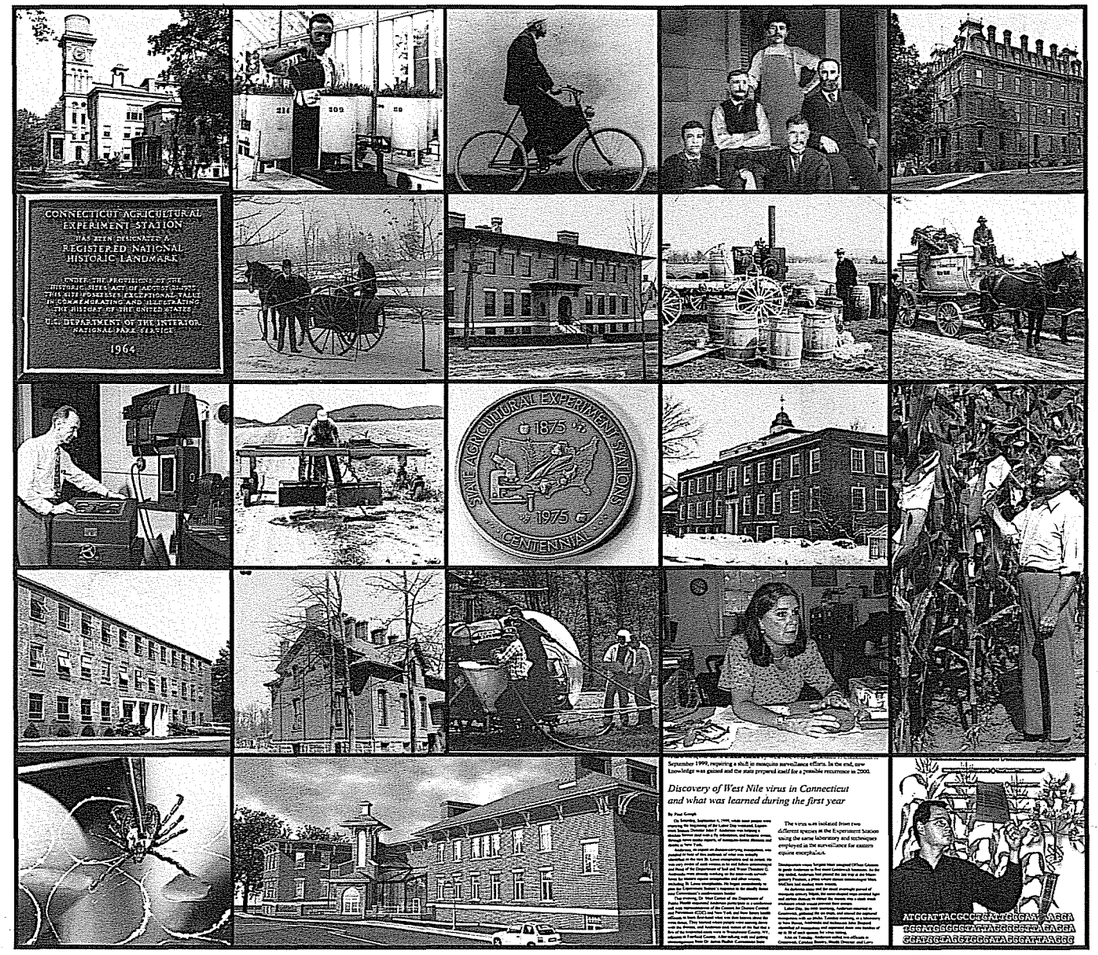
The Connecticut Agricultural Experiment Station

Putting Science to Work for Society Since 1875



1875 125TH ANNIVERSARY 2000

The Connecticut Agricultural Experiment Station

123 HUNTINGTON STREET BOX 1106 NEW HAVEN, CONNECTICUT 06504

Founded 1875 *Putting science to work for society*

October 10, 2000

One-hundred twenty-five years ago, The Connecticut Agricultural Experiment Station began to serve the citizens of Connecticut. This service began with analytical testing, then investigations of the pests of plants and of man and domestic animals, then improvement of crops through genetic means and methods of protecting plants to increase yields, and then studies of our natural environment and ways to increase the efficiency of farmers.

We celebrate this occasion with the publication of this commemorative booklet, which looks at some of the achievements of The Connecticut Agricultural Experiment Station and contains the greetings of many of our friends. The text describes some of our early achievements, such as the discovery of vitamins and invention of double-cross hybrid corn; it describes the services of the Experiment Station during two world wars, and through extracts from some of our annual reports describes some of the early work of the Station on both familiar and unfamiliar problems. It also describes current research and services of the Experiment Station. Also reproduced are the posters displayed at the 125th Anniversary Dinner that depict both past achievements and current research.

As The Connecticut Agricultural Experiment Station enters its sixth quarter century, I recognize the dedication of the Station's Board of Control, of all staff, both past and present, which helped make The Connecticut Agricultural Experiment Station, the first in the Nation, into an important research arm of the State and the Country.

Finally, I very much appreciate the trust citizens have placed in the Experiment Station over time and reaffirm, at this important milestone, our commitment to continually maintain and to earn that trust through practical and scholarly scientific achievement, service, and reporting.

John F. Anderson
Director

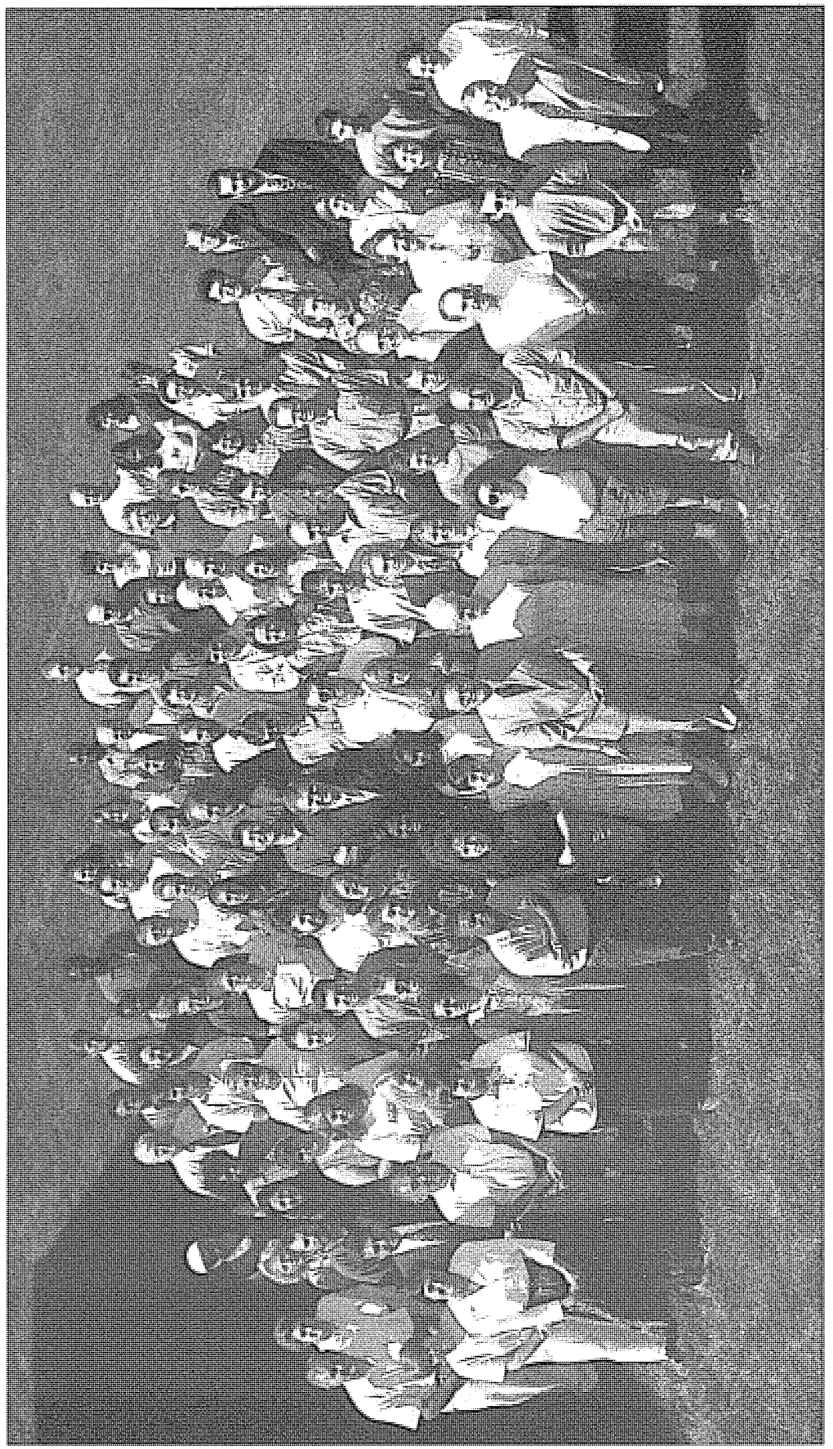
Phone: (203) 974-8500 Fax: (203) 974-8502
Toll Free: 1-877-855-2237
Web Page: http//www.state.ct.us/caes

BRAVO!

The President, Officers, Directors and Members
of the Experiment Station Associates wish,
on this memorable occasion,
to thank the Director, Vice Director, Scientists and Staff
of the Connecticut Agricultural Experiment Station
for their many acts of kindness and concern over the years.

We congratulate them on this milestone
on a long and outstanding journey
rich with remarkable accomplishments
and on their commitment to excellence,
which has so greatly benefitted the residents of this State.

Station Staff, 2000



UNIROYAL CHEMICAL

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Crop Protection Research & Development
Connecticut Research Centers: Bethany, Middlebury

John A. Lacadie, Ph.D.
Global Director
Research & Development

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&
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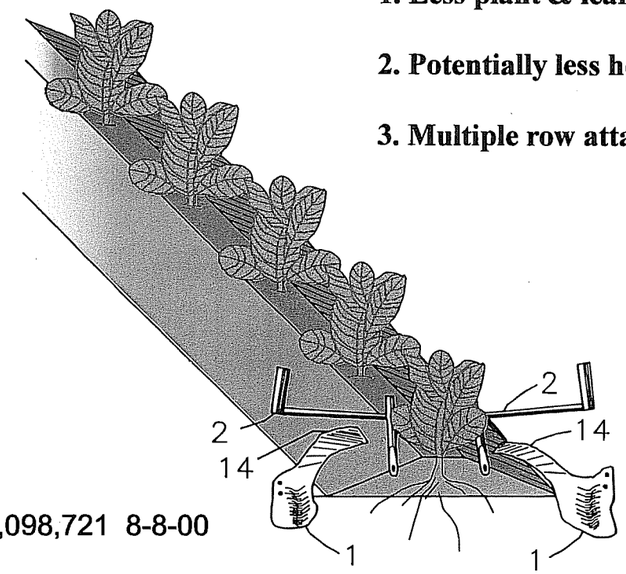
SAVE THE EXPENSE OF MOST OF YOUR HAND HOEING & HILLING ROW CROPS!!!

1. Less plant & leaf damage.

2. Potentially less herbicides.

3. Multiple row attachment.



U.S.Pat. #6,098,721 8-8-00

4. Ideal for Organic Farming.

5. Cultivate & hill approximately 2 acres per hour.

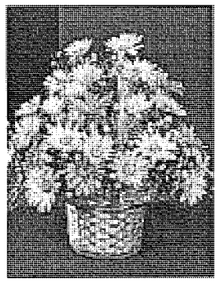
6. More utilization of broadcast fertilizers.

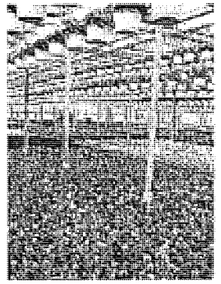
#1 Scoop
#2 Leaf lifter
#14 Speed sweep

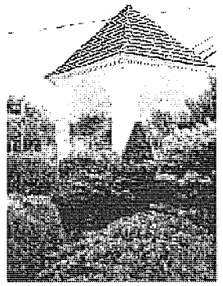
Congratulations

FOR 125 YEARS OF CONTINUED DEDICATION
TO THE CONNECTICUT RIVER VALLEY FARMERS

2,000 Connecticut Companies Grow & Sell $500 Million Worth of Flowers & Plants Yearly, The Biggest Part of Agriculture In Our State.







The Experiment Station's Work Is Indispensable to Our Industry.

The scientific back-up, research, and service we get every day from the Connecticut Agricultural Experiment Station is a tiny investment our state government makes to keep our floral and plant producers strong components of the Connecticut economy. We are proud of the Experiment Station on its 125th anniversary, and look forward to continuing a relationship that benefits all of Connecticut's people.

Connecticut Green Industries

Connecticut Florists Association

Connecticut Greenhouse Growers Association

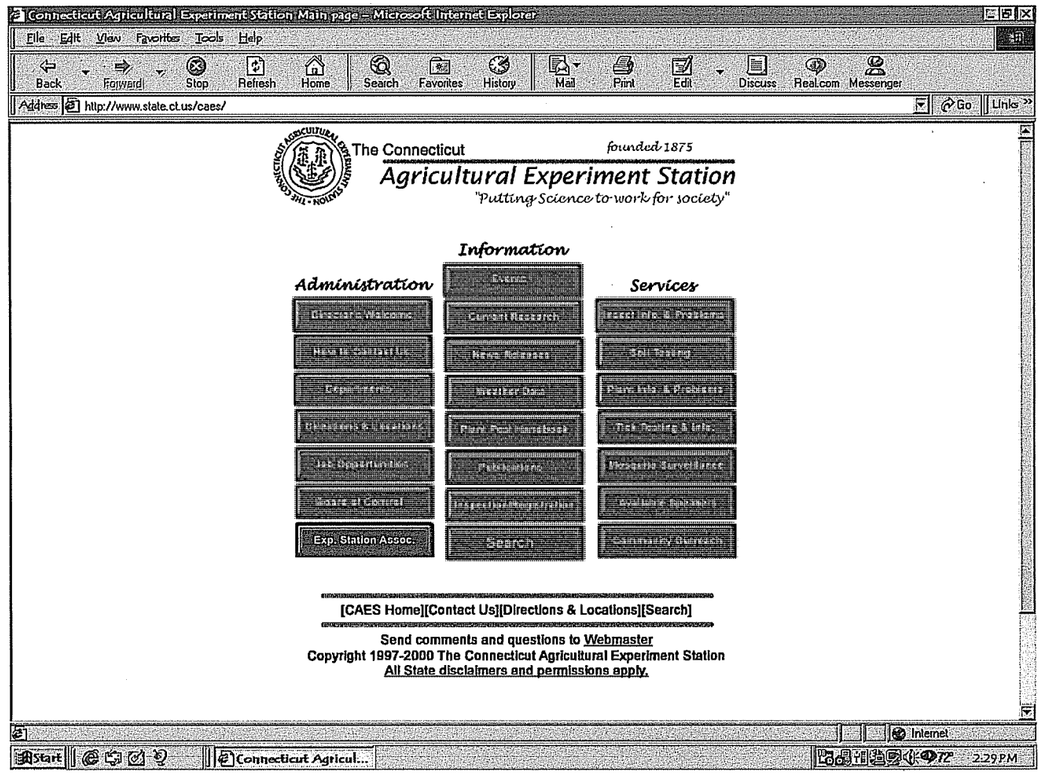
Connecticut Nursery & Landscape Association

P.O. Box 414 • Botsford, Connecticut 06404 • 800-562-0610

STATION WEB PAGE

HTTP://WWW.STATE.CT.US/CAES

Launched December 1998, it continues to be improved, changed, and updated.



Content: Mosquito information, factsheets, publications, events, staff biographies, etc...

Special Feature: Plant Pest Handbook

The Plant Pest Handbook features approximately 247 host plants to search on insect and disease problems. The electronic version of the Plant Pest Handbook is bringing the citizens of Connecticut continuously new and updated information.

Cases of Wine Were Donated by the Following Connecticut Vineyards

Bill Hopkins—Hopkins Vineyard
25 Hopkins Road; New Preston, CT 06777
(860) 868-7954

Larry McCulloch—Chamard Vineyards
115 Cow Hill Road; Clinton, CT 06413
(860) 664-0299

Nick Smith—Stonington Vineyards
523 Taugwonk Road; Stonington, CT 06378
(860) 535-1222

Harry Townshend—Raynham Vineyards
709 Townsend Avenue; New Haven, CT 06512
(203) 467-1409

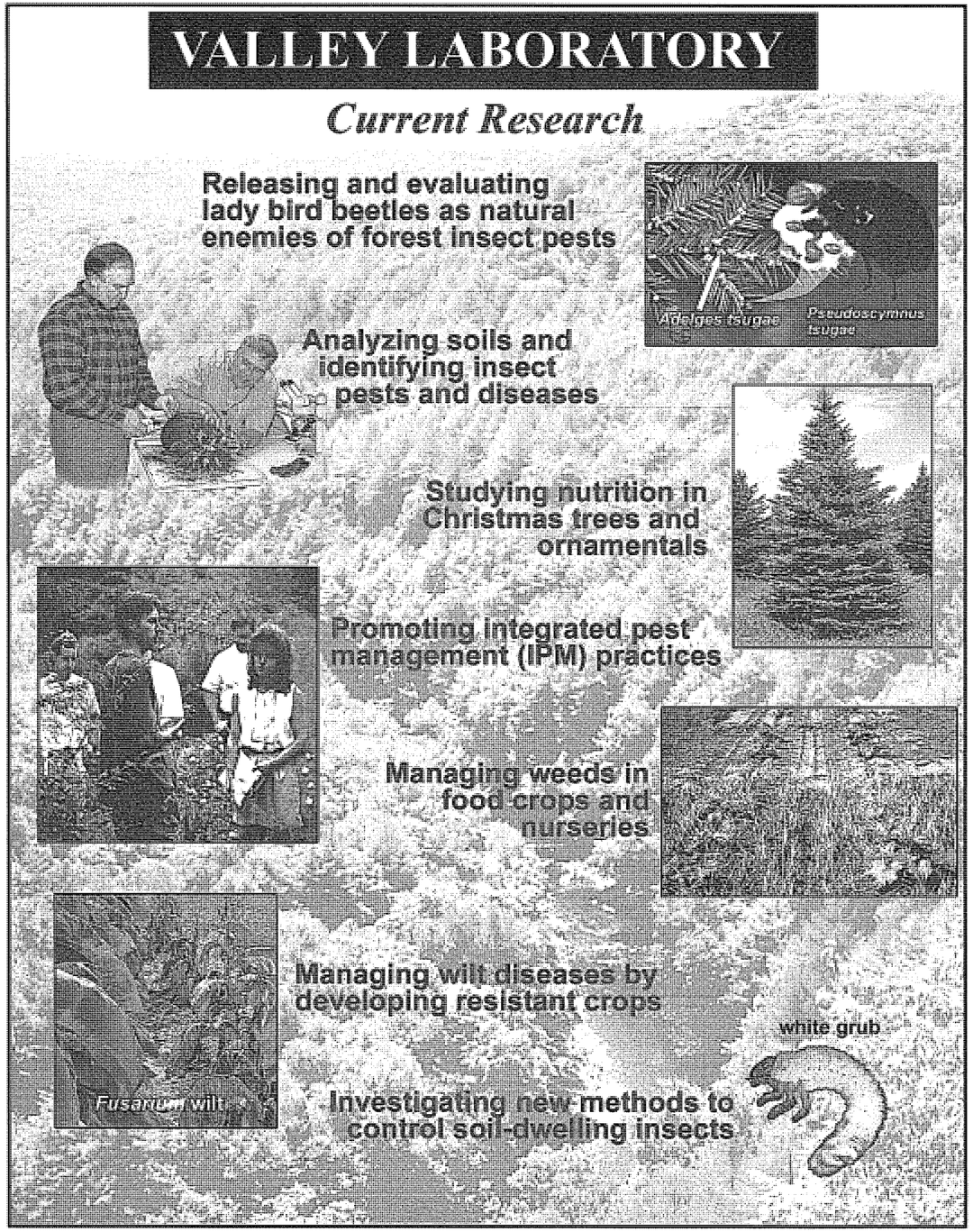
Steve Vollweiler—Sharpe Hill Vineyard
108 Wade Road; Pomfret, CT 06258
(860) 974-3549

Gary Crump—Priam Vineyards
11 Shailor Hill Road; Colchester, CT. 06415
(860) 267-8520

Dr. James Bobbit—Bobbitt Vineyard
88 Atwoodville Road, Mansfield, CT 06250
(860) 429-7004

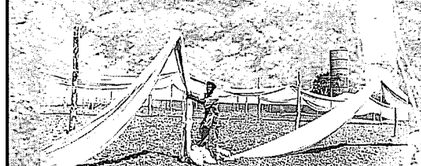
Robert Herold—The Vineyard at Tunnell Road
36 Driggs Road; Vernon, CT 06066
(860) 870-5102

Warren and Nora Strong—Bozrah Vineyard
83 Fitchville Road; Bozrah, CT 06334
(860) 889-3748



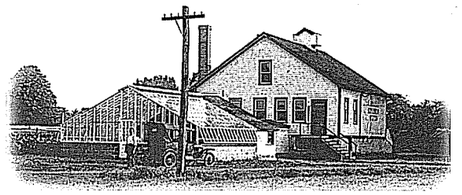
VALLEY LABORATORY

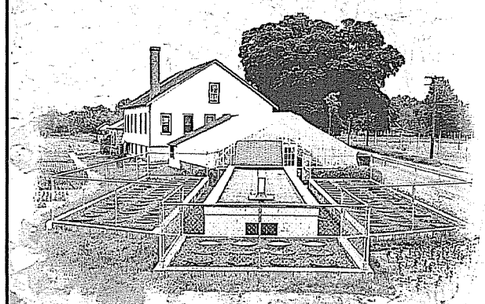
Key Events in Department History



Tobacco Shade Tent

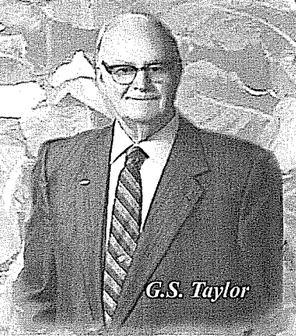
In 1900, tobacco was planted under cloth for the first time in Connecticut, revolutionizing the tobacco industry.



