

SANITARIAN MANPOWER

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The sanitarian is a strategic member of the public health team. Because of his contributions to the Nation's health and welfare, his identity and functions need to be crystal clear. In a larger context, the continuing critical manpower shortage in the health-oriented occupations makes it mandatory to husband the available human resource. Therefore, it is important that *all* groups in the health field know who they are, what they do, how and why their objectives change and their functions expand, and what new and different competencies are required of them to render maximum effective service to their fellowmen in a rapidly changing environment.

In viewing kaleidoscopically the history of medical advances and public health developments in the United States in the past 100 years, the sanitarian has proven an invaluable assistant to the basic professional specialists in these areas. In early days it was the physician who functioned as a sanitarian responsible for the health and welfare of a community. As the importance of environmental health was recognized, the sanitarian was charged with water, sewage, milk and food control and other aspects of the physical environment that are involved in combatting communicable, infectious diseases. Changes in the pattern of health and disease and the rise to prominence of new environmental health problems have brought into sharp focus the increased challenge to the field of sanitary science.

In the face of this growing specialization, sanitarians have themselves felt the repeated need to re-assess their role and clarify their status. The pioneering work of such people as Mangold, Bliss, and Dwork are well known. In recent years the State of Pennsylvania has made at least three surveys of its sanitarians (5, 6, 8). The California Association of Sanitarians examined the experience and educational background of sanitarians in that State (2).

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The need for a major survey was expressed five years ago by Mangold (3) who stated, "Because of the rapid growth of the responsibilities of the sanitarian, a new appraisal is vitally needed. This study would enhance the prestige of the sanitarian and should tell a complete story, whereas in the intervening years, we have only studied parts of his activities. This type of factual study would be of direct benefit in drafting or readjusting curricula in sanitary science, in describing and assembling examination items for this position by civil service commissions, in giving more complete information to state legislatures, boards of supervisors, and city councils. We must not depend upon our sporadic efforts or those of other public health workers to inform the public of our responsibilities in maintaining a sanitary and healthy environment."

Recognizing the need for as comprehensive a picture as possible, the U. S. Public Health Service last year (1962) conducted the first truly national manpower survey of the professional characteristics of thousands of people who claimed themselves to be sanitarians.

In comprehensive terms, the objectives of the survey were to help point toward a more accurate definition of Sanitarian with implications for educational institutions to plan more and/or different academic training of sanitarians, supply data which would be helpful to State legislative bodies in establishing and/or changing registration standards, provide information on salary and other items which would be helpful to the occupation's leadership in strengthening the sanitarian's role and position among the health-related groups.

There is no single definition acceptable to all interested parties. The American Public Health Association (1) issued a definition in 1956 which is worth noting: "A public health sanitarian is a person whose education and experience in the biological and sanitary sciences qualifies him to engage in the promotion and protection of the public health. He applies technical knowledge to solve problems of a sanitary nature and develops methods and carries out procedures for the control of those factors of man's environment which affect his health, safety, and well-being." An A.P.H.A. subcommittee has met to consider the qualifications of public health sanitarians and may wish to revise this definition. The

Public Health Service has its own description of sanitarian eligibility for employment.

The national professional sanitarian societies have their own definitions. There must be many more in existence. All have been attacked as either too comprehensive or too limiting. Perhaps the functions, duties, and responsibilities of sanitarians today are such as to make them a group more easily described than defined. At the same time, it should be a matter of concern to the occupation that 2 out of 5 survey respondents who reported themselves as engaged in sanitarian-type work did not have the title of Sanitarian. A good case can be made for uniformity of title and identification in terms of professional visibility, public image, State certification and registration, salary equity, standards of training, and levels of competence.

With the initial assistance of the three national professional sanitarian associations that provided their membership rosters, a master mailing list of some 16,000 names was constructed. Questionnaires were mailed to this entire file in May and June of 1962, with a followup later that summer. A third request took the form of a postcard. As a result of unavoidable duplications, deaths, incorrect addresses, and outright failure to reply, a final roster of some 10,700 people professing themselves to be sanitarians has been compiled. Of these 7,263 full-time employed persons returned completed questionnaires. All the finally published data on professional characteristics of sanitarians are based on these 7,263 returns. Probably there are considerably in excess of 14,000 sanitarians currently employed in the United States.

