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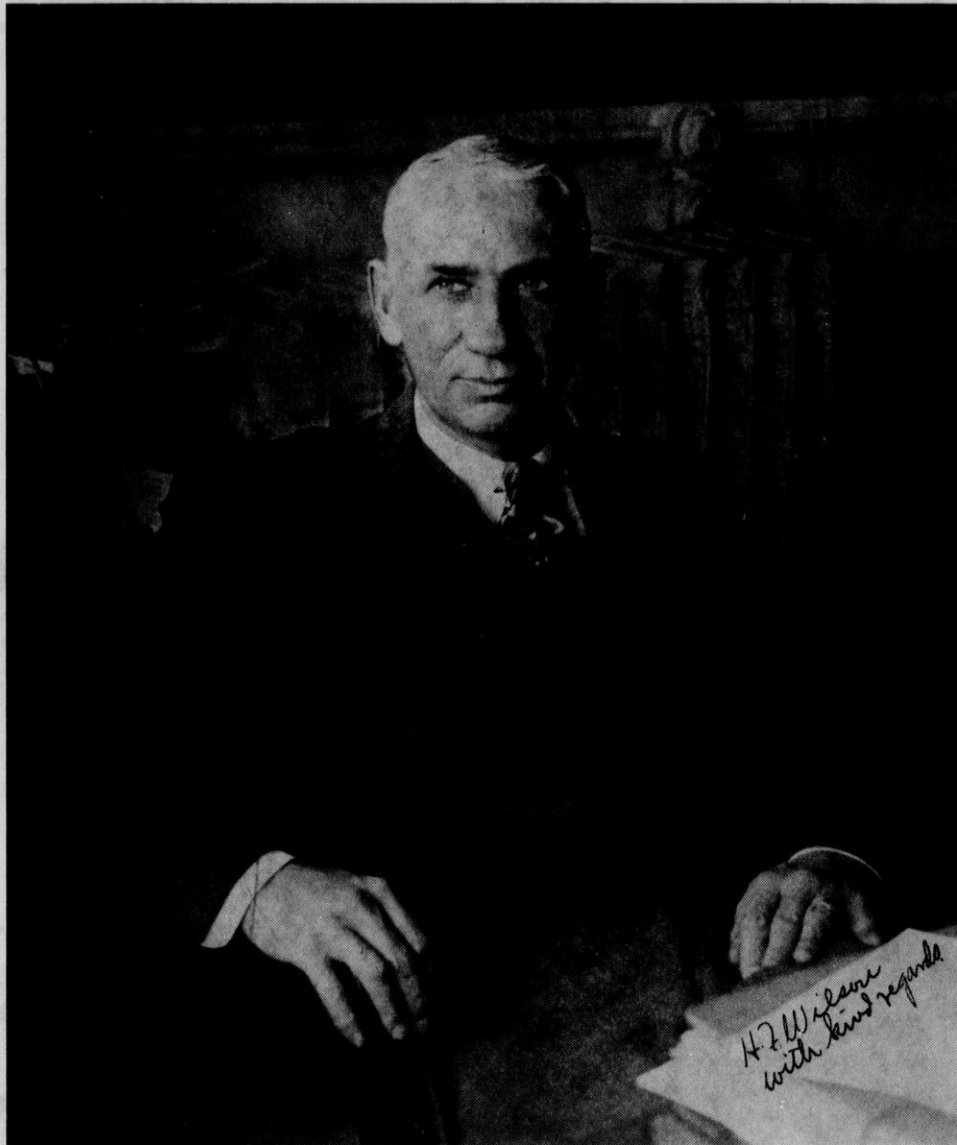
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WISCONSIN HEXAPOD

Wilson Jubilee Issue



Harley Frost Wilson

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Author's Preface

The narrator of this history has worked under pressure. Throughout he has made a sincere attempt to maintain a logical emphasis and to appraise honestly the changes and accomplishments that have come with the years. Where he has been guilty of omissions, they were unintentional. Where he has placed credit he thought it merited. Where he has been critical it was without malice. If he has erred he begs forgiveness.

This story could not have come into being had the author not received much assistance from others. Colleagues contributed willingly as did a number of others on the campus, among whom deserving special mention are C. S. Hean, Mrs. O. H. Miner, J. G. Moore, A. R. Whitson, W. A. Sumner, and W. S. Marshall. Alumni and others not on the campus also have made helpful contributions. These include H. L. Russell, J. I. Hambleton, Neale F. Howard, S. B. Fracker, V. G. Milum, C. R. Cleveland, George Chandler, F. A. Fenton, S. C. Chandler, H. A. Scullen, W. J. Chamberlin, and Sleeter Bull.

It is a privilege and a pleasure to dedicate this panegyric to its central figure and the man we propose to honor - Professor Harley Frost Wilson.

John H. Lilly

CHAPTER I

A Brief Biography and Characterization of Professor H.F. Wilson

It is always appropriate to record the highlights in the life and work of a man of achievement. Such is the task now confronting an untested biographer, who is motivated by the trust busy co-workers have placed in him and stimulated by a long-standing friendship with the man about whom he is to write. So much for a prologue.

Harley Frost Wilson was born at Del Norte, Colorado, on April 14, 1883. He was the first child in a family of four born to Thomas C. and Mary E. (Watson) Wilson, both of English extraction, tracing back to colonial days. The mother, now Mrs. Humboldt Emens, is alive and well at her home in Glendale, California. Mr. Wilson's early years were divided between farm and city life.

Harley Wilson's early education was secured in the grade and high schools at Victor, Colorado. In the fall of 1902 he entered the preparatory class at Colorado State College, where he was promptly nicknamed "Buck." He majored in Entomology and Horticulture and was graduated from this institution with a B. S. degree in 1907.

"Buck" Wilson's undergraduate career at Colorado Aggies was a busy and happy one. He worked much of his own way at various odd jobs-- an undertaking not universally admired by the student body of that day. Long since his metamorphosis from "Buck" to "Prof" he has chuckled over the way some of his fellow-students high-hatted him when he was digging ditches on the campus, and they were strolling by with their respective girl friends! Perhaps such incidents formed the genesis of some of the episodes that gave "Buck" the reputation as a prankster that he promptly acquired. Certainly they had something to do with the development of a broad sympathy for, and an understanding of his fellow men that he still retains.

Hard work and plenty of native ability won the respect and esteem of the great majority of Wilson's teachers and student acquaintances. Under the tutelage of Professor Gillette he became a thorough student of the plant lice, in which field he later won world-wide recognition. Years later, Assistant Director Morrison was able to write in his letter of recommendation to Acting President Birge that "Professor Wilson is also cordially endorsed by the staff at Colorado."

During the summer of 1907 Harley worked with the nursery inspection service of the State of Illinois. In September of that year he enrolled in the Graduate School of the University of Illinois, where he remained until April, 1908. It was during this interval that he became acquainted with Miss Clara McClain, who later became his wife. Lack of resources forced Mr. Wilson's withdrawal from the University of Illinois. He accepted an appointment as Special Agent in the U. S. Bureau of Entomology at that time and continued in Government service for two years and five months, being stationed at Washington, D. C. and in nearby states. In September, 1910, Mr. Wilson was appointed research assistant in Entomology at the Oregon Agricultural College. He served in this capacity until 1913, when he was appointed Professor of Entomology and Entomologist of the Experiment Station. He received his M. S. degree at Corvallis in 1913.

Professor Wilson's brief tenure as head of the Entomology Department at Oregon was an enviable one. His ability to select able assistants and direct their respective efforts to the best possible advantage soon became apparent. Among the men associated with him during the busy years from 1913 to 1915 were A. B. Cordley, A. L. Lovett, V. I. Safro, H. E. Ewing, LeRoy Childs, and G. F. Moznette. Wilson succeeded Cordley as head of the department when the latter was promoted to the position of Station Director, and was in turn succeeded by Lovett when his services were secured in Wisconsin in 1915.

The First and Second Biennial Crop Pest and Horticultural Reports of the Oregon Agricultural College and Experiment Station (1911-1912 and 1913-1914) stand as convincing evidence of the almost boundless industry and ability of Professor Wilson and his Oregon associates. Pages 79 to 176 inclusive of the first and 95 to 202 of the second report summarize the work of this group. A wide range of subjects, covering the entire scope of economic entomology as it was then constituted, was treated in a systematic and thorough manner. A review of the literature of any of the problems treated would be seriously incomplete without a careful digest of the material contained therein. A logical balance between life history, taxonomic, and control phases of investigation was consistently maintained.

The extent and quality of the work just described undoubtedly had much to do with the selection of Professor Wilson as head of the Department of Economic Entomology at the University of Wisconsin in 1915. Dean H. L. Russell was himself a thoroughgoing scientist of wide interests, and he readily recognized the merit in Professor Wilson's accomplishments in Oregon. Following the resignation of Professor J. G. Sanders to head the newly-acquired regulatory functions of the Wisconsin Department of Agriculture, Dean Russell arranged to interview Professor Wilson at San Francisco on August 25, 1915.

Under date of August 26, 1915, Assistant Director F. B. Morrison wrote Acting President E. A. Birge as follows: "Dean Russell has been studying the qualifications of the available men and has just wired me from San Francisco that he will be able to secure H. F. Wilson, now head of the Economic Entomology Department at the Oregon Agricultural College. If it is possible for the Executive Committee to act on this matter at the August meeting, Professor Wilson will be able to begin his duties at opening of the semester, which will be extremely fortunate.

"We therefore recommend the appointment of H. F. Wilson as full professor of Economic Entomology..... It is very important that a high-grade man be secured, who will be able to place the work in economic entomology on a thoroughly satisfactory basis.

"Dean Russell states that Professor Wilson has received training at the Universities of Colorado and Illinois, and in the United States Department of Agriculture, and has been at the Oregon Agricultural College for the past six years. He is very highly recommended by President Kerr and Dean Cordley of the Oregon College, and is also cordially endorsed by the staff at Colorado. Professor Wilson has done excellent research and is very systematic in his methods."

The following notation is found in the minutes of the regular meeting of the Executive Committee of the Board of Regents, held on August 27, 1915:

"That H. F. Wilson be appointed professor of Economic Entomology in place of J. G. Sanders, resigned..... Adopted." In attendance at this meeting were Regents Hammond and McMahn, Acting President Birge and Secretary McCaffrey.

The Wilsons arrived in Madison in early September, 1915. Professor Sanders had left the University on July 1, taking with him the departmental secretary, Miss Louise Evanson. The department during the interim had been in the hands of A. C. Burrill, an assistant, and George Chandler, an advanced student. Mr. Burrill was at that time in rather poor health and to George Chandler fell the "good fortune to officially welcome 'Prof' to the department, show him around the premises and help him get established."

The record of "Prof" Wilson at the University of Wisconsin during the past 25 years has been an outstanding one, the story of which will be told in succeeding chapters of this momento. Prof today is possibly even more active and enthusiastic than he was when he arrived 25 years ago next September. While many men years younger begin to "rest on their oars" he carries on with a characteristic aggressiveness. A new "trick" for improving pea aphid control intrigues him just as much in 1940 as did this same insect when he described the new genus Illinoia in 1910 in which the pea aphid now belongs.

We are choosing the words of some of his former students to characterize Prof as his students and associates have come to know him. Perhaps his most outstanding student writes of him as follows: "His greatest achievement, I feel, has been in the field of human endeavor, the things he has done unofficially; the encouragement, advice, and incentive that he has given to so many and that have helped so many causes. Prof's faculty of imbuing persons with enthusiasm has been preeminent. This prerequisite of teaching, in school and out, is perhaps of greater importance than brilliancy. I doubt that Prof's greatest admirers would call him a brilliant teacher, yet he has turned out more students who hold important positions in apiculture than any other person."

The full significance of the above remarks is brought home by a letter recently received by the committee from a former student, now a Regional Biologist in the Soil Conservation Service, for a "Book of Memories" which is to be presented to Prof on June 18, 1940. This letter reads:

"Dear Prof: A little more than ten years ago, a small-town boy asked you about the possibilities of working his way through college. Until he met and talked with you a college education was little more than an empty dream to him.

"To you, Prof, I owe my college education. Without your help I might never have graduated. Your fatherly guidance and counsel to all of us budding entomologists who lived in the old entomology building is one of my treasured memories. On your twenty-fifth year as head of the Department of Economic Entomology, I offer my heartiest congratulations."

The first Instructor brought into the department by Professor Wilson, now Associate Entomologist in a State Agricultural Experiment Station, writes of him as follows:

"Prof Wilson was a good organizer, and never let an opportunity slip to build up the department and to help his staff members. I shall always appreciate the interest which he continually showed in the welfare of those in the department. He constantly pointed out opportunities for taking advance work, for self-improvement, or for writing articles, etc. He fostered a spirit of loyalty and good will among those connected with the department. One of his sayings which has stayed with me all of these years is, 'He that tooteth not his own horn, his horn shall not be tooted'."

The above remarks are corroborated by the following words, written by an alumnus of prominence in the field of apiculture:

"If I were allotted only one word to describe Prof, it would be Organizer, which he undoubtedly was. They say that one's success depends upon his ability to get others to do things and in that line he was not lacking. He was a pusher and demanded action." In a lighter vein the same writer continued as follows: "That he is truly a professor with at least one well known trait, namely absent-mindedness, I have had proof on two occasions. At an Illinois meeting he left without his hat, while on his departure from a Michigan meeting where I had him as a roommate, I found that he had gone without his pants, although it is reported he had acquired another pair before reaching Madison."