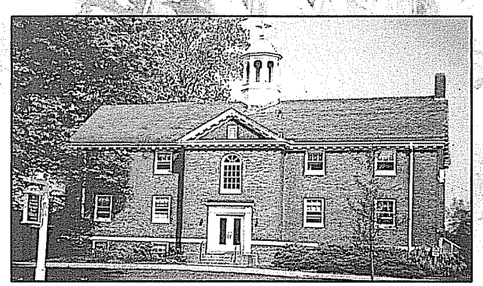


In 1921, the Tobacco Substation was built in Windsor and became a department with P.J. Anderson as its first Director.

In 1929, a lysimeter was installed to study losses of plant nutrients through leaching.



G.S. Taylor



In 1953, G.S. Taylor became Director and for the next 34 years studied several major diseases of tobacco.

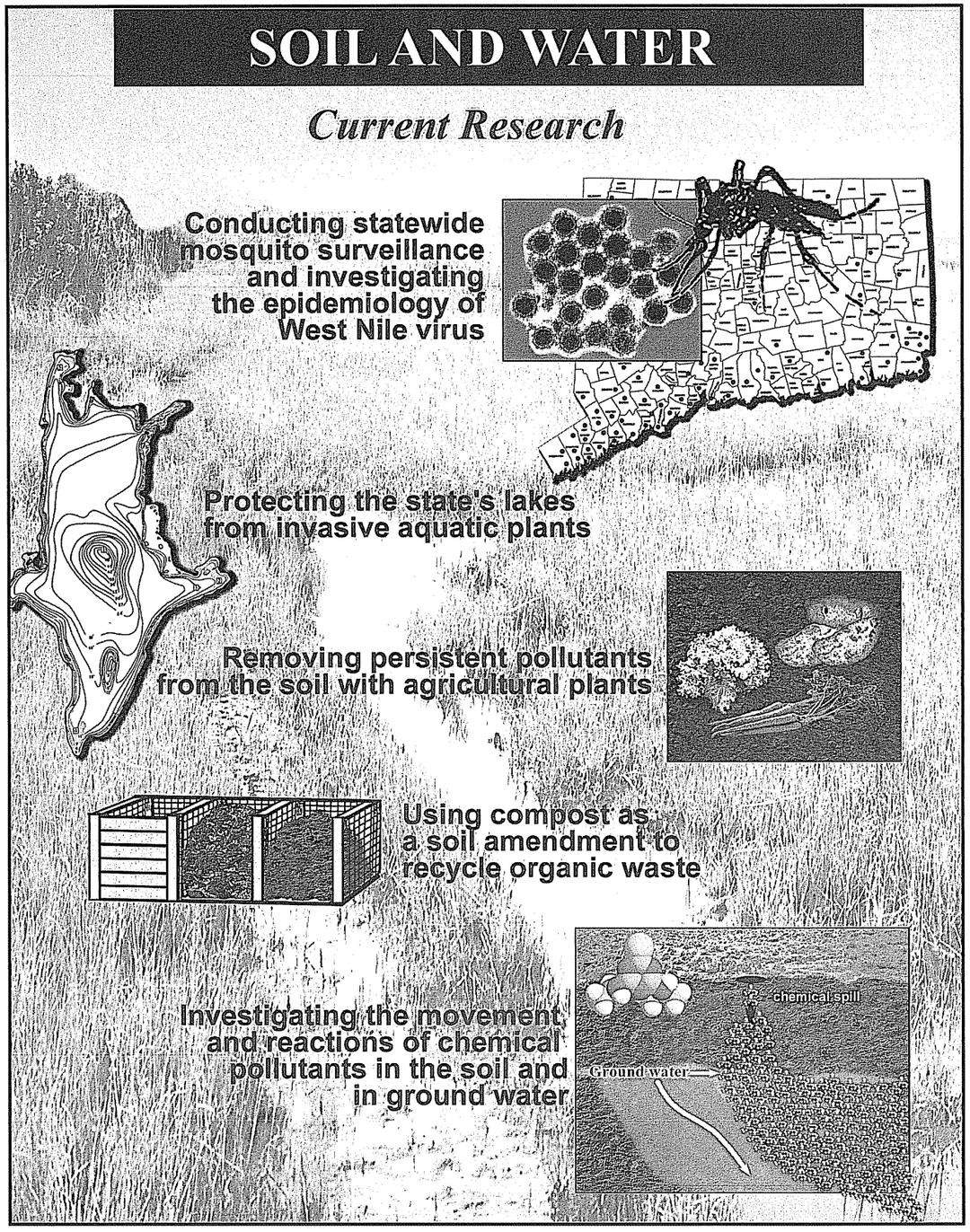
In 1940, a new building was constructed in Windsor, and renamed the Valley Laboratory in 1965 to reflect the more diversified agriculture of the Connecticut Valley.

Salutes

The Connecticut Agricultural Experiment Station

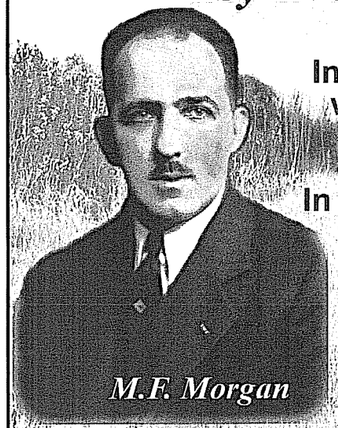
on its 125th Anniversary

Celebration



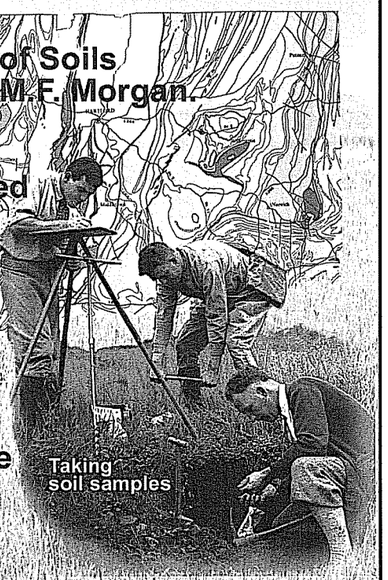
SOIL AND WATER

Key Events in Department History



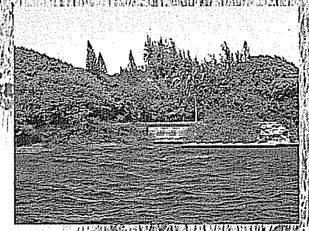
In 1923, the Department of Soils was established by Dr. M.F. Morgan.

In 1934, Morgan developed the world's first test for rapid analysis of soil fertility.

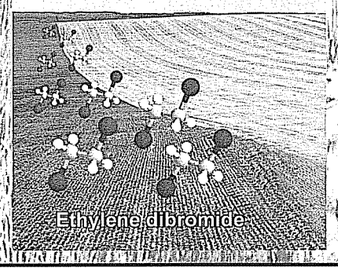


In 1946, sewage sludge compost was shown to improve soil.

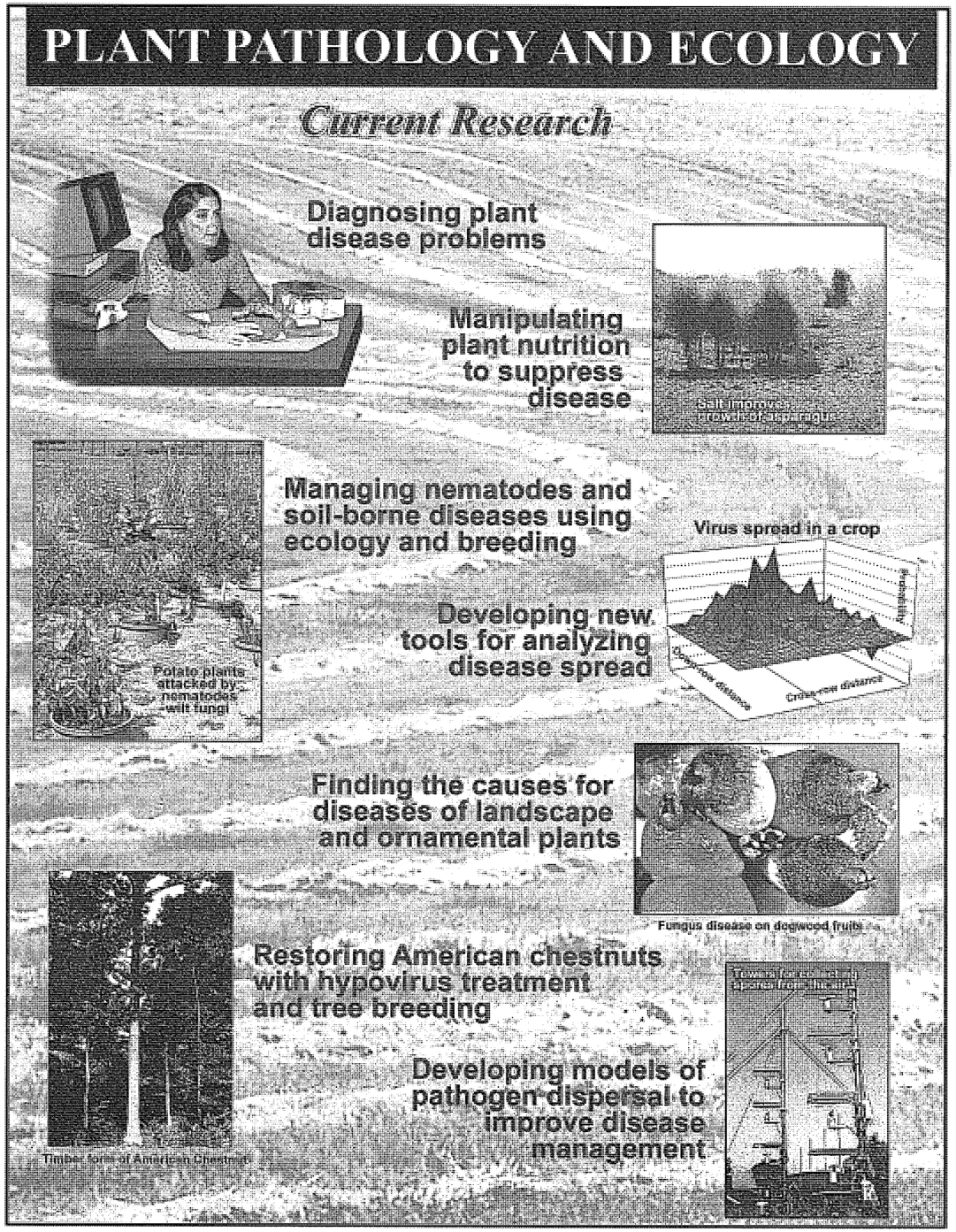
In 1967, nutrient budgets were described for Connecticut lakes.



In 1970, a soil survey of coastal wetlands was published.



In 1987, soil micropores were shown to retain toxic compounds.



PLANT PATHOLOGY AND ECOLOGY

Key Events in Department History

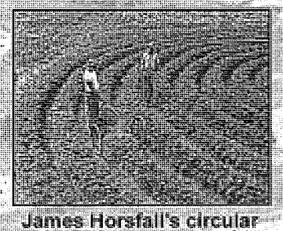
In 1888, the Department was established to provide diagnosis and information for control of plant diseases.

Roland Thaxter (RT) identified the potato scab pathogen.

Early application of fungicides to control disease.

In 1903, the first "spray calendar" guide was published to help Connecticut farmers minimize pesticide use.

In 1940, the first organic fungicide was discovered.

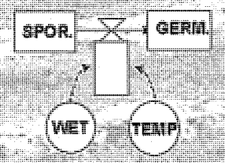


James Horsfall's circular celery plots were used to study organic pesticides.

In 1949, the technique for chemotherapy-by-injection was developed for control of Dutch Elm Disease.

Albert Dimond applies his theory in the field.

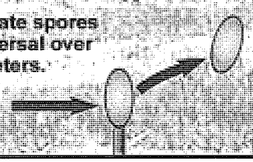
In 1969, the first computer model of a plant disease epidemic was published.



To initiate disease, spores germinate at a rate controlled by wetness and temperature.

Chestnuts sprout from vestiges of once majestic trees killed to the ground.

In 1972, a hypovirus was imported and used for biological control of the chestnut blight disease.



Gusts of wind liberate spores initiating their dispersal over hundreds of kilometers.

In 1982, a computer model of long-distance, aerial transport of plant disease spores was published.

Congratulations on your 125th Anniversary

The EIC Board of Directors

Compliments of

The Plant Group, Inc.
117 Pond Road
N. Franklin, CT 06524

Congratulations to

The Connecticut Agricultural Experiment Station
on its 125th Anniversary

Thanks for all your good work and advice!

Masons Island Fire District, Inc.
Mystic, Connecticut

BOARD OF CONTROL

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Governor John G. Rowland
ex-officio, President

John Lyman III
Vice-President

Norma O'Leary
Secretary

Dr. John F. Anderson
ex-officio, Director and Treasurer

Members

Shirley Ferris
ex-officio, Commissioner of Agriculture

Richard H. Bowerman

Dr. Donald B. Oliver

Leon J. Zapadka

Program

125th Anniversary Banquet

Tuesday, October 10, 2000, 6 PM
New Haven Lawn Club

Moderator, John Lyman III, Vice-President, Station Board of Control

---

Director, John F. Anderson—Welcome
State Representative William R. Dyson, 94th District
State Representative Chris DePino, 97th District

Greetings of State Legislators

SENATOR

Judith G. Freedman, *26th District*

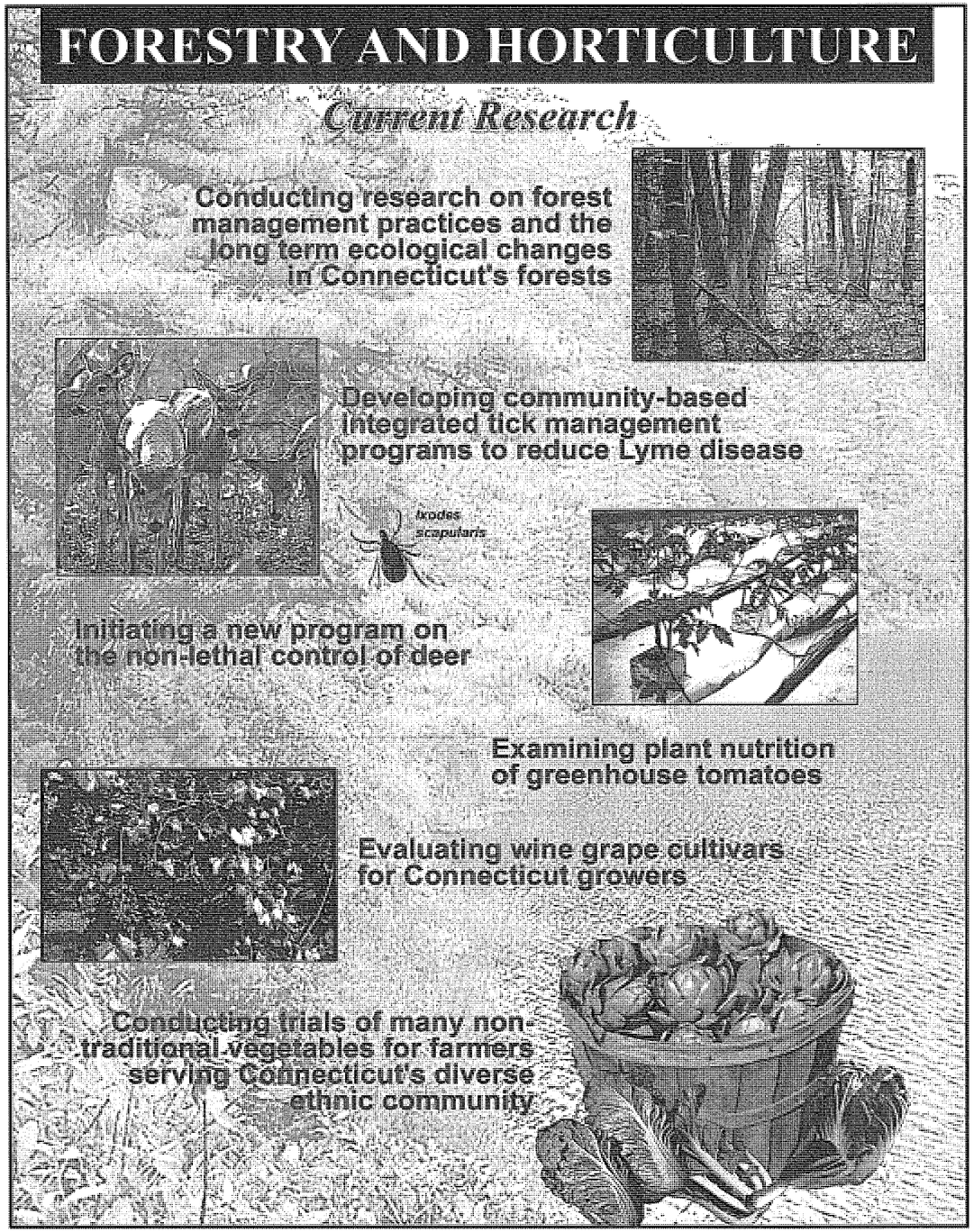
REPRESENTATIVES

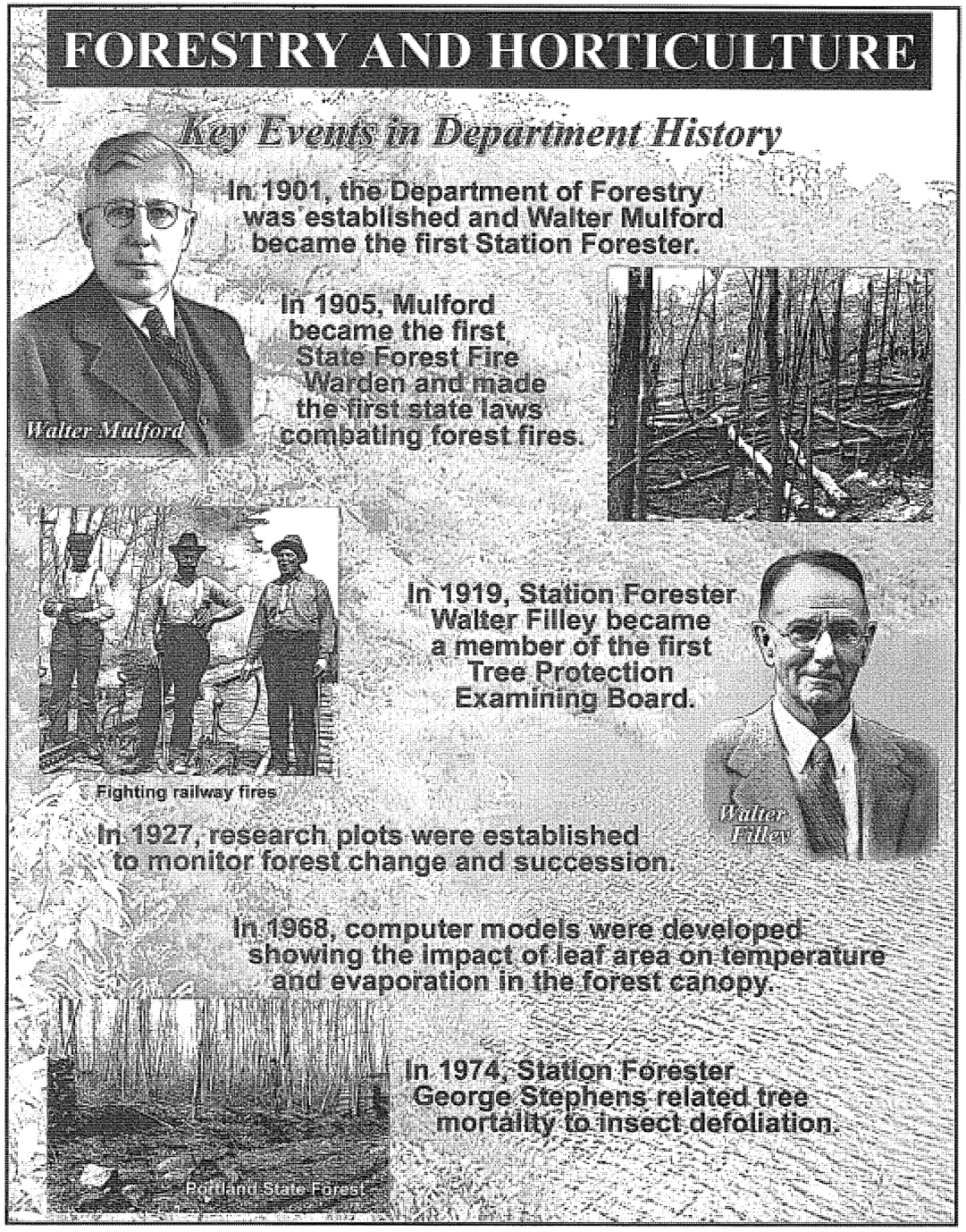
Richard O. Belden, *113th District*
Antonietta "Toni" Boucher, *143rd District*
Mary Fritz, *90th District*
Steve Jarmoc, *59th District*
Alex Knopp, *137th District*
Peter A. Metz, *101st District*
Vickie Orsini Nardello, *89th District*
John W. "Jack" Thompson, *13th District*