The roster indicates a national ratio of 5.7 sanitarians per 100,000 population in mid-1962, or 1 per 18,000 persons. This may be compared to a widely used figure of 1 sanitarian or sanitary engineer for every 15,000 persons as a basic and minimum public health service requirement (4). This standard was established in 1950 and should be reviewed in the light of current public health practice. Milk, food and meat technology as well as water, refuse, wastes and vectors have probably been recognized in this ratio as areas of work experience of sanitarians. It is doubtful that allowance has been made for the sanitarians' role in such fields as air pollution, radiological health, and occupational health. Also housing and institutional sanitation may or may not be a part of the local public health program. Hence, the ratio of sanitarians to population has to be evaluated in terms of the responsibilities assigned to the profession.

The Western region of the country has relatively more sanitarians in relation to population than any of the other three regions. The 13 western States have a total of 2,400 sanitarians or 7.8 per 100,000

population. The South has more sanitarians (3,700) but a lower ratio (6.4). The North Central region with a ratio of 4.9 and the Northeast region with a ratio of 4.4 are considerably below the South and West.

California is the State with the largest number of sanitarians listed in the roster. The count of 1,135 located there is nearly double the number in New York State. Ten States account for half of the total.

High ratios of sanitarians to population prevail in many of the western States. Hawaii is at the top, with 15.4 sanitarians per 100,000 population, followed by Wyoming, Alaska, Oregon, Utah, and Colorado. Although California led in actual numbers of sanitarians, its ratio of 6.7 is lower than that of 20 other States.

Major survey findings are grouped into the following categories: for whom sanitarians work, what they do, their areas of competence and specialization, their salary, their education and training, and general characteristics.

FOR WHOM DO SANITARIANS WORK?

State and county governments are the major employers, accounting for 61% of the respondents. City governments account for a further 17%. The Federal Government's 6% is divided among civilian employees, those in military service, and the PHS commissioned corps.

The nongovernment segment of 16% is divided among business including self-employment, education,

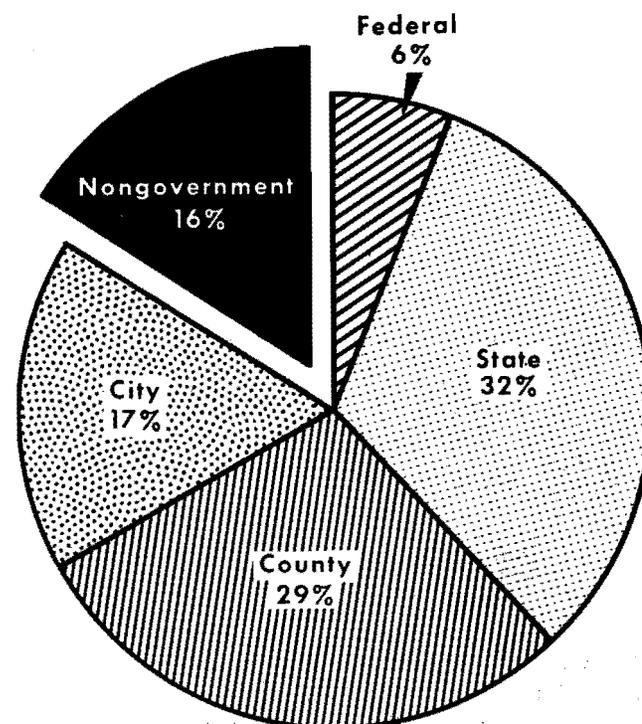


Figure 1. Employers of sanitarians in the 1962 survey.

nonprofit organizations, and other types of employment. If information were available for the total manpower supply, the proportion employed outside government might exceed the 16% tabulated (Figure 1).

In order to learn something about position descriptions of persons who regard themselves as sanitarians, each person was requested to furnish his official payroll title. Three out of 5 claimed the title of sanitarian. One out of 5 claimed the title of inspector, officer, or aide. The remaining 1 out of 5 wrote in his title which took many forms. Some used occupational classifications such as bacteriologist, chemist, industrial hygienist and so on. Some gave indication of grade such as director, chief, associate, assistant—usually followed by the name of the unit supervised.

WHAT DO SANITARIANS DO?