Someone has said, "If you have a tough job to assign and want it done well, ask a busy man to do it." Perhaps the truth of this remark helps explain some of the "extra-curricular" activities in which Professor Wilson has participated. A member of Sigma Nu before coming to Wisconsin, he has maintained an active interest in the local chapter. Many are the difficulties which he has helped this group surmount, and it is perhaps significant that this was one of the fraternities on the campus that weathered the storm of the trying years of the near past.

The Wisconsin (Iota) Chapter of the Alpha Gamma Rho Fraternity was founded in 1916, and through the influence of George Chandler "Prof" was initiated into its membership by special permission of the national officers. His contributions to this fraternity have been of inestimable value to both the local chapter and the national organization. What has been said of his services in behalf of Sigma Nu is doubly true of Alpha Gamma Rho. For a long period of years he served as president of the local Alpha Gamma Rho Building Corporation, which owns the chapter house. It is significant that this was one of the two fraternities on the entire campus which maintained its house without encumbrances throughout the early 1930's. Professor Wilson was elected Grand President of the national fraternity of Alpha Gamma Rho in 1927, in which capacity he served with distinction for two years. Other important posts he has held in the national organization include Member of Board of Control of Endowment Fund, Chapter Inspector, Director of Extension, Grand Treasurer, and Grand Vice-President.

Certain very important events in Prof's life have been conspicuous by their absence from our story up to this point. He was married on August 11, 1909, to Miss Clara Louise McClain of Urbana, Illinois. They have two sons, J. Robert, a graduate of the University of Wisconsin, and John Franklin, now completing his junior year in college. Mrs. Wilson is a model wife and mother who is respected and admired by a wide circle of friends and acquaintances. Among her associates she is recognized as a charming hostess and a true friend. In addition, she is accomplished musically.

Scientific workers are judged largely by the number and quality of their publications. The more important technical articles by Professor Wilson and the various members of his present staff are listed in another chapter of this panegyric. It is, however, appropriate at this point to give some indication of the number and scope of the many scientific and semi-popular articles published by Professor Wilson, either as sole or joint author. The number of his contributions in each of the various fields in which he has worked are tabulated chronologically in Table I.

On December 15, 1939, a luncheon meeting of the Extension staff of the college was held at which each place card carried a word picture of the person whose name it bore. Professor Wilson was in attendance and reportedly was greatly amused at what was written of him. Observing this, Professor R. E. Vaughan was prompted to ask him if someone had slipped something in between the lines for him. "No," chuckled Prof, "It's all right in the lines, and only too true! The poem read as follows:

"HARLEY FROST WILSON

With energy offusive, with onergy rampant,
We try to be just like him
We try and learn we can't.

We always try to please him, we wish we always could,
But a double-barreled wisdom
Lets us know we're not so good.

He may be slightly balky, and rarely get a gripe,
For when taxes came on cigarettes
He began to smoke a pipe.

Interests varied, some commercial, always keep him on the run,
Still 'tis rumored here and there
That he's not immune to fun.

Yet when he is so busy and we see him tearing round,
We can know, and know for certain
That his feet are on the ground!"

TABLE I - Technical and Semi-technical Books, Bulletins, and Articles by Harley Frost Wilson.*

Year	Economic Entomology	Beekeeping	Miller Memorial Library	American Honey Institute	American Honey Producers League	Beekeeping in Wisconsin, and Miscellaneous
1909	3					
1910	3					
1911	3					
1912	7	1				
1913	11	2				
1914	2	1				
1915	19	0				
1916	1	0				
1917	0	0				
1918	3	0				
1919	3	0				2
1920	0	1	1			6
1921	1	6	0			4
1922	0	4	1		1	2
1923	0	7	3		2	1
1924	0	2	0	2	0	1
1925	0	1	3	2	0	1
1926	0	0	3	0	0	2
1927	0	3	2	0	1	1
1928	0	1	0	0	1	1
1929	1	8	0	1	0	1
1930	0	6	3	0	1	3
1931	0	6	0	0	0	1
1932	0	5	2	2	0	2
1933	0	2	1	0	1	1
1934	1	2	1	7	0	2
1935	0	1		5	3	0
1936	1	2		8		2
1937	1	1		3		1
1938	0	0				1
1939	2	1				1
Totals	62	63	20	30	10	36

*Tabulated from a list of titles recently prepared by Professors C. L. Farrar and C. L. Fluke.

CHAPTER II

History of Entomological Research at the University of Wisconsin

Part 1. Accomplishments Prior to Formation of Department of Economic Entomology in 1909.

William Arnon Henry was brought to Wisconsin from Cornell University in June, 1880, and assigned the title of Professor of Agriculture and Botany. The first appropriation for agricultural research in Wisconsin (\$4,000) came in 1881, and the State Agricultural Experiment Station was organized in 1883. (Connecticut pioneered by establishing the first agricultural experiment station in 1875, and four or five others were founded in the East prior to 1883.) Three professors made up the staff in 1883, and it was not until 1886 that Henry was made Director. He became Dean and Director in 1889, a position he held until succeeded by H. L. Russell in 1907.

Dean Henry was an early advocate of grape-growing in Wisconsin, preferring vineyards to apple orchards, "which have been beset with many difficulties." His experimental vineyard was located near the site of the present Home Economics building and gratifying yields are recorded in his early reports. Undoubtedly he had some insect problems to contend with, although "blight" and "rot" were the only troubles specifically mentioned, and these were apparently not important in the early years.

The horticultural work initiated by Dean Henry was continued by Professor E. S. Goff who followed him from Cornell in 1889. The first entomological publication from the Wisconsin Station was entitled, "Insects and Diseases Injurious to Cranberries" (Bulletin 35, published in April, 1893). This work by Goff contained 19 pages and 18 figures, and admittedly was largely a compilation of work done in Massachusetts and New Jersey. Goff had a distinguished career as horticulturist at Wisconsin, during which he was responsible for handling any insect or plant disease problems that arose.

Goff was succeeded by E. P. Sandsten as head of the department of Horticulture in 1902. He remained in this capacity until 1909, during which interval nursery inspection became an important responsibility of this department. Sandsten wrote the second entomological publication of the Wisconsin Station (Bulletin 110, published April, 1904). It was entitled, "Spraying Fruit Trees--With Notes on Common Insects and Fungus Diseases Infesting Orchards." It consisted of 28 pages and 12 figures.

On May 10, 1903, the Wisconsin Legislature appropriated \$2,500 per year for two years to aid the development of a cranberry industry in the State. Bulletin 119 (February, 1905) by A. R. Whitson, E. P. Sandsten, L. P. Haskins and H. Ramsay was a report on the resultant cranberry investigations. The entire bulletin covered 77 pages, of which pages 43 to 49 and 6 figures were devoted to "Cranberry Insects." This report laid the foundation for an outstanding piece of entomological work that was to follow.

"The Cranberry Insects of Wisconsin," Station Bulletin 159, appeared in 1908. It consisted of 23 pages and two excellent colored plates. This noteworthy publication was written by C. B. Hardenberg who had studied cranberry insects in the marshes of Central Wisconsin during the seasons of 1907 and 1908. Hardenberg was a native of Holland who came here as a young man with some entomological training. Unfortunately, Wisconsin was unable to retain him, and he went from here to Pretoria, South Africa, where he continued along entomological lines, at least for a time.

The next and last entomological publication of the Wisconsin Station prior to the establishment of the Department of Economic Entomology was Bulletin 168 by E. P. Sandsten and J. G. Milward (November, 1908). It was entitled, "Spraying Potatoes Against Blight and the Potato Beetle," and contained 27 pages and 13 figures. The last entomological publication from the Department of Horticulture was Bulletin 190, "Common Insect Pests of Fruits in Wisconsin," by J. G. Moore. It contained 38 pages and 32 figures and was published in February, 1910.

Part 2. Entomological Research in the Department of Economic Entomology

From 1909 to 1940.

The Wisconsin College of Agriculture, under the inspiring leadership of Dean H. L. Russell, who succeeded Dean Henry in 1907, developed rapidly during the years from 1907 to 1913. Four new departments - Economic Entomology, Plant Pathology, Poultry, and Agricultural Economics - were created in 1909. The Department of Veterinary Science was established in 1910, followed by Genetics, (Animal Breeding), in 1913.

Strange as it now seems, the creation of a new department in the College of Agriculture at that time apparently did not require action by the Board of Regents. The following paragraph taken from the Report of the Dean of the College of Agriculture published in the Biennial Report of the University Regents for 1909-10, explains the changes that accompanied the formation of the Department of Economic Entomology:

"The teaching work in plant pathology and economic entomology, as well as nursery inspection, has heretofore been carried on by the horticultural department. The growing importance of the horticultural work, as well as the necessity for further development in these additional lines, has led to the formation of the two departments mentioned on a separate basis. Prof. L. R. Jones, formerly botanist at the University of Vermont, has been placed in charge of the plant pathological work, while Prof. J. G. Sanders, of the Bureau of Entomology of the U. S. Department of Agriculture, has been chosen to develop the economic entomological work and also designated as the state nursery and orchard inspector. Prof. J. G. Moore was made associate professor of horticulture in July, 1909, and placed in charge of that department."

The first mention of the Economic Entomology Department in the minutes of the Board of Regents is found in the budget approved by it

on June 18, 1909. A departmental budget was set up for it for the first time with a notation that it was a "new department." The following paragraph appeared in the Report of the Director for 1909, which was published in February, 1910:

"ECONOMIC ENTOMOLOGY-- Heretofore any entomological work carried on by the Station and College has been done by the Horticultural Department. The last Legislature increased materially the scope of the nursery and orchard inspection service and the time has come for the development of this work on a separate basis. During this year there has been authorized the establishment of a Department of Economic Entomology, and Mr. J. G. Sanders, now associated with the Bureau of Entomology of the United States Department of Agriculture, has been placed in charge of this work. It will not be possible for this department to begin its active work before the middle of the forthcoming year."

Professor Sanders had specialized in the taxonomy of scale insects, and he was confronted with a disturbing outbreak of the San Jose' scale when he took over the nursery inspection work of the college on July 1, 1910. A survey to determine the scope and seriousness of this infestation was inaugurated promptly, and recommendations for its control were issued. A late spring frost had destroyed most of the apple crop, and injury by codling moth and plum curculio was almost negligible.

A severe outbreak of codling moth was forecasted for 1912 by Professor Sanders, and his predication was fulfilled abundantly. Other insect problems listed in the Director's Report for that year were: white grubs, cutworms, army worms, corn ear worm, strawberry leaf roller, leaf-mining larvae, and grasshoppers. Sanders strongly advocated fall plowing as a general preventive measure.

Professor Sanders put considerable emphasis on life history studies and preservation of specimens of common destructive insects. He was ably assisted in this work by a number of his students, among whom was W. W. Clark, now Associate Director of the Agricultural Extension Service in Wisconsin.

The first intensive research on a limited group of insects sponsored by the new department was a series of experiments on truck crop insects carried out in the vicinity of Racine by C. R. Cleveland during the summer of 1911. In his report he stated that "the object of the experiments is to determine the identity of the insects doing the damage, their life history, their methods of attack and their possible control." Among the pests studied were onion thrips, cabbage loopor, cabbage butterfly, asparagus beetle, cucumber beetles and a number of sugarbeet insects. The high quality of this report, written while Mr. Cleveland was still an undergraduate student, clearly indicates why the author is now Entomologist for the Standard Oil Company of Indiana.

The onion maggot was an important pest in the Racine area, and during the summers of 1913 and 1914 H. H. Severin was assigned to a study of its control by Professor Sanders. Most of the emphasis was placed upon sweetened poison bait sprays. A formula was developed containing 1/5 ounce of sodium arsenite to a gallon of boiling water, plus one pint of New Orleans

molasses. This mixture was applied by hand, with a whisk broom, or a spray pump. It cost only fifty cents per acre and was reported as giving good results in several places. Sanitation in the onion fields was recommended. Sanders also arranged for a further investigation of the onion maggot in cooperation with the Bureau of Entomology. Neale F. Howard was assigned to this project during the summer of 1915 at Green Bay and 1916 at Madison.

A third research project undertaken during the administration of Professor Sanders was a study of white grubs, which was financed by a special appropriation. Great numbers of June beetles were collected from various points throughout the State and preserved in barrels in the basement of the old entomology building. It was Neale Howard's job during his first year of graduate work to go through these collections and determine the species represented. This task was never completed, but a preliminary report of the work was published in the "Journal of Economic Entomology" by Professor Sanders.

The arrival of Professor Wilson in Madison in September, 1915, marked the beginning of a new era in entomological research at Wisconsin. This was quite natural, in view of his capable leadership at Oregon.

Considerable space has been devoted to the early entomological researches in the college and department in order to make them matters of record and to give the foundation for subsequent developments. Space does not permit such detail for the accomplishments of the past 25 years under Professor Wilson's administration. In research, however, results and not comments count. Consequently, an attempt is being made to show only the general scope and significance of the problems studied, the contributions made and the men who did the work.

Mention must be made at this point of the excellent cooperation of the Bureau of Entomology and Plant Quarantine of the U. S. Department of Agriculture with this department. The inauguration in 1915 of a cooperative project for the study of the onion maggot has been referred to. This work was initiated by Neale F. Howard who was assisted in 1916 by L. A. Stearns and in 1917 by J. I. Hambleton. Mr. Howard joined the army in the spring of 1918 and was succeeded by J. E. Dudley, who is still in charge. Among those who have been employed in this laboratory, either temporarily or on a permanent basis, are E. M. Searls, Al Weed, T. E. Bronson, J. F. Roe, J. H. Lilly, C. E. Woodworth, C. W. Schaefer, F. E. Carroll and P. Stone. In the early years this laboratory cooperated in studies of several truck crop insects, including onion maggot, potato leafhoppers, cucumber beetles, and the pea aphid. Since about 1927 it has devoted itself almost exclusively to studies of the ecology and control of the latter insect.