Brenda Sisco, Legislative Director, *Office of Governor John G. Rowland*
Dr. Edmund Tucker, President, *Experiment Station Associates*
Dr. Paul E. Waggoner, Director, Experiment Station 1972-1987, *National Academy of Sciences*
Honorable, John DeStefano Jr., *Mayor of New Haven*

State of Science

Dr. D. Allan Bromley
Sterling Professor of the Sciences
Yale University





Music Program

My Funny Valentine ..... Rogers and Hart*

Chop Sticks (duet) ..... De Lulli

Beautiful Dreamer ..... Stephen Foster*

Maple Leaf Rag (duet) ..... Scott Joplin

En Bateau (duet) ..... Claude Debussy

Op 25. No. 1 (The Harp) ..... Frederick Chopin

True Love ..... Cole Porter*

Tenderly ..... Walter Gross*

Can Can (duet) ..... Jacques Offenbach

Autumn Leaves ..... Prevert and Kosma*

Two Preludes from Op. 23 ..... Sergei Rachmaninov

Barcarolle (from The Tales of Hoffmann) (duet) ... Jacques Offenbach

By the Beautiful Blue Danube (duet) ..... Johann Strauss, Jr

Slavonic Dance #8 (duet) ..... Antonin Dvorak

Puttin' on the Ritz ..... Irving Berlin*

By the Light of the Silvery Moon ..... Madden and Edwards*

The White Cliffs of Dover ..... Walter Kent*

Golliwog's Cake Walk (duet) ..... Claude Debussy

The Entertainer Rag (duet) ..... Scott Joplin

Pianists

Gale E. Ridge-O'Connor

Steve Buchanan

* Music provided by Mrs. Phyllis Mazik

Imported Pests and Pathogens

BIOLOGY, DISPERSAL, AND CONTROL

A Conference Commemorating the 125th Anniversary of
The Connecticut Agricultural Experiment Station

Tuesday October 10

8:45 AM **Welcome.**
John F. Anderson, Director, *The Connecticut Agricultural Experiment Station, New Haven*

9:00 AM **Invasive Fungi: Identification, and Safeguarding Plant Resources (Powdery Mildews as Examples).**
Mary Palm, *Aphis/PPQ/USDA*

10:00 AM **Plant Quarantine on the Front Line at Kennedy Airport (The Size of the Problem).**
Michael Kenney, *USDA/PPQ JFK*

11:30 AM **The World-wide Distribution of a Tree Disease (Dutch Elm Disease).**
Clive Brasier, *Alice Holt Lodge, Surrey, UK*

2:00 PM **Implications of New Importations of a Plant Disease Pathogen (Potato Late Blight).**
Christine Smart and William Fry, *Cornell University*

3:00 PM **The Effect of Multiple Importations of Pests and Pathogens of Native Trees (Chestnut Blight and Ink Disease).**

Sandra L. Anagnostakis, *The Connecticut Agricultural Experiment Station, New Haven*

Wednesday October 11

9:00 AM **Viruses of Plants and Fungi, Good and Bad (Hypovirus, Plum Pox).**
Bradley Hillman, *Rutgers University*

10:00 AM **Seeds as Vehicles for Pathogen Importation.**
Wade H. Elmer, *The Connecticut Agricultural Experiment Station, New Haven*

11:30 AM **Epidemiology and Management of a Periodically Introduced Pathogen (Blue Mold).**
James A. LaMondia and Donald E. Aylor, *The Connecticut Agricultural Experiment Station, New Haven*

2:00 PM **From Unappreciated Import to Unanticipated Control (Gypsy Moth).**
Ronald M. Weseloh, *The Connecticut Agricultural Experiment Station, New Haven*

3:00 PM **Pest Status, Ecology, and Control of Well Established Fruit Tree Pests (Leafminers).**
Chris T. Maier, *The Connecticut Agricultural Experiment Station, New Haven*

Thursday October 12

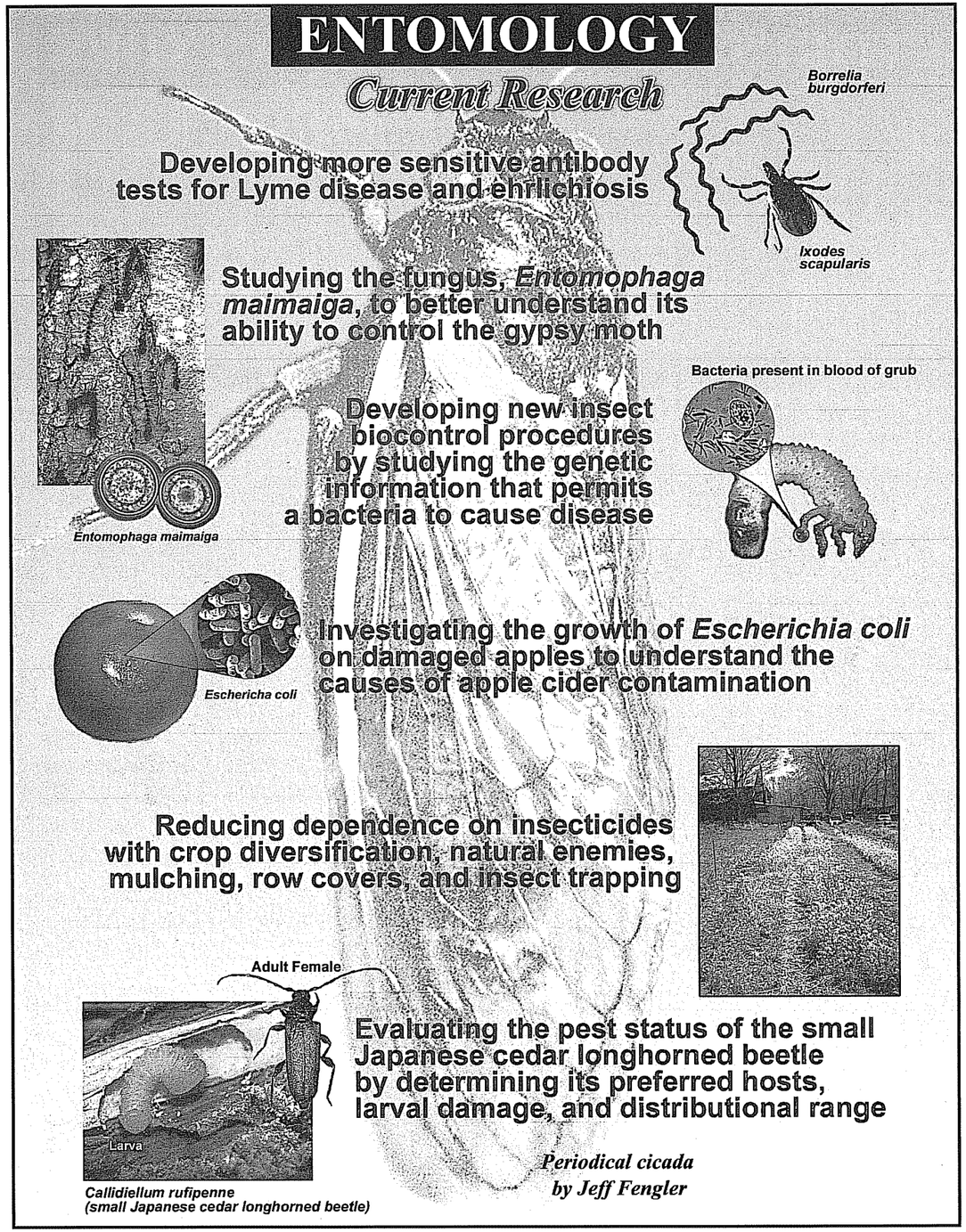
9:00 AM **Management and Biology of a Well Established Crop Pest (Colorado Potato Beetle).**
David Ferro, *University of Massachusetts*

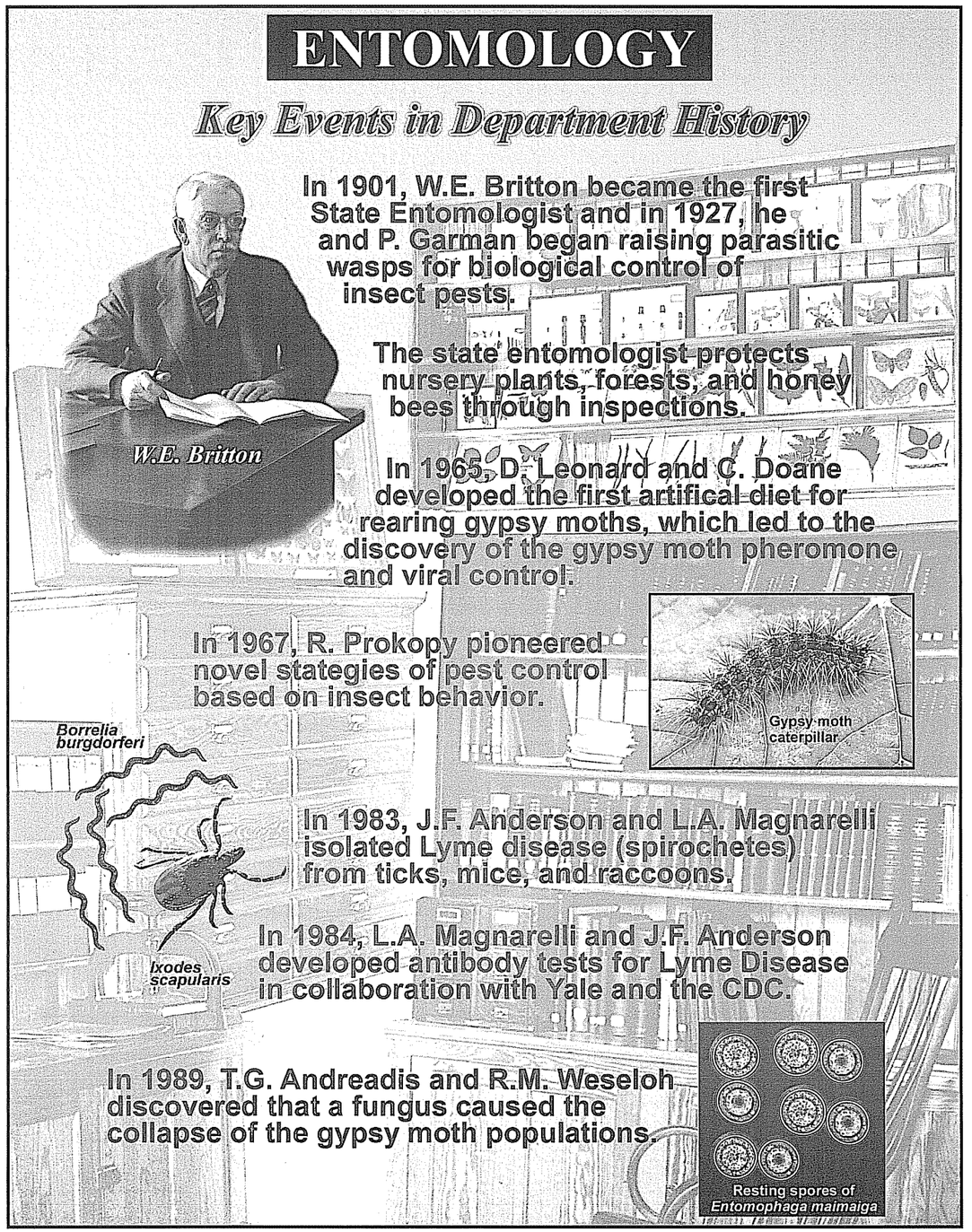
10:00 AM **Effect of Weather and Predators on Imported Insect Pests (Hemlock Woolly Adelgid).**
Mark S. McClure, *The Connecticut Agricultural Experiment Station, New Haven*

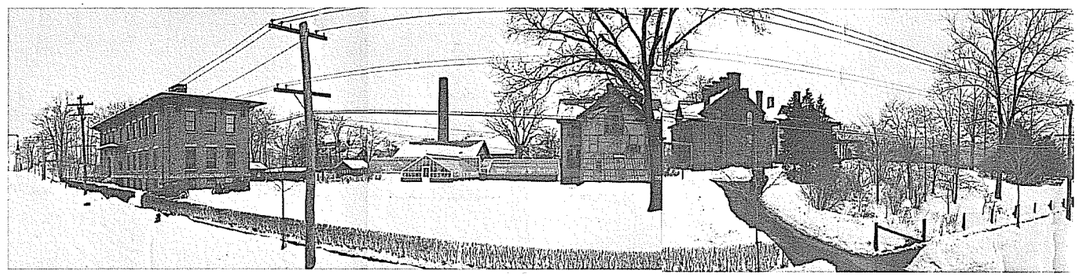
11:30 AM **Understanding and Suppressing Imported Pests (Scarab Beetles).**
M.G. Klein, *USDA/Ohio*

2:00 PM **Managing Exotic Forest Insects (Asian Long-horned Beetle).**
Dennis Souto, *USDA Forest Service/NH*

3:00 PM **Evolving Management Strategies for a New Exotic Forest Pest (Pine Shoot Beetle).**
Robert Haack, *USDA Forest Service/MI*





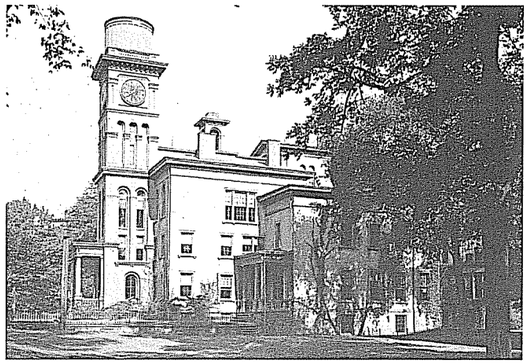


The Station's buildings circa 1922. Seen, from left, are the Johnson Laboratory, the heating plant stack, greenhouses, the Thaxter Laboratory, the Chemical Laboratory (now Osborne Library), and behind the evergreen trees, the Whitney Building, which, with the Thaxter Laboratory, was razed for construction of the Slate Building.

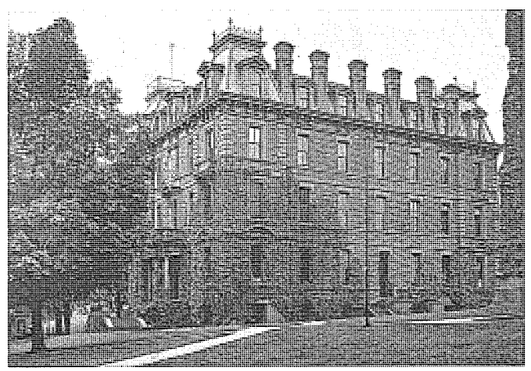
The Experiment Station's facilities over 125 years

The idea of state agricultural experiment stations was generated by Samuel W. Johnson, professor of agricultural chemistry at Yale University, at the time the Land-Grant College in Connecticut. Johnson envisioned putting science to work for agriculture in an institution supported by public funds and near, but not part of, an institution of higher learning. The 1875 General Assembly passed a bill appropriating $2,800 a year for two years, assigning management to the Trustees of Wesleyan College in Middletown. This location was chosen because Orange Judd offered free quarters in Orange Judd Hall, and he also made a grant of $1,000 to support the work.

Wilbur O. Atwater, a student of Johnson's was made Director, and he appointed Edward H. Jenkins, who was later to become Director of the Connecticut Station and H.P. Armsby who was later to become director of the Pennsylvania Station as assistants. The only report issued was presented before the January 1877 meeting of the State Agricultural Society, a sponsor of the Station. There was mention of the necessity for further legislation to continue the work of the Station, and a farmer stated that the work so far had saved farmers $50,000 in fertilizer bills.



Sheffield Hall at Yale University, the Experiment Station's second location after the move to New Haven in 1877.



Judd Hall where the Experiment Station started work on October 1, 1875 using laboratory facilities provided by Wesleyan University in Middletown.

There is no open record of events that led up to passage of the bill by the 1877 General Assembly "establishing" the Station, providing for management by a Board of Control composed of representatives of agriculture, Wesleyan, Yale, and appointees of the Governor, who was an ex-officio member of the Board. Samuel W. Johnson was directed to call the Board into session and organize the work.

Johnson was elected Director and obtained free quarters in Sheffield Hall (at the corner of Grove and Prospect Streets in New Haven) from Yale University. He also reappointed Jenkins and Armsby as assistants. There was some evidence that the move to New Haven came because Johnson was

unwilling to leave his post at Yale to direct the Station in a different location.

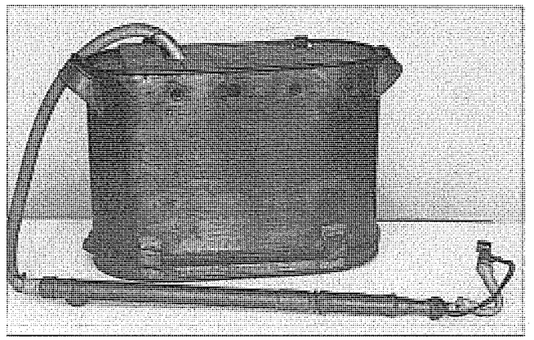
Within a few years, Yale asked the Station to find other quarters because the space was needed for students. The Board selected a tract on Suburban Street, which ran west from Whitney Avenue near the city line, and purchased it from Eli Whitney Jr. There was a large wooden house, a large barn and some outbuildings, an ice house, and a well on the premises. The state appropriation also funded a brick two-story chemical laboratory building, which was occupied when the Station moved to the site in 1882. The chemical hoods were vented through a complex of chimneys at the peak of the roof. The main house served as office space, and it is probable that the Director lived in it. At least he did at a later date.

In 1887 the Congress passed the Hatch Act, providing funds for an experiment station in each state, usually in connection with the agricultural college. The original bill would have excluded the Connecticut Station, as well as

Some of the Station staff in 1888, from left. First row, A.L. Winton, Thomas B. Osborne, Second Row, E.H. Farrington, Edward H. Jenkins, Top, Hugo Lange.

some "independent"stations in other states. The senators from Connecticut were able to change the wording of the act so that the Station was eligible. The Storrs Agricultural School, which had been taken over by the state in 1881, had grown to a college of agriculture and it too was eligible. The General Assembly voted that Storrs and the Connecticut Station should share in the funds. Duplication of effort was to be avoided by the presence of Johnson on the Storrs Board of Trustees.

The Hatch appropriations were used to construct a wooden laboratory, which looked like a colonial building, to the west of the chemical laboratory. Dr. Roland Thaxter was appointed botanist and was to concentrate on plant diseases. He stayed only a short time but made some important

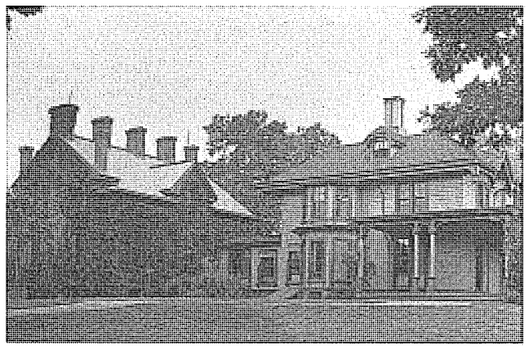


Sprayer devised by Roland Thaxter.

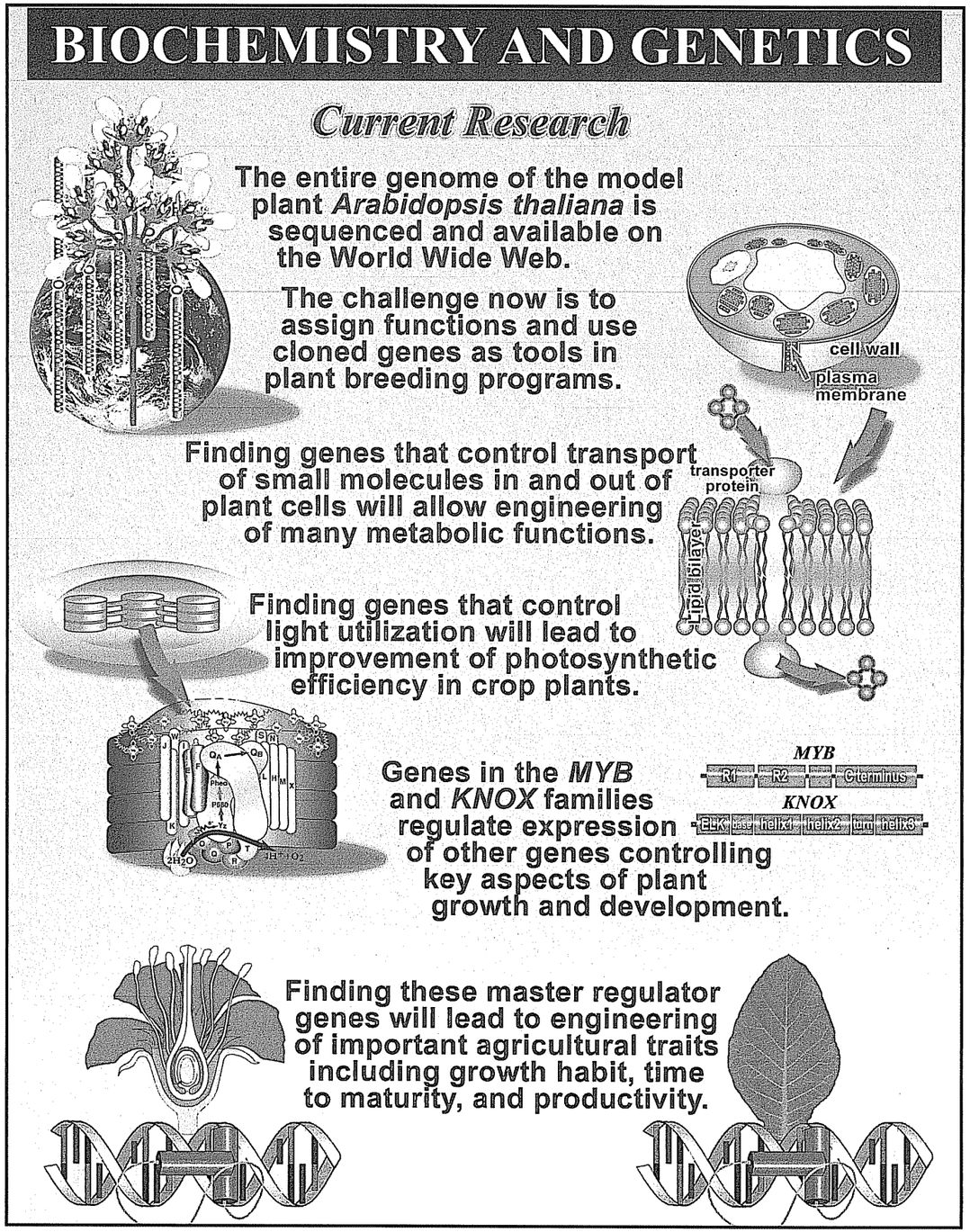
contributions. He built a hand sprayer using a copper wash-boiler for a tank, and demonstrated control of plant diseases using Bordeaux mixture. He also determined the cause of potato scab.

