



# Hawaiian Health

**E**THNICALLY, geologically, and politically, the islands which compose the State of Hawaii, admitted to the Union July 4, 1960, are about the youngest, newest, freshest portion of the planet.

Their snow-capped volcanic peaks boiled up from the core of the earth after most of the continental crusts had cooled. Before ancient rains had washed down the cooled lava to form deep valleys and broad beaches, other lands had nurtured a full assortment of animals and flowers. As a result, most of the life on Hawaii is a consequence of importation. But Hawaii gives more than it has taken. By providing a hospitable setting for exotic plants and animals, the State has developed a unique character.

Each successive arrival has worked new effects on the island ecology. Sometimes these effects have been happy, sometimes disastrous.

The oldest surviving human colony was founded, if legend is correct, by Tahitians who sailed and paddled long canoes across thousands of miles of open sea under unfamiliar stars at a time when the barks of Mediterranean civilization did not dare venture out of sight of shore. Ruled until 1893 by their ancient royal family, they lived for centuries untouched by Orient or Occident. But with the explorations of Captain James Cook, in 1778, modern immigration began. Waves of whalers, traders, missionaries, adventurers, scholars, contract laborers, militia, and tourists imported literacy,

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*Material for this report was gathered by Jeanne Paty, M.P.H., director of health education, State of Hawaii, who also participated in refinement of the final draft. Photographs were supplied by Tom Fujise, Hawaii Department of Health.*

science, new systems of ethics, irrigation, politics, commerce, pineapple, sugar, airplanes, and orchids. Inadvertently, they also imported mosquitoes, rats, smallpox, influenza, cholera, measles, venereal disease, tuberculosis, Hansen's disease, plague, and dengue. These invasions decimated the ancient Hawaiian population. By the time protective measures were developed, their numbers had dwindled from an estimated 500,000 to fewer than 60,000.

In the journal of conscientious Captain Cook, it is evident that the dangers of communicating disease were realized. He wrote, "The order not to permit the crews of the boats to go on shore was issued that I might do everything in my power to prevent the importation of a fatal disease into this island, which I knew some of my men labored under and which, unfortunately, had been already communicated to other islands in these seas."

Of the many tragedies induced by the imports of the last two centuries, none surpassed those caused by microbes. Especially cruel were the sufferings of the ancient Hawaiians, who had acquired no evolutionary protection against the infections of Europe and Asia. For this reason, King Kamehameha III established a board of health in 1850, and the protection of public health has continued to be a prominent activity to the present day.

The earliest documented public health measure was an order by Kinau, reigning in 1836, to the harbor pilot "to ascertain whether there has been any case of smallpox or other pestilent disease" on board an approaching vessel and, if so, to "direct the Master to hoist a yellow flag at the main and immediately give information to the constituted authority."

Modern Hawaii had until 1950 a tonnage tax, self-imposed by the chambers of commerce of Honolulu, Hilo, and Wailuku for the exclusive support of public health services. This contribution was a consequence of the first outbreak of plague, which hit the islands in 1899 and forced the ports to close. Interest from this tonnage tax fund still contributes to health services.

For those who think of the islands as a care-free paradise, the past records of morbidity and mortality are instructive. For the present, however, public health conditions, under the eye of

Dr. Richard K. C. Lee, director of health for the State, are good (1).

## The People

"The loveliest fleet of islands that lies anchored in any ocean," in Mark Twain's phrase, is also a meeting place for all who travel the broad seas that link the Americas, Asia, and Australia. Even as the green and purple waters trimmed with frothy waves blend against the sands and forested mountains, so the families and traditions of distant lands have formed an iridescent society on these shores. Few other lands, if any, have such a variety of people and customs living together so agreeably, with as much mutual respect and friendliness, as wide a freedom, or as great a dignity and pride. To personify this prismatic unity, the islands are officially represented by the descendants of families whose ancestors lived in the hills of China, in Philippine jungles, in Japanese fishing villages, on New England farms, and on many a South Sea lagoon.

The oddities of Hawaiian speech are no stranger than the varieties in New York, Boston, or New Orleans. The costume largely resembles southern California's, except for the rigs which are favored by the tourists. Some indication of the futility of ethnic classification is seen in an analysis of 1,000 new births which finds about 263 as "part-Hawaiian," 276 Caucasian, 54 miscellaneous, 240 Japanese, about 113 Filipino, and 47 Chinese, with the unmixed Hawaiian ancestry a mere 7. Nearly a third of the parents had dissimilar ethnic backgrounds.

## Leading causes of death for resident civilians, State of Hawaii, 1960

Cause of death	Number	Rate	Percent
All causes -----	3, 456	581	100. 0
Heart diseases -----	1, 135	191	32. 9
Cancer and other malignant neoplasms -----	602	101	17. 4
Cerebral hemorrhage -----	304	51	8. 8
Accidents (all forms) -----	234	39	8. 0
Diseases of early infancy -----	268	45	7. 7
Pneumonia and influenza -----	128	22	3. 8
Diabetes mellitus -----	91	15	2. 6
Congenital malformations -----	79	13	2. 3
Nephritis and nephrosis -----	48	8	1. 4
Suicide -----	45	8	1. 3
Other causes -----	522	88	13. 8

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## The State of the Islands

Hawaii is the name of the 50th State.

Hawaii is also the name of the largest of the seven major islands of the State. The "island of Hawaii" is distinct from "The State of Hawaii."

The capital city, Honolulu, is on the island of Oahu, in the State of Hawaii.

Hawaiians are people who live on the Hawaiian Islands.

Pure or original Hawaiians are descended in an unbroken line from the earliest permanent colonizers of the islands.

Part-Hawaiians are Hawaiians whose ancestors include the ancient Hawaiians, among others.

References to Hawaii usually apply to all islands in the State, but primarily to Honolulu and Oahu.

The pronunciation is Hah-wy-ee. The accent on the second syllable is quite light. The *w* is sometimes pronounced like a soft *v*.

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Of more than 600,000 on the islands now, including 450,000 on Oahu, all but a small proportion were born there. All but 3 percent are American citizens (2). And four in five are under 45 years of age.

With records of infant health as a reasonable indicator of public health, the record of 1,000 births (including military parentage) gives 989 born in hospitals. A physician attended five born at home. Only 50 were born to unmarried mothers. The infant mortality rate, 24 per 1,000, is below the average for the 50 States.

Before they are 3 years old, all babies are immunized against smallpox, typhoid infections, pertussis, diphtheria, tetanus, and poliomyelitis. There is scarcely another community, let alone a State, which can boast as high a proportion of immunization.

On the other hand, the siblings of these children have one of the highest dental caries rates in the nation. Only those on the military water system, a tenth of the total, have the benefit of fluoridated water.

The reported causes of death for the resident civilian population (see table) do not differ radically from those reported for the mainland population (3).