The second cooperative Government laboratory to affiliate with this department was the Cereal and Forage Insect Laboratory which was established here in April, 1935. Mr. T. R. Chamberlin was placed in charge of this work, and he has been ably assisted by Lee Seaton, P. O. Ritcher, and J. A. Callenbach. A long-time research program has been inaugurated which involves ecological, cultural and control studies on white grubs.

In April, 1938, the North Central States Bee Culture Laboratory was established by the Government in cooperation with the Department of Econ-

omic Entomology. C. L. Farrar was placed in charge and given professorial rating in the College. This laboratory has since had the full-time services of C. W. Schaefer and the part-time assistance of H. H. Laidlaw and a number of other students. A diversified program of research on problems closely related to honey production in this area is under way.

Less formal cooperation with other agencies of the Federal Government has also been of material benefit to the department. In 1917, G. C. Mathews, G. H. Cale, and H. L. McMurray were sent here as Government Extension Agents to study and promote good beekeeping practices in order to increase honey production and thus help to relieve the sugar shortage of the war years. More recently, C. W. A., P. W. A., and N. Y. A. assistance has been of real value in the furtherance of a number of projects within the department.

Nursery inspection and other regulatory activities in the field of pest control have been under the supervision of the State Department of Agriculture and Markets since 1915. Mr. Sanders was succeeded as State Entomologist by E. D. Ball, who served through 1916 and 1917. S. B. Fracker succeeded Mr. Ball as State Entomologist in 1918, and he in turn was followed in 1927 by E. L. Chambers, the present incumbent. Now on his staff are N. F. Thompson, C. D. Adams, A. L. Piller, and H. Halliday. This group has handled its responsibilities efficiently and in a spirit of cooperation with the work of the College of Agriculture.

The following portions of this panegyric are intended primarily to portray the research accomplishments in the department from 1915 to 1940:

1. A summary of the men employed, their tenure of service, and the general problems investigated during five-year intervals. (Table II)
2. An account of the apicultural work of the department, and the establishment of the Miller Memorial Library. (Chapter IV)
3. A listing of the Station bulletins of the department and the more important publications of the respective members of the present staff. (Chapter V)

Potato leafhopper
Pee moth
Pee aphid
Cuckoo sparrow
Tobacco insects
Biological control
Plant disease transmission
Bee wintering and hive temperatures
American foul brood control
Beekeeping survey

TABLE II - Personnel and Principal Projects in the Department of Economic Entomology from 1915 to 1940 (Order and position of project name give no indication of the men who worked on it)

Period	Personnel	Active Projects
1915-1920	H. F. Wilson	Plum curculio
	A. C. Burrill	Apple spray schedule
	N. F. Howard (U.S.D.A.)	Codling moth
	L. A. Stearns	Apple worm
	R. C. Pickett	Banded apple aphid
	C. W. Appler	Onion maggot
	L. G. Gentner	Potato leafhopper
	C. L. Fluke	Striped cucumber beetle
	J. I. Hamblton	Imported cabbage worm
	J. E. Dudley (U.S.D.A.)	Mosaic transmission
		Insect hibernation
	G. C. Mathews) Gov't.	Insecticide studies
	G. H. Calo) extension	Pea moth
	H. L. McMurry) agents	Green clover worm
		Queen rearing
		American foul brood control
		Bee wintering and wintering losses
	Value of package bees	
	Cherry pollination	
1921-1925	H. F. Wilson	Codling moth
	C. L. Fluke	Cherry aphid
	J. I. Hamblton	Red-necked cane borer
	H. L. McMurray	Cucumber beetle
	J. E. Dudley (U.S.D.A.)	Onion maggot
	V. G. Milum	Onion thrips
	L. P. Whitehead	Potato leafhopper
	A. A. Granovsky	Pea moth
	E. M. Searls (U.S.D.A.)	Pea aphid
		Grasshoppers
		Tobacco insects
		Biological control
		Plant disease transmission
		Bee wintering and hive temperatures
		American foul brood control
		Beekeeping survey
		Prick hairs vs. poultry
	Fire worms	
	Insect resistance in plants	
	Plant disease transmission	
	Rodent control	
	Cattle sprays	

*indicates half-time with U.S.D.A.

TABLE II - Continued

Period	Personnel	Active Projects
1926-1930	H. F. Wilson	Apple maggot
	C. L. Fluke	Fruit tree leafroller
	A. A. Granovsky	Cherry case bearer
	V. G. Milum	Cherry aphid
	W. Whitcomb	Cucumber beetle
	C. M. Gwin	Cabbage maggot
	G. E. Marvin	Potato flea beetle
	C. E. Woodworth	Cutworms
	C. H. Griffith	Slugs
	J. H. Roberts	Onion maggot
	F. Sasama	Pea aphid
	K. Koch	Alfalfa yellows
	T. C. Allen	Grasshoppers
	J. E. Dudley (U.S.D.A.)	Corn borer
	E. M. Searls (U.S.D.A.)	White grubs
	Al Weed (U.S.D.A.)	Hemlock span worm and airplane dusting
	T. E. Bronson (U.S.D.A.)	Willow chrysolid
		Biological control
		Plant-insect symbiosis
		Honey storage
	Yeasts in honey	
	Winter losses of bees	
1931-1935	H. F. Wilson	Cherry case bearer
	C. L. Fluke	Buffalo tree hopper
	E. M. Searls	Apple maggot and bacterial rot
	G. E. Marvin	Codling moth hooch traps
	C. E. Woodworth	Apple curculio
	T. C. Allen	Fruit tree leaf roller
	K. Koch	Spray residue removal
	J. H. Lilly	Dormant sprays
	R. J. Bushnell	Insect electrocutors and ecological studies
	J. A. Callenbach	
	M. H. Doner	Onion maggot
	C. M. Gwin	Onion thrips
	G. C. Broome	Cabbage worms
	E. C. Alfonsus	Potato leafhopper
	M. Haydak	Pea aphid
	*P. O. Ritcher	Alfalfa yellows
	G. Stanek	White grubs
	F. Zimmerman	Tobacco insects
	J. E. Dudley (U.S.D.A.)	Grasshoppers
	T. E. Bronson (U.S.D.A.)	Poison baits vs. poultry
	Carl Schaefer (U.S.D.A.)	Wire worms
	T.R. Chamberlin (U.S.D.A.)	Insect resistance in plants
	Lee Seaton (U.S.D.A.)	Plant disease transmission
		Rodent control
		Cattle sprays

*indicates half-time
with U.S.D.A.

TABLE II - Continued

Period	Personnel	Active Projects
1931-1935		Dysentery of bees Honey storage Honey sources Bee wintering Nutrition of bees
1936-1940	H. F. Wilson C. L. Fluke E. M. Searls C. L. Farrar (U.S.D.A.) T. C. Allen J. H. Lilly *J. A. Callenbach C. D. Harrington F. M. Snyder C. E. Dieter J. W. Brooks T. Carpenter L. D. Beadle J. E. Dudley (U.S.D.A.) T. E. Bronson (U.S.D.A.) F. E. Carroll (U.S.D.A.) P. Stone (U.S.D.A.) *C. W. Schaefer T. R. Chamberlin (U.S.D.A.) Lee Seaton (U.S.D.A.)	Fruit tree leaf roller Bud moth Timing codling moth sprays Cherry case bearer Apple curculio Apple aphids Cherry aphids Strawberry leaf roller Oil injury to apple trees Spray residue studies Pea aphids Atomized oil sprays Cucumber beetle Squash vine borer Cabbage aphids Cutworms Grasshoppers Alfalfa insects White grubs Insect resistance in plants Biological control Ecological studies Cattle sprays Clothes moths Effects of aphid feeding Poison baits vs. pheasants Pollen problems Honey production problems Queen losses and supersedure Adaptation of package bees Comparison of bee stocks Two-queen management
	*indicates half-time with U.S.D.A.	

Note: Digests of the annual reports on most of these projects have been published in the Annual Reports of the Director of the Wisconsin Agricultural Experiment Station.

Table II gives an indication of the important part graduate students, particularly those who have earned Ph. D. degrees, have played in the conduct of various Station projects. Space is not available for details, but the titles of all Ph. D. dissertations in the department (exclusive of those in apiculture which are mentioned in Chapter IV) are listed below.

Fluke, Charles L. (1928) The Known Predacious and Parasitic Enemies of the Pea Aphid in North America.

Weed, Al. (1928) The Development of Winged Forms and Migration of the Pea Aphid (Illinoia pisi Kalt) in Relation to Changes in the Moisture, Nitrogen, Sugar and Phosphorous Content of the Food Plants.

Woodworth, Charles E. (1930) Effect of Reduced Temperature and Reduced Pressure on Honey Bee Respiration.

Allen, Thos. C. (1932) The Apple Maggot in Wisconsin and Its Relation to Rot of Apples in Storage.

Koch, Karl L. (1932) The Nature of Potato Rugose Mosaic and Its Transmission by Aphids.

Doner, Melvin H. (1935) Studies on the Anatomy and Hymenopterous Parasites of Coleophora (Haploptilia) pruniella, Clemens.

Ritcher, Paul O. (1935) Biology of Wisconsin Phyllophaga and Related Forms.

Searls, Ed. M. (1936) Foliage Color as an Index of the Resistance of Certain Strains of Canning Peas to the Pea Aphid.

Schaefer, Carl W. (1937) Wing Formation of the Pea Aphid, Illinoia pisi Kalt.

Callenbach, John A. (1938) The Influence of the Codling Moth Upon Commercial Apple Production in Southwestern Wisconsin.

Granovsky, Alexander A. (1939) Contribution Toward a Monograph of North American Aphidae.

Lilly, John H. (1939) The Biology, Ecology, and Control of the Cherry Case Bearer, Coleophora pruniella, Clemens.

Dieter, Curtis E. (1940) Injury Caused to Pea Vines by the Feeding of the Pea Aphid.

Harrington, Cecil D. (1940) Aphid Resistance in Peas; Its Extent and Measurement.

Snyder, Fred M. (1940) Revision of the Mydaeni of the World (Diptera, Muscidae).

CHAPTER III

History of Entomological Teaching at the University of Wisconsin

The University of Wisconsin catalogue for the 1898-99 academic year listed the first entomological course offered at this institution. Designated as Zoology 9, it was described as follows: "Entomology. A general course in the anatomy, embryology, and classification of insects, with special attention to forms of economic importance. First semester; full study, Assistant Professor Marshall." According to Professor Marshall's records, it was not actually taught until 1906.

Doctor William Stanley Marshall had been at this institution for a number of years before this course was first offered, and he served with distinction until his retirement on July 1, 1936. He continued to teach an advanced course in insect anatomy and embryology, later called Zoology 110, from 1906 until his retirement. Since then it has been conducted by Professor Lowell E. Noland. Three other entomological courses were introduced in the Department of Zoology by Professor Marshall. In 1906, Zoology 9, a three credit survey course intended primarily for Letters and Science students, was introduced. Zoology 112, Insects and Man, a two-credit course for students in pre-medicine and allied fields, was first given under that title in 1919-20. Since Professor Marshall's retirement it has been continued by Doctor C. A. Herrick. The other course offered by Marshall, Zoology 123, consisted of topical work assigned to advanced students.

The first entomological course in the College of Agriculture was listed in the 1903-04 catalogue as Horticulture 5. It was described as follows: "Economic Entomology. A brief study of injurious insects and methods of combating them. Lectures and laboratory work. Twice a week; second semester." The instructor was not named.

The catalogue issued for the following year (1904-05) listed Horticulture 5 as "primarily for undergraduates," and designated Professor E. P. Sandsten as the instructor. In addition, Horticulture 20 was offered, "primarily for graduates." This course was described as follows: "Economic Entomology. With special reference to insects injurious to horticultural and agricultural crops. Facilities are provided for the breeding and for the study of the life histories of insects. The methods of compounding, and the uses of insecticides will be fully considered. Second semester; M., W., F. Professor Sandsten."

The University catalogue for 1908-09 listed the last entomology course offered by the Department of Horticulture. Horticulture 20 had been discontinued, and the description of Horticulture 5 had been altered to read: "Economic Entomology and Pathology. A study of insects injurious to horticultural and agricultural crops. Second semester; two laboratory periods a week; two unit hours. Mr. Milward."

The 1909-10 catalogue listed four courses in the newly-created Department of Economic Entomology, but they were not given as Professor Sanders did not assume his duties here until shortly before July 1, 1910.

Economic Entomology courses 1, 3 and 6 were offered "primarily for undergraduates," while 20 was intended "for undergraduates and graduates." These new courses and the descriptions of them are given below because they show the lines along which the teaching in this department was subsequently developed.

"1. General Economic Entomology. A general survey of insects in their economic relation to agriculture, horticulture and public health. Three credits; first semester; lectures and laboratory. Mr. Sanders.

"3. Horticultural Entomology. A study of insects affecting horticulture. Prerequisite, course 1. Three credits; second semester; one lecture and two laboratory periods. Mr. Sanders.

"6. Household insects. A general consideration of insects of importance in the household. One credit; second semester; lectures and laboratory. Mr. Sanders.

"20. Research Work. Special economic problems for advanced students. Prerequisite, course 1. Throughout the year. Credit by special arrangement. Mr. Sanders."

In the following catalogue the same courses were listed with the identical descriptions, but they bore the numbers 101, 103, 106, and 120, respectively. So began the teaching activities in the Department of Economic Entomology.

Professor Sanders was 29 years of age when he came to Wisconsin in 1910. An ex-athlete with a fine physique and classic profile, he was popular with his students from the first. Some of his examination questions now in the department files indicate that he followed a "Three R" system of teaching rather closely. Unfortunately, his forthright nature and outspokenness made him unpopular with some of his faculty colleagues.