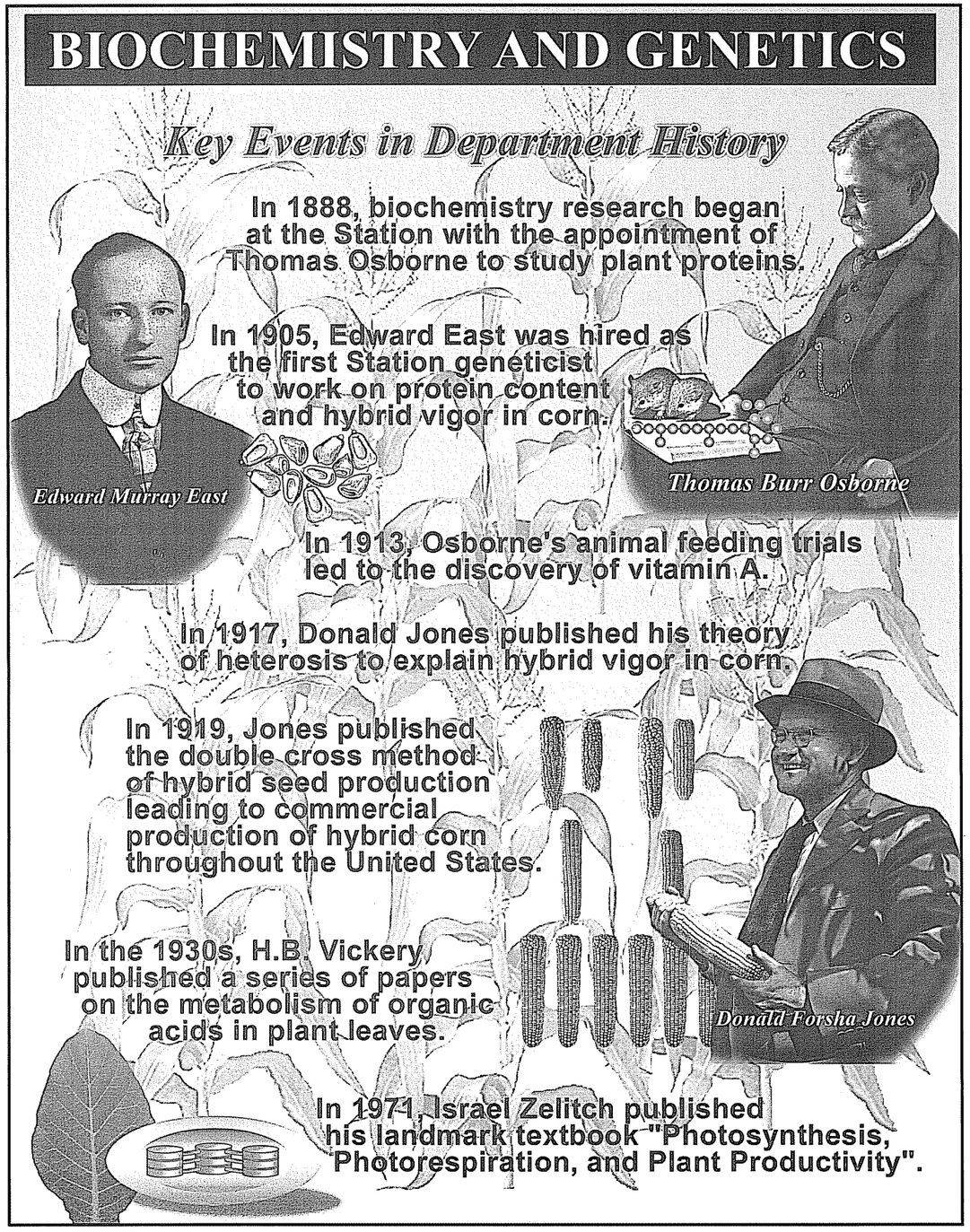
The earliest glass photographic negatives still in the files of the Experiment Station were dated about 1892. However, a print dated 1888 shows five staff members: chemists A.L. Winton, E.H. Farrington, Edward H. Jenkins, Thomas B. Osborne, and assistant Hugo Lange. Not included were Director Johnson, the Station secretary, and Thaxter.

The earliest photographs of the grounds show the Whitney Building, the Chemical Laboratory, and the Botany Laboratory. One photo shows Suburban Street, which followed the Station property line on the southeast and veered northwest across the area where the present Johnson Laboratory stands. There are several photos of the barn, one showing a buggy which was undoubtedly the Station transportation. (At a later date Dr. William E. Britton wrote to a farmer in North Haven that a proposed visit could not be made because the Director was using the Station "rig.")



The Chemical Laboratory, currently the Thomas B. Osborne Library, on the left and the Whitney Building on the right.





The Station's botanical laboratory in 1894.

In 1887 Jenkins started a forage garden on the Station grounds to the north of the barn. The main purpose was to determine grasses or other forage crops which furnished the most food for cattle. There also were plots of lawn grasses. In 1890 the Station planted a lawn grass garden in Manchester on the farm of J.B. Olcott, who had worked on the forage garden. Olcott collected both seed and sod, making at least one trip to Europe to get samples of sod. This grass garden seemed to have faded out by the early part of the 20th Century.

Around 1892 Whitney decided to develop more land. He owned considerable acreage in northern New Haven, on both sides of Whitney Avenue, as well as some in southern Hamden. The City of New Haven insisted on street development before approving any further use of the land in the area of the Station and also ruled that Whitney would have to pay any damages arising from the street layout. The Station grounds were elliptical in shape, and the approved layout took land from both the north and south sides. The Board negotiated for Whitney to pay $400 in cash damages and connect the Station to a sewer. Whitney died before the streets were constructed.

At about the same time, William R. Lockwood of Norwalk died and left half of his estate to the Station as trustee, the income to support agricultural research. The first money was received in 1900.

When the new street layout was completed, attorneys for the Whitney estate raised some objections to the authority of the Board of Control, which went to the General Assembly to get things settled. The Station received the $400, about an acre of land in addition to the original holding, and a connection to the sewer in Rock Avenue, now East Rock Road. The Station Report says that previously the Station sewage had been discharged on "other land belonging to Mr. Whitney."

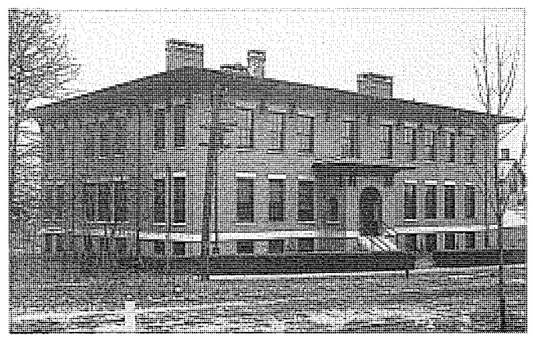
In 1900, Jenkins succeeded Johnson as director and land was purchased in Windsor for forestry. In 1901 Jenkins wrote that the abandoned farmland in the state should be reforested and especially noted the value of forests in eliminating pollution of water. The original land was used for grafting of nut trees and for other experiments. A short time later land in another part of Windsor was purchased and reforested as the Rainbow tract. This was abandoned tobacco land of marginal value, and it was gradually replanted to various forest trees.

In 1901 the depredations of San Jose scale, which had arrived in 1894 or 1895, stimulated the General Assembly to establish the office of State Entomologist to inspect nurseries, experiment on control of insects, publish results, and conduct extension. In the same year the Assembly created the office of State Forester at the Station and gave authority to fight forest fires and to grow seedlings for reforestation. Seedlings were grown on the Station grounds in the area formerly used for the forage garden, and later a nursery was established at Rainbow. The Station also imported seedlings from Germany as the only available source for large numbers at reasonable cost. Responsibility for control of forest fires was transferred to the Park and Forest Commission in Hartford a few years later (1921), and for growing of seedlings in the late 1930s.

Both Entomology and Forestry were crowded into the Botany Laboratory. Osborne started his studies of plant proteins in 1902. Two years later the Carnegie Foundation granted funds for the study of proteins and Osborne and Lafayette B. Mendel started their fruitful collaboration which discovered vitamin A and the essentiality of amino acids.

Congress passed the Adams Act in 1905, appropriating funds for more fundamental research. Jenkins decided to go into genetics, particularly of corn, and brought Edward Murray East from Illinois to start the work. Jenkins in his usual way spread his bets by having East also work on potatoes.

The year 1905 also marked the construction of a new chemical laboratory, now the east wing of the Johnson Laboratory. This was a stark brick building, two stories and a basement, with what must have been a furnace room and coal storage to the west. This structure allowed the Station



The Johnson Laboratory after the addition in 1910.

Some of the attendees at the Experiment Station's first "Field Day" in Hamden in 1910.

library to move to the old chemistry building.

In 1909 growing pains encouraged an appropriation for an addition to the Chemical Laboratory. A brick and concrete addition was made on the east. In January 1910 the original building was destroyed by fire, probably of incendiary origin. The fire occurred when the streets were covered with snow and ice, and the fire equipment could not get up the Huntington Street hill.

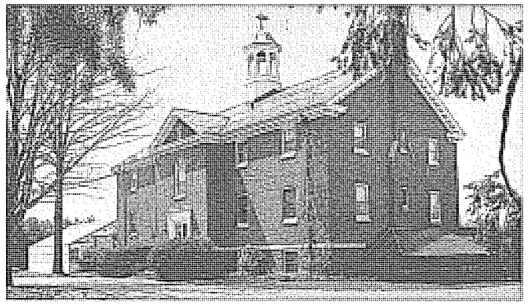
The Board of Control collected the insurance on the chemistry building and immediately reconstructed it with concrete floors (the interior was originally wood). The Board also borrowed $6,500 to complete construction and equipping. Johnson had died in 1909, and the building was named the Johnson Laboratory in his honor at ceremonies held in the summer of 1910.

For several years the Station had leased farmland in Centerville (Hamden) from James Webb who was on the Station Board of Control for many years. After the dedication, the visitors adjourned to these plots for the first field day (probably traveling by trolley).

The Johnson Laboratory housed analytical and biochemistry, forestry, botany, and entomology. The botany laboratory, later named for Thaxter, was turned over to the geneticists. In 1910 Lockwood Farm in Mt. Carmel (Hamden) was purchased with income from the Lockwood Fund. It was selected because it had some bearing orchards. More orchards were planted, and the lease on the Centerville land was terminated.

From early days, the Station had worked on tobacco, particularly fertilization for high quality leaf. At the beginning of the 20th Century Jenkins introduced the concept of shade to produce thin leaves with flat veins. Methods of curing were also studied, and an experimental curing barn was built in Windsor. This building still exists and can be recognized by the presence of a brick chimney.

In 1921 a group of tobacco farmers with whom the Station had collaborated purchased land in Windsor and sold it to the Station for a tobacco experiment station. The deed restricts use of the land to this purpose. A small wooden laboratory was built, together with a greenhouse. One of the first uses of the land was construction of a lysimeter by the new Soils Department established in 1923. This furnished



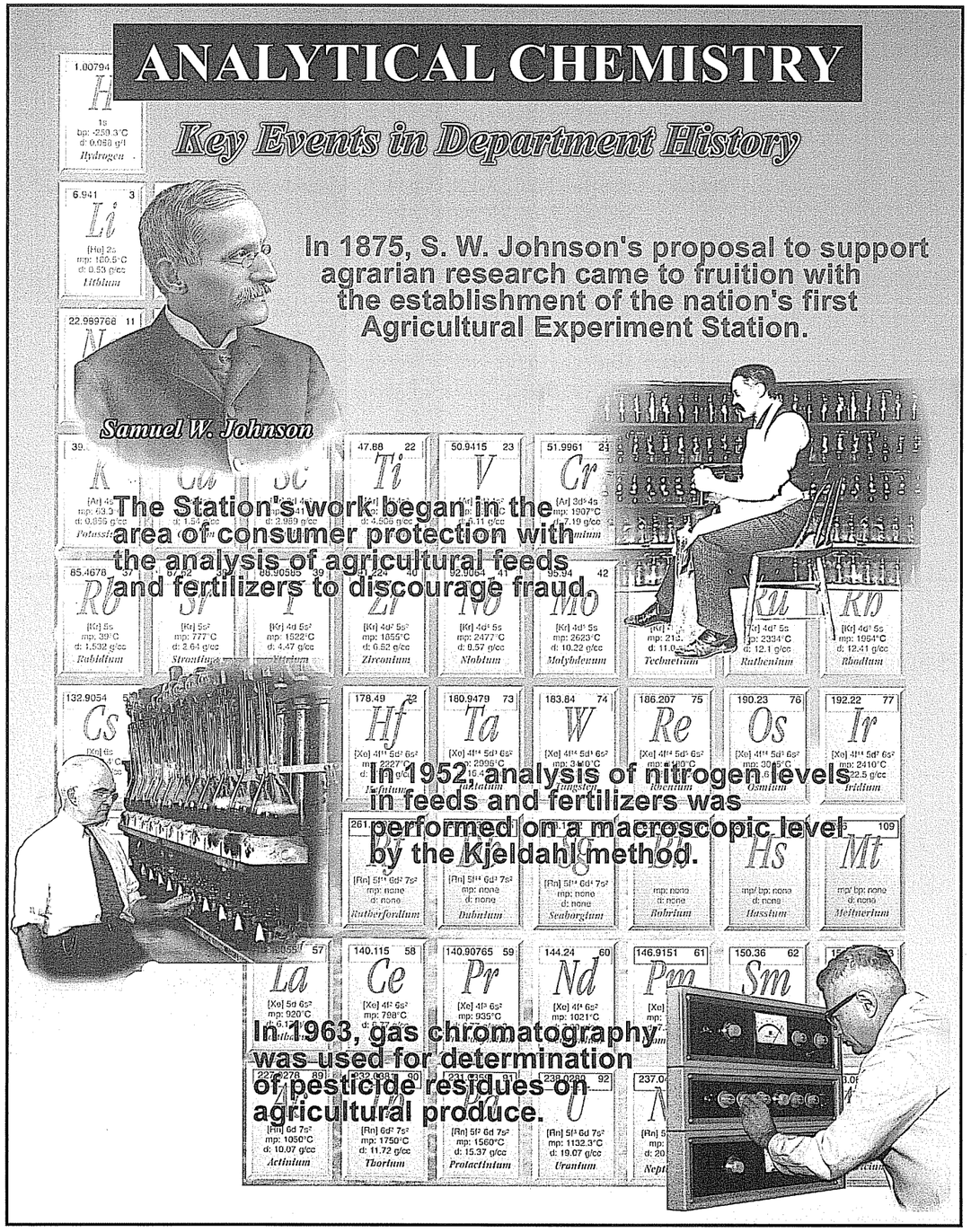
Valley Laboratory in Windsor

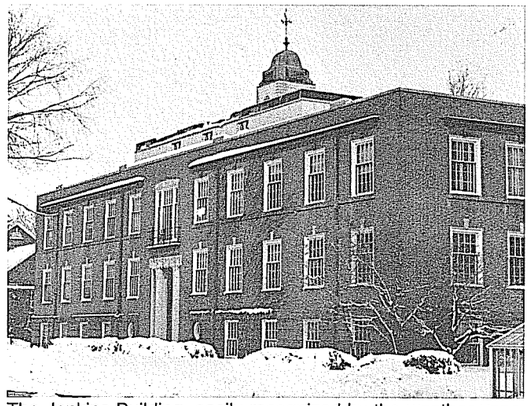
valuable information on the loss of nutrients from the tobacco soils by leaching.

A photograph labeled "Station Staff" dated 1910 shows eight young women in the attire of the day. Unfortunately no one identified the members of the group. At the time there were six women on the staff. In the 1919 report, the Board of Control included resolutions on the death of Miss E.L. Terry, the first staff member to die while still working. Miss Terry was a graduate of Mt. Holyoke and was assistant to Osborne. She was the first woman granted an M.S. degree in physiological chemistry by Yale in 1913. The final paragraph of the resolution reads, "By her ability she won a place among scientific investigators and by her high courage in the fact of very difficult conditions she earned the respect and affectionate regard of all of her associates."

The group photo also included Miss E.M. Brautlecht, later librarian and bookkeeper (the equivalent of the present business manager), Miss Luva Francis, long associated with

Women on the Station staff in 1910.



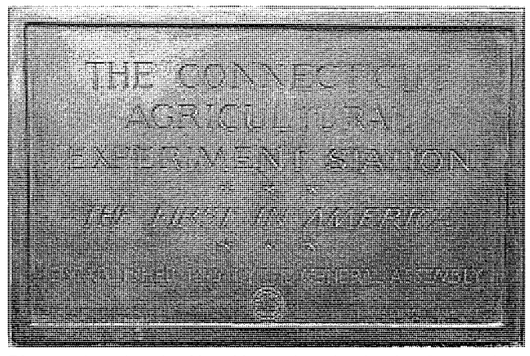


The Jenkins Building, easily recognized by the weather vane at the top of the cupola. The architect was Douglas Orr.

the Biochemistry Department, and Miss Jagger, the seed tester, later Mrs. E.M. Stoddard. When Miss Brautlecht died some time after her retirement, she left her "estate" to the Experiment Station, about $200.

In the early days, the Station was responsible for its own extension. Staff talked to groups of farmers and at institutes organized by the Agricultural Society and the Grange. Many staff joined the Grange. The college at Storrs was growing steadily by the turn of the century and made several attempts to get extension going. One of the chores at the Station was preparation of exhibits for the various agricultural fairs.

In 1912 there was an upheaval at Storrs and the Director departed. After considerable discussion the Trustees of the College approached the Board of Control with the proposal that Jenkins also serve as Director at Storrs. The proposal was accepted and the Director at New Haven continued as Director at Storrs until 1947.



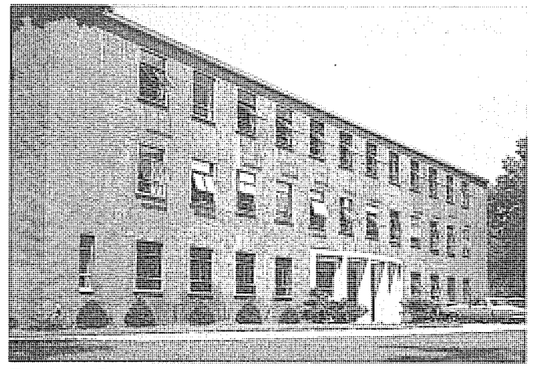
Plaque placed at the New Haven location by the Connecticut Development Commission in 1950.

This arrangement helped the transition when the agricultural extension service was organized and took over extension. The Board of Control (and to a great extent the staff) welcomed this transfer because it freed staff members for the important business of research.

In 1925 Director Jenkins retired and William L. Slate was appointed Director. Slate had originally been brought to Storrs by Jenkins as an agronomist. Later he was transferred to New Haven as Vice-Director.

The next major building constructed was the Jenkins Laboratory, which just got under the wire before the Depression stopped all state building. It was constructed to house botany, entomology, forestry, and genetics, and for the first time to provide laboratory facilities for these departments. Entomology had used space in the basement of the library for rearing parasites of the Oriental fruit moth, and its insecticide laboratory had been the abandoned coal bin in the Johnson Laboratory. The Thaxter Laboratory was given over to soils.

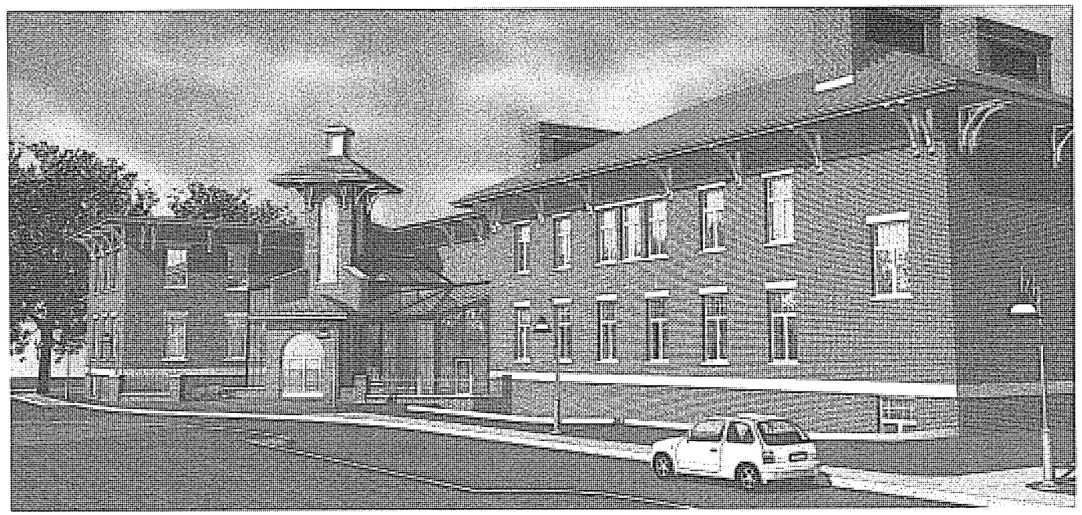
During the Depression, Station staff participated in



The Slate Building.

several emergency programs to provide employment: mosquito control, Dutch elm disease control, and general forestry in the CCC camps. Later in the Depression, funds for buildings became available. The building housing the Jones Auditorium was constructed as an addition to the power house and assembly room, and included both the present garage and laboratories for rearing parasites. It was completed in 1942. The Tobacco Laboratory (now the Valley Laboratory) in Windsor was constructed under another provision that permitted new buildings. It was completed in 1941.