The island population is growing at a somewhat more rapid rate than the mainland popu-

lation (see chart). One factor is the relatively high portion of the population of the child-bearing ages. Another is the number who move to the islands from the mainland.

Preliminary results from a survey conducted cooperatively by the State, the Oahu Health Council, and the Public Health Service indicate a slightly higher incidence of acute diseases in Hawaii than on the mainland. Although automobile accidents were less frequent (Hawaiian drivers courteously wave others ahead at intersections), accidents at home and at work are 20 percent more frequent. About 12,500 civilian residents in a random sample of 3,300 noninstitutional households were examined.

## Communications

Considering that information is essential to effective public health practice, the islands have the necessary facilities. English is spoken everywhere. Nearly all children complete a secondary school education, and two-thirds proceed to higher education. All the major centers are connected by radio and telephone, not to mention a regular postal service. And most households receive television or radio broadcasts. Six of the seven inhabited islands are reached by airplane. The State ranks 23d in the number of daily paid newspaper circulations per 100 population (4, 5).

The 13 commercial airports and 3 military fields are busy; 25,000 flights land in Honolulu in a single month. With 7 deep water harbors, the islands in 1960 accommodated 1,400 passenger and freight ships of 26 different countries in Honolulu harbor alone. In addition to the press, about 208,000 telephones, 3 television systems, and 16 radio stations, the people of Hawaii have recourse to 313 schools, 615 churches, 6 museums, public libraries, and an abundance of community, professional, trade, and social organizations (2,4,5).

A partial list in the 1960 health inventory of voluntary health agencies, exclusive of hospitals, clinics, medical, dental, and nursing societies, includes the following:

Blood Bank of Hawaii; County chapters of the National Foundation; American Cancer Society (Hawaii Division); Hawaii Heart Association; Hawaii Committee on Alcoholism; Hawaii Public Health Associa-

tion; Hawaii Association to Help Retarded Children; Honolulu Council of Social Agencies; Kauai Health and Welfare Council; Mental Health Association of Hawaii; National Society for Crippled Children and Adults, Hawaii Chapter; Oahu Health Council; Rehabilitation Center of Hawaii; Tuberculosis and Health Association of the State of Hawaii; Tuberculosis and Health Associations of Hawaii, of Kauai, of Maui, and of Oahu.

The only major health agency in the Community Chest is the Mental Health Association, with a modest budget (1).

Also, the chamber of commerce in each major city frequently promotes public health action.

The distance from the northernmost shore to the southern edge of the Hawaiian Islands is 337 miles. The land area of all the islands is 6,435 miles, but 77.4 percent of the people live on Oahu, third largest of the islands and a seat of government, industry, commerce, military installations, and tourist attractions.

In contrast, Niihau, privately owned, smallest of the inhabited islands, retaining the ancient ways, with no police or courts, is closed to uninvited visitors. Its pure Hawaiian population,

225, used carrier pigeons for communication until a shortwave radio was installed in 1942. A small boat makes a daily trip from Niihau to neighboring Kauai. Health services are provided by the State on request.

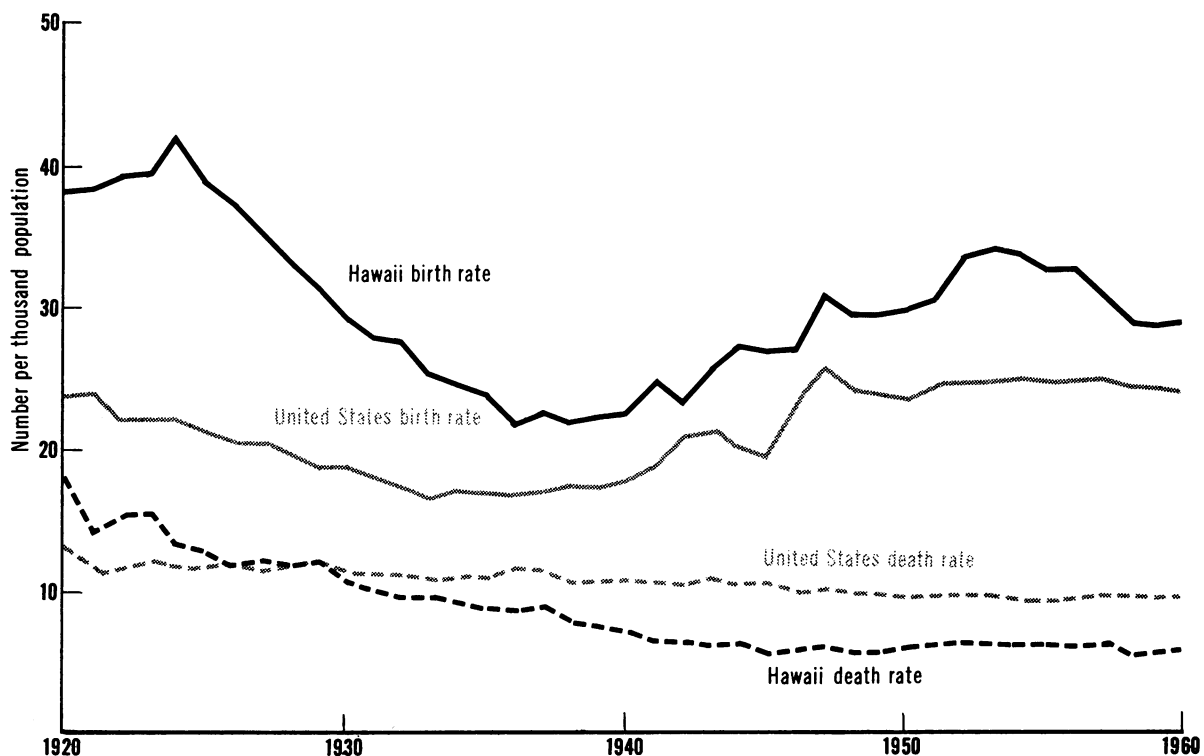
### Health Organization

Official and professional health services and their organization are the core of community health.

Hawaii is the only State to vest all public health authority in a single department. Even Delaware has a separate department for the city of Wilmington, and similar exceptions are found in Rhode Island, Alaska, Pennsylvania, and Illinois, where State officials provide many local services. However, local authorities have every freedom to augment health services if they wish.

The Hawaii Department of Health, 1 of 18 departments created by the legislature in 1959 to combine more than 100 separate units, has a broad charter of authority. Although med-

Birth and death rates, State of Hawaii and United States, 1920-60



NOTE: 1920-40 rates based on total population, 1941-59 rates on civilian population only.



**New Hawaii State Health Department building and Oahu Health Center in Honolulu**

ical care for indigents is assigned to the department of social services, the health department encompasses a division of dental health, communicable disease (including a special service for Hansen's disease), special health services (including public health nursing and nutrition), mental health, mental retardation, a broad battery of services in preventive medicine, and a complete environmental health division. Hawaii is one of five States to have the mental hospitals in the health department. Staff offices include research, planning, and statistics, health education, and personnel and administrative services.