Half the respondents report their primary activity in terms of working time to be in the field of inspection, testing, and/or quality control. Almost another fourth are in the management-administration category. Of the remaining respondents 5% are in research-teaching-writing, 5% in consulting, and 17% have general duties or are involved in production, sales, or marketing.

A larger proportion of the nongraduates than of the graduates were engaged in inspection, testing, or quality control—58% compared with 46%. The reverse was true for the field of management or administration, with relatively more of the graduates having this type of work.

WHAT ARE THE SPECIALIZED BACKGROUNDS OF SANITARIANS?

Slightly more than one-third of the group report food and meat technology as being their area of greatest competence. Another third report milk as their specialized field. Less than 7% indicate any other single area among 15 listed.

In recent years sanitarians have been assigned various functions, duties, and responsibilities in such relatively new fields as air pollution, radiological health, and occupational health. These combined fields were chosen as representing their major specialty by only 3% of the respondents. The sanitarian occupation is acquiring greater perspective and growing numbers of specialists in these specialties can be expected.

Such hope and expectation lead naturally to the consideration of *education*. Almost two-thirds (63%) of the total group surveyed are college graduates. Many reported 2 or 3 years of college but had not completed the full course leading to the bachelor's

degree. That 2 out of 3 respondents had graduated from college may reflect a greater response among the better educated in the occupation. The mailing lists were essentially members of the professional sanitarian associations and persons so affiliated are usually assumed to be among the better educated in any calling.

The college-graduate group are divided into two-thirds with the bachelor of science and one-third with the bachelor of arts. Relatively more of the nongovernment than of the government employees are college graduates (Figure 2).

A wide variety of background fields are represented among the respondents: 29% in agriculture, 25% in the biological sciences, 24% in public health and/or veterinary medicine, and 13% in the physical and earth sciences. Only 4% majored in the sanitary sciences, which constitute a relatively new grouping of health related specialties offered primarily at the graduate level. Opportunities for advanced study in environmental health are becoming more frequent and should attract greater numbers of persons.

Fourteen percent of the respondents indicated that they had earned a master's degree. Three-fourths of the degrees were either the master of science or master of public health.

A doctor's degree had been earned by 3% of the total. This was more likely to be a PhD degree than any of the other doctorates.

The varied background majors of the respondents suggest that there is as yet no clearly defined and sharply focused basic curriculum to produce sanitarians with initial competence on the job. The great variety of majors represents a measure of the many facets of a sanitarian's work leading to later specialization.

The survey shows that enrollment for specialized short-term courses is characteristic for practically all respondents. However, the sanitarians tended to concentrate within their own specialties. The greatest number of respondents are specialists in milk, food, or meat technology and these individuals enrolled for short courses in their same fields. In the face of the need for sanitarian generalists, this concentration should be examined. That sanitarians report taking so many specialized short courses could be an indication that: (a) they have a keen interest in keeping abreast of new developments in rapidly expanding technologies; (b) they are being assigned to a greater variety of fields in many of which they have little or no substantive background; and/or (c) their original basic education and training may have been inadequate in some areas. The survey points out the need for continued emphasis on in-service training programs.

WHAT ABOUT SALARIES?

The median annual salary is \$5,960; that is half the respondents receive less and half receive more. Who the sanitarian works for makes a difference. Median salaries are highest for those in teaching or in business (\$8,840) and lowest for those employed by State and local governments (\$5,660).

Education made a difference, too. College graduates have a median salary \$1,000 higher than that of nongraduates (\$6,350 compared to \$5,350). But the advantage of a college education discloses much greater spreads by type of employer. The differential is about \$3,000 for Federal and nongovernment sanitarians but only about \$700 among State and local government employees (Figure 3).

That one-fourth of the respondents receive less than \$5,000 per year and half receive less than \$6,000 reflects the obviously depressed salary schedule among the major employers. State and local governments employ 3 out of 5 sanitarians, yet they pay the lowest and show the smallest differential for a college education.

These data are representative of the many facts to be found in considerable detail in the Health Manpower Source Book titled *Sanitarians*, recently issued by the U. S. Public Health Service (7). This questionnaire also asked for information on such general characteristics as year of birth, sex, length of work experience, membership in professional association,

and State licensing. Three-fourths of the sanitarians reported that they belonged to one or more national professional associations.