The original chemistry building had the chimneys removed first, and in 1955 was rebuilt by removing all the wooden construction, and replacing one floor with two. Although it was possible to construct a fireproof building, the Governor at the time endorsed the desire of the Director



Artist's rendering of the Johnson-Horsfall Laboratory, which will be an addition to and a complete renovation of the existing Johnson Laboratory.

and Board of Control to preserve the façade of this building, named Osborne Library because of Osborne's work in it, and because he donated his chemical library to the Station.

In 1959 both obsolescence and crowding were taking their toll, and the Board sought a new laboratory. The Governor supported the idea but insisted that some of the obsolete floor space be demolished rather than be saved to be maintained at heavy expense. The old Whitney Building had some sentimental value, but was never occupied by Eli Whitney and needed major structural repairs. Both the Thaxter Laboratory and the Whitney Building yielded to the construction of the new building.

A fireplace mantel from the Whitney Building was installed in the Board Room of the new Slate Laboratory, and the more beautiful mantel from the Thaxter Laboratory was moved to the Director's office.

The final major building project in the first century was reconstruction of the Johnson Laboratory. In this case the structure was sound but the arrangement inefficient, and the plumbing and electrical wiring entirely inadequate. Funds were obtained and this historic structure was renovated.

The auditorium in the Britton Building was renovated twice. First, to produce the modern auditorium named after Donald F. Jones in the early 1970s and again in the late 1990s to update it and make it accessible.

At the Valley Laboratory, the small auditorium was renovated and named for Gordon S. Taylor, longtime head of the Valley Laboratory and the old lysimeter was renovated to rear lady bird beetle predators of the hemlock woolly adelgid. This facility was named in honor of Kenneth White, a Hamden landscaper who had great interest in the Station's attempts at biological control of the adelgid.

The first new major construction of the millennium will be construction of an addition and a complete renovation of the Johnson Laboratory to update laboratory and office facilities for the Departments of Analytical Chemistry and Biochemistry and Genetics.

This article is a slightly edited and updated version of a talk prepared by Neeley Turner, for the 100th anniversary of the Station in 1975.

Plaque showing the Station's Designation as a National Historic Landmark.

The 125th Anniversary Committee

Station

John F. Anderson, Paul Gough, Louis A. Magnarelli
Michael Last, Roberta Ottenbreit

Friends

Lee Bauerfeld, Richard Bowerman, John Lacadie
John Lyman III, Paul Mazik, Phyllis Mazik
Robert Mullane, Grace Nome. Norma O'Leary,
Steve Pope, Edwin Tucker, Pamela Weil

Table decorations were provided by the Connecticut Green Industries
(Connecticut Florists Association, Connecticut Greenhouse Growers Association, and Connecticut Nursery & Landscape Association).

Nile virus in crows and other birds in many parts of the state, helping policy makers base decisions about warnings, control or other public health measures on accurate information from numerous monitoring locations.

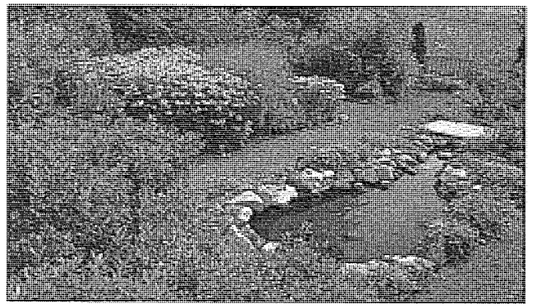
THOUSANDS OF **TICKS ARE IDENTIFIED** and many of these are tested to learn if they carry the spirochetes that cause Lyme disease, helping physicians determine if treatment is advisable and to monitor the rates at which infected ticks occur in Connecticut.

Connecticut has a multimillion dollar nursery industry which needs **PROTECTION FROM FOREIGN INVADERS** THAT THREATEN VALUABLE CROPS and inspections that allow transport (and therefore sales) of their Connecticut-grown plant materials to buyers out-of-state. Nurseries are registered and inspected and shipments certified as required.

Bees are a valuable resource, not just for the honey they produce, but as pollinators of crops such as fruit trees and some vegetables. **BEEKEEPERS ARE REGISTERED**, hives inspected for mites and bacterial diseases, and quarantines are invoked if necessary to protect bees from disease or other threats.

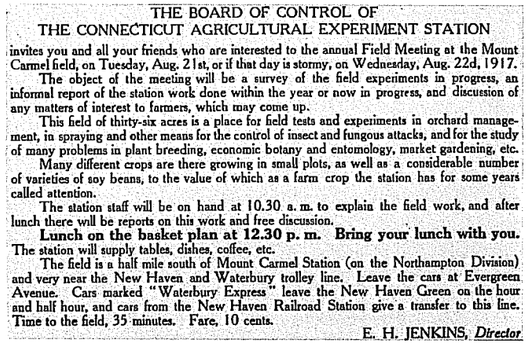
Lockwood Farm in Hamden, with the Sleeping Giant in the background, serves as the location of many experiments and the annual Plant Science Day open house.

Three times a year STATION FACILITIES ARE OPENED TO THE PUBLIC FOR **SPECIAL EVENTS**. Plant Science Day in the Spring, held in the Jones Auditorium in New Haven, covers various topics of interest to home gardeners and gives attendees an opportunity to visit laboratories and greenhouses. Plant Science Day on a Wednesday in August is held at Lockwood Farm in Hamden. Visitors have an opportunity to hear talks, view exhibits, see demonstrations, and visit over 60 farm plots covering the wide range of work of Station scientists. Agricultural Chemistry Night in the fall in New Haven features talks and laboratory visits highlighting work of the Department of Analytical Chemistry.



Part of the Station's Bird and Butterfly Garden at Lockwood Farm.

THE STATION HAS **DEMONSTRATION GARDENS** showing horticultural crops discovered or introduced to the trade by Connecticut nurserymen. These nurserymen's gardens, installed with the assistance of the Connecticut Nurserymen's Association, are in New Haven, Hamden, and Windsor. In Windsor, a special garden is under development containing hundreds of shrubs and flowers to assist those seeking to become certified nurserymen identify plants. A different demonstration garden is under development at the Experiment Station's Lockwood Farm in Hamden. This Bird and Butterfly Garden, installed and maintained with the assistance of the Federated Garden Clubs of Connecticut and the Spring Glen Garden Club, shows the plants that can be grown in backyards or parks to attract birds and butterflies.



THE BOARD OF CONTROL OF
THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

invites you and all your friends who are interested to the annual Field Meeting at the Mount Carmel field, on Tuesday, Aug. 21st, or if that day is stormy, on Wednesday, Aug. 22d, 1917.

The object of the meeting will be a survey of the field experiments in progress, an informal report of the station work done within the year or now in progress, and discussion of any matters of interest to farmers, which may come up.

This field of thirty-six acres is a place for field tests and experiments in orchard management, in spraying and other means for the control of insect and fungous attacks, and for the study of many problems in plant breeding, economic botany and entomology, market gardening, etc.

Many different crops are there growing in small plots, as well as a considerable number of varieties of soy beans, to the value of which as a farm crop the station has for some years called attention.

The station staff will be on hand at 10.30 a. m. to explain the field work, and after lunch there will be reports on this work and free discussion.

Lunch on the basket plan at 12.30 p. m. Bring your lunch with you. The station will supply tables, dishes, coffee, etc.

The field is a half mile south of Mount Carmel Station (on the Northampton Division) and very near the New Haven and Waterbury trolley line. Leave the cars at Evergreen Avenue. Cars marked "Waterbury Express" leave the New Haven Green on the hour and half hour, and cars from the New Haven Railroad Station give a transfer to this line. Time to the field, 35 minutes. Fare, 10 cents.

E. H. JENKINS, *Director*

A copy of the invitation to Plant Science Day held at Lockwood Farm in Hamden in 1917. The tradition of Plant Science Day began in 1910 when farmers visited rented land used for experiments and has continued as an annual event, except during World War II.

THE STATION OFTEN HOSTS COLLEGE OR SCHOOL **GROUPS** for tours to help spread the word of its research projects and also to inspire a new generation of students to see science as a possible career.

Station serves public and State agencies

The Connecticut Agricultural Experiment Station had its beginnings as a scientific service agency, making analyses of fertilizers for farmers so they could learn the nutrients in the products they purchased before they experienced a crop failure because the nutrient-laden "guano" they purchased was really mud from New Haven Harbor. The science of the chemist could identify the nutrients and their composition.

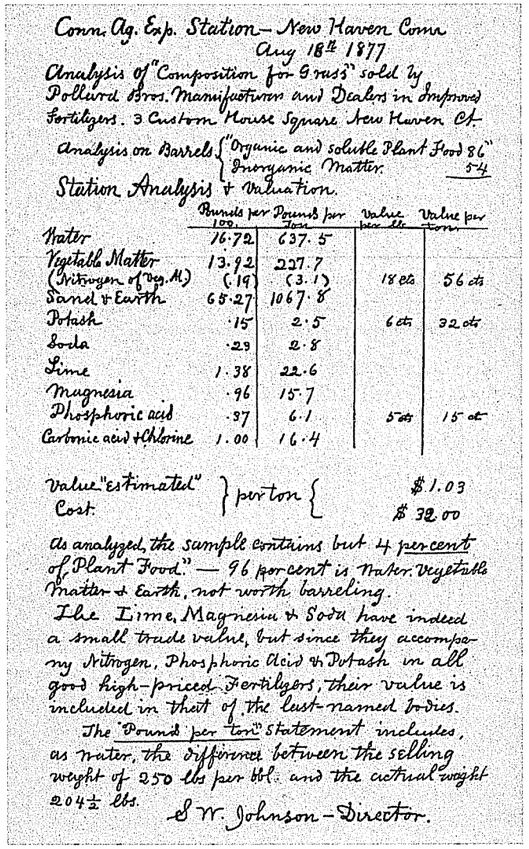
NOT SURPRISINGLY, THIS **CONSUMER PROTECTION** WORK CONTINUES after 125 years with food analyses for the Department of Consumer Protection; fertilizer, seed, and animal feed analyses for the Department of Agriculture; alcohol analyses for the Department of Revenue Services; and pesticide and PCB analyses for the Department of Environmental Protection. It also performs other tests as needed for agencies such as the Department of Administrative Services, which may ask the Experiment Station to test a product being proposed for purchase or to determine if an already purchased product meets standards. While some of the products tested may change over the years, and the methods used for detecting violations are very different from the time when the Station was established, the Experiment Station has always been ready, willing and able to put its scientists to work to help protect farmers and other consumers from problems ranging from innocent mistakes to outright fraud.

CITIZENS WITH **QUESTIONS ABOUT PLANTS OR INSECTS** MAY CALL, write, or visit the Station in New Haven or Windsor for expert analysis and sound information about their problem. Many times the proper identification of a plant disease or insect helps a wider group than the single citizen bringing the problem to the Station. On occasion a new problem may be discovered because of a citizen inquiry, such as the discovery in 1998 of the small Japanese cedar longhorned beetle on an arborvitae branch brought to the Station.

During the past few years THE STATION HAS ESTABLISHED A **HOME PAGE** to make information available to a wider audience 24 hours a day. Fact sheets and an On-Line Plant Pest Handbook help provide information.

Several dozen agricultural and natural resource organizations and state agencies use STATION FACILITIES FOR **MEETINGS** which inform and serve the public. The Donald F. Jones Auditorium in New Haven and the smaller Gordon S. Taylor meeting room in Windsor are used for many meetings, and, on occasion, Lockwood Farm in Hamden hosts an outdoor meeting.

THE STATION PROVIDES FREE **SOIL TESTS** for Connecticut citizens at both Windsor and New Haven to help them grow better crops and help reduce unnecessary fertilizer that may leach into ground water.



Conn. Ag. Exp. Station— New Haven Conn
Aug 18th 1877
Analysis of "Composition for Grass" sold by Pollivod Bros. Manufacturers and Dealers in Improved Fertilizers. 3 Custom House Square New Haven Ct.
Analysis on Barrels { "Organic and soluble Plant Food 86"
Inorganic Matter. 54
Station Analysis & Valuation.

	Pounds per 100	Pounds per Ton	Value per lb.	Value per Ton
Water	16.72	637.5		
Vegetable Matter	13.92	227.7		
(Nitrogen of Veg. M.)	(.19)	(3.1)	18 cts	56 cts
Sand & Earth	65.27	1067.8		
Potash	.15	2.5	6 cts	32 cts
Soda	.29	2.8		
Lime	1.38	22.6		
Magnesia	.96	15.7		
Phosphoric acid	.37	6.1	5 cts	15 cts
Carbonic acid + Chlorine	1.00	16.4		

Value "estimated" } per ton { $1.03
Cost: $32.00

As analyzed, the sample contains but 4 per cent of Plant Food." — 96 per cent is Water Vegetable Matter & Earth, not worth barreling.
The Lime, Magnesia & Soda have indeed a small trade value, but since they accompany Nitrogen, Phosphoric Acid & Potash in all good high-priced Fertilizers, their value is included in that of the last-named bodies.
The "Pounds per ton" statement includes, as water, the difference between the selling weight of 250 lbs per bbl. and the actual weight 204½ lbs.
S. W. Johnson—Director.

A copy of Bulletin Number 1, produced in 1877, reporting fertilizer sold for $32.00 per ton had an estimated value of $1.03 per ton.

STATION SCIENTISTS SERVE THE PUBLIC BY GIVING **TALKS** about their work to garden clubs, school groups, general audiences, and professional groups throughout the state. Such talks help keep Station scientists in touch with problems in the field as well as inform the public of recent advances in laboratories.

Each spring and summer, when mosquitoes become active, the Experiment Station has participated in a multi-agency effort to learn of disease threats from mosquito-borne viruses by COLLECTING AND **TESTING MOSQUITOES.** During the past few years, eastern equine encephalitis and West Nile virus have been found in mosquitoes and West

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The Long Ridge School – An independent school for children two years old through grade five providing excellence in education since 1938

Best Wishes for The Station's
Continued Success at
Useful Discovery by
"Inquiries and Experiments Regarding Plants,
Insects and the Pests of Plants,
Soil and Water"
(Connecticut General Statutes 22-81).

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Jane F. West, American Association of University Women

George and Dorothy Whitney

Diane Worden, The Nature Center

Experiment Station was goal of Samuel W. Johnson

The Connecticut Agricultural Experiment Station was the result of the vision and persistence of Samuel W. Johnson, the son of a New York farmer and founder of the State Agricultural Experiment Stations. Although Johnson's father thought farming, medicine and the law were the only way to make a decent living in the mid-1800s, the younger Johnson pursued a career in science and helped launch agricultural research in the United States.

Johnson was a bookish young man driven by an interest in natural science and a desire to put science to work for society. Some of his first scientific experiments were in a small laboratory at the family farm when he was 18 years old. After graduation from Lowville Academy, Johnson taught general school subjects for several years before becoming an instructor in science at the Flushing Institute on Long Island and at the State Normal School in Albany.

In 1850, he entered Yale Scientific School to study agricultural chemistry. As was necessary in those days to succeed in science, Johnson studied for two years in Germany. There he saw the German Station at Moeckern, which was the first of its kind. The German name for this institute was literally "Agricultural Experiment Station." Johnson, who often wrote for *The Cultivator* and *Country Gentleman*, described the work of the experiment station in an article. During the fall of 1855, Johnson returned to New Haven to become chief assistant at the Yale Scientific School chemical laboratory. In 1856 he was appointed to the chair in agricultural chemistry.

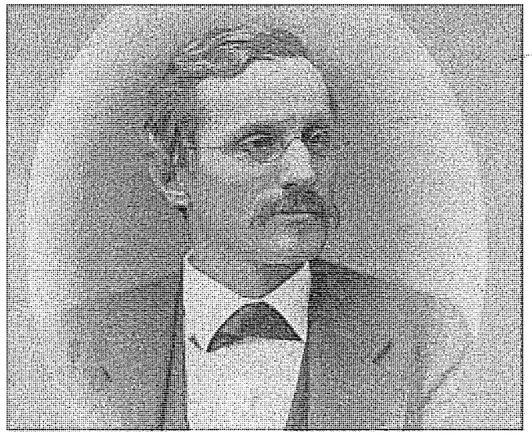
Johnson built support for an experiment station by offering farmers information they could use on the composition of fertilizer, based on scientific analysis rather than the often fraudulent claims of manufacturers.

Gaining fame through his writings and speeches, Johnson was invited to lecture before the New York State Agricultural Society at its annual meeting in February 1856. In that lecture, Johnson set forth his ideas on what science could do for agriculture and described the European stations and their work. To combat the problem of fraudulent products, Johnson suggested "if the manufacturer knew that every month or so a new analysis of his fertilizer would be published on behalf of the farmer…he would find himself compelled to be not only honest, but careful in his business."

Back in New Haven, Johnson revived his earlier practice of evaluating fertilizers and was hired in 1857 by the Connecticut Agricultural Society to perform such analyses and to issue reports for farmers.

He issued three annual reports, but the outbreak of the Civil War in 1861 led to the demise of the Agricultural Society. After the war ended, the State Board of Agriculture was set up, and Johnson was appointed its chemist, holding that position until 1898.

After returning from the February 1872 convention of



Samuel W. Johnson

agricultural colleges in Washington, Johnson renewed his campaign for an experiment station. At a Board of Agriculture meeting in December 1873, Johnson and W.H. Brewer of Yale discussed German experiment stations and his protégé, Wilbur O. Atwater, spoke on commercial fertilizers. Johnson, not surprisingly, reported the unanimous opinion of its members that "the State of Connecticut ought to have an Experiment Station as good as can be found anywhere, and they are of the opinion that the legislature of the state ought to furnish the means."

The Board of Agriculture held 17 meetings in different parts of the state at which Johnson, Atwater, and others stumped for the establishment of an experiment station. A bill was drawn up for the 1874 legislature; the Agricultural Committee tabled it. After this, Orange Judd, trustee of Wesleyan University and agricultural publisher, offered the Board of Agriculture use of a laboratory at Wesleyan, the services of Atwater, who had been appointed chemist at the university, and $1,000 to start the station.