### **Training**

Most of the program directors have degrees in public health, in addition to degrees in basic specialties. Such advanced training is exceptionally costly for Hawaii because there are no graduate schools for medicine, dentistry, or public health in the islands. Students earn their degrees on the mainland and return to the islands to practice. In the fall of 1962 a graduate program in public health will be initiated at the University of Hawaii.

Schools for nursing, beginning at the Queen's

Hospital in 1916, are subject to approval by the Board of Nursing. In 1959, 2,212 held professional nurse licenses from the board, and 1,665 held licenses as practical nurses. The health department employs 79 public health nurses. Instruction in public health nursing is given in the College of Nursing at the University of Hawaii.

Physicians were among the earliest missionaries from New England to Hawaii. By 1910 there were 34 practicing physicians in Hawaii. Today there are 850 in every specialty of medicine.

Licensing procedures went into effect in 1896. Hawaii's physicians, to be licensed upon graduation from a medical school or college approved by the Council on Medical Education and Hospitals of the American Medical Association, must have lived in Hawaii for 1 year and must pass an examination or be certified by the National Board of Medical Examiners.

A State medical association, affiliated with the American Medical Association, and four local medical societies have active committees serving the community. They also sponsor symposiums and conferences for the continuing education of their members.

Since 1896, when 10 dentists were reported in

practice, there has been a steady increase in the number of licensed and practicing dentists on the islands. The ratio of dentists to the total population in 1960 was about 1:1,300. For a license, potential practitioners need a year's residency in order to take an examination by the Board of Dental Examiners.

Dental health in Hawaii was influenced greatly by the founding of the Honolulu Dental Infirmary in 1920 by Mrs. Helen Strong Carter, with a program of dental service, health education, and the training of dental hygienists. The dental hygienists served mainly in the public schools. Classes were graduated in 1922, 1923, and 1924 and provided a nucleus of 28 hygienists. The training was taken over in 1926 by the Territorial Normal School and in 1933 by the University of Hawaii. Today there are 88 licensed practicing dental hygienists in Hawaii.

### Hospitals

There are 4 general hospitals in Honolulu with a total of 849 beds and 20 other general hospitals in rural areas with a total of 984 beds. Special use hospitals consist of four for tuberculosis, one for mental illness, one for the mentally retarded, two for Hansen's disease, three for chronic disease, one children's, one maternity and gynecology, one for rehabilitation, and one orthopedic hospital for children.

The 38 civilian hospitals of all types have a total bed capacity of 4,997. Many are accredited and all are inspected for approval by the Hawaii Department of Health. Tripler Army Hospital overlooks the leeward coast of Oahu. Occupying 375 acres, its 1,000 beds can be increased to 1,500.

As economic conditions have changed and roads have improved, a number of small private and plantation hospitals have closed or reorganized as community or county hospitals.

Under the Hill-Burton Act, offering Federal assistance for hospital surveys, construction, or expansion, hospital services were materially improved.

### Civil Defense

With a strong civil defense program dating back to the formation of a major disaster council created in Honolulu in June 1941, all em-

ployees of the State health department have assignments to cope with any predictable emergency. In addition to the annual alerts, periodic training is provided physicians, nurses, radiation monitors, and laboratory technicians.

### Environmental Factors

The natural physical environment of the islands, with elevations up to 13,784 feet, is so varied as to offer a wide choice of climates, but 95 percent of the people live in the valleys and at seaside. In Honolulu, the average temperature is 75.2° F., with a record high of 92° in 1959 and a record low of 55° in 1955 (6). Storms are rare. Snow is limited to the mountain peaks. The Hawaiian Volcano Observatory studies signs of potential eruptions and methods of diverting lava flow. The U.S. Coast and Geodetic Survey now operates a system of warning against tsunamis (tidal waves) (7).

*Water resources.* The mountains invite abundant rainfall on the windward side, and the rains generally maintain a substantial underground reservoir in the permeable lava. A system of wells and tunnels draws on these high water tables and aquifers to irrigate parts of the land. Plans to pipe water from impoundments on the rainy slopes will augment the supply for areas which cannot be served by underground resources. The surface waters require treatment, but the underground supply is naturally filtered free of biological contaminants. Quasi-private boards of water supply on each island operate systems of piped water.

*Air pollution.* For short periods when the trade winds falter, Honolulu is susceptible to temperature inversions which favor forms of atmospheric pollution similar to those that afflict other urban centers. On rare occasions, lands leeward of an active volcano are likely to be dosed with sulfur dioxide and particulate matter. During an unusual eruption in January 1960, the health department surveyed the concentrations of gas and volumes of particulate matter in relation to the direction of the winds and recorded physiological responses and crop damage.

The department also maintains permanent air monitoring stations, including a station for observing aerial radioactivity and establishing a record of readings to compare with possible con-





tamination in the future. Several steps for preventing atmospheric pollution have been taken.

*Waste management.* In 1950, there was only one municipal waste treatment plant of substantial size in the State, an activated sludge treatment plant at Wahiawa in central Oahu to serve a population of 6,000.

Solid refuse is for the most part disposed of on open dumps except in Honolulu, where it is incinerated. Garbage may be taken to dumps or be cooked for feeding to hogs.

Sewerage systems and garbage collections are for the most part a public service, operated by government. Homes are served by individual cesspools where public sewerage is not yet available.

Since 1957, municipal waste management has been stimulated by Federal grants-in-aid under Public Law 660, the Federal Water Pollution

Control Act. Honolulu County, which embraces the entire island of Oahu, has received approval for the construction of 10 sewage treatment projects with the estimated cost of eligible items amounting to \$6,063,512, for which the county will receive Federal grants totaling \$1,533,070. The projects will provide needed sewage treatment facilities in the growing communities of Kailua, Kaneohe, and Pearl City.

Sugar and pineapple, the two leading agricultural products of the State, have waste disposal procedures which have been well established for many years. However, extensive research has been directed toward the production of paper from bagasse and the possible production of plastics from pineapple pulp so that the development of plants to produce new products will pose new questions of waste management.

In anticipation of these, the State is undertaking studies to determine the physical, bacteriological, and biological status of Hawaii's rivers, streams, harbors, bays, and coastal waters for the purpose of developing standards of quality and criteria for future regulation of waste disposal. At the same time, with urban growth, the State must determine the degree of treatment needed and the locations of outfall lines so that discharges will not reach waters used for recreational purposes. The studies are expected to include extensive charting of ocean current movements under varying wind and tide conditions.

Other studies may seek data and information for measures that are needed to prevent the contamination of the ground water resources; for the financing of waste treatment facilities, and for appraising the effects and extent of radioactivity in the water resources of the State.