DISCUSSION

The survey raises many questions and identifies many problem areas to which the authors feel organized sanitarian leadership can address itself with profit. In the desire to be initially comprehensive, the survey could not investigate certain areas in depth. Future studies of specific aspects of sanitarian work would illuminate many relationships which remain obscure.

For example, age distribution was poorly reported in the survey, with the result that the expansion or contraction of manpower in the occupation cannot be determined. There are great differences in concentration of sanitarians throughout the Nation. Is there an adequate supply to serve the needs in all areas? Is there a deficit of trained sanitarians, with increasing shortages predicted for the future?

The reported years of work experience suggest that a significant number of sanitarians do not enter the occupation directly from school. Why not? How can recruitment be made more effective?

There are no data at present on the number of college graduates with majors in the agricultural, biological, and health-related sciences who become sanitarians. Should there be a basic curriculum for

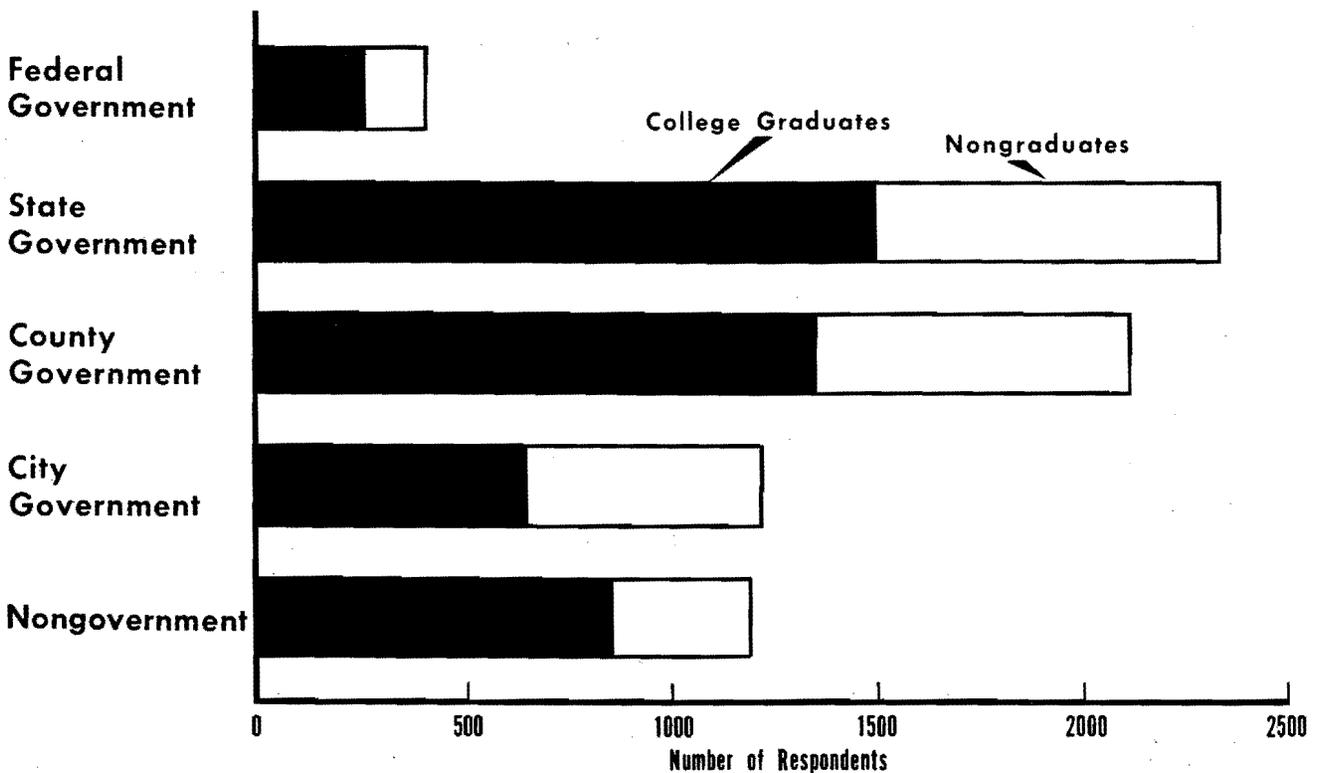


Figure 2. Education related to employer of sanitarians, 1962

all sanitarians regardless of their later specialization? Or should there be two distinct curricula, one for the generalist and one for the specialist? The nature and extent of short-term, specialized courses should be further examined for clues that might disclose