The following year the legislature accepted this offer and on July 20, 1875, appropriated $2,800 to the Trustees of Wesleyan University to be used in employing "competent scientific men to carry on the appropriate work of an Agricultural Experiment Station" for two years. The Connecticut Agricultural Experiment Station started its work in Orange Judd Hall at Wesleyan on October 1, 1875. Any disappointment that Johnson may have felt at having his idea implemented by his student rather than by himself was resolved two years later in 1877 because, before the initial appropriation ran out, the legislature passed a new law establishing a Board of Control, which appointed Johnson to serve as Director.

its life. The preparation contained 2.70 per cent. ammonia, camphor, opium and 75 per cent. of alcohol. **Annual Report 1909-1910.**

On account of our experience the previous year in finding nests of the brown-tail moth on nursery stock imported from France, and the continued absence of any Federal inspection of such stock, in order to protect the state from wholesale and rapid infestation with this most undesirable pest, an attempt was made to inspect all woody nursery stock brought into Connecticut during 1910....The inspection of this imported stock required an amount of time equivalent to one man's work for more than two months. One man could not have examined it all, however, without great delay and in some cases serious injury to some of the stock. In the rush of the season the services of three men were required on some days, all in different nurseries. **Annual Report 1909-1910.**

The Station has bought a farm of twenty acres at Mount Carmel, not far from the city, including a small house for the caretaker, has set out an orchard of apples and peaches for experiment, has begun an experiment on the effect both on the crop and on the soil of fertilizers and manures, and another on the handling of an old and neglected orchard. **Annual Report 1910.**

25546. Nyal's Spring Sparilla Compound. "The cultivation of cheerfulness of mind, purity of life, and habits of cleanliness, greatly conduce to aid the medicine in the cure of disease." This delightful truism cannot be contradicted, but can hardly be considered as a specific recommendation for this particular preparation. **Annual Report 1911.**

*It is an indisputable fact that the soda waters and soda water syrups sold in this state are grossly adulterated with chemical preservatives, saccharin and artificial colors and flavors....***Annual Report 1911.**

Experiments have shown that some still unknown substance is essential to growth and that this unknown substance is present in milk. Much work is being done in an effort to discover and isolate this substance. **Annual Report 1913.**

Cocaine, Heroin and Morphine. Seventeen samples of these drugs were analyzed in connection with the police crusade against their sale in New Haven. One sample was a mixture of cocaine and B-eucaine with milk sugar. Another sample suspected of being cocaine gave reactions for alkaloids, but too faint for identification. Nine samples proved to be heroin and five morphine. Another sample suspected to be morphine was milk sugar. The examination of these samples and the testimony given in court in connection with them, resulted in the conviction of distributors of these drugs in New Haven....The direct result of this New Haven campaign was the passage of a stringent law by the last legislature regarding the sale of narcotic drugs in this State. **Annual Report 1913.**

Cases of violent illness and death, following the eating of chestnuts from trees infested with chestnut bark disease, occurred last year in the state. Certain physicians and others attributed these effects to a poison developed by the disease. A careful study by the botanist revealed no evidence of any direct connection between the blight fungus and the illness. Small quantities of the pure blight fungus were eaten by the botanist, without any resulting discomfort, and white rats fed largely on infected chestnuts and various preparations containing the fungus developed no symptoms of poison. **Annual Report 1914.**

The chemical department is being called upon frequently by the police to identify habit-forming drugs found in possession of those who trade in them illicitly. This has been done without charge and necessary testimony given in court. **Annual Report 1914.**

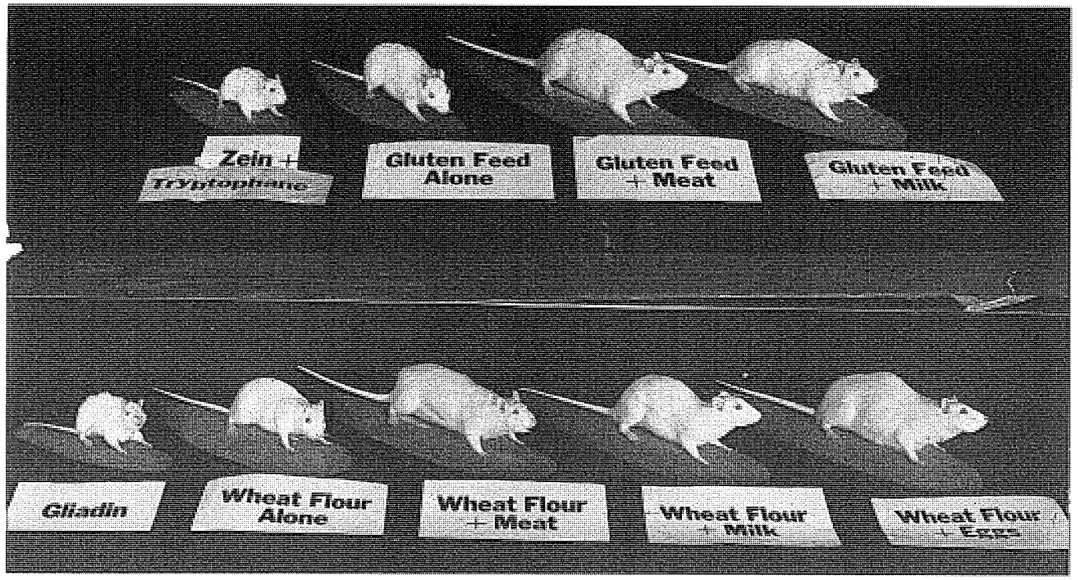
Due to rising feed costs and uncertainty of transportation, interest is increasing in corn for grain in Connecticut. **Annual Report 1941.**

Of over 100 organic chemicals, five or six have shown promise in retarding the progress of the Dutch elm fungus in small (3-6' tall) elms, or in preventing growth of the fungus if applied before the trees become infected. **Annual Report 1941.**

Another fungicide recently developed here is juglone. This...substance...excreted by walnut roots.... is known to kill tap-rooted plants like alfalfa and tomatoes. Laboratory tests with the synthesized form of juglone prove that this material is more toxic than copper oxide, commonly used as a fungicide before the outbreak of the war. **Annual Report 1942.**

We have been distributing the bacteria which cause "milky" disease of the grubs for several years and have studied its effect on the grub population. **Annual Report 1943.**

The Station's soil testing service is becoming increasingly useful to the people of the State. The many new names on the record show that the public is becoming more and more aware of its existence. Repetition of the same names year after year shows that people benefit by the reports and have come to depend upon this service. **Annual Report 1944.**



Rats used in early experiments to show the effects of various foods and proteins on growth and development.

While employed at the Station, Mr. H.L. Viereck roomed in a new six-story building having a restaurant on the top floor. This restaurant was overrun with croton bugs or cockroaches. A man who was employed to destroy them visited the place at intervals and distributed roach powder on the top floor of the building, which drove the roaches down the steam pipes into other parts of the building. A number of Mr. Viereck's book bindings were ruined by the roaches. **Annual Report 1904.**

The discovery of the dreaded gypsy moth at Stonington has made an unusual demand on the time and resources of the entomologist. Before the first of May, the brush was cut and burned on 5 acres known to be infested and thirty acres were destroyed. Over 1,500 trees were banded and examined throughout the summer, and about 10,000 of the caterpillars destroyed. About forty new egg masses were destroyed after August 1st. Much work has been done in clearing land of brush and thus preventing a further increase of the infected area as well as facilitating the work of extermination within this area. The State Board of Agriculture has contributed $800 to meet a part of the expense of this work. **Annual Report 1905.**

Mr. F.V. Stevens, Jr., tree warden of Stamford, informs the writer that the chestnut disease, which has proved so serious in the vicinity of New York City and on Long Island, has become common in the neighborhood of Stamford. He also reports having seen the trouble in one or two other places in the state. Dr. Murrill, of the New York Botanical Garden, has carried on extended investigations during the past three years, and finds that a particular fungus is responsible for the injury. This fungus produces cankers in the bark, and in times becomes so general on an infested tree as often to kill it. While most injurious so far to native chestnut, it also occurs on the chinquapin and the European chestnut, but has been found only occasionally on the Japanese. **Annual Report 1907-1908.**

Beaver Swamp, near New Haven, has long been regarded as unsanitary and as a source of malaria, even before the cause of malaria and its methods of transmission were known. In the mosquito survey made by this Station in 1904, this swamp was found to be the most prolific source of Anopheles, or malarial mosquitoes, about New Haven. **Annual Report 1907-1908.**

Dr. Clinton, Station botanist, was given two months' leave of absence, being commissioned by Harvard University to visit Japan to find and bring back alive, if possible, a fungus which is parasitic on the gypsy moth and which may be useful in fighting the same insect here. This somewhat difficult work he did successfully. **Annual Report 1909-1910.**

Two samples marked "Cough Medicine" and one marked liniment were submitted. One of the cough medicines was found to be identical with the liniment. This careless error in labeling of the New Britain druggist made a child, who took the medicine, violently ill and threatened

Lockwood establishes trust fund

In the year covered by this report, the Station has received a portion of a bequest by William R. Lockwood, Esq., deceased, late of Norwalk. He died June 10, 1896, and left a will dated January 9, 1894, devising a portion of his estate to the Connecticut Agricultural Experiment Station, in trust. The Board of Control accepted the bequest and trust at its Autumn Meeting, October 13, 1896, which action was further confirmed, and Wm. H. Brewer was made special agent for purposes pertaining to the transaction of the necessary business, at a special meeting held January 5th, 1897....

Mr. Lockwood had been interested in this Station and its work from its very inception, and in directing the use of the income, he used essentially the language of the Act of Establishment of the Station in the 4th section of the will. "I give, devise and bequeath the other equal half part of such residue and remainder of my estate to the Connecticut Agricultural Experiment Station, a corporation or institution of that name, created and established by an Act of the General Assembly of the State of Connecticut, passed in the year 1877, and approved March 21, 1877, as trustee, in trust, to have, hold, manage and take care of the same, and to maintain the principal or capital thereof as a perpetual fund, for the following uses and purposes, to wit;" and giving authorization and power to the "said trustee, at its discretion" to sell, buy, invest, etc., for the preservation of the property bequeathed, to meet the expenses incident to its preservation and management, and "to use and apply all the balance or net income in the promotion of agriculture by scientific investigation and experiment, and by diffusing a knowledge of the practical results thereof among the people of the State of Connecticut in such manner as shall be deemed by the Board of Control or governing body of said institution for the time being, most practicable and generally useful."

The Act cited as establishing the Station begins its first section with the words, "That for the promotion of agriculture by scientific investigation and experiments, an institution is hereby established, to be known as the Connecticut Agricultural Experiment Station."

Mr. Lockwood was a frequent attendant at annual agricultural conventions held by the State Board of Agriculture and was familiar with all the facts relating to the original establishment of the Station, and with its later operations. He wisely left the use of the income in such shape that it might be applied to any line of scientific investigation for the promotion of agriculture, which the judgement the board of control might deem most promising of practical results. He was reasonably familiar with the actual work of the Station and its results, and had often expressed his commendation.

This Station was the first of its kind in the country to be established by any State, as Mr. Lockwood well knew, and now he comes forward as the first person in America to bequeath any considerable sum as a permanent endowment for scientific agricultural research. He has the honor to be the leader in this special beneficence, of such far reaching to his native state and of wider benefit to all mankind.

Wm. H. Brewer, Treasurer in the Annual Report 1900

The other half of Mr. Lockwood's estate was left for the life use of his only son. But under the terms of the will, his son having died without heirs in May 1902, this second half ultimately came to the Station. Exclusive of some worthless securities, the Lockwood estate, chiefly in good securities, consisted in part of real estate in the vicinity of Norwalk and in Washington, DC....Under the terms of the will, if the Station ceases to exist...the whole fund is to be given to the Sheffield Scientific School without reservations.

Fifty Year Sketch by E.H. Jenkins.

Experiments lead to discovery of vitamins

In 1909, Thomas B. Osborne, a chemist at the Experiment Station who was son-in-law of Samuel W. Johnson, invited Lafayette B. Mendel of Yale to join him in his research. The team used rats to study the nutritive properties of proteins Osborne had prepared from seeds of all of the ordinary crop plants.

Osborne and Mendel maintained albino rats upon diets made of pure protein, starch, lard, and a salt mixture. Although these rats lived for many months, they ultimately lost weight and died unless their diet was changed to include whole milk powder.

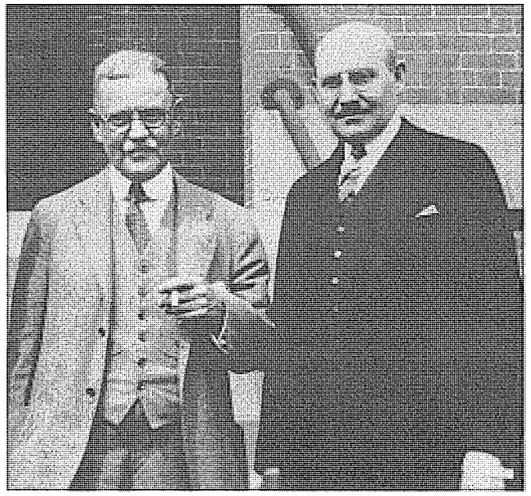
Upon further studies it appeared that the inorganic constituents of milk played an important part in recovery. For further experiments, Osborne and Mendel removed all of the milk proteins and evaporated the filtered whey to obtain a dry product that contained the sugar lactose and the minerals.

Using the "protein-free milk" as the basic food, the Connecticut scientists were able to maintain rats indefinitely by adding certain purified proteins.

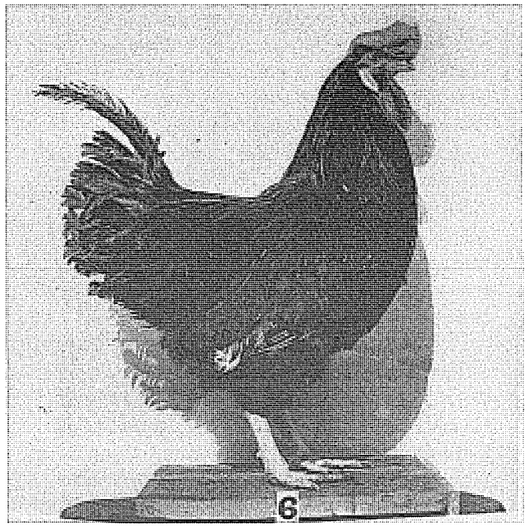
They were also able to demonstrate the nutritive inadequacy of certain proteins such as gliadin in wheat or zein in corn. Both were deficient in certain amino acids, the simpler components which make up proteins.

Further work showed that animals fed a protein-deficient diet or a diet low in the amino acid lysine were stunted. However, they began to grow immediately after lysine was added to their diet.

This was the experiment that showed that certain essential amino acids must be supplied by food because animals have a limited capacity to produce their own.



Thomas B. Osborne, left, and Lafayette B. Mendel.



A Rhode Island Red chicken, one of the first to be grown in confinement, on rations developed at the Experiment Station.

Although Osborne and Mendel knew they could raise rats to old age on whole milk powder and that protein-free milk helped to maintain rats on artificial diets for long periods, something was missing. That something appeared to be the butter in the whole milk powder diets.

Thus, butter was added to the diets of rats that were declining on protein-free milk diets. Recovery was almost immediate. The Connecticut scientists reported it appeared "as if a substance exerting a marked influence upon growth were present in butter." Those words reported the discovery of what would later be called vitamin A.

In the meantime, in Wisconsin, Osborne's former student Elmer V. McCollum—working with Marguerite Davis—encountered failures in their rat-feeding experiments similar to those of Osborne and Mendel.

The Wisconsin scientists tried butter and an ether extract of eggs in their artificial diets and made the same discovery as Osborne and Mendel in Connecticut.

Although discovery is the goal of scientists, they must also publish their results so that others may build upon them. McCollum and Davis submitted a report to the *Journal of Biochemistry* exactly three weeks before Osborne and Mendel submitted theirs. Because of this, the Wisconsin scientists are credited with the first report, but it is quite clear that the discoveries were made independently.

The discoveries of Osborne, Mendel, McCollum, and Davis developed within a few years into the vitamin theory

in transit.... At least a dozen should be gathered if they can be found, and if insects are accompanied by a sample of their work and notes regarding it, so much the better. **Annual Report 1900.**

In the smallest village, as well as in the largest city, trees can only be protected by the creation of an intelligent public sentiment on the subject. Small villages can more easily produce and maintain exceptionally fine shade trees than can cities, where "modern improvements" do so much to damage them, and few material things add more to the attractiveness of small country places and their value to those who are seeking temporary or permanent homes, than well-shaded and well-kept streets. **Annual Report 1900.**

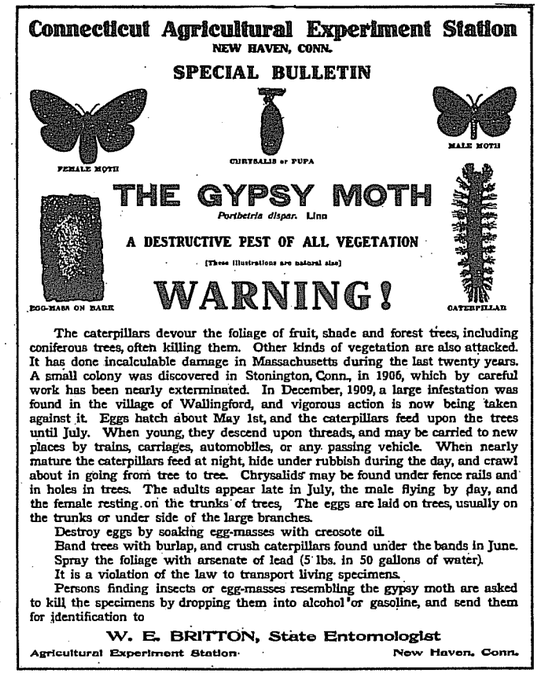
In July of the present year, a sample of low-priced green tea from a consignment purchased for use in a city almshouse was sent to this Station for examination. The sample was found to contain 11.5 per cent. of dried tea fruit or berry....The flowers of various plants are often mixed with tea, to impart fragrance, and tea blossoms, it is said, are also used to some extent for this same purpose, but tea berries, having probably no value whatever, are doubtless added merely as an adulterant. **Annual Report 1901.**

To make of our Connecticut woodland and idle land what ought to be made of them, there is needed more intelligent management of such lands; above all, protection from fire. Timber must come to be regarded as a regular crop, and be cared for as such. This will come with a gradual diffusion of knowledge regarding the fire problem, regarding the general aims and methods of rational forest management, and regarding the details of a practicable system of managing Connecticut woodlands and of establishing forests on idle lands. **Annual Report 1901.**

During the autumn months there have been meetings and basket picnics on the Station grounds of the New Haven Co. Pomona Grange and of the State Pomological Society. Two afternoons have also been devoted to the members of the senior class of the New Haven State Normal School who were specially concerned with the methods and results of the work in the chemical, botanical and entomological laboratories. **Annual Report 1902.**

In case of any serious insect outbreak, or the introduction into the State of any dangerous species, if specimens are sent to this office, an investigation will be conducted at once and measures will be taken to suppress it. **Annual Report 1902.**

A beginning has been made of observations regarding the mosquito in this state, with a view to lessening this nuisance. **Annual Report 1903.**



Connecticut Agricultural Experiment Station
NEW HAVEN, CONN.
SPECIAL BULLETIN

FEMALE MOTH — CHRYSALIS or PUPA — MALE MOTH

THE GYPSY MOTH
Portheiria dispar. Linn
A DESTRUCTIVE PEST OF ALL VEGETATION
(These illustrations are natural size)

EGG-MASS ON BARK — CATERPILLAR

WARNING!

The caterpillars devour the foliage of fruit, shade and forest trees, including coniferous trees, often killing them. Other kinds of vegetation are also attacked. It has done incalculable damage in Massachusetts during the last twenty years. A small colony was discovered in Stonington, Conn., in 1905, which by careful work has been nearly exterminated. In December, 1909, a large infestation was found in the village of Wallingford, and vigorous action is now being taken against it. Eggs hatch about May 1st, and the caterpillars feed upon the trees until July. When young, they descend upon threads, and may be carried to new places by trains, carriages, automobiles, or any passing vehicle. When nearly mature the caterpillars feed at night, hide under rubbish during the day, and crawl about in going from tree to tree. Chrysalids may be found under fence rails and in holes in trees. The adults appear late in July, the male flying by day, and the female resting on the trunks of trees, The eggs are laid on trees, usually on the trunks or under side of the large branches.

Destroy eggs by soaking egg-masses with creosote oil.
Band trees with burlap, and crush caterpillars found under the bands in June.
Spray the foliage with arsenate of lead (5 lbs. in 50 gallons of water).
It is a violation of the law to transport living specimens.
Persons finding insects or egg-masses resembling the gypsy moth are asked to kill the specimens by dropping them into alcohol or gasoline, and send them for identification to

W. E. BRITTON, State Entomologist
Agricultural Experiment Station. New Haven, Conn.

A warning to Connecticut citizens about the gypsy moth published in 1909.

I believe that this is the first agricultural station in this country to which has been committed by state law the work of examining food products. Each year there has been made in its report some contribution of permanent scientific value to our knowledge of the methods of examination of these products. Interest in the subject of pure food is rapidly increasing and one state after another is enacting laws modeled after those of Massachusetts and Connecticut. It has been our lot, besides making the tests of food products required by the letter of the law, to do some work of a pioneer nature, for the general good. **Annual Report 1903.**

Some collecting was done, and a portion of the region about New Haven was explored for the natural breeding places of mosquitoes. We have already taken thirteen species in the state. This important work will be continued and a careful survey made of the principal breeding places. The State Entomologist will be glad to hear from any localities where an organized effort is being made to prevent the breeding of mosquitoes, and will, if possible, institute an investigation of local conditions and give advice as to the best method of treatment. **Annual Report 1903.**

Virgil Churchill, the Station sampling agent during the early 1900s, on the bicycle he rode while collecting milk samples.

with a pasteboard cap labeled "Pure fruit jellies, W.P. & Co., Ayer, Mass." The fruits from which they were supposed to be prepared as given on other labels were orange, raspberry, currant, and grape. These jellies were found to consist of starch paste sweetened with glucose, artificially flavored, colored (in all cases but one) with coal-tar dye and preserved with salicylic acid. **Annual Report 1898.**

Of 332 samples of spices sold in bulk which have been examined at the Station during the past three years, 127 or 38.3 per cent. of the whole number, have been found adulterated....As the purchaser has no ready means of distinguishing between the pure and the adulterated, the only safe course is to buy spices in sealed packages, bearing the name of a reliable house whose goods have not been found adulterated. **Annual Report 1898.**

Since the coming of the Japanese chestnuts a new interest in chestnut culture has been awakened in Connecticut. The native chestnut grows naturally throughout the State and covers a considerable portion of the wooded area. Trees have been cut over many acres and some of the sprouts issuing from the stumps are of a suitable size to graft. **Annual Report 1898.**

Several new localities infested with San Jose scale have been brought to light during the year. One of the most important things to note, however, is the bringing into the State of two other species closely resembling the San Jose scale, and probably just as undesirable. Both were shipped into Connecticut upon nursery stock and according to the statement of the purchasers each came under a certificate of inspection. **Annual Report 1899.**

The agent was provided with a bicycle carrying in the frame a case containing 18 cans for samples. This case is similar in construction to those used by bicycle tourists for carrying traveling necessities, but is divided into compartments for the cans and the whole of one side opens so that any one of the cans can be removed without disturbing the others. The sampling agent, between the hours of four and seven a.m., rode from street to street and bought a pint of milk of each milkman whom he met, without making known the object of his errand. He also noted the name of the milkman or his dairy as given on the wagon, or if there was nothing on the wagon, he asked the driver for the name of the man who carried on the business. The agent thoroughly mixed the sample of milk and filled one of the tin cans with it. **Annual Report 1900.**

A particularly reprehensible adulteration, because very likely to prove injurious to health, is that practiced by the Southern Soda Works, Nashville, Tenn., manufacturers of number 1175, Sweetheart, One Spoon, Baking Powder. This preparation contains more than twenty-five per cent. of a ground rock, insoluble in strong acids and consisting chiefly of silicates of magnesia. Prof. S.L. Penfield of Yale University, kindly examined this material and found it to be a mixture of pulverized talc and tremolite, a series of hornblende, which is much used as a filler in the paper manufacture. The tremolite appears under the microscope in sharp needle-like splinters which make it a dangerous admixture in food. **Annual Report 1900.**

A series of analyses included twenty-five samples of Connecticut ground waters, twenty-four springs and one well. For the twenty-five samples eleven were normal waters, and fourteen showed some evidence of past contamination. All the contaminated samples but two, appeared to have been very satisfactorily purified from the chemical standpoint in the natural process of filtration and oxidation to which the water had been subjected. **Annual Report 1900.**

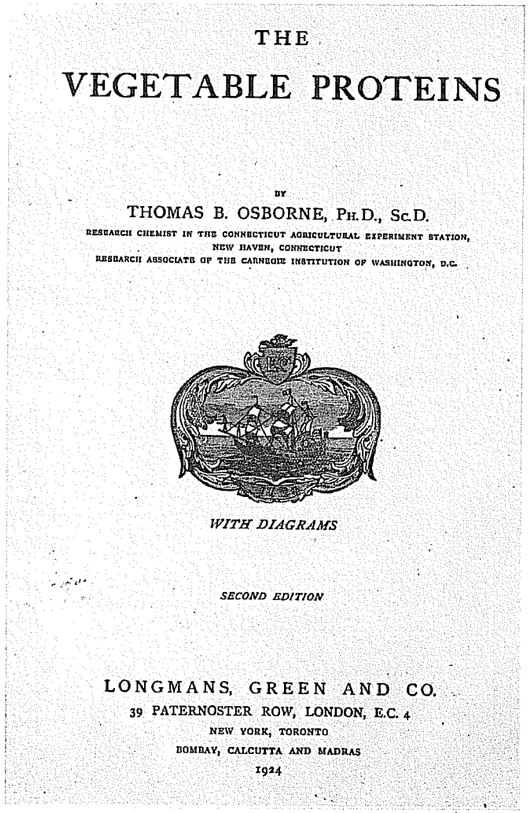
There is still great need of field observations regarding the insects of our State, and no person is in a better position to make such observations than the grower. Familiarity with the pests that attack his crops cannot be otherwise than advantageous to the agriculturist. The Station is prepared at all times to determine insects and give such information regarding them as will enable growers to employ the best treatment known in fighting them. Specimens should be collected and packed with some of their food plant, in a tin, wooden, or pasteboard box, and sent by mail to the Station. If sent in a letter the specimens are liable to be so crushed that recognition is impossible. The mailing box only needs to be strong enough to prevent crushing. Ventilation is not necessary, as the box contains all the air needed by insects

of nutrition. Their discoveries led to the conquest of vitamin deficiency diseases such as scurvy, rickets, beri-beri, and others, and also improved the health of the general population.