The excellent basal water underlying Oahu has been extensively developed for domestic, industrial, and irrigation purposes. The continued protection of this valuable resource requires the development of information on potential sources of contamination so that protective measures may be devised. With expansion of industry and residential areas above the basal water table and the increasing use of irrigation water, the need for such information is evident.

Likewise, the interest in radioactivity is associated with the proximity of the State to several nuclear weapon testing sites and the possible development of nuclear power plants.

*Shelter.* Hawaii's need for housing reflects the rise in population and in dwelling standards. Since 1945, approximately 100 new subdivisions were developed annually to provide more than 40,000 new homes. Thousands of units were built annually in the form of apartments and hotels throughout the State, in Waikiki and in other shoreline resort areas.

With home construction in recent years concentrated in the rural areas on Oahu, the island has rapidly become urbanized. The desire of young families to obtain better housing has contributed largely toward the high volume of home construction and continued large-scale subdivisions in rural areas where land is comparatively cheap and available.

The amount of construction in Hawaii is indicated in the following summary of building permits issued during the past 10 years by the City and County of Honolulu Building Department.

<i>Year</i>	<i>Building permits</i>	<i>Estimated cost (thousands)</i>
1950-----	7,323	\$46,692
1955-----	7,178	62,245
1959-----	11,078	128,896

To relieve the shortage of housing, the Hawaii Housing Authority, a body politic and corporate during its existence of 25 years, has provided approximately 4,385 dwelling units of public housing and 156 dwelling units of housing for the elderly. It is estimated at this time the immediate need of families living in overcrowded and dilapidated housing is a minimum of 6,500 units.

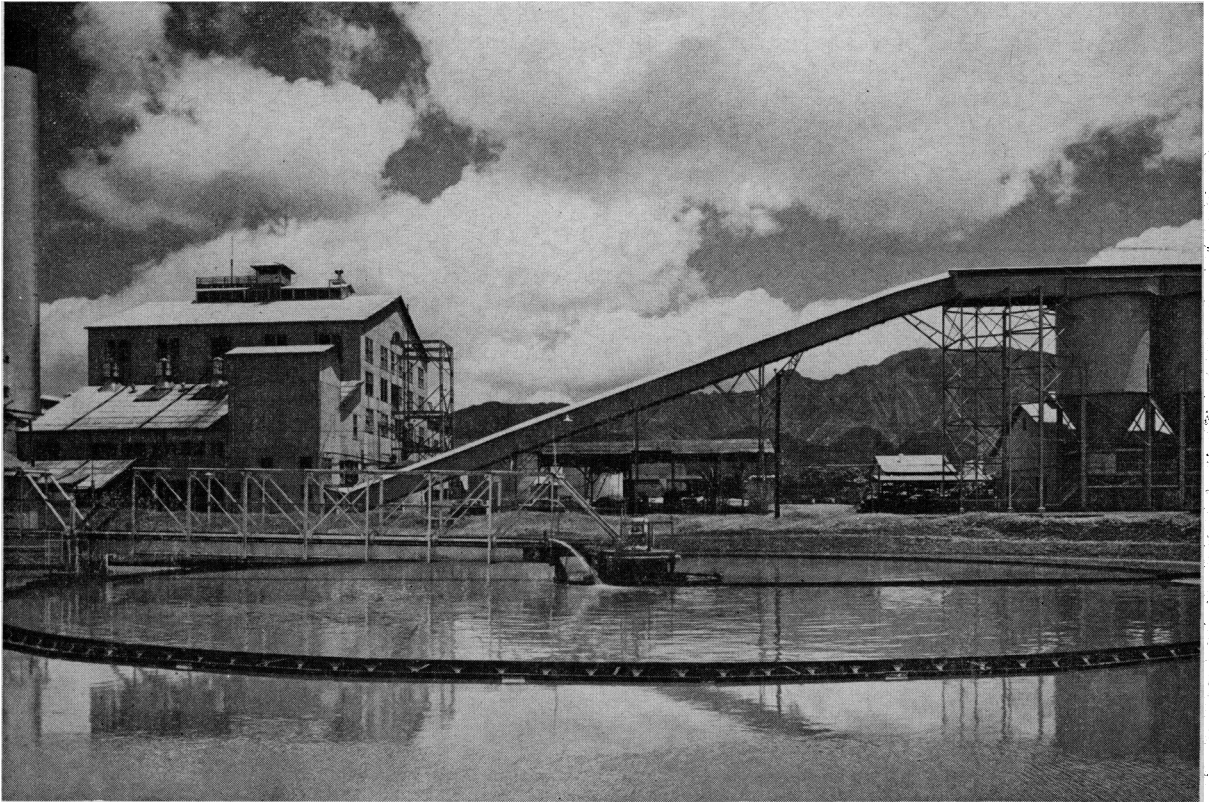
During the past 2 years the environmental health division in the Hawaii Department of Health has participated in the Honolulu condemnation program of tenements and substandard dwelling units. A housing sanitarian was assigned to a special inspection team consisting of representatives from the city and county building department and the city and county fire department. In 1959 this team condemned 63 substandard buildings, 17 of which were demolished voluntarily. Most of the remaining buildings are part of an urban renewal project. Meanwhile, in order to coordinate its efforts with the city and county of Honolulu for continued certification of the Urban Renewal Workable Program, the department of health is revising its housing code to follow the format and provisions of the Uniform Housing Code, 1958 edition, of the International Conference of Building Officials.

*Food and nutrition.* The production of sugar and pineapple, largely for export, has an annual combined value in the range of \$250 million. In contrast, the total meat, poultry, and dairy production in the State has only about one-tenth of the value of sugar and pineapple production.

About half of the food consumed on the islands is imported. Apart from dental caries, however, there is no reported evidence of nutritional deficiency of consequence.

The State health department conducts an





—Hawaiian Sugar Planters Association Photograph

**Hydroseparator takes sugarcane washings from Waialua mill (left), sifts out mud for landfill in swamps and coral rock areas. At right are bulk sugar storage bins.**

intensive program of milk and food sanitation, which employs 7 full-time and 21 part-time sanitarians and inspectors.

A booklet published by Hawaii's Department of Health, called Public Health Regulations, describes the comprehensive responsibilities of the agency. All food installations are under regulation.

Although contamination of offshore waters is alleged, little regulation of traffic in clams, oysters, or crabs is necessary as there is virtually no commercial interest in these foods. They are gathered and eaten largely by amateurs.

The food and drug branch of the environmental health division is unique in that it also carries out Federal responsibilities in behalf of the Food and Drug Administration.