To develop sufficient data for an effective study of manpower requires consideration of the supply of sanitarians, their utilization, and the need for their services. The measurement of supply involves the collection of data describing those currently in the

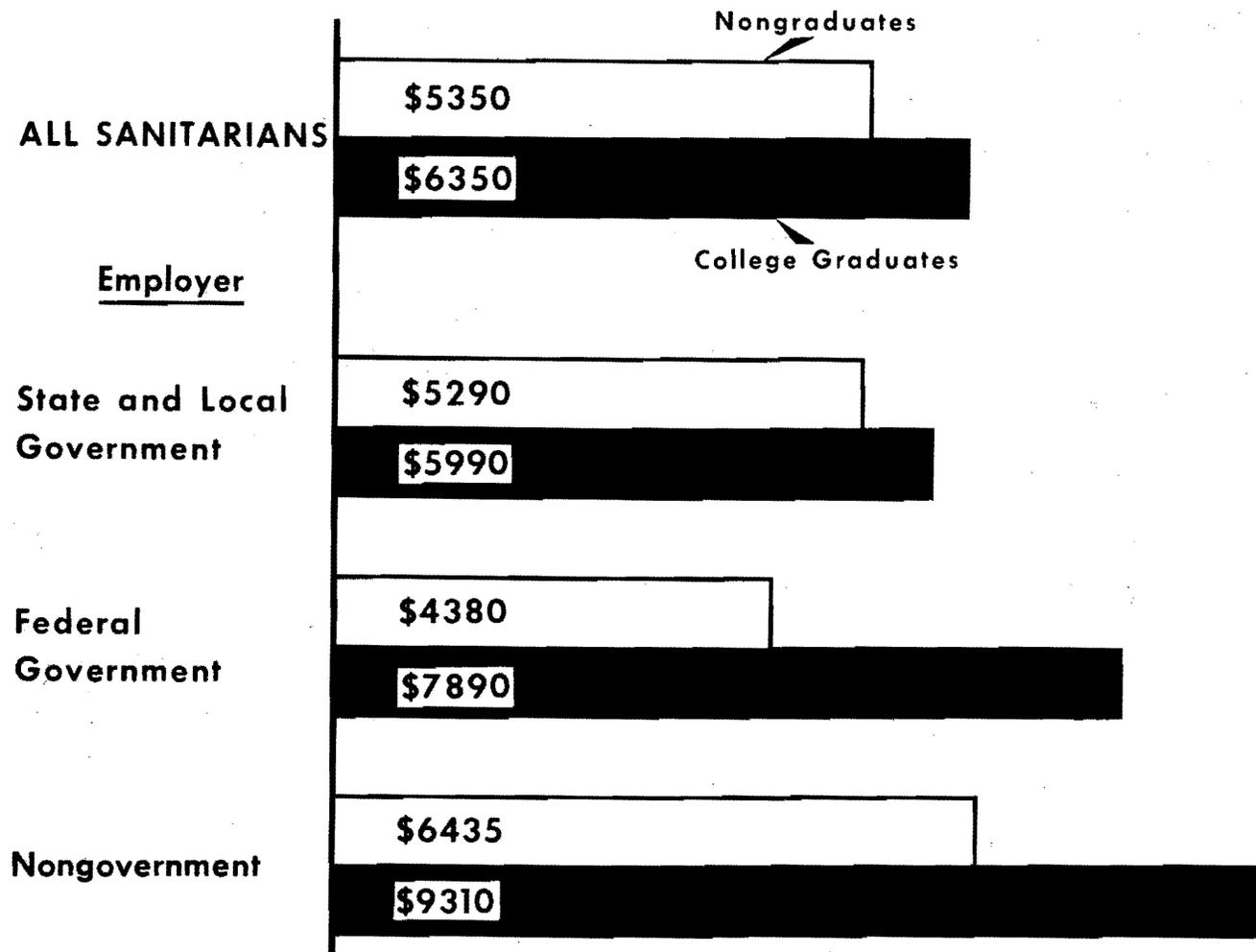


Figure 3. Salary related to education and employer of sanitarians, 1962

limitations in the basic education of sanitarians.