Further investigations by Osborne and Mendel showed that the unknown factor—later called vitamin A—was present in cod liver oil, a substance long esteemed in medicine. After World War I the eyesight of thousands of children in Europe was saved through the use of cod liver oil supplements.

Osborne and Mendel showed that chickens could be raised to maturity on an artificial diet which contained the vitamin. This discovery laid the foundation for the present-day poultry industry. In Wisconsin, McCollum and Davis used the curative effect of butter on a vitamin A deficiency-caused eye disease of rats as a test for the vitamin.

Through extensive studies of rice and lactose they were able to conclude that there was a second type of essential


THE

VEGETABLE PROTEINS

BY

THOMAS B. OSBORNE, PH.D., SC.D.

RESEARCH CHEMIST IN THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN, CONNECTICUT

RESEARCH ASSOCIATE OF THE CARNEGIE INSTITUTION OF WASHINGTON, D.C.

WITH DIAGRAMS

SECOND EDITION

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1924

Title page of a book by Thomas B. Osborne which summarized much of his work on the proteins of vegetables.

George Smith, left, and Rebecca Hubbell weighing a rat used in tests for vitamin D in milk. The rats were fed rations deficient in vitamin D and milk collected by the Station inspector. The milk passed if the rats did not develop a deficiency disease. Circa 1948.

nutritive factor. The first—vitamin A—was soluble in fat, while the second was soluble in water. The presence of vitamin B as a contaminant in Osborne and Mendel's protein-free milk was undoubtedly why this material was successful in early feeding tests.

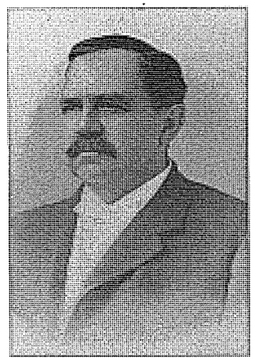
The lasting scientific value of this early nutritional work can be illustrated by the work of O.E. Nelson, who once worked at the Connecticut Station, and E.T. Mertz at the Indiana Experiment Station. In 1963 they became interested in the amino acid composition of the proteins of corn. One strain they studied was the so-called opaque-2 which was discovered in Connecticut in 1930.

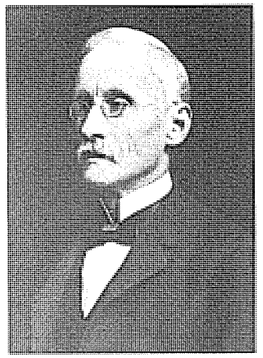
Analysis of opaque-2 revealed that this variety contained proteins rich in both lysine and tryptophan.

Feeding tests with rats and pigs showed that both species grew much more rapidly on "high-lysine" corn. Experiments by others in Central America and Colombia involving children whose normal diets consisted largely of corn showed that they benefited greatly from high-lysine corn. Also, children afflicted with the deficiency disease kwashiorkor recovered quickly if they were fed high-lysine corn.

These experiments in Connecticut, Wisconsin, and Indiana show agricultural research cannot only fill stomachs, but fill them with nutritious, healthful food.

Station Directors, 1875-2000


Atwater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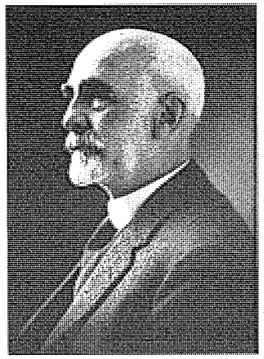
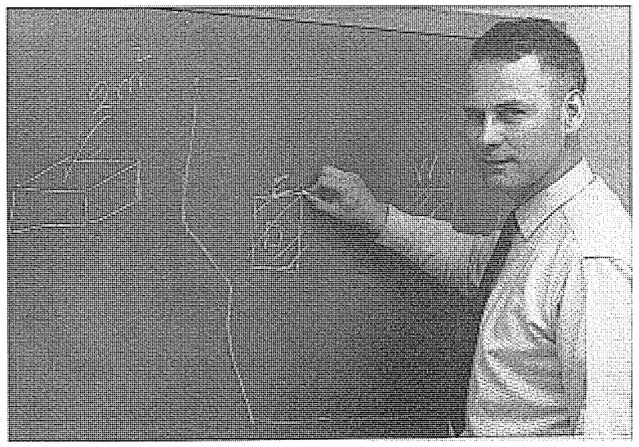

Jenkins

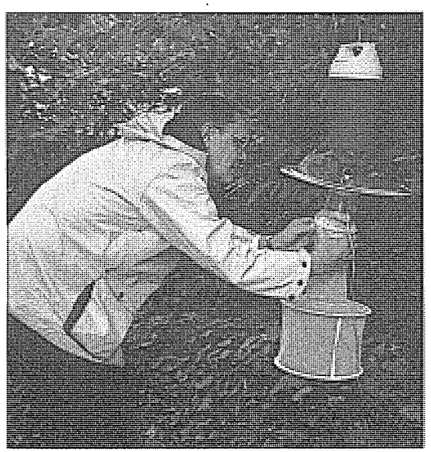

Slate

The Connecticut Agricultural Experiment Station has had only seven directors during its 125 years. Station directors and their terms are:

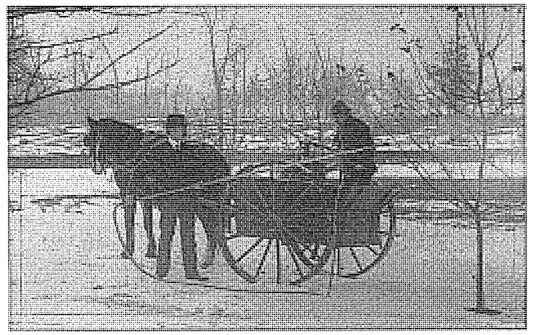
Wilbur O. Atwater 1875-1877
Samuel W. Johnson 1877-1900
Edward H. Jenkins 1900-1922
William L. Slate 1923-1947
James G. Horsfall 1948-1971
Paul E. Waggoner 1972-1987
John F. Anderson 1987-2004
Louis A. Magnarelli-2004-


Horsfall


Waggoner


Anderson

This page courtesy of Marilynn and John Anderson


B.H. Walden spraying a tree on December 19, 1902.

Station, and experiments of this nature cannot otherwise be made. **Annual Report 1889.**

This fungus when cultivated in an absolutely pure condition on nutrient substrata and thence transferred to growing tubers with the necessary precautions, reproduces in them the disease called (potato) scab, from which it was originally obtained, the observations and experiments made so far being convincing, to the writer at least, that the two are directly associated as cause and effect. **Annual Report 1890.**

The Station is prepared to analyze and test fertilizers, cattle-food, seeds, milk, and other agricultural materials and products, to identify grasses, weeds, moulds, blights, mildews, useful or injurious insects, etc., and to give information on various subjects of Agricultural Science, for the use and advantage of the citizens of Connecticut. The Station does not undertake sanitary analyses of water. **Annual Report 1894.**

Specimens of wood sent by an orchardist living near New London from trees which were dying or dead, proved to be affected with the dreaded San Jose scale. Dr. Sturgis and Mr. Britton immediately visited the orchards, directed the course of treatment to keep the disease in check, till a winter treatment could be used to eradicate it, and a Bulletin was at once issued to call the attention of fruit growers to the subject. **Annual Report 1895.**

Mr. J.B. Olcott has continued the study of native and foreign turf-making grasses in the Grass Garden at South Manchester. The garden has been considerably enlarged during the year by collections made in England, France, Denmark and Austria by Mr. Olcott. **Annual Report 1896.**

The first publication of this Station on Foods was issued in July, as Bulletin No. 123, and covers seventy-nine pages, giving a detailed account of the examination of eight hundred and forty-eight articles of food, thirty per cent. of which were adulterated. **Annual Report 1896.**

In every case the purchasing agent asked for lard and there was sold to him an imitation or substitute without any statement of hint that it was not pure lard. The prices paid ranged from seven to twelve cents per pound and averaged 9.3 cents. **Annual Report 1896.**

Eighty-nine per cent. of the ground coffee found on sale was grossly adulterated. The adulterants detected were peas, "imitation coffee," "pellets" (pea hulls and starchy matter made into granules), wheat, rye, and chicory. Only two samples of pure ground coffee sold in bulk were found on sale. **Annual Report 1896.**

During the month of May one hundred and five samples of milk were bought by agents of the Station from grocers and a few bakeries in all parts of the city of New Haven. The analysis of these samples show the general quality of the milk sold by grocers, which is quite likely to be rather poorer than that delivered by milkmen to families. **Annual Report 1896.**

It may well be that the free publication and circulation of the simple facts that such and such foods and drinks are thus and so adulterated, and the A & B have sold and are offering for sale this and that falsified article, will in time effectually check the demand for and commerce in adulterated goods. **Annual Report 1897.**

*During the last twenty years, the Connecticut Agricultural Experiment Station, in accordance with the act establishing it, has annually made and published analyses of every brand of fertilizer made, sold or offered for sale, in the State that could be collected by its special agents. During this time, the adulterated or fraudulent fertilizers, that for twenty-five years previously, were common in our markets, have practically disappeared, and, as respects them, the intelligent farmer has been efficiently protected from deception and fraud....***Annual Report 1897.**

Several States to which Connecticut nurserymen are shipping nursery stock have passed laws forbidding entry into those States stock from nurseries which have not been inspected within the year, and requiring with each shipment a certificate of inspection. In response to requests from our nurserymen, Mr. Britton has made eleven inspections of nurseries, and in eight cases has given the desired certificate. **Annual Report 1898.**

Samples Nos. 9502 to 9506 inclusive are interesting frauds. Each was put up in a tumbler which was covered

Excerpts from Early Annual Reports

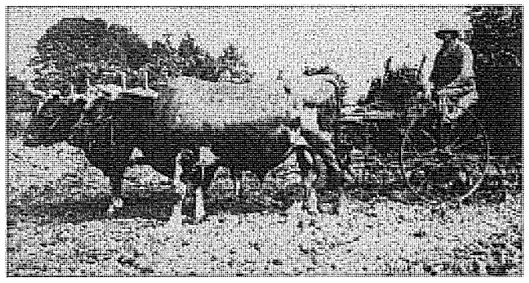
It has been felt from the first, that more abstract scientific investigations would afford not only the proper, but also the most widely and permanently useful work of an Agricultural Experiment Station. Such an institution will be worthy of its name in proportion as it carries on accurate and thorough investigations and experiments in agricultural science. **First Annual Report 1876.**

These results of chemical analysis confirm the general verdict of experience, which places our red rock soil among the best, while it shows that, excepting the sulfuric acid, this rock is about equally rich in all the needed elements of plant food. **Annual Report 1878.**

The advantage of spreading manure from the wagon as it is drawn out are, a saving of labor and an even distribution of the soluble salts (ammonia, potash, phosphates, etc.), in the soil by rain. If the manure is heaped on the field and gets a heavy rain before spreading, the ground under the heaps receives an undue share of the best part of the manure. **Annual Report 1879.**

To the General Assembly of the State of Connecticut: The Sheffield Scientific School of Yale College, which has furnished accommodations free of expense, since the establishment of the Station in 1877, gave notice at the end of the fourth year of this arrangement that it would need its rooms for instruction at the end of the five years named in its original offer, which would be June 30, 1882. This necessitates that provision be made for the future accommodation of the Station, and your Honorable Body will be asked to make a special appropriation to furnish a place and facilities for its work. **Annual Report 1881.**

At the request of Hon. J.B. Tatem, the Dairy Commissioner, the Station has examined 61 samples of suspected butter obtained by the Commissioner in different parts of the State. Forty-seven of these were proved to be imitation butter. In thirty-nine cases suit was brought by the Commissioner against dealers in this article and in every case conviction was secured. **Annual Report 1886.**



In 1920, farmer George Carter produced the first commercial hybrid corn seed on his farm in Clinton using a team of Guernsey bulls to help cultivate the soil.

Besides receiving many calls from individual farmers the Station has been visited the last year by the Green's Farms Farmer's Club in a body and also by the Cheshire Grange, whose members to the number of seventy-five, came to the Station on an appointed day, bringing their lunch, and made a picnic on the Station grounds. It is hoped that other organizations of farmers will follow this example during the coming season. The Station officials will do all in their power to make visits interesting and profitable. **Annual Report 1887.**

Station Grounds, Laboratories and Offices are on Suburban st., between Whitney avenue and Prospect st., 1-5/8 miles North of City Hall. Suburban st. may be reached by the Whitney ave. Horse Cars, which leave the corner of Chapel and Church sts. Three times hourly, viz: on the striking of the clock and at intervals of twenty minutes thereafter. The Station has Telephone connection and may be spoken from the Central Telephone Office, 346 State st., or from Peck and Bishop's Office in Union R.R. Depot. **Annual Report 1888.**

During April and May, special agents of the Station, Messers. E.C. Ellwood of Green's Farms, and C.L. Gold, of West Cornwall, visited 144 cities, towns, and villages in the State and drew 887 samples of fertilizers, reporting also cases where the requirements of the fertilizer law appeared not to be fully met. **Annual Report 1888.**

Fifty samples of molasses have been examined for the Dairy Commissioner. Of the first twenty-two samples collected by him after the passage of the law regarding the adulteration of molasses, nine were found to be mixed with glucose; one also contained salts of tin. After giving public notice that after a fixed date, all sellers of such molasses would be prosecuted, further samples were drawn and sent here for examination, but they all proved to be pure molasses. Apparently molasses mixed with glucose is no longer sold in the state. **Annual Report 1888.**

Farmers are strongly advised to try experiments for themselves with the use of fungicides, for which full directions will be furnished by the Station on application, adapted to the particular disease which it is desired to treat, and when possible, personal supervision will be given if requested. Such cooperation on the part of farmers is much to be desired from the fact that no farm is attached to the

ANNOUNCEMENT.

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION was established in accordance with an Act of the General Assembly, approved March 21, 1877, "for the purpose of promoting Agriculture by scientific investigation and experiment."

The Station is prepared to analyze and test fertilizers. cattle-food, seeds, soils, waters, milks, and other agricultural materials and products, to identify grasses, weeds, and useful or injurious insects, and to give information on the various subjects of Agricultural Science, for the use and advantage of the Citizens of Connecticut.

The Station makes analyses of Fertilizers and Seed-Tests for the Citizens of Connecticut *without charge*, provided—

1. That the results are of use to the public and are free to publish.
2. That the samples are taken by *consumers* from stock now in the market, and in accordance with the Station instructions for sampling.
3. That the samples are fully described on the Station "Forms for Description."

All work proper to the Experiment Station that can be used for the public benefit, will be made without charge. Work done for the use of individuals will be charged for at moderate rates. The Station will undertake no work, the results of which are not at its disposal to use or publish, if deemed advisable for the public good.

Samples of Commercial Fertilizers, Seeds, etc., will be examined in the order of their coming; but when many samples of one brand or kind are sent in, the Station will make a selection for analysis.

The results of each analysis or examination will be promptly communicated to the party sending the sample. Results that are of general interest will be sent simultaneously to all the newspapers of the State for publication.

The officers of the Station will take pains to obtain for analysis samples of all the commercial fertilizers sold in Connecticut; but the organized coöperation of the farmers is essential for the full and timely protection of their interests. Farmers' Clubs and like Associations can efficiently work with the Station for this purpose, by sending in samples early during each season of trade.

It is the wish of the Board of Control to make the Station as widely useful as its resources will admit. Every Connecticut citizen who is concerned in agriculture, whether farmer, manufacturer, or dealer, has the right to apply to the Station for any assistance that comes within its province to render, and the Station will respond to all applications as far as lies in its power.

☞ Instructions and Forms for taking samples, and Terms for testing Fertilizers, Seeds, etc., for private parties, sent on application.

☞ Parcels by Express, to receive attention, should be prepaid, and all communications should be directed to

AGRICULTURAL EXPERIMENT STATION,
NEW HAVEN, CONN.

P. O. Box, 945.

Laboratory and Office, in East Wing of Sheffield Hall, Grove St., head of College St.

Reproduced from the 1877 Annual Report

Major corn discoveries made in Connecticut

The name of Donald F. Jones, the Connecticut Agricultural Experiment Station, and hybrid corn are inseparable in the history of American agriculture. His discoveries continue to pay huge dividends to consumers of meat and milk in Connecticut and the rest of the world.

The story begins in Station Board minutes around the beginning of the 20th Century which record the frequent discussion of the need of employing a person to work on "the improvement of crops." In 1905, the Director was authorized to find such a person. The person was Edward Murray East, who left Illinois to take the position in September 1905. Trained as a chemist, by the time he arrived in New Haven, East had read everything written on the subject of genetics from Darwin on, and he brought with him several inbred strains of corn he had selfed in Illinois.

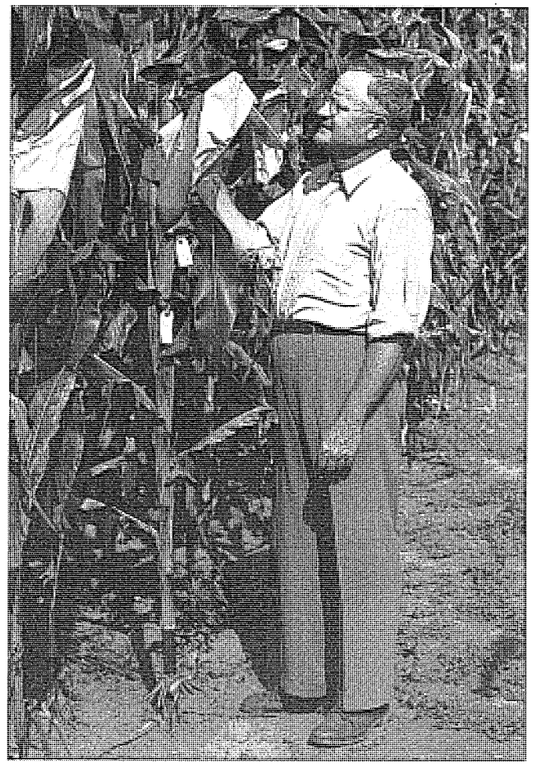
At the same time, George Harrison Shull was inbreeding corn at Cold Spring Harbor, Long Island. Both East and Shull found that continued inbreeding reduced yield and vigor of corn while exhibiting particular characteristics. Both found crossed inbred lines often resulted in superior yields when the hybrid seeds were planted.

Although yields were greater, East concluded that even superior crosses would not be practical because of the difficulty in growing the seed and the resulting cost. Shull moved to Princeton and ceased corn breeding in 1912 and East moved to Harvard. Herbert K. Hayes replaced East and continued the work. When Hayes left Connecticut for Minnesota, Donald F. Jones took up the work.

The 25-year-old Jones arrived in Connecticut in 1914 to continue breeding experiments knowing about the work of Shull and East . He took the next logical step, which was to cross two different hybrid lines which originated from four distinct inbred lines. The resulting "double cross" plants from "single cross" parents produced a greater vigor and yield than the parent and grandparent plants.