Dry powdered milk imported to the islands for retail sale is also reconstituted in wholesale quantities for sale to the Department of Defense and for flavored drinks. Maintenance of a

dairy industry to supply fresh whole milk is a conscious policy in the State, even though livestock feed is usually imported. It is reasoned that in the event of an interruption of shipping, the islands might be bereft of milk unless the local farms are supported. The islands manufacture no dairy products except cottage cheese and a small amount of butter. In 1957, the amount of milk sold raw on one island, Hawaii, was limited to one distributor with a 30-quart capacity. Practically all milk is pasteurized today, except for a small amount on Maui and Molokai.

In general, milk sanitation employs regulations based on the Public Health Service Recommended Milk Ordinance and Code. Eating and drinking establishments are governed by regulations based on the recommendations of the Public Health Service. Inspection of meat is conducted by the State department of agriculture and conservation. Slaughterhouse inspection is conducted by the health department.

Sanitation services in general entail inspectional, regulatory, educational, and promotional activities designed to put into effect the statutes and regulations regarding dwellings, apartment houses, hotels, lodging houses, tenements, boarding houses, schools, hospitals, grocery stores, restaurants, liquor dispensers, soda fountains, food manufacturing plants, markets, food peddlers, dairy farms and milk and milk product plants, hog ranches, poultry farms, vegetable gardens, barber shops and beauty parlors, tattoo parlors, laundries and cleaning establishments, amusement places, and industrial plants.

### Vector Control

The rapid urbanization that has taken place in certain areas of the State and the expansion of the tourist industry has resulted in an increased interest on the part of the public in fly, gnat, cockroach, tick, spider, and wasp infestations. There is a strong demand for increased vector control for new housing developments and recreational areas. The major objects of vector control are the mosquito and the rat. The mongoose, imported to control the rat, has become something of a commercial pest. There is no rabies in Hawaii.

*Mosquito control.* The night mosquito, *Culex quinquefasciatus*, the first species to establish itself in the islands, is reported to have been introduced aboard the ship *Wellington* from San Blas, Mexico, to Lahaina, Maui, in 1826. To date, three biting species have established themselves, and four nonbiting species were purposely introduced, the predatory *Toxorhynchites*.

The three noxious species are *Aedes aegypti*, *Aedes albopictus*, and *Culex quinquefasciatus*. The two *Aedes* species are referred to as the day mosquitoes and the *Culex* species as night mosquitoes.

The four species of *Toxorhynchites* (Megarhinus) introduced on the islands for biological control of *A. albopictus* are *T. inornatus* from New Britain in 1929, probably no longer present; *T. brevipalpis* from South Africa in 1950; *T. splendens* from the Philippines in 1953; and *T. hypoptes* from Panama in November–December 1953, probably no longer present. Although *T. brevipalpis* and *T. splendens* appear to have

established themselves in Hawaii, they seem incapable of providing any significant economic control of *A. albopictus*.

Dengue is the only mosquito-borne disease in the islands to have reached epidemic proportions. Significant outbreaks occurred in 1903, 1912, and 1943–44.

The trend in mosquito control is shifting from disease suppression to control of the mosquito nuisance, which is in most places kept at a tolerable level. In this regard, the night mosquito, *C. quinquefasciatus*, is the target. This foul-water species breeds in pools, tin cans, buckets, barrels, and other relatively small catchments. These small domestic foci may create significant annoyance if not discovered and corrected. The major extensive chronic breeding areas, however, are natural ground pools, swamps, and other lowlands located for the most part in suburban and rural areas, as well as ponds associated with sugar plantation cane wash water used for irrigation or soil reclamation.

There is no enabling legislation in Hawaii for the formation of mosquito abatement districts. Present prevailing opinion is that they are not needed. The staff of the vector control branch, within the limited scope of its operations, employs chemical attacks on adult mosquitoes and larvae, biological enemies of the pests, and measures to limit the breeding places.

The department of health's mosquito activities are complemented by programs carried out by Federal officials within military installations in Hawaii. Also, private industries such as the sugar plantations undertake larviciding operations as well as water management practices to minimize mosquito breeding. These various authorities have established effective methods of exchanging information and coordinating plans.

*Rodent control.* Hawaii's subtropical climate affords and will continue to afford ideal conditions for rodents. The principal endemic rodent-borne diseases are plague, typhus fever, and leptospirosis. The human incidence of these diseases is low, thanks to sanitation and vigilant control.

Hawaii's experience with plague provides the incentive for rodent control. The historic outbreak in Honolulu in 1899 resulted in 61 deaths out of 71 afflicted.



**When an artificial lake formed inside Diamond Head after a heavy rainstorm, fish were introduced to cope with mosquito breeding. The fish multiplied so rapidly that mosquito control men had to go fishing.**

From Honolulu, plague vectors reached the islands of Hawaii, Maui, and Kauai. The disease disappeared from Oahu and Kauai but sylvatic plague continues in two confined areas on Maui and Hawaii. In plague surveillance today, public health employees trap rats and study them and their fleas for evidence of infection. Control activities include poisoning, gassing, sanitation, and public education. A plague immunization program has been in effect since 1944. The last case of human plague occurred in 1949; the patient recovered after antimicrobial medication. The last rodent plague infection was detected in 1957 in the Hamakua District on the island of Hawaii.

In 1958 studies on the ecology of plague were initiated and are currently being conducted in this district. In 1959 additional financial support for a 3-year period was received from the Public Health Service. The research team in-

cludes a medical entomologist, two animal ecologists, and a microbiologist. Rodent control men assist in field investigations. The principal objective is to determine why plague persists in the Hamakua District. The future course of the State's plague surveillance and control may be shaped by the findings regarding population dynamics of the rodents and fleas, their physical environment, food and feeding habits, reproductive capacity, migration patterns, and intermingling of species. Also planned are investigations of the susceptibility of the mammal hosts to experimental plague infection and the capability of the fleas present to transmit plague. Several branches of the Hawaii Department of Health are actively participating in these studies.

Another cooperative investigation concerns leptospirosis among rodents. A high rate of infection in these animals has been determined.

Vector control includes a well-rounded health education program. Transparencies on all phases of the bureau's activities are now available for use in connection with talks to schools and community organizations and for inservice training purposes. A 16-mm. film on plague control and research activities is near completion.

### Communicable Disease

In 1929 in Hawaii, of every 100,000 residents, 418.5 died of a communicable disease. This mortality dropped dramatically decade after decade. In 1960, it was down to 27.0 (4).

Although most communicable disease on the islands is well restricted by immunization programs, by effective medical treatment, and by activities in sanitation and vector control, two infectious diseases command more than ordinary attention because of the special experience of the islands. One is tuberculosis; the other, Hansen's disease.

The tuberculosis death rate in Hawaii, 2.2 per 100,000 in 1960, has dropped 90.8 percent in the past 10 years. Nevertheless, the case rate in 1960 was 27.1 per 100,000, above the national average. This rate both reflects and encourages the local zeal for case detection.

The case detection program includes tuberculin testing of all high school sophomores (in the year when it fits into their health education curriculum), of all university students, and others under age 40 who request a test. Prophylaxis is recommended for converters.