The teaching activities of Professor Sanders during his stay at Wisconsin were somewhat erratic. Nursery inspection work took him away from Madison a great deal, to the detriment of his classroom responsibilities. One of his students of those days, now a prominent commercial entomologist, writes as follows regarding his class work under Professor Sanders:

"The chief thing I remember about his classes was going over there and meeting with a handful of the other fellows whose names I do not even remember, waiting about ten or fifteen minutes for the Prof. to show up, then going out and loafing the rest of the hour away on the green grass of the Ag. campus in the warm spring sunshine or in the pursuit of other interests."

The merits of Professor Sanders as a teacher apparently lay more in his informal contacts with his students, for the same alumnus wrote further:

"I do not mean to infer that I did not acquire much from Prof. Sanders in the way of information, understanding and inspiration along the line of the possibilities and opportunities for work in the applied field. It was

probably my contact with him, especially my work for him during the summer of 1911, that directed my future activities toward the economic phase of the subject. While conventional class work was very limited and sporadic because of the reasons mentioned above, I did get a lot of practical working experience in and understanding of some of the fundamentals of economic activity."

The above remarks are substantiated by the records subsequently made by a number of students who got at least a portion of their entomological training under Professor Sanders. C. R. Cleveland, following creditable records in academic pursuits at Purdue and New Hampshire, became Entomologist of the Standard Oil Company of Indiana, a position he now holds with credit to his Alma Mater. F. A. Fenton, after a highly successful career studying cotton insects for the U. S. D. A. Bureau of Entomology, became head of the Department of Entomology at the Oklahoma A. and M. College, where he is steadily building a strong department. Neale Howard is now Entomologist in charge of Mexican bean beetle investigations for the Bureau of Entomology and Plant Quarantine, stationed at Columbus, Ohio. S. B. Fracker is in charge of Plant Disease Control activities in the Bureau of Entomology and Plant Quarantine at Washington, D. C.

A number of other early students in the department are no less deserving of special mention. A. C. Burrill is now Curator of the Missouri State Museum, located at Jefferson City. Stewart C. Chandler is Field Entomologist with the Illinois State Natural History Survey, located at Carbondale. T. T. Haack went to Pennsylvania with Professor Sanders in 1918 and later joined him in the service of the Sun Oil Company.

Other alumni of the early years have made distinguished records outside of the field of entomology. George A. Chandler, after a long period of service in an administrative capacity in the Registrar's office at Madison, became Professor of Philosophy at Principia College in Elmhurst, Illinois, a position he now holds. R. C. Pickett, the first student to take both B. S. and M. S. degrees under Professor Wilson at Wisconsin, is now associated with the Advertisers Service Bureau of Chicago. Additional names might be added if space permitted.

The coming of Professor Wilson marked the beginning of a new era of teaching within the department. He did most of the teaching himself during his first years here, his first assistant being A. C. Burrill. Mr. Lloyd B. France had handled the beekeeping work prior to Professor Wilson's arrival, although it had not been stressed. From then on an increased emphasis was placed on this phase, and Prof made it his specialty. This will be discussed further in the chapter to follow.

Classes were small at first, but Professor Wilson was building solidly for the future. L. G. Gentner was brought from Oregon as an Instructor beginning February 1, 1916, followed by C. L. Fluke from Colorado in the fall of 1916. Mr. Fluke soon distinguished himself as an outstanding teacher and has long been recognized as one of the half-dozen "best teachers" in the College of Agriculture. He has for many years carried the brunt of the teaching load in the department, including Course 1 and courses in insect morphology and taxonomy. Professor Wilson more than

once has affectionately characterized him as "a good wheel-horse." W. L. Beran was appointed Instructor in September, 1916, but resigned at the end of the first semester and was followed by J. I. Hambleton in the same capacity. Mr. Hambleton taught some of the beekeeping during the early years, as did V. G. Milum who came later.

Time brought changes in the teaching roster of the department which need not be given in detail here, since all the names are included in Table III. A. A. Granovsky, after a distinguished undergraduate career at the Colorado Agricultural College, joined the department in 1922. He set a high standard both as a teacher and as a research worker at Wisconsin from 1922 to 1930, when he joined the faculty of the University of Minnesota. Under Professor Wilson's tutelage he won wide recognition in the field of plant disease transmission by insects and in the taxonomy of aphids.

Other names have appeared as teachers in the time tables of recent years. Ed. M. Searls came to the department from the Bureau of Entomology and Plant Quarantine in 1930 and assumed the teaching duties formerly carried by Granovsky. He has taught Insect Transmission of Plant Diseases, Larval Taxonomy, Field Crop Insects, and Truck Crop Insects during the intervening period. George Marvin taught beekeeping from 1925 through 1930, when he was succeeded by Erwin C. Alfonsus. Since the establishment of the U. S. D. A. Bee Culture Laboratory in Madison in 1938, the beekeeping courses have been continued by C. L. Farrar. Mr. Alfonsus also taught a course in Insect Ecology in which he has been succeeded by John H. Lilly. Thomas C. Allen has organized and twice taught an original course in Insecticides and Insect Control. A number of assistants in the department have helped conduct the various courses from time to time.

Table III gives a complete summary of the teaching in the department (exclusive of the Short Course classes) since the beginning of Professor Wilson's administration in 1915. With some earlier class statistics, it is placed here to make it a matter of record, since a compilation of this material has not been attempted up to this time.

TABLE III - Summary of Courses Given and Students Enrolled in Economic Entomology at the University of Wisconsin - 1915 - 1940

Year	Semester	Course Number	Title	Instructor	Enrollment
1916-17	I	1	Farm Insects	Wilson	13
1917-18	II	"	" "	"	9
1918-19	"	"	" "	Wilson & Fluke	14
1919-20	"	"	" "	" "	15
1920-21	"	"	" "	" "	26
1921-22	"	"	" "	Fluke	44
1922-23	"	"	" "	"	25
1923-24	"	"	" "	"	33
1924-25	"	"	" "	"	51
1925-26	"	"	" "	"	22

TABLE III - Continued

Year	Semester	Course Number	Title	Instructor	Enrollment
1926-27	II	1	Farm Insects	Fluke	17
1927-28	"	"	" "	"	27
1928-29	"	"	" "	"	38
1929-30	"	"	" "	"	27
1930-31	"	"	" "	"	49
1931-32	"	"	" "	"	44
1932-33	"	"	" "	"	21
1933-34	"	"	" "	"	24
1934-35	"	"	" "	"	54
1935-36	"	"	" "	"	68
1936-37	"	"	" "	"	78
1937-38	"	"	" "	"	108
1938-39	"	"	" "	"	105
1939-40	"	"	" "	"	100
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1926-27	I	2	Insect Morphology &	Fluke	3
1927-28	"	"	" Taxonomy	"	5
1928-29	"	"	"	"	10
1929-30	"	"	"	"	10
1930-31	"	"	"	"	10
1931-32	"	"	"	"	6
1932-33	"	"	"	"	5
1933-34	"	"	"	"	9
<hr/>					
1922-23	II	7	Household Insects	Granovsky	5
<hr/>					
1917-18	II	10	Beckeping	Wilson	14
1918-19	"	"	"	"	9
1919-20	"	"	"	"	29
1920-21	I	"	"	"	44
1921-22	"	"	"	"	26
1922-23	"	"	"	Milum	19
1923-24	"	"	"	"	10
1924-25	"	"	"	"	14
1925	SS	"	"	"	2
1925-26	I	"	"	Marvin	8
1926-27	"	"	"	"	4
1927-28	"	"	"	"	4
1928-29	"	"	"	"	11
1929-30	"	"	"	"	4
1930-31	"	"	"	"	8
1931-32	"	"	"	Alfonusus	3
1932-33	"	"	"	"	6
1933-34	"	"	"	"	5
1934-35	"	"	"	"	6
1935-36	"	"	"	"	7

TABLE III - Continued

Year	Semester	Course Number	Title	Instructor	Enrollment
1936-37	I	10	Beekeeping	Wilson	6
1938-39	II	"	"	Farrar	7
1939-40	"	"	"	"	8
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1923	SS	100	Thesis (undergraduate)	Staff	1
1923-24	I	"	"	"	1
1924-25	I	"	"	"	1
1925	SS	"	"	"	2
1925-26	I & II	"	"	"	4
1926	SS	"	"	"	1
1926-27	II	"	"	"	1
1927-28	I	"	"	"	2
1928-29	II	"	"	"	3
1929-30	I & II	"	"	"	5
1930-31	" "	"	"	"	9
1931-32	" "	"	"	"	7
1932-33	" "	"	"	"	3
1933-34	" "	"	"	"	3
1934-35	" "	"	"	"	7
1935-36	" "	"	"	"	1
1936-37	" "	"	"	"	3
1937-38	" "	"	"	"	2
1938-39	" "	"	"	"	2
1939-40	" "	"	"	"	1
<hr/>					
1910-11	I	101	Economic Entomology	-	15
1911-12	"	"	"	"	32
1912-13	"	"	"	"	34
1913-14	"	"	"	"	16
1914-15	"	"	"	"	49
1915-16	"	"	General Entomology	Wilson	27
1916-17	"	"	"	"	13
1917-18	"	"	"	"	1
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1935-36	I	102	Insect Morphology &	Fluke	10
1936-37	"	"	" Taxonomy	"	3
1937-38	"	"	"	"	8
1938-39	"	"	"	"	6
1939-40	"	"	"	"	14
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1909-10	II	103	Fruit Insects	-	16
1910-11	"	"	"	"	13
1911-12	"	"	"	"	21
1912-13	"	"	"	"	22
1913-14	"	"	"	"	10
1914-15	"	"	"	"	22

TABLE III - Continued

Year	Semester	Course Number	Title	Instructor	Enrollment
1915-16	I	103	Fruit Insects	Wilson	9
1916-17	"	"	" "	"	8
1917-18	"	"	" "	Fluke	7
1920-21	"	"	" "	"	9
1922-23	"	"	" "	"	11
1924-25	"	"	" "	"	8
1926-27	"	"	" "	"	7
1928-29	II	"	" "	"	6
1930-31	"	"	" "	"	16
1932-33	"	"	" "	"	7
1934-35	"	"	" "	"	5
1936-37	"	"	" "	"	6
1938-39	"	"	" "	"	11
<hr/>					
1914-15	II	105	Truck Crop Insects	-	15
1915-16	"	"	" " "	Gentner	8
1916-17	"	"	" " "	"	10
1918-19	I	"	" " "	Wilson	3
1919-20	"	"	" " "	Fluke	9
1921-22	"	"	" " "	"	14
1923-24	"	"	" " "	"	10
1925-26	"	"	" " "	"	6
1927-28	"	"	" " "	Granovsky	7
1929-30	II	"	" " "	"	9
1931-32	"	"	" " "	Searls	9
1933-34	"	"	" " "	"	6
1935-36	"	"	" " "	"	6
1937-38	"	"	" " "	"	12
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1936-37	I	107	Principles of Insect	Allen	6
1938-39	"	"	" Control	"	7
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1912-13	II	110	Beekeeping	-	21
1913-14	"	"	"	-	28
1914-15	"	"	"	-	20
1916-17	"	"	Advanced Beekeeping	Wilson & Hambleton	8
1919-20	"	"	" "	" "	13
1920-21	"	"	" "	Hambleton	18
1921-22	"	"	" "	Wilson	7
1922	SS	"	" "	"	4
1922-23	II	"	" "	"	5
1923-24	"	"	" "	Milum	6
1924-25	"	"	" "	"	2
1925	SS	"	" "	"	2
1925-26	II	"	" "	Marvin	3
1927-28	"	"	" "	"	1
1928-29	"	"	" "	"	4
1929-30	"	"	" "	"	3

TABLE III - Continued

Year	Semester	Course Number	Title	Instructor	Enrollment
1931-32	II	110	Advanced Beekeeping	Alfonsus	6
1932-33	"	"	"	"	4
1933-34	"	"	"	"	4
1914-15	I & II	115	Entomology & Beekeeping	Fracker	8
1915-16	" "	"	"	Wilson	5
1916-17	" "	"	"	"	12
1917-18	" "	"	"	"	6
1919-20	" "	"	"	"	5
1920-21	" "	"	"	"	8
1921-22	" "	"	"	"	7
1922-23	" "	"	"	"	1
1923-24	I & II	115	Seminary	Wilson	19
1924-25	" "	"	"	"	10
1925-26	" "	"	"	"	11
1926-27	" "	"	"	"	7
1928-29	" "	"	"	"	14
1933	SS	118	Taxonomy	Fluke	2
1933-34	I	"	"	"	8
1913-14	I	120	Research	Sanders	13
1914-15	I & II	"	Research & Thesis	Fracker & "	22
1915-16	" "	"	Topical Work	Wilson	10
1916-17	" "	"	"	"	7
1917-18	" "	"	"	"	12
1918-19	" "	"	"	Wilson & Fluke	4
1919-20	" "	"	"	Wilson	7
1920-21	" "	"	"	"	6
1921-22	" "	"	"	"	9
1922	SS	"	"	"	2
1922-23	I & II	"	"	"	13
1923	SS	"	"	"	3
1923-24	I & II	"	"	"	18
1924	SS	"	"	"	1
1924-25	I	"	"	"	6
1925	SS	"	"	Wilson & Fluke	1
1925-26	I & II	"	"	Wilson	18
1926-27	" "	"	"	Wilson & Fluke	16
1927-28	" "	"	"	"	10
1928-29	" "	"	"	"	13
1929-30	" "	"	"	"	9
1930-31	" "	"	"	"	14
1931	SS	"	"	"	2
1931-32	I & II	"	"	"	11
1932-33	I	"	"	"	11

