%) from each diet cube</th>
<th>Cube A</th>
<th>Cube B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two nutritionally complete cubes</td>
<td>47</td>
<td>53</td>
</tr>
<tr>
<td>Casein cube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sucrose cube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One w/casein only, one w/sucrose only</td>
<td>79.4</td>
<td>20.6</td>
</tr>
</tbody>
</table>

NB “self-selectors” had lower RGR’s, ECI’s and RCR’s than control larvae

**Why do “self-selectors” grow slower?**

They waste time and energy switching foods.

Feeding behavior was investigated via time-lapse photography

<table>
<thead>
<tr>
<th></th>
<th>Switches per hour</th>
<th>Bout length (hr)</th>
<th>% of time on each cube</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two nutr. complete cubes</td>
<td>0.05</td>
<td>16.7</td>
<td>A: 58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B: 42</td>
</tr>
<tr>
<td>One casein cube, one sucrose cube</td>
<td>0.43</td>
<td>2.4</td>
<td>Cas: 83</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suc: 17</td>
</tr>
</tbody>
</table>
And continued into the 1990s…


**Sheppard, C.A., Friedman, S.** (1992) Effect of dietary nitrogen on gypsy moth larval nutritional indices, development and lipid content Entomologia Experimentalis et Applicata, 64 (3): 269-280.


In August, 1992, Stanley officially retired…

He may have been ready to retire before that but options for succession were limited. In 1990, when I was promoted to Full Professor, Gil Waldbauer was the only other faculty member at that rank. Stanley told me that he wanted to wait until I had more experience with children before becoming Head. By 1992, Hannah was two years old and Stanley decided I was ready…
Well, it's been quite a decade, and then some. The change most readily apparent to avid newsletter readers (who have no doubt been frustrated by the 12-year lapse in service) is that, after 17 years, Stanley Friedman officially stepped down as department head and retired in August 1992. Even if Stanley didn't stand 6' 3" tall, he would have left big shoes to fill. Throughout his tenure as head, spanning the period from 1975 to 1992, he oversaw the hiring of six faculty members, five of whom (Stewart Berlocher, May Berenbaum, Hugh Robertson, Gene Robinson, and Susan Fahrbach) make up the majority of the present faculty.
During Stanley's administration, the department took on a significantly enhanced role in the delivery of undergraduate instruction in biology, easily a decade before other departments of entomology recognized the importance of connecting with large undergraduate constituencies for ensuring acquisition of campus resources and support. Members of our department were integrally involved in revamping the introductory biology course sequence and members of our department remain involved in the delivery of that sequence; indeed, the sequence is a major source of teaching assistantships for the department.
During this period as well, our department gained stature on the campus. Department members have been called upon to serve on executive committees of both the College of Liberal Arts and Sciences and the Graduate College, to serve in administrative capacities in the School of Life Sciences, and to serve on advisory committees for vice chancellors for research and for academic affairs, as well as on numerous search and evaluation committees for deans, directors, and department heads. (Stanley himself set the example, serving as Acting (1987-1989) and then Associate (1989-1991) Director of the School of Life Sciences...
Stanley's greatest legacy, perhaps, was in coordinating a revision of the departmental bylaws that opened up new collaborative arrangements with affiliate faculty. As a result, competition among entomology-centered units on the campus has been greatly reduced; faculty in four colleges and one state agency (Veterinary Medicine, LAS, ACES, Fine and Applied Arts--!!--) and the Natural History Survey now participate freely in the training and supervision of graduate students in the department's advanced degree programs.
Physical evidence of Stanley's effectiveness as department head is everywhere in evidence in the form of capital construction projects; a new $150,000 departmental greenhouse on the roof of the medical sciences building (made possible by the UI Foundation's determination to take historic Harker Hall, long the department's teaching building and greenhouse location, as its headquarters), a new-state-of-the-art Bee Research Facility on south campus, a dedicated departmental seminar room on the fourth floor of Morrill, and extensive renovation to aging laboratories in Morrill Hall.

**Stanley Friedman**

I am having as good a time as one can when away from daily contact with one's colleagues, and especially with my department head, May Berenbaum--or is it Mary Barenboim? I forget easily these days. It seems that I left the headship at just the right time to be able to go in a few days a week and talk a lot about what should be done, but have no responsibility for either doing it or seeing that it gets done. I must say, however, that I do pray a lot. Hopefully, we shall weather the present storm as we have in the past.
After retirement, Stanley continued to support the department…
On June 16, 2017, the field of entomology lost a pioneer and a leader; here at UIUC, we lost a mentor, a role model, a supporter, and a dear friend…