Three mobile X-ray units are available to all communities and to the larger industries throughout the State. Community X-ray surveys are planned in cooperation with the community organizations and the local tuberculosis associations. Up to 40 percent of all new cases of tuberculosis are discovered from mobile X-ray screening. Foodhandlers and school personnel are required to have an annual test for tuberculosis.

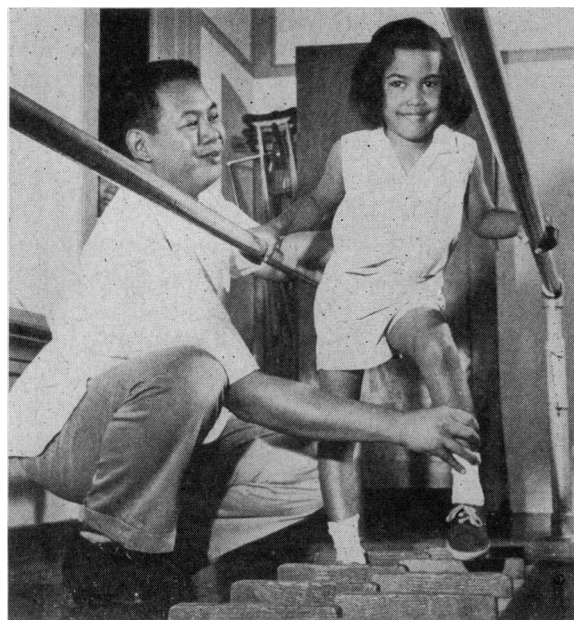
An X-ray survey is not completed until a diagnosis has been reported on every abnormal condition found on the original film. These diagnoses may be done by private physicians or at State facilities. The medical social worker insures that patients with suspected neoplasm

are brought to treatment or observation and that a special file is kept.

The law provides tuberculosis treatment for any resident without charge. There are four sanatoriums. Some of the tuberculosis beds are unfilled. Recent legislation permits admission of indigent and medically indigent patients with chronic disease. Two sanatoriums have admitted chronic mental patients who formerly were at the State mental hospital.

All inactive patients are followed for a minimum of 5 years and most for much longer. A recent review of patients who have been removed from the case register found that a significant number of the sample had become reactivated. In March 1961 a study of prophylaxis for inactive patients who had never had drug treatment was begun to determine whether the reactivation rate can be reduced.

Until the introduction of the sulfone drugs in 1946, the prospect for patients infected with the *Mycobacterium leprae*, first isolated by Gerhard Armauer Hansen, was grim to say the least. With the advent of a scientific basis for management of Hansen's disease, the main concern is not casefinding and treatment but erasure of the fear and stigma, which cause more suffering to the patient and family than the infection itself.



Physiotherapist and young patient

Indications of modern confidence in treatment of the disease are found in a new center, Hale Mohalu, established near Pearl Harbor in 1949. In the past 5 years, 42 patients have been discharged from isolation and have returned to their former homes and associates. New admissions in the same period numbered 31. Because of the long incubation period, it is difficult to determine the original source of infection, but there is reason to believe that 25 percent of these infections were acquired outside the islands. Services for control of Hansen's disease in Hawaii are supported largely by the Federal Government, as Hawaii does not send leprosy patients to the Public Health Service Hospital at Carville, La. In a 10-year period at Hale Mohalu and Kalaupapa, 92 patients were admitted and 89 patients released.

### **Maternal and Child Health**

The committee of the Hawaii Medical Association advisory to the maternal and child health services branch, department of health, studies all maternal deaths and selected infant deaths. Its recommendations to hospitals, physicians, and the branch on ways to decrease maternal and infant mortality and morbidity have far-reaching effects. Well-child supervision and immunization are provided in child health conferences throughout the islands. One child in 12 attends these conferences before entering school. High priority is given to multiple-problem families. One-fourth of the children are from families which receive assistance from the department of social services.

Programs which emphasize prevention and correction of neurologically handicapping conditions are a new development in Hawaii, as elsewhere. These programs include more and better obstetrical care, management of the epileptic and the cerebral palsied child, and a great increase in interest in the services for the mentally retarded child.

The most pressing immediate problem is that of dental care for children whose families cannot afford private care. There is a high rate of caries, combined with inadequate services, particularly in the rural areas. Effects of the caries are seen in specific as well as general health problems. The bureau of crippled chil-

dren provides dental services for certain categories of handicapped children, such as those with rheumatic heart disease, cleft palate, and cerebral palsy.

### **Mental Health**

With statehood and subsequent State government reorganization, the Hawaii State Hospital (formerly Territorial Hospital) was placed with other mental health services within the health department.

Starting with a 1,200-bed, modern State hospital, a large day hospital convalescent facility, and four regional mental health centers on Oahu and one regional mental health center on each of the three major neighbor islands, the department is moving toward "total treatment" units. This means combining mental health promotional, preventive, and treatment functions within each of these islands.

Two of the neighbor islands are providing, in addition to preventive and outpatient treatment services, long-term hospitalization for mentally ill persons in tuberculosis sanatoriums, with supervision by the State hospital staff. Also, the State provides funds for short-term hospitalization of medically indigent mentally ill persons in general hospitals.

The division of mental health, with the assistance of the National Institute of Mental Health, is establishing a central patient registry to compile epidemiologic data and information about the flow of patients into, through, and out of the State treatment facilities.

There are no special facilities for the inpatient treatment of emotionally disturbed children and no family care program for either children or adults. Various community organizations are exploring the possibilities of opening a small day care center for a selected group of disturbed children.

Many visitors to the islands are struck by a serenity among Hawaiians, coupled with extraordinary friendliness and hospitality. Although such traits are hardly universal, their frequency indicates to the newcomer (malihini) a relatively high level of public mental health. This conclusion is strengthened by the common acceptance of religious and ethnic variety in the islands: it is as natural to accept a difference there as it is to expect uniformity elsewhere.



## Mental Retardation

In the 1960 reorganization of the government, the institution for the mentally retarded, Waimano Training School and Hospital, was transferred to the department of health. A new division of mental retardation was created and the institution and a community services branch were placed within this unit.

The department appointed an advisory committee on mental retardation with representation from agencies providing services to retardates: the department of education's division of vocational rehabilitation, the University of Hawaii, department of social services, Pediatric Society of the Medical Association, and representatives of the Hawaii Association

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## Ho'oponopono or Setting to Rights

In pre-Christian days, ho'oponopono was of great importance and is not entirely deserted by some to this day. My people believed that the taking of medicine was of little help without first removing any and all mental obstructions. "E ho'oponopono mua i kuakahi ka la'au," or "Set to rights first so that medicine might take effect."