TABLE III - Continued

Year	Semester	Course Number	Title	Instructor	Enrollment
1932-33	II	120	Insect Ecology	Alfonsus	11
1934-35	"	"	" "	"	8
1936-37	"	"	" "	Lilly	4
1938-39	"	"	" "	"	13
1928-29	I	120E	Plant Diseases	Granovsky	12
1930-31	II	120a	Ecology	Searls	11
1931-32	"	"	Taxonomy	Fluke	4
1932-33	"	"	"	Searls	1
1929-30	II	120b	Methods	Fluke & Granovsky	14
1930-31	"	"	"	Fluke	7
1929-30	II	120c	Taxonomy	Fluke & Granovsky	8
1930-31	"	"	"	Fluke	6
1932-33	"	"	"	"	3
1933-34	II	121		Fluke	4
1931-32	I	123	Larval Taxonomy	Searls	10
1932-33	"	"	" "	"	5
1933-34	"	"	" "	"	2
1934-35	"	"	" "	"	8
1936-37	"	"	" "	"	6
1938-39	"	"	" "	"	8
1929-30	I	125	Insect Transmission of Plant Diseases	Granovsky	8
1931-32	"	"	"	Searls	4
1932-33	"	"	"	"	10
1933-34	"	"	"	"	5
1935-36	"	"	"	"	8
1937-38	"	"	"	"	9
1915-16	I & II	130	Thesis	Wilson	5
1916-17	" "	"	"	"	8
1917-18	" "	"	"	"	7
1918-19	" "	"	"	"	1
1919-20	" "	"	"	"	2
1920-21	" "	"	"	"	2

TABLE III - Continued

Year	Semester	Number	Title	Instructor	Enrollment
1929-30	I & II	130	Seminary	Wilson	25
1930-31	" "	"	"	"	34
1931-32	" "	"	"	"	37
1932-33	" "	"	"	"	25
1933-34	" "	"	"	"	12
1934-35	" "	"	"	"	20
1935-36	" "	"	"	"	18
1936-37	" "	"	"	"	21
1937-38	" "	"	"	"	21
1938-39	" "	"	"	"	17
1939-40	" "	"	"	"	20
<hr/>					
1933-34	II	180	Special Topics	Staff	2
1934	SS	"	" "	"	4
1934-35	I & II	"	" "	"	7
1935-36	" "	"	" "	"	11
1936	SS	"	" "	"	3
1936-37	II	"	" "	"	4
1937	SS	"	" "	"	1
1937-38	I & II	"	" "	"	20
1938	SS	"	" "	"	1
1938-39	I	"	" "	"	2
1939	SS	"	" "	"	2
1939-40	I & II	"	" "	"	5
<hr/>					
1929-30	I & II	200	Research (Graduate)	Staff	10
1930-31	" "	"	" "	"	17
1931-32	" "	"	" "	"	20
1932	SS	"	" "	"	1
1932-33	I & II	"	" "	"	9
1933	SS	"	" "	"	1
1933-34	I & II	"	" "	"	7
1934-35	" "	"	" "	"	8
1935-36	" "	"	" "	"	11
1936-37	" "	"	" "	"	9
1937	SS	"	" "	"	1
1937-38	I & II	"	" "	"	11
1938	SS	"	" "	"	2
1938-39	I & II	"	" "	"	5
1939	SS	"	" "	"	5
1939-40	I & II	"	" "	"	5
<hr/>					
1926-27	II	220	Research	Fluke & Wilson	6
1927-28	I	"	"	" "	4
1928-29	I & II	"	"	" "	7
1931	SS	"	"	" "	1

The names of several early students of the department have been mentioned already, along with their subsequent accomplishments. The achievements of later graduates have been, on the whole, just as creditable as those of the earlier group, and the present positions of many of them are just as noteworthy. Obviously, however, it is impossible to devote a proportionate amount of space to each graduate of the department since 1915.

An alternative procedure is to name the alumni of the department since the beginning of Professor Wilson's administration and state concisely their present occupations where this information is at hand. The list below represents such an attempt.

<u>Name and Degree</u>	<u>Address</u>	<u>Occupation</u>
Aeppler, C.W. BS'17;Fac.'16.	Oconomowoc, Wis.	Bee supplies & honey
Ahrens, H.G. BS'22;MS'23	Two Rivers, Wis.	Teacher
Alberts, H.W. PhD '18		
Alfonsus, E.C. BS Minn.; MS'32; PhD'35; Fac.'31-'36.		
Allen, Thos. C. BS'28,Ore.; MS'29 Ore.; PhD'32. Fac.	Dept. Econ. Ent., Univ. of Wis.	Ass't. Prof.
Barr, Kenneth MS'33	Eagle Grove, Ia.	Teacher
Beadle, Leslie	Platteville, Wis.	State Teachers Colleg
Birge, S. J. MS'14	St. Louis, Mo.	Seymour Mfg. Co.
Boggs, Newton MS'21	Viroqua, Wis.	Beekeeper
Boucher, Clarence K. BS'15	Rochester, N. Y.	Farmer
Bronson, Theo.E. BS'29; MS'31	U.S.Bur.Ent.,Madison	Ass't Entomologist
Brooks, James W. BS'36 Carroll	Univ. of Wis.	Graduate Assistant
Broome, G.C. BS'30 Miss.; MS'31	Gulfport, Miss.	U.S.D.A.Bur.Ent.
Burdick, H.L. BA'37 Milton;MA'38	Univ. of Wis.	Graduate Assistant
Bushnell, R.J. BS'31;MS'32; PhD '35	Univ. of Connecticut, Storrs, Conn.	Faculty
Burrill,A.C. MS;Fac.'11-'15.	Jefferson City, Mo.	Curator,Mo.Res.Museum
Butler, Richard BS'25;MS'33	Madison, Wis.	Science Teacher
Cairns, Clifford E.	Marinette, Wis.	Teacher

Name and Degree	Address	Occupation
Callenbach, John A. BS'30; MS'31; PhD'39; Fac.'36-	Dept. Econ. Ent. Univ. of Wis.	Instructor
Carpenter, T. L. BS'37	Sinclair Oil Co., E. Chicago	Entomologist
Carroll, F.E. BS'31; MS'32	Agicide Lab., Milwaukee	Entomologist
Chada, H.L. BS'26; MS'31	Huron, S. D.	U.S.D.A. Bur. Ent.
Chamberlin, T.R. BA'20 Utah	U.S. Bur. Ent., Madison	Assoc. Entomologist
Chandler, S.C. BS'15	R.1, Carbondale, Ill.	Entomologist
Chambers, E.L. MS'25	Madison, Wis.	State Entomologist
Chandler, Geo. BS'17	Principia College, Elsau, Ill.	Prof. Soc. & Phil.
Chen, Tsung BS'30; MS'31	Peking, China	Teacher
Cleveland, Clarence R.	Chicago, Ill.	Ent., Standard Oil Co.
Conger, P.S. BS'20; MS'21	U.S. Nat. Mus., Washington	Diatomist
Daehnert, Raymond	Univ. of Wis.	Undergraduate
Courtney, O.K. BS '15 Texas MS'34	St. Louis, Mo.	USDA Plant Quarantine
Davis, Ray J.	Box 125, Rexburg, Idaho	Teacher, Ricks College
Dicke, Robert BS'40	Univ. of Wis.	Graduate Assistant
Dieter, C.E. BS'35; MS'36 PhD'40	Midland, Mich.	Ent., Dow Chemical Co.
Deguisti, Dominic	Univ. of Wis.	Undergraduate
Dodge, Harold BS'35	Ohio State University	Graduate Assistant
Doner, M.H. BS'31; PhD'35	Winona, Minn.	Entomologist
Dobrovsky, T. BS'31; MS'33	Madison, Wisconsin	Beekeeper
Dobson, Richard	Univ. of Wisconsin	Undergraduate
Dosch, Howard BS'34	Blue River, Wis.	Teacher
Duckworth, C. D.	Deceased	
Dudley, J.E. BS'26; MS'28	Madison, Wis.	USDA, Bur. Ent.
Elliott, D.C. BS; MS	Lafayette, La.	S.W. La. Institute

Name and Degree	Address	Occupation
Ellis, Earl BS'36	Madison, Wis.	Salesman
Epple, Arol MS'36	Antigo, Wis.	Teacher
Ehrgott, E.E. BS'25	Deceased	
Farrar, C.L. PhD'31 Mass.	USDA Bur.Ent.,Madison	Apiculturist
Fellows, H. MS'22; PhD'23	Manhattan, Ks.	USDA Pl.Pathologist
Feng, H.W. BS'24	Shanghai, China	Entomologist
Fenton,F.A. PhD'15	Stillwater, Okla.	Head, Dept. Econ.Ent.
Fluke, C.L. PhD'28;Fac.'16-	Dept.Econ.Ent., Univ.Wis.	Professor
Fluke, Barnaby BS'39	Univ. Idaho, Moscow	Graduate Assistant
Fracker, S.B. PhD' Ill.,Fac. '14	Washington, D. C.	Sr.Ent., USDA, Pl. Quarantine
France, L.V. BS'14; MS'15 'Fac. '13-'14	St. Paul, Minn.	Biology Teacher
Frey, David	Dept. of Zoology, Wis.	Graduate
Gentner, Louis MS'18; Fac.'15-'17	Talent, Ore.	So. Oregon Hort. Field Station
Glawe, John F.	Yorkville, Ill.	Graduate
Goldsworthy, Vernon MS'31	Wis. Rapids, Wis.	Mgr.,Cranberry Sales Co.
Gerlach, Chas.	Univ. of Wis.	Undergraduate
Goss, Victor BS'24	Blair, Wis.	Principal, Blair Schools
Granovsky, A.A. MS'23; PhD'39; Fac.'23-'30	Univ. of Minn.	Assoc. Professor
Griffith, C.H. MPh'30	Minneapolis, Minn.	
Gwin, C.M. BS; MS'30	Madison, Wis.	Comm'l. Entomologist
Haack, T.T. BS'14	Columbus, Ohio	Ent., Sun Oil Co.
Halliday, Hubert	Madison, Wis.	Nursery Inspector
Hambleton, J.I. BS'17 Ohio; Fac.'20	Beltsville, Md.	Chief,Div. Apiculture, USDA
Harrington, C.D. MS'37 Milton; Miltipas, Cal. PhD'40		Assoc. Seed Growers

Name and Degree	Address	Occupation
Harris, Herbert BS'34;MS'35	McConnon & Co., Winona, Minn.	Entomologist
Hartwell, R.W. BS'18	Univ. of Wis.	Hort. Dept.
Hauge, G.H. Ex.'13	Viroqua, Wis.	Instructor
Haydak, Mykola M. MS'27 Prague; PHD'33	University of Minnesota	Instructor, Ent. & Econ. Zoology
Hiestand, Wm.A. BA'25; MA'28; PhD'30	Purdue University	Ass't Professor of Physiology
Hoffman, George BS'33	Ento Pest Control, Chicago	Entomologist
Howard, Neal F. BS'14; Fac.'14; PhD, Ohio	Columbus, Ohio	U.S. Bur. Ent'
Hughes, E. R. BS'26	Deceased	Agriculturist
Jacobson, Jacob BS'22	Mondovi, Wis.	
Jasperson, Newell BS'39	Port Edwards, Wis.	Cranberry production
Johnson, James BS'09; MS'11; PhD '18	Univ. of Wis.	Prof. of Horticulture
Johnstone, Mary C. BS'20	Rochester, Minn.	Translator, Mayo Bros.
Jones, Leon K. MS'21;PhD'22	Pullman, Wash.	Assoc.Prof.Plant Path.
Kappel, Gus. V. BS'18; Fac.'17	Lake Mills, Wis.	Teacher
Kartman, Leo BS'35;MS'36	Spring Grove, Ill.	
Kellogg, C.R. MA'18	Fukien Christian Univ., China	Prof. of Ent.
Kessenich, A.M. BS'16	Minneapolis, Minn.	Montgomery Ward Co.
Koch, Karl L. BS & MS Neb.; PhD'31	Eastern States Farmers Exchange, Presque Isle, Maine	Ass't. State Ent.
Kohn, George BS'32	Univ. of Wis.	Graduate
Kuckuk, H.J. BS'28	Mellen, Wis.	Principal, High school
Kramer, Marvin BS & MS Zool. Univ. of Wis.	Dept. Entomology	Graduate
Laidlaw, H.H. BS, L.S.U.; MS'34 LSU; PhD'39	Okland City, Ind., College	Science Teacher
Kinsky-Korshakoff, V. BS'27; PhD'30	Washington, D.C.	Congressional Lib.