Further study should be made of the great spread in salaries among regions, with particular attention to differences in levels of competence and performance. Are the functions, duties, and responsibilities of sanitarians today too varied and diverse for effective on-the-job performance? Has the professional sanitarian outgrown certain functions which should be assigned to lesser trained personnel?

The survey data will be interpreted differently by sanitarian societies, by employers of sanitarians, by those who educate and train sanitarians, and by the sanitarians themselves. All interpretations and analyses should lead to further study, and further study can lead only to improvements, individually and collectively for those in the occupation.

profession and those in training to become sanitarians. From such data as mortality rates and anticipated population growth the manpower investigator can develop information on the current sanitarian-population ratio, the anticipated supply, and replacements required to cover deaths, retirements, and expansion. Supply data must be accompanied by information on the degree of utilization of those currently employed, the demand or need for personnel with such training, and the unmet need for sanitarian services. The present duties and responsibilities of the sanitarian have evolved to meet modern needs and can be expected to change with future growth of the profession. Single copies of the Source Book are available free by writing to the Public Inquiries Branch, U. S. Public Health Service, Washington, D. C., 20201.

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TECHNIQUES FOR EVALUATING VECTOR CONTROL MEASURES

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SUMMARY

Monitoring devices for determining population characteristics of the fly, roach, miscellaneous insect pests, and rodents are described along with ecologic factors. Entomologic surveillance of fly populations is accomplished by use of the fly grill, fly trap, and visual observations. These all require periodic evaluations to determine population changes. Cockroach evaluations are made by direct count and observations, coupled with nocturnal inspection of premises timed to coincide with peak roach activity. Other insect populations are monitored for presence or absence by checking sites such as windows for flying insects, and examining floors, pallets, and walls for insects that have emerged. Sacked grains and cereal infestations are checked for insect presence by examining the exteriors of the bags and the stitched ends. Presence or absence of rodents is usually determined by searches for rodent signs. However, total rodent populations can be estimated. Most sanitarians consider the presence of a single fly, rat, or other pest in a milk or food establishment objectional. Until this goal of complete exclusion of insects and rodents is reached, food and milk sanitarians should give serious thought to developing improved monitoring tools based on insect and rodent ecology.

As milk and other foods travel the route from producer to consumer, there are many opportunities for them to become contaminated by vermin. Our goal is complete exclusion of insects and rodents from foods. In the past, we have been unsuccessful in our attempts to completely "build them out" because insects are so mobile and rodents are so resourceful (9). Until we are able to build them out, we must keep ourselves aware of the status of insect and rodent populations and apply the most effective reduction techniques.

There are many points along the producer-to-consumer route where vermin populations should be measured. For example, in the milk-producing in-

dustry population measurements should be done at the farm, in the milking shed, and at the bottling plant. In meat production, vector populations should be assessed on the packing plant premises and inside the plant. In the food-serving industry, population measurements should be done on the restaurant premises and in the restaurant. Surprisingly, although vector-monitoring devices, e.g., fly grills, bait traps, and light traps, have been available for some years, few milk and food sanitarians have made use of them. During the remainder of this discussion, I shall review the characteristics of our problem vectors and the devices available for monitoring their populations.

FLY CHARACTERISTICS AND MONITORING DEVICES

Flies undergo complete metamorphosis. Most species of fly oviposit (a few species retain the eggs within the body and give birth to larvae). The eggs that are laid, hatch into larvae which continue growth until they are ready for pupation. In the quiescent pupal stage, the organs and structure of the mature fly are formed. At the end of the pupal stage, the pupal case is split open and the adult fly emerges.

Adult fly populations have been measured by using a "fly grill". This technique was developed and described by Scudder (8). The large grill, used to measure outside populations, is a grid-like device consisting of 24 wooden slats, each 36 in. long, 3/4 in. wide, and 1/4 in. thick, fastened 3/4 in. apart on a Z-shaped frame. A smaller 18-in. grill has been developed for use in restaurants and similar situations. The fly grill technique is based on the tendency of