I have participated in many a ho'oponopono in my immediate family, with my grandmother and her semi-heathen ways and my mother in her all Christian ones. Today, the ho'oponopono remains only as a fond memory since the death of my mother in 1942. When a problem arose in the family affecting an individual or the group as a whole, every member of the immediate family turned to the ho'oponopono. The problem might be lack of employment, physical illness, ill luck, or whatever. If it was illness, the ailing person was asked whether he had a feeling of resentment against anyone or had committed a deed that he should not have. If he had, he confessed and explained. Then he was asked whether he was convinced that it was wrong, and if he was, a prayer was asked, asking forgiveness of God or the gods. The person against whom the feeling of resentment was directed was asked to forgive him also. If he, in turn, bore an ill will and had thought or spoken evil against him, he must ask to be pardoned. First the patient confessed and was forgiven, then he in turn forgave the trespasses of the others against him. A mutual feeling of affection and willingness to cooperate had to exist in the family and the household before anything further could be done. So it was between the family and the 'aumakua, all obstructions had to be removed. The current of affection and co-operation had to flow freely between the 'aumakua (gods) and the family also.

The process of ho'oponopono sometimes took

from one to several hours, depending on the natures of the individuals, whether quick to anger and to curse, or the reverse. If the process would be too lengthy it would be broken up in shorter sessions with periods of rest between so as not to exhaust the patient. In my family, most ho'oponopono did not go beyond the door of our house, because ours was a family of kahunas, but with some a kahuna from outside handled the ho'oponopono. One did a lot of self-examining during a ho'oponopono whether one was the patient or not.

I know, for I had participated in it for 47 years, from semi-Christian to all Christian times. The process was similar except that with the latter there was no calling upon the 'aumakua. Every one of us searched our hearts for any hard feelings one against the other and did some thorough mental housecleaning. We forgave and were forgiven, thrashing out every grudge, peeve, or resentment among us. In this way we became a very closely bound family unit.

With some people, the ho'oponopono was combined with "Wahi i ka Paipala." The ho'oponopono is rare today and regarded as a silly remnant of heathenism by most people and squelched at every turn. With modern psychiatry, the doctor deals with a single individual, but in the ho'oponopono it included the entire household who were made to feel their responsibility toward an ailing member and to each other.

Expressions like "ku i ka mihi" or repentance, "ku i ka pule," set a special period of time for prayers, and "kukulu kumuhana" or present the problem to God, were often heard then and are still heard now.—MARY KAWENA PUKUI WAHI I KA PAIPALA, *associate in Hawaiian culture, Bishop Museum, Honolulu.*



to Help Retarded Children. This committee meets monthly to advise the division on policy and program development, and it serves an important exchange function in keeping agencies informed about all segments of the program.

Waimano Training School and Hospital provides care, supervision, and training to 860 residents. In its first year within the health department, professional staff has been added for occupational therapy, manual arts and homecrafts instruction, and administrative personnel for a training section.

Both adults and children are evaluated at clinics operated throughout the State. Also some training is provided for groups of young retardates. It is estimated that there are 18,000 retarded in Hawaii and that there is an annual increment of 544 newborn to this group.

### **Dental Health**

Hawaiians have one of the highest dental caries attack rates in the nation, according to data released in February 1960 on school children, 9 to 16 years of age. The number of fillings is also high, although the interest in sound teeth and oral health is not pronounced.

Although no civilian water supply is fluoridated, an experimental fluoride tablet program is being tried on one sugar plantation. For many families on the islands it is not practical to obtain water from a central treated source. Topical applications of sodium fluoride are being employed statewide by the dental hygiene service.

### **Chronic Disease and Rehabilitation**

The increases in cancer and diseases of the heart as leading causes of death are associated with the changing pattern of the population. Although Hawaiians are relatively young, that portion of the population over 65 years increased 39 percent in the period from 1950 to 1960. Chronic illness and disability, afflicting all age groups, especially are visited upon the aged. Hawaii consequently has undertaken to prevent disability associated with prolonged inactivity and with the failure to encourage the aged patient to recover the ability to look after personal needs.

The first step was professional preparation of medical and paramedical personnel, who had exhibited intense interest in rehabilitation but lacked familiarity with the scope and content of such work. In the training sessions for nurses, physicians, and others who work with the handicapped, priority was given those from islands where they do not have ready access to a specialized medical rehabilitation facility. The only facility of this kind is in Honolulu.

The object of the training was to enable workers to carry out restorative treatment with limited resources, without recourse to specialized personnel or equipment. The staff of the center in Honolulu has supervised these workers in providing restorative care to many patients on the neighbor islands. The supply of such services, however, is still far short of the demand.

The division of vocational rehabilitation in cooperation with the State department of health, Hawaii Medical Association, and the Rehabilitation Center of Hawaii is conducting a demonstration project aimed toward preventing or reducing the need for long-term dependency among the chronically ill and to explore ways in which this may be accomplished in this community. Physicians and rehabilitation specialists examine and evaluate patients and provide complete rehabilitation treatment.

Diabetes screening has found disease in nearly 2 percent of those screened. Of these diabetics, 60 percent had no previous knowledge of their condition.

### **Cancer Control**

Public education programs on cancer have been conducted in Japanese, several Filipino dialects, and Chinese, as well as in English, with pamphlets and movies produced locally as co-operative ventures between the health department and the American Cancer Society, Hawaii Division. Professional education programs have been conducted in cooperation with various voluntary and professional organizations.

A cancer morbidity study which covered 11 years (1944-54) produced statistics on ethnic differences in the incidence of cancer. A special study on the incidence of skin cancer was conducted with the Hawaii Dermatologic Society.

Ethnic differences in the incidence of this type of cancer are still being investigated.

Morbidity studies conducted here have pointed out the high incidence of cancer of the stomach in Japanese men, prompting epidemiologic efforts to find reasons for this. Other ethnic differences have been established, such as the low incidence of cancer of the breast in Japanese women as compared with Caucasian women.

The most recent project in cancer statistics is the tumor registry, a joint venture of the Hawaii Medical Association, the American Cancer Society, Hawaii Division, and the State health department.

Any physician or dentist in the State can send a smear test from any body secretion to the cytology laboratory and receive the detection service free of charge. This laboratory service provides comprehensive smear test detection coverage.

### **Alcoholism**

The alcoholism clinic was set up in the State health department in 1955. This activity has developed considerably in the past 6 years, and the first bureau of alcoholism control was started in 1960. The program in development is to include public and professional education services, rehabilitation services through such facilities as the halfway house operated by the Hawaii Alcoholism Foundation, and preventive work with industrial employees. The program is supported by a percentage of the liquor license fees.

### **Research**

Hawaii has the facilities, the enthusiasm, and certain natural advantages which have stimulated public health research to an unusual degree in recent years. Only 10 years ago, health agencies in Hawaii had few research projects in mind. At present, thanks in part to support from the Public Health Service, a broad range of studies are underway. In addition to the studies on plague, the health survey, volcanic effects, offshore water investigations, and other experiments mentioned earlier, several are noteworthy.