Name and Degree	Address	Occupation
Leonard, Royal	Commercial air pilot in China	
Lilly, John H. BS'31, PhD'39; Fac.'31-	Dept. Econ.Ent., Univ. Wis.	Instructor
Logan, W. T. BS'24	Winamac, Ind.	Teacher
Long, J.F. BS'22; MS'24	Westfield, Wis.	
Lotz, J.A. BS'22	Cadott, Wis. (Teacher, Philippine Islands)	
Marvin, Geo.E. BS'23; MS'26; Fac.'25-'30	Kohala, T. H.	County Agent
McCaughn, Robert	Star Lake, Wis.	
Milum, V.G. BS'21; MS'24; PhD'28; Fac.'21-'24	Champaign, Ill., Univ. Ill.	Apiculturist
Neale, Fred H. BS'14		
Netterstrom, Ralph W.	Santa Paula, Calif.	
Newell, Leslie BS'39	Univ. of Wis.	Graduate
Noland, Mrs. L.E. BS'12 (Nee Ruth W. Chase)	Madison, Wis.	Housewife
Oertel, E. BS'24; PhD Cornell '28	USDA Bur.Ent, Baton Rouge, La.	Assoc. Apiculturist
Paddock, F.B. MS'30	Iowa State College, Ames	State Apiarist
Parfrey, A.C. BS'16	Spring Grove, Ill.	
Paullus, J. Harold	Crystal City, Mo.	Graduate (SS)
Pickett, R.C. BS'15; MS'21	LaGrange, Ill.	Advertising
Piller, Al. BS'31	Madison, Wis.	Ass't. State Ent.
Plonsky, Harry BS Ill.'39; MS'40	Univ. of Wis.	Graduate
Polivka, J.B. BS'25; MS'25; PhD Ohio '30	Wellston, Ohio	Agr. Exp. Sta. Staff
Ramaker, E.A. Fed. Bd.'20-'22		
Rasmussen, E.J. BS'27	E. Lansing, Michigan	Ass't. Prof. Hort.
Rimsky-Korsakoff, V. BS'27; MS'30	Washington, D.C.	Congressional Lib.

Name and Degree	Address	Occupation
Robinson, A.H. BS'17	Milwaukee, Wis.	X-Ray Specialist
Ritcher, Paul O. BS & MS Ill.; PhD'35	Univ. of Ky., Lexington	Ass't. Ent.
Roe, John F. BS'32	Mindot, N.D.	USDA, Bur. Ent.
Roberts, J.H. BS.; PhD, Md.	Univ. of La., Baton Rouge	Ass't. Prof.
Roe, Chas. W. MS'28; Fac.'27	Mercer, Wis.	USDA, Bur. Ent.
Ruch, Lewis BS'32; MS'33	S.C.S., Michigan	Jr. Biologist
Ruste, Anton BS'32; MS'33	Deceased	
Sanders, J.G. MS; Fac.'10-'14		
Sazama, Frank B. BS; MS'30	Chippewa Falls, Wis.	Physician & Surgeon
Schaefer, Carl W. BS'32; MS'33; PhD'37; Fac.'36-	Univ. of Wis. & USDA	Bur. Ent. Instructor
Searls, Ed. M. BS'26; MS'28; PhD'36; Fac.'30-	Univ. of Wis.	Ass't. Prof.
Seaton, Lee	US Bur. Ent., Madison	Ass't Sci. Aide
Severin, H.C. BA'07	S. Dak. State College, Brookings	Prof. Ent.
Severin, H.H.P. BA'06; MA'07; PhD'10	Univ. of Cal., Berkeley	Assoc. Ent.
Stanger, N. Ward	Univ. of Cal., Berkeley	Graduate
Slocum, B.A. BS'21	University of Nanking, China	Prof. of Ent.
Smith, Dorland	New Carlisle, Ind.	Fruitgrowing
Smith, Phillip	Univ. of Wis.	Undergraduate
Stanek, George BS'33	S.C.S., Cambridge, Ohio	Jr. Biologist
Snyder, Fred BS'35; MS'36 PhD'40	John Powell Co., New York	Entomologist
Stearns, Louis A. EX.'17	Univ. Delaware, Newark	Entomologist
Stone, Philip BS'34	USDA, Bur. Ent., Madison	Field Aide
Streets, R.B. MS'22; PhD'24	Univ. of Ariz., Tucson	Assoc. Prof. Pl. Path.
Strom, Lawrence	Milwaukee, Wis.	

Name and Degree	Address	Occupation
Swan, H. J.	Milwaukee, Wisconsin	
Van Fleet, Olin	Clark's Summit, Pa.	Farming
Weed, Al BS'23; MS'25; PhD'28	John Powell Co., New York, N.Y.	Entomologist
Welch, D. W. Fed.Bd.'24	Deceased	
Whitcomb, Warren, Jr. MS'25; PhD'28; Fac.'27-28	USDA Bur. Ent., Baton Rouge, La.	Apiculturist
Whitehead, L.P. MS; Fac.'21-'23	Madison, Wis.	Dentist
Woods, John B. BS'27	Fayetteville, Ark.	
Wilson, H.F. BS Col.; MS Ore.; Fac.'15-	Univ. of Wis.	Professor
Woodsdalek, J.E. PhB'10; PhM'11; PhD'13	Univ. of Minn., St. Paul	Prof. Zoology
Woodworth, Chas. E. MS; PhD'13; Fac.'28-'30	USDA, Bur. Ent., Walla Walla, Wash.	Assoc. Ent.
Zahorik, John J.	Alma, Wis.	County Agent
Zaumeyer, Wm. J. BS'25; MS'27; PhD'28	USDA Bur. Pl. Indus., Washington, D. C.	Pathologist
Zermuchlen, Al. BS'34; MS'36	Instant Post Control, Madison	Entomologist
Zimmerman, Fred R. BS'34	Madison, Wis., State Conservation Dept.	

CHAPTER IV

Development of Apicultural Work in the
Department and Establishment of the Miller Memorial Library

We have already noted the statement of an alumnus of prominence in the field of apiculture to the effect that, "he (Professor Wilson) has turned out more students who hold important positions in apiculture than any other person. In corroboration of this remark we quote the following paragraph by E. R. Root from the 1940 edition of "The ABC and XYZ of Bee Culture":

"There have been a number of men outside of the U. S. Bee Culture Laboratories, and the Bureau of Chemistry, but connected with various state activities, who have done some very fine work. The pioneer, perhaps, of these is Professor H. F. Wilson, of the University of Wisconsin. He has made special studies of temperature, dysentery, wintering, honey, and of marketing; but his greatest achievement, outside of organizing the "Dr. Miller Memorial Library", is what he has done for his students, some of whom have made their mark in the apicultural field. Among this number are Jas. I. Hambleton, F. B. Paddock, E. Oertel, E. C. Alfonsus, Carl Schaefer, Harry H. Laidlaw, C. W. Aeppler, Warren Whitcomb, Geo. E. Marvin, V. G. Milum, and Mykola Haydak."

Previous mention has been made of the apicultural work of L.V. France during the administration of Professor Sanders. Although it is not known to many people, Professor Wilson had become interested in apiculture at Oregon and had taught a course in beekeeping there. Mr. France went to the University of Minnesota as Instructor in Beekeeping soon after Professor Wilson came to Wisconsin. Wisconsin Agricultural Experiment Station Bulletin 264, "Beekeeping in Wisconsin," by N. E. and L. R. France, appeared in March, 1916. It contained 28 pages and 10 figures.

Early in his career at Wisconsin, Professor Wilson began to emphasize beekeeping. The first research in this field done under his administration was a queen breeding project carried out by C. W. Aeppler in 1916. Mention has been made of the appointment of G. C. Mathews, G. H. Calc and H. L. McMurray as Government Extension Agents in apiculture during the season of 1917. Among other things, they made a detailed survey of the honey-producing potentialities of representative agricultural areas throughout the State.

The record of accomplishments of Professor Wilson and his colleagues in the field of apiculture forms almost a continuous story right down to the present. The appointment of James I. Hambleton as Instructor, beginning February 1, 1917, gave impetus to this phase of the department's activity. Hambleton was active in both teaching and research during his period of service from 1917 to 1921. Among the problems investigated by Wilson and Hambleton were wintering problems and causes of winter losses, spread and control of American foul brood, value of package bees, pollination experiments with cherries, and disinfection of beekeeping equipment.

V. G. Milum came to the University of Wisconsin in 1921 with a brilliant war record and a genuine interest in bees and bee culture. He remained through the summer of 1925 but accepted a position as Apiculturist at the University of Illinois shortly before he received the first Ph.D. in Apiculture granted by the department. Wilson and Milum continued along the lines previously laid down, emphasis being placed on bee wintering, American foul brood, honey discoloration and studies of the wax moth. Milum's Ph.D. thesis was devoted to a detailed study of winter temperatures in beehives, the results of which have been quoted widely. Also interested in journalism, Milum was an excellent writer and capable teacher. "Winter Protection for the Honey Bee Colony," Research Bulletin 75 of the Wisconsin Station, by H. F. Wilson and V. G. Milum, appeared in February, 1927. It contained 47 pages and 11 figures.

Warren Whitcomb, Jr., came to the department in 1926 and was assigned to a field station near Racine to study the control of the onion maggot and other truck crop insects of that area. Although he did an excellent job at Racine, he was keenly interested in apiculture and his Ph.D. thesis was devoted to a study of the digestion of pollen in the honey bee. Research Bulletin 92, "Mechanics of Digestion of Pollen by the Adult Honey Bee and the Relation of Undigested Parts to Dysentery of Bees," by Whitcomb and Wilson appeared in May, 1929. It contained 27 pages and 11 figures. Following his graduation in June, 1929, Whitcomb joined the staff of the Bee Culture Division of the U. S. Bureau of Entomology and Plant Quarantine. He is now in charge of its Southern States Field Laboratory, at Baton Rouge, Louisiana, which has a technical staff of five who are working on package bee production, queen rearing, genetics and breeding, physiology, honey plants, and local problems peculiar to southern beekeeping.

George E. Marvin joined the staff of the department in 1925 and remained until he went into the service of the Bee Culture Division of the Bureau of Entomology and Plant Quarantine in 1930. Marvin's research was devoted principally to honey storage and spoilage problems, particularly the role played by yeasts. He was a careful investigator whose results have received well-merited recognition. Marvin also taught the beekeeping courses during his period of service in the department.

Erwin C. Alfonsus came to the department from the University of Minnesota early in 1931. From his father, a famous Austrian bee expert, he inherited a brilliant mind and a deep-seated understanding of bees and their habits. This had been supplemented by a broad biological training, both in this country and abroad. He was assigned the task of determining the cause of dysentery in honey bees, an important problem that had baffled beekeepers for centuries. Alfonsus undertook this study with determination and brought forth a solution that is a credit to both him and the department. His theory is that it is the excess moisture in honey resulting from granulation which is responsible for this disorder. It is not an accident that Professor Wilson was asked to write a discussion of this subject for the 1940 edition of "The ABC and XYZ of Bee Culture." Alfonsus also taught the beekeeping courses until his departure in 1936.

Mykola Haydak is another of Professor Wilson's students who is well known in apicultural circles. A native of the Ukraine and a graduate of the University of Prague, Czechoslovakia, Haydak came to Wisconsin in 1931

as a joint major in the Departments of Economic Entomology and Biochemistry. His native ability and industriousness, along with his friendly disposition, won for "Nic" a high place in the esteem of his associates. Haydak devoted himself to an intensive study of honey bee nutrition with the aim of developing a satisfactory substitute for pollen. Since receiving his Ph.D. in 1933, he has been in Instructor in Apiculture at the University of Minnesota, where he has continued his researches along the same line.

Carl W. Schaefer is another graduate of the department who has demonstrated an unusual capacity for apicultural research, although his most notable publication to date has been in another field. He was awarded a Ph.D. in 1937, his thesis being an outstanding contribution to our knowledge of wing formation in aphids. He served as Instructor and taught some of the beekeeping courses from 1936 to 1938, and since has been on the staff of the North Central States Bee Culture Laboratory.

The most recent Ph.D. in the apicultural field awarded by the department was obtained by Harry H. Laidlaw in 1939, a joint major in the Departments of Economic Entomology and Genetics. His thesis was devoted to a study of artificial insemination of queen bees, particularly the anatomical peculiarities of queens and drones that must be understood before this process is feasible. His percentage of successful queen inseminations has been notably higher than that of any of his predecessors.

The establishment of the cooperative Government Beekeeping Laboratory at Madison may be considered rightfully as a tribute to Professor Wilson and the outstanding work he and his associates have performed in the field of apiculture. Under the capable leadership of Clayton L. Farrar, this laboratory already has made contributions of an outstanding nature. Established primarily to study queen supersedure and honey production problems, projects have been inaugurated for studies on the characteristics, production efficiency, and supersedure of different bee stocks, pollen problems, and two-queen colony management. No one familiar with the record of this laboratory to date has any doubt regarding its promise for the future.

In summarizing the development of apicultural research in the department we have underemphasized the guiding genius of Professor Wilson. In addition to fostering the above-named researches, he has continuously promoted apicultural extension with the aim of putting scientific discoveries into practical application as promptly as possible. In the final analysis, it is this utilization of research findings that justifies all agricultural experimentation and keeps the tax-paying public in sympathy with it. Too often this fundamental truth is overlooked by those in administrative positions.

Professor Wilson has been an active contributor to a number of contemporary movements of prime importance to the beekeeping industry. Among the first of these was conducting beekeeping chautauquas which became extremely popular during the 1920's. This institution was for years an annual event on the agricultural campus which consistently attracted large crowds and did an inestimable amount of good. The American Honey Institute is another institution that owes much to "Prof's" services. From its inception he insisted that it adhere to a sound financial policy - a move

undoubtedly responsible for the present existence of this worthy organization. The American Honey Producers' League is another organization that benefited greatly from Wilson's unselfish efforts. The establishment and building of the Miller Memorial Library, of which more is to be said shortly, is another example. In fact, the name of Professor Wilson has appeared in the bee press consistently throughout his 25 years at Wisconsin, usually in an official capacity either as head or sponsor of some movement.

Again we quote from a letter received from one of Professor Wilson's illustrious former students:

"Prof's work, which has been largely administrative, comes under a classification for which it is difficult to make a catalogue file of accomplishments and perhaps if an effort were made to do so, his most outstanding characteristic might thereby be lost track of..... Everyone readily admits that if Prof had not given his time and encouragement during the formative years of the Institute, it is doubtful whether we would have an American Honey Institute to-day, so here again we have an illustration of Prof's ability to deal with and understand people, an intangible thing, or more importance than any concrete ideas that he may have contributed.