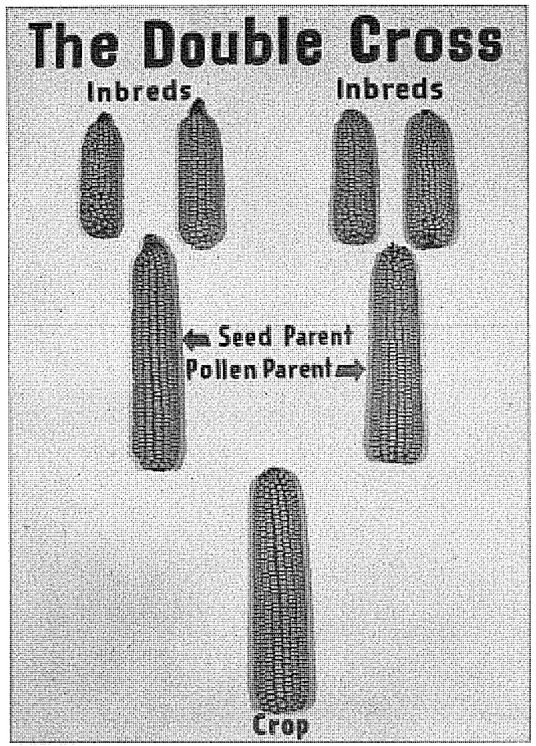
Jones actively campaigned for the adoption of this economical technique by commercial seed producers until the late 1920s because he recognized that the average farmer could not carry out the extensive inbreeding, selection, and crossing necessary to produce the desirable final product.

In 1919 he wrote: "…it is something that may easily be taken up by seedsmen; in fact, it is the first time in agricultural history that a seedsman is enabled to gain the full benefit from a desirable origination of his own or something that he has purchased. The man who originates devices to open our boxes of shoe polish or autograph our camera negatives, is able to patent his products and gain the full reward for his inventiveness. The man who originates a new plant which may be of incalculable benefit to the country gets nothing—not even fame—for his pains, and the plants may be propagated by anyone. There is correspondingly less incentive for the production of the improved types. The utilization of first generation hybrids enables the originator to keep the parental types and give out only the crossed seeds, which are less valuable for continued propagation."



Donald F. Jones examining a corn plant. The bags prevent unwanted crosses.

Jones took every opportunity to point out the practical value of breeding to produce desirable plants, the practical value of hybrids to improve the resulting progeny, and the practical value of a second or double-cross to avoid undue expense in seed production. He also carried the message "practical value" in a book co-authored with East, and it appeared frequently in the popular magazine *Wallace's Farmer* as well as the *Breeder's Gazette* and *Scientific American*. He spoke to farmers, experiment station scientists and seed producers in the Corn Belt. He spoke at professional meetings. He also published an extensive discourse on hybridization in his textbook *Genetics in Plant and Animal Improvement*.

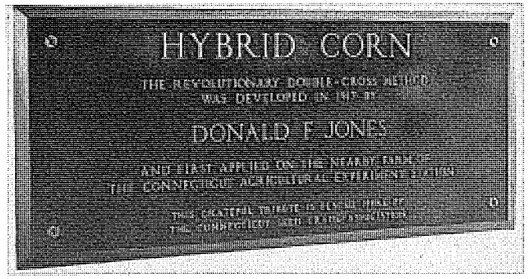


The method of producing double-cross hybrid corn.

One of the persons who recognized the practical value of Jones's discovery was agricultural publisher Henry A. Wallace of Iowa, later a vice-president under Franklin D. Roosevelt. Wallace took up the double-cross hybrid early, and as Jones had hoped, helped turn it into a practical invention by producing hybrid corn seed. How this partnership with Wallace and other seed producers grew is illustrated by the acres of hybrid corn in production. In 1900 no hybrid corn was planted; in 1933 approximately 100,000 acres; in 1939 approximately 20 million (more than 20%), and by the mid-1940s, hybrid corn was grown on approximately 60% of the corn-producing land of the United States. Today the amount is virtually 100%.

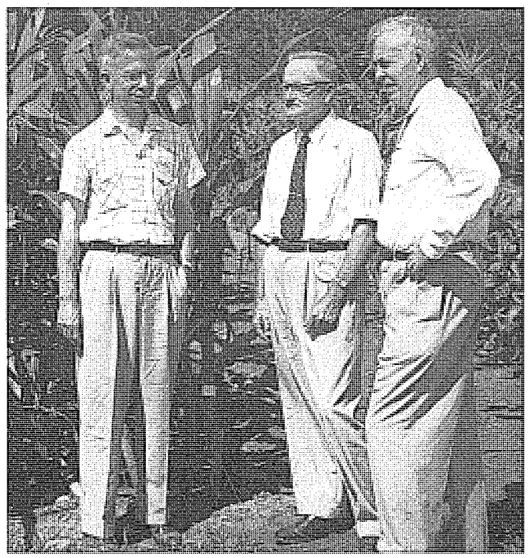
The discovery by Jones and its practical application had immeasurable impact on nutrition and food production. The higher-yielding corn was used as feed for the cattle, swine, and chickens that were grown for meat, milk, and eggs, making the products more plentiful and cheaper to produce.

In 1955, Wallace spoke at Plant Science Day at Lockwood Farm: "The marvel is that Connecticut, which is about 38th in corn acreage, should have, during the first 20 years of this industry, done perhaps a hundred times as much for corn as the Great Corn Belt Experiment Stations in states where they grow 50 to 100 times as much corn as Connecticut, and where their experimental farms are far larger, their appropriations greater, and their scientific personnel more numerous."



Plaque placed by the Connecticut Seed Trade Association commemorating the hybrid corn discovery of Jones.

By the time Wallace spoke, Jones had produced another major innovation in corn seed production. Working with Paul Mangelsdorf of Harvard during the late 1940s and early 1950s, Jones worked out the complicated interactions using a male sterile plant and a restorer gene that led to production of corn seed without the manual detasseling of individual plants. This second major achievement meant cheaper seed by reducing the cost of its production. Jones was a giant in agriculture; we still benefit from his discoveries.



Director James G. Horsfall, left, Donald F. Jones, center, and Henry A. Wallace, right, on "Donald F. Jones Day" at Lockwood Farm, August 16, 1955.

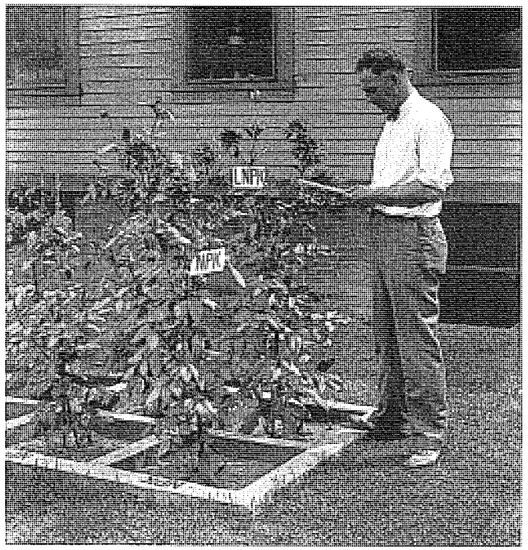
sheep, beef cattle, hogs and horses, not to mention man. The nation's corn crop was estimated this year at 3,175,154,000 bushels. This is the highest annual yield on record and was produced on a smaller acreage. This result may be attributed in part to the extensive use of hybrid corn as well as a good season. **Annual Report 1942.**

With more than 90 per cent of the world supply of rubber now controlled by Japan, all possibilities of producing a natural supply in the Western Hemisphere are being explored. One of the most promising of temperate zone rubber plants is the Russian dandelion. Seed, obtained by the U.S. Department of Agriculture, was brought to this country by airplane and trial lots were sent to experiment stations in all parts of the country where the common dandelion grows. A small plot at the Mount Carmel farm has produced a good stand of plants similar in habit of growth to the lawn weed. Yield of dry roots as well as the proportion and total amount of rubber produced, will be determined by the U.S. Department of Agriculture....This plant seems to offer the best possibilities of all the temperate zone plants that are being studied. **Annual Report 1942.**

Large quantities of sulfuric acid are used in the production of high octane gasoline, and much of the spent acid is available for use in the manufacture of superphosphate. This Station is cooperating with the Federal Government in determining the suitability of spent acid superphosphate as fertilizer. In field experiments conducted during the past summer on alfalfa and sweet corn for seed, this material was just as effective as superphosphate made with fresh acid. **Annual Report 1943.**

War Gardens. In common with other agencies the Station staff gave largely of its time to this important program. Some served on local and state committees. Many talks were given to town and community groups. Particularly useful was Circular 155, "Controlling Pests of War Gardens." Addressed to home gardeners, this circular was the outcome of our many years of research on commercial food crops. Forty thousand copies were distributed on request. **Annual Report 1943.**

Feed grain shortages and the uncertain supply of ingredients for mixed feeds have created a difficult problem for feed manufacturers. It has been impossible for them to maintain fixed formulas, and frequent revisions have been necessary. So far as this situation was reflected in the 1942 inspection year, guaranties were well sustained. About 1,000 samples, including vitamin D carriers, were examined and over 95 per cent of guaranties made were substantially met or exceeded. The grain shortage has been more acute in the current year, 1943, for which inspection data are not yet available. **Annual Report 1943.**



M.F. Morgan, Chief of the Soils Department, killed in the Philipines during World War II, conducting an experiment at the Station in 1931.

To compensate partially for the curtailment of garden club talks by staff members, due to wartime conditions, a second annual "Day at Your Experiment Station" for Federated Garden Clubs of Connecticut was held in Britton Auditorium on March 8. More than 130 delegates from garden clubs throughout the State attended the session. **Annual Report 1944.**

The dedication of our own Station, the first in the country, to "the advancement of agriculture by scientific investigation and experiment" is typical of the aim and purposes of them all. It contemplates primarily research in the fundamentals of natural phenomena and processes. This involves two-way intercourse between farm and laboratory whereby, in one direction field phenomena are evaluated in the laboratory, and in the other, laboratory discoveries and methods are tested under practical field conditions...Looking to the future, we must not forget the spectacular achievements made during the last few years in the world of science. Some of these served humanitarian purposes, others were temporarily directed to ends of destruction. How to adapt all to the permanent welfare and betterment of mankind is our present opportunity and challenge. To determine whatever of these discoveries may be adaptable to the advancement of agriculture is within the province of our Agricultural Experiment Stations, and it may well command their special attention. **Annual Report 1945.**

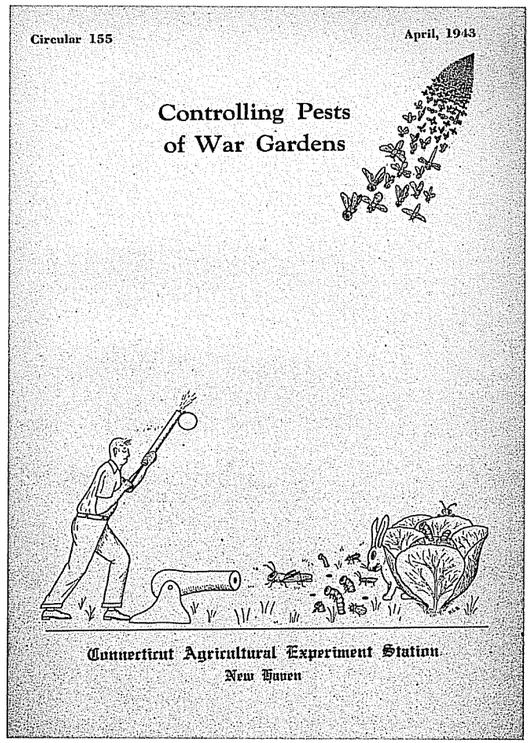
The Experiment Station during World Wars

WORLD WAR I

John P. Street, chief chemist, was given leave of absence, commissioned captain in the United States Army, and engaged, under the Surgeon-General, in the inspection and control of army rations and food wastes in the cantonments in this country. Promoted to major, he was sent abroad and is serving in France. C.B. Morison, assistant chemist, was given leave of absence, commissioned lieutenant in the United States Army, and is doing work similar to Major Street's in the American cantonments. I.W. Davis, in charge of gipsy moth work was given leave of absence and is a corporal in the United States Marine Corps. Twelve men employed as laborers in the gipsy moth work have also entered the army or the navy. E.H. Jenkins, director, is the Federal Food Administrator for the New Haven District and is a member of the Food Committee of the State Council of Defense. W.E. Britton, chief entomologist, is chairman of the Food Committee of the New Haven War Bureau. W.O. Filley, forester, has served as recruiting officer for the Foresters' Regiment and is a member of the State Fuel Administration. W.C. Pelton, vegetable expert, is one of the committee assisting in the supervision of gardens in New Haven.

In 1917 the seed corn was greatly damaged by an untimely freeze, and to protect farmers from planting worthless seed this year the Station tested over 1100 samples, chiefly drawn by the County Agents in all parts of the State, reporting each test to the Extension Department of the Agricultural College, to the County Agent and to the owner of the sample. Only one-third of the samples tested was satisfactory, but largely as a result of this work very little poor seed was planted and the corn crop in 1918 is very satisfactory.

Aside from the above direct war services, every member of the staff has devoted much time to special war work. Of special importance is the work of Dr. Osborne, with the collaboration of Dr. L.B. Mendel, of the Sheffield Scientific School. In our opinion, the greatest service which the Station is rendering in the present emergency, both to agriculture (in the department of cattle feeding) and to the world, and which will continue to be of special value until the production of human food everywhere has become nearly normal again, is that which Dr. Osborne has done at this Station for the last twenty-five years and more. It was supported for years wholly from State Funds, but is now in part supported by the Adams Fund. This work has established for the first time, with substantial accuracy, the ultimate and proximate composition of a large number of protein bodies, proving that while their ultimate composition is in many cases nearly alike they differ widely in the nature and relative amount of their complex constituent radicals.



There followed a very extensive study of the relative nutritive value of these individual proteins by newly devised methods which, for the first time, made such tests possible, and which incidentally showed the futility of many of the short-time feeding tests which often have been given a confidence which was misplaced. This study of the nutritive value of different single proteins showed that "protein" was not assimilated as a unit, but rather that each form of protein was a complex of nutrients (amino-acid and bases) from which the required elements were selected by the body, which rejected the others. The very different requirements for growth and maintenance have been demonstrated. By the methods referred to above it has been for the first time possible to determine the relative importance of each mineral element in nutrition. The nature, the importance, and the relative amount of vitamines existing in various feeds of animal and vegetable origin are being studied.

The application of all this work to the vast problem of feeding our own people and our allies at this time is being made by Dr. L.B. Mendel, who has been collaborating with

Circular 156 April, 1943

Growing Potatoes in War Time

Prepared jointly with the Agronomy Department,
Storrs Agricultural Experiment Station

Field of potatoes in flower

Connecticut
Agricultural Experiment Station
New Haven

Dr. Osborne on the physiological side of this project and who is a representative of the United States Food Administration on the Inter-Allied Scientific Food Commission, and a member of the Advisory Committee on Alimentation and of the Advisory Committee of the Home Conservation Division of the United States Food Administration. **Annual Report 1918.**

The only son of Botanist G.P. Clinton lost his life on the battlefield. **Fifty Year Sketch by Edward H. Jenkins.**

WORLD WAR II

As this Station year comes to a close the world is shaken by conflicts of arms, of trade and of social philosophies. As a nation, we are preparing for war on a gigantic scale. Farmers, on their part, must increase production in the face of declining supplies of labor, fertilizers, spray materials and many other items. As the scientific servant of agriculture, how can the Station be of the greatest use? It seems clear that we should bend every effort, (1) to place in the hands of farmers the latest information that bears on efficient production, and on economy in the use of materials; (2) to find substitutes for materials that are short, ways to save spray materials and fertilizers, higher yielding varieties of crops; and (3) to maintain without serious interruption its fundamental research, upon which all future progress depends. **Report of the Director for the Year Ending October 31, 1941.**

Of 56 samples of vitamin D carriers examined, 16 were distinctly below the unitage claimed.... A probable explanation lies in the changing sources of supply of vitamin D oils. Due to unsettled market conditions adequate control by manufacturers is more difficult. **Annual Report 1941.**

There is a constant and fairly large demand for charcoal throughout Connecticut, particularly among tobacco growers who use it for heating sheds during the curing season. In recent years very little charcoal has been made in Connecticut, and the demand has been filled by the by-product kilns which operate in Pennsylvania. Because of the Defense Program, this supply is virually shut off. The production of charcoal in Connecticut is a logical use of low-grade thinnings from our hardwood forests and at the present time offers not only an opportunity for marketing these thinnings, but also a means of encouraging the improvement of woodlots. **Annual Report 1941.**

Due to rising feed costs and uncertainty of transportation, interest is increasing in corn for grain in Connecticut. **Annual Report 1941.**

Copper, mercury, and formaldehyde are distressingly scarce just now and it will be necessary to reduce their consumption in fungicides. Fundamental research at this Station can now be applied. Until recently no one knew the relation of quantity of material to the control obtained, but this has been just learned for some materials. Only half as much copper as yellow oxide, for example, is required for control as red copper oxide....On the basis of research with fruits, vegetables, and roses it is clear that tetramethylthiuram disulfide, ferric dimethyl dithiocarbamate, mercapto-benzothiazole, and tetrachloro benzoquinone will be useful substitutes for much copper, mercury, and probably formaldehyde that is now consumed for fungicidal purposes. Through its connections with the War Emergency Committee of the national society of plant pathologists it seems probable that the Station will contribute still more in 1942 to this pressing problem. **Annual Report 1941.**

To save tires and gasoline, some outlying experiments have been omitted and the work done near the Station. **Annual Report 1942.**

The usual Field Day at Mount Carmel Farm was omitted, it being felt that farmers were too busy and rubber too precious. The Strawberry Field Day and the usual Field Day at the Tobacco Substation, Windsor, were not held for the same reasons. **Annual Report 1942.**

Dr. Vickery is on part-time leave, connected with the blood plasma program of the Federal Government at Harvard Medical School. **Annual Report 1942.**

In the stress of war time some consumers become suspicious of foodstuffs that they buy and their fears are enhanced by rumors of malicious tampering with the food supply....In our experience over many years, we can recall only two or three instances of glass in food products. Contamination of foods can happen by accident in the commercial processing or packing of foods, and it can also happen in the home.

Shortages of certain foodstuffs for civilian use, by reason of rationing or curtailment of imports, invite substitution and "stretching." It is not new in food control experience to find our domestic vegetable oils marketed under the representation that they are imported olive oil, but such occurrences have been more common than usual during the past year. So far as examination of market coffee submitted by the Dairy and Food Commissioner reveals, there is little adulteration at the present time. **Annual Report 1942.**

The production of food required during the present war emergency demands efficient protection against insect pests. This is particularly essential in view of increasing shortage of insecticides, equipment and labor. The situation may be met in several ways, but our investigations have emphasized the use of proper dilutents for dusts, the adjustment of dosages and schedules to give adequate control, and the development of new insecticides. **Annual Report 1942.**

Not since Colonial times has wood assumed the importance it holds today in homes and production plants of a fighting America. Anticipating the fuel oil shortage, the Forestry Department, in cooperation with the Yale School of Engineering, designed a wood-burning conversion unit for household furnaces and prepared Bulletin 463 describing its construction and use. The project was part of a study of the utilization of native woods which has been in progress at the Station for several years.

The conversion unit that has been perfected is directly adaptable to most coal and oil furnaces. With the exception of a cast-iron door, the entire unit can be made of non-strategic materials such as fire brick, fire-resistant cement and tile. The essential features are a fuel chamber, which may be built in front of or at the side of the furnace, and a connecting flue between the chamber and the furnace ash pit. Green as well as seasoned wood can be utilized, and softwoods as well as hardwoods. **Annual Report 1942.**

With food rationing the order of the day, corn becomes increasingly important since it is a principal ingredient in the dairy cow's ration, and is used in the feeding of poultry,

How Connecticut Nurserymen Can Aid in Food Production

FOREWORD

This circular is issued by the Connecticut Agricultural Experiment Station, New Haven, in collaboration with the executive committee of the Connecticut Nurserymen's Association. Its purpose is to suggest ways in which the nurseryman can use such equipment as he has and such land as he can spare to produce food crops so much needed. We believe, too, that it will help the large estate owner or gardener whose problems are similar to the nurseryman's. The nurseryman's problem is to select crops that will be most efficiently produced with the type of equipment and labor he has available. We are confident that every nurseryman will do his utmost in this emergency.

The Association is indebted to our Agricultural Station for its cooperation in the preparation and distribution of this publication to all interested.

WELLINGTON KENNEDY, *President*
CONNECTICUT NURSERYMEN'S ASSOCIATION

MANY Connecticut nurserymen have already made their plans. The following suggestions may be helpful to other nurserymen and to people similarly situated as to land, equipment and labor.

What to Grow

Almost all food or grain crops should be in demand this year, and at good prices. Tomatoes, sweet corn, potatoes, cabbage, beans (dry or snap), winter squash, rutabagas, carrots, corn for husking, all have possibilities. Considering the situation of the average nurseryman, the follow-

DR. M. F. MORGAN
(Lt. Colonel, U. S. Army)

As this Report was being written, we were shocked and saddened to receive word that Dr. Morgan, chief of our Soils Laboratory, had lost his life while on active military duty.

A captain of infantry in the last war, Dr. Morgan was keenly interested in military matters. He maintained an active contact through membership in the Officers Reserve Corps, and when it became clear that we would be drawn into this war, put his affairs in order. He reported for active duty in March 1942, and after several assignments, was ordered to the Philippines in November 1944. On January 15, 1945, he was killed by Japanese troops while leading his unit on Leyte Island.

But proud as we are of Dr. Morgan's part in the war, it is as scientist, colleague and friend that we will remember him best. For twenty years he led our researches in Soil Science, with imagination, resourcefulness and energy. His contributions not only served Connecticut's agriculture, but earned recognition throughout the world.

Perhaps he is best known for the "Morgan" method of soil testing, but his work covered a much wider range of agronomic matters. His thorough knowledge of the field and his sound judgment were widely recognized. Not only in Connecticut but throughout the region and the country, farmers, scientists and industrialists sought his counsel and guidance.

Dr. Morgan possessed to an unusual degree those qualities that make for ideal public service—character, ability and energy. His loyalty to the Station and its interests was sincere and complete. We of the Station Staff mourn his loss and cherish his memory.

Connecticut Farm Bureau Association

and its County Farm Bureau Affiliates

express our congratulations and thanks to

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