Human factors in traffic accidents are the subject of an inquiry which began with tests and examination of 250 experienced professional drivers, including measurements of visual perception, self-appraisal, response to traffic frustrations, and ability to deal with traffic conditions. A second phase of the study will deal with experienced adult drivers, and the third will study teenage applicants for licenses, who will be followed for 5 years.

Other studies include a search for arthropod-borne encephalitis; the etiology of bovine arteriosclerosis, which occurs in nature in Hawaii as in no other region; an atherosclerosis survey among the human population; and a comprehensive evaluation of school health services.

### **Prospects**

The future of Hawaiian health was forecast by Dr. Lee in addressing the Pacific Science Congress (8):

"The future in public health in Hawaii holds forth exciting challenges. In the foreseeable future, Hansen's disease, tuberculosis, and poliomyelitis will have been eradicated. Mental health service will be well developed on all islands, with private care a part of the general hospital system as a routine procedure. Custodial care will be limited to those patients who show no response after long periods of treatment.

"Cure for most cancers would have been found and this health problem no longer will be the second leading cause of death.

"Alcoholism, suicide, accidental injuries, and deaths will be leading problems of the State. Care of the aged and the chronically ill will have been greatly improved and homemaker services and care for the homebound will be provided. Comprehensive health and medical services will have been improved.

"Occupational health and medical services will be expanded as the State becomes more and more industrialized.

"A medical school at the University of Hawaii may be established during the growth of the East-West Cultural Center. The medical school will serve State, national, and international needs. Health research activities will be

actively carried out at the university, hospital, health department, and in other health agency programs. Environmental health will continue to be an important part of the health department program for the prevention of air pollution, for radiation health, and disposal of solid waste and sewage."

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### Purified Virus From Leukemic Rats

Extraction of nearly pure virus from the blood of laboratory rats with virus-caused leukemia has been accomplished by A. J. Dalton and J. B. Moloney of the National Cancer Institute, Public Health Service. The availability of a relatively simple method of extracting purified virus from cancer-bearing hosts will greatly aid efforts to learn whether viruses cause human leukemia, according to the Institute's director, Dr. Kenneth M. Endicott. Cancer Institute scientists are already searching for viruses that may cause leukemia in the blood of human leukemia patients.

The procedure used to extract virus from the blood of rats consists essentially of centrifuging the blood four times at high speeds. Blood cells and other debris are separated out, and a small, solid pellet consisting almost entirely of virus particles is formed. The purified virus extracted from the blood of rats causes leukemia sooner and in a higher percentage of animals than does virus recovered from other rat tissues.

The possibility of extracting virus from blood was revealed by an electron microscope study by Dalton, who saw many virus particles in the blood plasma of rats having the so-called Moloney leukemia. This leukemia was discovered 3 years ago in mice by Moloney after he had inoculated them with cell-free extracts of a solid tumor.

## New Members of the PHR Board of Editors



**Dr. Littauer**



**Mrs. Shackelford**



**Dr. Galagan**



**Mrs. Leone**

The Board of Editors of *Public Health Reports* has four new members, who will serve for 3 years. Retiring from the board are: Dr. Francis A. Arnold, Jr., Dr. W. Palmer Dearing, Karl M. Mason, and Ruth Sleeper.

**David Littauer, M.D.**, has been executive director of the Jewish Hospital of St. Louis, Mo., since 1952. Previously, he was director of Menorah Medical Center in Kansas City. During World War II, he was commanding officer of an Army hospital in the Pacific theater.

He is a member of the council of professional practice of the American Hospital Association, president of the Hospital Association of Metropolitan St. Louis, and a member of the board of directors of the Health and Welfare Council of St. Louis. He is co-chairman of the Medical Care Research Center of Washington University and the Jewish Hospital and a research associate in the university's social science institute.

Dr. Littauer is a lecturer in hospital administration at Washington University and at St. Louis University. He is on the board of editorial consultants for *Modern Hospital* magazine and is chairman of the board of publications of the American College of Hospital Administrators. He has authored more than 30 articles published in hospital and medical journals, and a monograph on home care.

Dr. Littauer graduated from Cornell University in 1927 and received his medical degree from the New York University College of Medicine in 1933. He is a fellow of the American College of Hospital Administrators, the American Medical Association, the American Public Health Association, and the Gerontological Society.

**Margaret F. Shackelford, M.S.**, has been director of the division of statistics, Oklahoma State Department of Health, since 1948. She is also assistant professor of biostatistics in the department of preventive medicine and public health, Oklahoma University School of Medicine. She has been in the Oklahoma State Health Department since 1938. In 1956, she was a consultant in vital statistics to the Public Health Service Indian Health Survey.

Mrs. Shackelford is vice president of the American Public Health Association and president of the American Association for Vital Records and Public Health Statistics. She is a member of the U.S. National Committee on Vital and Health Statistics and the Standing

Committee of the Public Health Conference on Records and Statistics, both sponsored by the Public Health Service. She is also a member of the APHA Subcommittee on Educational Qualifications of Public Health Statisticians.

Mrs. Shackelford received her B.A. degree from the University of North Carolina in 1936 and her M.S. in biostatistics from the Columbia University School of Public Health in 1947.

**Donald J. Galagan, D.D.S., M.P.H.**, is chief of the Division of Dental Public Health Resources, Public Health Service, and a career dental officer in the Service.

He has served in a variety of clinical, research, and public health capacities. His most significant research work has been in the development of topical fluorides and water fluoridation techniques to prevent dental caries. He has provided leadership to various dental public health programs, both of a general nature and those concerning special areas such as dental services for the chronically ill.

Dr. Galagan graduated from the College of Dentistry, State University of Iowa, in 1937 and received his master of public health degree from the University of California in 1950. He is a diplomate and current president of the American Board of Dental Public Health. Dr. Galagan was a member of the Surgeon General's Task Force on Mission and Organization of the Public Health Service.

**Lucile Petry Leone, R.N., M.A.**, is chief nurse officer of the Public Health Service and holds the rank of Assistant Surgeon General. Before coming to the Public Health Service in 1943 to direct the U.S. Cadet Nurse Corps program, she was associate professor at the University of Minnesota School of Nursing.

She served as technical adviser to the U.S. delegation at the first and ninth World Health Assemblies at Geneva and is a continuing member of the Panel of Experts on Nursing of the World Health Organization.

Mrs. Leone has received honorary doctoral degrees from eight universities. In 1957, she received the Lasker Award, and in 1959, the Florence Nightingale Medal of the International Committee of the Red Cross. In 1961, she was re-elected president of the National League for Nursing.

Mrs. Leone is a graduate of the Johns Hopkins School of Nursing and received her master's degree from Teachers College, Columbia University.