"Prof was an active contributor to many contemporary movements, such as beekeeping chautauquas, extension work, research, national organizations and the like. As we look back some of these efforts may seem to have produced temporary results, but they were all essential steps in the progress of the beekeeping industry. If they do not seem so important as they once did, it is simply because time has a way of amalgamating such efforts into a whole or a mass -- a thing we speak of as progress."

The Miller Memorial Library

The crowning achievement of Professor Wilson at the University of Wisconsin is undoubtedly the Miller Memorial Library. His continued enthusiasm for this project, from its very beginning right down to the present, coupled with many long hours of monotonous searching and effort, make a most remarkable story. Without a doubt this is by far the finest and most complete bee library in the United States, and it is not equalled anywhere in the world. It is housed in the east wing of the College of Agriculture Library, and Professor Wilson is custodian. The U. S. Bee Culture Laboratory has assisted in its maintenance during the past few years.

Dr. Charles E. Miller was a graduate of the University of Michigan Medical School, but because of ill health, he was unable to practice and became interested in beekeeping as a means of livelihood. He made a phenomenal success of the business, and because of a keen mind and the ability to write, was a correspondent for bee journals throughout the world and was many times quoted. Dr. Miller had an unusual personality which endeared him to beekeepers throughout the whole world.

Dr. Miller died at his home at Marengo, Illinois, on September 4, 1920, and a number of his friends conceived the idea of creating some sort

of a memorial to him. The moving spirits in this undertaking included C. P. Dadant, E. F. Phillips, E. R. Root, E. G. LeSturgeon and B. F. Kindig. These men developed the idea, collected funds for a memorial, and finally decided that it should be in the form of an apicultural library to be endowed and placed in the custody of one of the colleges or universities where beekeeping was being given active support.

Dr. Miller himself had not been a great collector of beekeeping literature, and had given the literature he had received to interested beekeepers. As a result, at the time of his death his library consisted of not more than one hundred books which were bought by the "American Bee Journal" and presented to Wisconsin. Professor Wilson soon started a movement to bring the Miller Memorial Library to Wisconsin. Although two other institutions competed actively for it, the committee in August, 1922, informed the University of Wisconsin authorities that the library was to be established at this institution.

It seems appropriate at this point to quote the purposes of this Memorial, as stated by the committee, since they give an indication of the trust and responsibility vested in Professor Wilson. They are as follows:

- I. To erect an active memorial to one of America's most noteworthy and lovable beekeepers, Dr. Chas. C. Miller.
- II. To provide an international monument to the beekeeping industry and to those who have been, and will in the future be interested in beekeeping.
- III. To bring together in one place as great a collection of beekeeping literature as it is possible to secure.
- IV. To create a reference library where beekeepers from every part of the world may deposit literature and receive aid in the history and knowledge of beekeeping.
- V. To create a repository for historical relics, such as old letters, manuscripts, patent records, photographs and other material relating to beekeeping."

The Miller Memorial Library was dedicated at Madison on August 17, 1923, at the annual conference of Wisconsin beekeepers, held that year in memory of Dr. Miller. Following this meeting a pilgrimage was made to the home of Dr. Miller at Marengo. The records of these meetings, with nearly a hundred photographs, "constitute the most valuable collection of beekeeping material ever assembled at any one time."

The main addition to the library up to 1925 was the collection of four or five hundred volumes and a number of pamphlets donated by Mr. A.C. Miller of Providence, R. I. Later Mr. E. J. B. Schubring of Madison donated a substantial sum for its enlargement. Between 1925 and 1930 the library was increased to approximately 3000 serial volumes of American and European bee journals, and about 2000 books and pamphlets. A fund of \$1,957.00 was donated by beekeepers from all parts of the world in small sums ranging from 50¢ to \$10.00, which was made an endowment, the interest

being used to subscribe for bee journals of which over 100 are received regularly. These developments came about almost entirely as a result of Prof's tireless efforts. In the files of the department is a bound volume of Miller Memorial Library correspondence with people in the State of Illinois alone for the years from 1923 to 1929 which is fully one and one-half inches thick.

Professor Wilson's activities in the development of this great library were directed along the following lines:

1. Solicitation of funds from beekeepers and other interested individuals.
2. Keeping in contact with European book dealers and purchasing desirable books and journals by the sale of duplicates on hand.
3. Keeping in touch with friends in Europe and personally financing the purchase of valuable private collections offered for sale until he could be reimbursed for such expenditures.
4. Solicitation of Dean Russell and the University Business Manager for aid in the purchase of particularly valuable items.
5. Appropriation of the \$25.00 monthly salary received as Secretary of the Wisconsin State Beekeepers' Association for the purchase of additions to the library.

In February, 1930, Professor Wilson learned that the private collection of Colonel H. J. O. Walker in England was to be disposed of. He realized that this was a particularly valuable collection and that the price asked, \$1,735.00, was not half its actual value. Knowing that this offer would not be available long enough to permit purchase through regular University channels, Prof at once placed an order for the collection and financed its purchase with the assistance of the late S. L. Odegard of Madison. Although offers have been received for duplicate material, the Walker collection has been kept intact, in accordance with the wishes of Colonel Walker.

We are able to give here only a mere hint of the contents of the Miller Memorial Apicultural Library. Practically the entire June, 1925, issue of "Wisconsin Beekeeping" was devoted to a listing of its contents at that time (pages 62 to 86 inclusive). The Report of the Custodian for 1927 listed 2,044 complete volumes of bee journals, 226 incomplete volumes, 160 U. S. reports, and 1,600 books and pamphlets, for a grand total of 4,030. Up to that time approximately 5,500 pamphlets, books and volumes of bee journals had been received, of which 1,500 were duplicates. At that time 131 serial bee journals and papers from all parts of the world were being received monthly by the library. Its value was then placed at \$4,143.00.

The Walker Collection materially swelled the library contents when it was added in 1930. Many of its volumes are extremely rare and practically all of them are in excellent condition. The Miller Library was appraised at between \$10,000.00 and \$12,000.00 in 1930, after the addition of the

Walker Collection. This figure did not include the endowment fund of approximately \$2,000.00. The library has continued to grow materially during the past ten years, but no recent appraisals of it have been made. Undoubtedly, its growth and development have far exceeded the most optimistic expectations of its founders. Truly it is an institution of which Professor Wilson personally and the University of Wisconsin as a whole may well be proud.

Part I. List of contributions from the Economic Entomology Department

Specific Items of Interest About the Miller Memorial Library

(Included with Professor Wilson's letter of July 3, 1930, to President Glenn Frank)

1. It contains the most extensive collection of bee literature in the English language.
2. It contains a more complete file of bee journals in the Dutch and Flemish language than is to be found in any single collection of Holland or Flemish Belgium.
3. It contains a more complete collection of Belgian beekeeping literature (including Flemish and French) than is to be found anywhere in Belgium.
4. It contains the most complete collection of beekeeping literature in the German language outside the Berlin Zoological Museum.
5. It contains the most complete collection of beekeeping literature in the French language outside the Paris Muscum.
6. It contains a more complete collection of American beekeeping literature than is to be found in any other library.
7. It contains several important and rare books of which only two to five copies are now known.

Mar., 1915 28 pp., 10 figs.

Circular 92 DEFEND YOUR GARDEN AGAINST INSECT PESTS - L. G. Genthner
June, 1917 4 pp.

Circular 85 KILL THE POTATO BUG - H. F. Wilson and J. G. Milward
June, 1917 4 pp., 1 fig.

CHAPTER V

Publications of the

Department of Economic Entomology and its Staff Members

Part 1. List of contributions from the Economic Entomology Department
published by the Experiment Station since 1915.

The publication of many Station Bulletins and Circulars marked the early existence of the Wisconsin Agricultural Experiment Station. Most of them were put out for extension purposes, although many of them contained important original results of carefully conducted experiments. There can be no doubt that these publications helped put the tax-payers of the State in sympathy with the work of the University and this paved the way for the remarkable progress that has been made since.

In later years there was a marked increase in the proportion of Research Bulletins published by the Station. This was a natural trend in view of the intensification and specialization of effort in all phases of the Station program. During recent years there has been a decrease in the number of agricultural publications put out by the Station for extension purposes, and this reduction has been reflected in the list of publications of all departments. The utilization of other channels for the dissemination of information, particularly the radio, the weekly and daily press, as well as agricultural magazines, and county agricultural agents, has brought about this situation.

Regardless of the merits of this reduction in number of extension publications, it explains the decrease in number of entomological publications during recent years that is apparent in the list below. That this trend has not decreased the activities of the various staff members of the department is evident from the lists of publications in the second section of this chapter. This is further evidenced by the digests of their accomplishments that have been published regularly in the Annual Reports of the Director.

The following list includes the contributions from the Department of Economic Entomology that have been published by the Wisconsin Agricultural Experiment Station since 1915, exclusive of the material that has appeared in the Director's Annual Reports:

- | | |
|---------------------------|---|
| Bul. 264
Mar., 1916 | BEEKEEPING IN WISCONSIN - N. E. and L. V. France
28 pp., 10 figs. |
| Circular 82
June, 1917 | DEFEND YOUR GARDEN AGAINST INSECT PESTS - L. G. Gentner
4 pp. |
| Circular 83
June, 1917 | KILL THE POTATO BUG - H. F. Wilson and J. G. Milward
4 pp., 1 fig. |

- Res. Bul. 45
August, 1919
THE COMMON CABBAGE WORM IN WISCONSIN (*Pontia rapae* Linn.)
H. F. Wilson, R. C. Pickett and L. G. Gentner
35 pp., 11 figs.
- Circular 124
March, 1920
FIGHT OYSTER SHELL SCALE - Charles L. Fluke, Jr.
4 pp., 3 figs.
- Bul. 310
April, 1920
THE PEA MOTH; HOW TO CONTROL IT - C. L. Fluke, Jr.
12 pp., 9 figs.
- Bul. 333
May, 1921
HOW TO CONTROL AMERICAN FOULBROOD - H. F. Wilson
21 pp., 8 figs.
- Sten. Bul. 72
May, 1923
NICOTINE DUST KILLS CUCUMBER BEETLES
J. E. Dudley, Jr., H. F. Wilson, and W. D. Mecum
2 pp.
- Bul. 355
June, 1923
NICOTINE DUST KILLS CUCUMBER BEETLES
J. E. Dudley, H. F. Wilson and W. D. Mecum
10 pp., 4 figs.
- Bul. 366
June, 1924
CHOOSE SPRAYS CAREFULLY - H. F. Wilson and C. L. Fluke
12 pp., 3 figs.
- Bul. 385
July, 1926
LOOK FOR THE EUROPEAN CORN BORER
S. B. Fracker and C. L. Fluke
8 pp., 5 figs.
- Res. Bul. 75
Feb., 1927
WINTER PROTECTION FOR THE HONEY BEE COLONY
H. F. Wilson and V. G. Milum
47 pp., 17 figs.
- Res. Bul. 82
Feb., 1928
SPRAYING VERSUS DUSTING TO CONTROL THE POTATO LEAFHOPPER
IN COMMERCIAL POTATO FIELDS OF WISCONSIN
John E. Dudley, Jr., and C. L. Fluke, Jr. (Co-authorship)
16 pp., 6 figs.
- Res. Bul. 92
May, 1929
MECHANICS OF DIGESTION OF POLLEN BY THE ADULT HONEY BEE
AND THE RELATION OF UNDIGESTED PARTS TO DYSENTERY OF
BEES - Warren Whitcomb, Jr. and H. F. Wilson
27 pp., 11 figs.
- Res. Bul. 93
June, 1929
THE KNOWN PREDACIOUS AND PARASITIC ENEMIES OF THE PEA
APHID IN NORTH AMERICA - C. L. Fluke
47 pp., 2 figs., 6 plates.
- Sten. Bul. 93
June, 1929
SAVE TOBACCO FROM GRASSHOPPER INJURY - A. A. Granovsky
7 pp.
- Sten. Bul. 96
Jan., 1930
SOME INSECT PESTS OF THE CHERRY AND APPLE ORCHARDS OF
DOOR COUNTY - A. A. Granovsky
7 pp.

- Sten. Circ. 107 CUCUMBERS FOR PICKLES
Mar. 1932 Depts. Econ.Entomology, Horticulture and Plant Pathology-4 pp.
- Ext. Circ. 258 BEEKEEPING METHODS FOR WISCONSIN - H. F. Wilson
June, 1933 31 pp., 10 figs.
- Special Circ. WHITE GRUB DAMAGE CAN BE PREVENTED AND REPAIRED
Jan. 1934 L. F. Graber and C. L. Fluke
- Sten. Circ. 157 SPRAYING FARM ORCHARDS
Mar. 1935 Depts. Econ.Entomology, Horticulture and Plant Pathology
4 pp., 4 figs.
- Special Circ. FIGHTING GRASSHOPPERS IN WISCONSIN
March, 1938 E. L. Chambers and H. F. Wilson
8 pp., 4 figs.
- Sten. Circ. 209 SPRAYS FOR THE CONTROL OF FLIES ON DAIRY ANIMALS AND IN
Jan., 1939 DAIRY BUILDINGS - Ed. M. Searls and Fred M. Snyder
7 pp.

Part 2. List of the more important technical publications of present staff members and certain others associated with the work of the Department.

HARLEY FROST WILSON

Professor of Economic Entomology and Head of Department

- Wilson, H. F. 1909. The peach tree bark beetle. U. S. D. A., Bureau of Entomology Bul. 68, part 9, pp. 91-108.
- Wilson, H. F. 1911. Two new genera and seven new species of the family Aphididae. Can. Ent. 43: 59-65.
- Wilson, H. F. and A. L. Lovett. 1915. Orchard insect pests and methods of control. Written specially for use in the Pacific Horticultural Correspondence School, Portland, Oregon. 126 pp. (mimeographed)
- Wilson, H. F. and Vickery, R. A. 1918. A species list of the Aphididae of the world and their recorded food plants. Trans. Wis. Acad. of Sci. Arts and Letters 19: 22-355.
- Wilson, H. F. 1921. Spread and control of American foulbrood. Jour. Econ. Ent. 14: 134-137.
- Wilson, H. F. and W. A. Hadfield. 1923. The effect of sodium hypochlorite upon the spores of American foulbrood. Science 57 (1472): 334.
- Wilson, H. F. and W. Whitcomb. 1929. The status of the onion maggot (Hylemyia antiqua Meig.) in Wisconsin. Jour. Econ. Ent. 22:400-405.

- Wilson, H. F. and G. E. Marvin. 1929. On the occurrence of the yeasts which may cause the spoilage of honey. Jour. Econ. Ent. 22: 513-517.
- Wilson, H. F. and G. E. Marvin. 1931. The effect of temperature on honey in storage. Jour. Econ. Ent. 24: 589-597.
- Wilson, H. F. and C. E. Holmes. 1936. Effect on chickens of arsenic in grasshopper bait. Little danger in eating arsenic-fed chickens. Jour. Econ. Ent. 29: 1008-1014.
- Wilson, H. F. and M. H. Doner. 1937. The historical development of insect classification. John S. Swift Co., Inc., St. Louis, Mo. 133 pp.
- Wilson, H. F. and C. E. Dieter. 1939. Time of pea aphid treatment in relation to aphid populations and plant development in Wisconsin. Canner 88:18-19.

CHARLES LEWIS FLUKE

Professor of Economic Entomology

- Fluke, C. L. 1919. Does Bordeaux mixture repel the potato leaf hopper? Jour. Econ. Ent. 12: 256-7.
- Fluke, C. L. 1921. The Pea Moth in Wisconsin. Jour. Econ. Ent. 14: 94-8.
- Fluke, C. L. 1922. Syrphidae of Wisconsin. Trans. Wis. Acad. Sci. Arts and Lett. 20: 215-253.
- Painter, H. R., Fluke, C. L., and Granovsky, A. A. 1925. Attractant and poisoned bait experiments on the Pellucid grasshopper. Jour. Econ. Ent. 18: 818-23.
- Curran, C. H. and C. L. Fluke. 1926. Revision of the Nearctic species of *Helophilus* and allied genera. Trans. Wis. Acad. Sci. Arts and Lett. 22: 207-281.
- Fluke, C. L. 1933. Revision of the *Syrphus* flies of America North of Mexico. Trans. Wis. Acad. Sci. Arts & Lett. 28: 63-127.
- Fluke, C. L. 1935. Revision of the *Epistrophe* flies of America North of Mexico. Entom. Amer. 15: (N. S.) 1-57.
- Fluke, C. L. and P. O. Ritcher. 1935. Oak trees and the white grub menace. Science 81: 71.
- Fluke, C. L., Eleanor P. Dunn, and P. O. Ritcher. 1935. Silicates of Soda incorporated with lead arsenate in the last regular spray as an aid to residue removal. Jour. Econ. Ent. 28: 1056-8.

CLAYTON LEON FARRAR

Apiculturist in Charge, North Central States

Bee Culture Laboratory and Associate Professor of Economic Entomology

- Farrar, C. L. 1931. A measure of some factors affecting the development of the honeybee colony. Mass. State College Thesis: 185 typewritten pages, 19 figs. 24 tables.
- Farrar, C. L. 1931. The evaluation of bees for pollination. Jour. Econ. Ent. 24: 622-627.
- Farrar, C. L. 1932. The influence of the colony's strength on brood-rearing. Ont. Dept. Agric. Report 1930 and 1931. 51st and 52nd Ann. Rept.:126-130 pp., 4 figs., 1 table.
- Farrar, C. L. 1934. Bees must have pollen. Gleanings in Bee Culture. 62: 276-278, 1 table.
- Sturtevant, A. P. and C. L. Farrar. 1935. Further observations on the flight range of the honeybee in relation to honey production. Jour. Econ. Ent. 28: 585-589, 1 fig. 2 tables.
- Farrar, C. L. 1936. The influence of pollen reserves on the surviving populations of overwintered colonies. Amer. Bee Jour. 76: 452-455, 4 figs., 2 tables.
- Farrar, C. L. 1936. Two-queen vs. single queen colony management. Gleanings in Bee Culture 64: 593-396, 1 fig. 1 table.
- Farrar, C. L. 1937. The influence of colony populations on honey production. Jour. Agr. Res. 54: 945-954, 1 fig., 3 tables.
- Farrar, C. L. 1938. New recommendations for the installation of package bees using a spray and direct-release method. U.S.D.A. Bur. Ent. & Pl. Quar. Cir. E-427: 7 pp., 10 figs., 2 tables.
- Farrar, C. L. and C. W. Schaefer. 1939. A preliminary report on the influence of stock on supersedure, or loss, of queen bees. U.S.D.A. Bur. Ent. and Pl. Quar. Cir. E-473: 13 pp., 2 fig., 4 tables.

EDWARD MARLBOROUGH SEARLS

Assistant Professor of Economic Entomology

- Searls, E. M. 1928. A simple method for life history studies of root feeding Arthropods. Jour. Agr. Res. 36: (7).
- Searls, E. M. 1932. A preliminary report on the resistance of certain legumes to certain Homopterous insects. Jour. Econ. Ent. 25: 46-49.

- Searls, E. M. 1934. The effect of alfalfa cutting schedules upon the occurrence of the potato leafhopper (Empoasca fabae Harris) and alfalfa yellows in Wisconsin. Jour. Econ. Ent. 37: 80-88.
- Searls, E. M. and F. M. Snyder. 1935. The control of some ectoparasites of laboratory rats by atomized pyrethrum extract in oil. Jour. Econ. Ent. 28: 304-310.
- Searls, E. M. 1935. Further studies on the effect of controlling the potato leafhopper (E. fabae Harris) in alfalfa by designed cutting. Jour. Econ. Ent. 28: 831-833.
- Searls, E. M. 1935. The relation of foliage color to aphid resistance in some varieties of canning peas. Jour. Agr. Res. 51 (7).
- Searls, E. M. and F. M. Snyder. 1936. Relation of viscosity to drop size and the application of oils by atomization. Jour. Econ. Ent. 29: 1167-1170.
- Searls, E. M. 1939. Time of fumigation of aphid infested canning peas and resistance of the plants to subsequent infestation. Jour. Econ. Ent. 32: 90-93.
- Searls, E. M. and F. M. Snyder. 1939. A study of the relation of vitamin A to louse resistance in rats. Jour. of Parasitology 25: 425-430.

THOMAS CORT ALLEN

Assistant Professor of Economic Entomology

- Mote, Don C. and T. C. Allen. 1930. Food consumed by the China Pheasant in Oregon. Jour. Econ. Ent. 23: 783.
- Allen, T. C. 1931. Bacteria producing rot of apple in association with the apple maggot, Rhagoletis pomonella, Walsh. Phytopathology 21: 338.
- Allen, T. C. and A. J. Riker. 1932. A rot of apple fruit caused by Phytomonas melophthara, n. sp., following invasion by the apple maggot. Phytopathology 22: 557-571.
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- Allen, T. C. and C. L. Fluke. 1933. Notes on the life history of the apple maggot in Wisconsin. Jour. Econ. Ent. 26: 1108-1112.
- Allen, T. C. 1936. Toxicity of kerosene steepates of Derris and Pyrethrum to some potato insects. Jour. Econ. Ent. 29: 742-743.

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JOHN HENRY LILLY

Instructor in Economic Entomology

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Lilly, J. H. 1938. A method for measuring effects of dormant sprays upon apple tree growth. Jour. Econ. Ent. 31: 388-393.

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JOHN ANTON CALLENBACH

Instructor in Economic Entomology

and Agent of Bureau of Entomology and Plant Quarantine

Cook, H. T. and J. A. Callenbach. 1935. Spinach seed treatment in Virginia. Phytopathology 25: 12 (abstract).

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Cook, H. T. and J. A. Callenbach. 1935. Spinach seed treatment. Virginia Truck Experiment Station Bulletin 87.

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Callenbach, J. A. 1940. The influence of the codling moth upon commercial apple production in Southwestern Wisconsin. In Summaries of Doctoral Dissertations, University of Wisconsin. Vol. 4, pp. 36-38. Univ. of Wisconsin Press, Madison.

Callenbach, J. A. 1940. Influence of road dust upon codling moth control in sprayed orchards. Jour. Econ. Ent. 33. (In press).

(See also list of T. R. Chamberlin)

CARL WILLIAM SCHAEFER

Instructor in Economic Entomology

and Agent of Bureau of Entomology and Plant Quarantine

Schaefer, Carl W. 1937. Wing Formation of the Pea Aphid, Illinoia pisi Kalt. In Summaries of Doctoral Dissertations, University of Wisconsin. Univ. of Wisconsin Press, Madison.

Schaefer, Carl W. 1938. Physiological conditions which produce wing development in the pea aphid. Jour. Agr. Res. 57: 825-841.

(See also list of C. L. Farrar)

JOHN EDWARD DUDLEY, JR.

Entomologist, Bureau of Entomology and Plant Quarantine

(In charge of Truck Crop Insect Laboratory)

- Dudley, J. E., Jr., and H. F. Wilson. 1921. Combat potato leafhopper with Bordeaux. Wis. Agr. Expt. Sta. Bul. 334. 31 pp., illus.
- Dudley, J. E., Jr. 1921. The potato leafhopper and its control. U. S. D. A. Farmers' Bull. 1225. 16 pp., illus.
- Dudley, J. E., Jr., H. F. Wilson and W. D. Mecum. 1923. Nicotine dust kills cucumber beetles. Wis. Agr. Expt. Sta. Bul. 355. 10 pp., illus.
- Dudley, J. E. Jr., and Ed. M. Searls. 1923. Color marking of the striped cucumber beetle (*Diabrotica vittata* Fab.) and preliminary experiments to determine its flight. Jour. Econ. Ent. 16: 363-368, illus.
- Dudley, J. E., Jr., and C. L. Fluke, Jr. (Co-authorship). 1928. Spraying versus dusting for control of the potato leafhopper in commercial potato fields of Wisconsin. Wis. Agr. Expt. Sta. Res. Bul. 82. 16 pp., illus.
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THEO EARL BRONSON

Assistant Entomologist, Bureau of Entomology and Plant Quarantine

- Bronson, Theo E. 1935. Observation on winter survival of pea aphid eggs. Jour. Econ. Ent. 28: 1030-1036.
- Bronson, Theo E. 1936. Effect of ground derris upon pea aphid when infesting peas subsequent to spraying. Jour. Econ. Ent. 29: 1170-1172.
- Bronson, T. E. 1932. A simple instrument for recording of rainfall and velocity and direction of the wind. Ecology. 13: 409-412. illus.
- Bronson, T. E. 1937. An efficient method for mixing large or small quantities of insecticidal dusts containing a conditioner. U.S. D.A., Bur. Ent. & Pl. Quar. ET-115 (mim. series).
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THOMAS R. CHAMBERLIN

Associate Entomologist, Bureau of Entomology and Plant Quarantine

(In charge of Cereal and Forage Crop Insect Laboratory)

Chamberlin, T. R. 1924. Studies of the parasites of the alfalfa weevil in Europe. Jour. Econ. Ent. 17: 623-632.

Chamberlin, T. R. 1925. Some observations upon Necremmus leucarthros (Nees). Hymenoptera: Eulophidae. Ent. Soc. Wash. Proc. 27: 142-144.

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Chamberlin, T. R. 1933. Some observations on the life history and parasites of Hypera rumicis (L) (Coleoptera: Curculionidae) Ent. Soc. Wash. Proc. 35: 101-109.

Chamberlin, T. R., C. L. Fluke, Lee Seaton, J. A. Callenbach and P. O. Ritcher. 1938. Population and host preferences of June beetles in Southern Wisconsin in 1935, 1936, and 1937. Insect Pest Survey Bull. 18: Supp. to No. 4, pp. 225-239, seven tables.

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LEE SEATON

Assistant Scientific Aide, Bureau of Entomology and Plant Quarantine

Walter, E. V., Lee Seaton and A. A. Mathewson. 1938. The Texas leaf-cutting ant and its control. U.S.D.A. Circ. 494.

Seaton, Lee. 1939. A feeding record of Pterostichus (Poecilus) chalcites (Say) upon June beetle eggs and grubs. Jour. Econ. Ent. 32: 151-152 (Scientific Note).

(See also list of T. R. Chamberlin)

WILLIAM STANLEY MARSHALL

Professor of Zoology (Retired)

Marshall, Wm. S. 1900. A study of the follicular epithelium from the ovary of the walking-stick (Diapheromera femorata). Arch. f. Zellforschung 3: 627.

Marshall, Wm. S. 1907. The early history of the cellular elements of the ovary of Polistes pallipes. Zeit. wiss. Zool. 86: 173.

Marshall, Wm. S. 1908. Amitosis in the Malpighian tubules of the walking-stick (Diapheromera femorata). Biol. Bull. 14: 89.

Marshall, Wm. S. 1913. The development of the wings of a caddis-fly, Platyphylax designatus. Zeit. wiss. Zool. 105: 574.

Marshall, Wm. S. 1928. The development of the compound eye of the confused flour beetle, Tribolium confusum. Trans. Wis. Acad. 23: 611.

Marshall, Wm. S. 1935. The development and structure of the eyes, ocelli, of the female black scale, Saissetia oleae Bern. Jour. Morph. 57.

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