# "Place" in Environmental Epidemiology

## *A Rectangular Coordinate Method*

HARLEY T. WRIGHT, M.S.P.H., CARL J. MARIENFELD, M.D., M.P.H., and STANLEY L. SILBERG, Ph.D., M.P.H.

THE METHODOLOGY of epidemiologic investigation of acute communicable disease is being applied increasingly to the study of environmental health and chronic diseases. The efficacy of this method in describing and clarifying the host-agent-environment interactions in the herd ecology of the human being and other species is no longer questioned. There is, however, one basic difference in methodology as applied to communicable disease in comparison to environmental health in the availability of data on time, place, and person. In the study of communicable disease the factor of place, as defined by the occurrence of an epidemic, gives the initial orientation, and the remaining investigation determines the specific time and population involved.

Such a well-defined geographic locus is not generally available in environmental epidemiology except in those rare instances involving the simultaneous and acute intoxication of large numbers within a population, as in the pollution of the air over Donora, Pa., fish kills, or the epidemic of abnormal infants due to thalidomide. The many possible environmental health effects are chronic, of low intensity, and often widely scattered. Thus, identification of a sufficient number of individuals who demonstrate a minimal effect may involve a number of species located in scattered geographic areas over a protracted period of time. This identification, nevertheless, requires an exactitude in determining place which must be at least equal to that of time and person.

*Mr. Wright is instructor, Dr. Marienfeld is professor, and Dr. Silberg is assistant professor, community health and medical practice, University of Missouri Medical Center, Columbia. Dr. Marienfeld is also director, environmental health center, Columbia.* *This research was supported by Public Health Service grant No. ES00082.*

### The Problems

*Place.* The establishment of a surveillance system for congenital abnormalities in multiple species by the environmental health center of the University of Missouri has reinforced our concern about the lack of specificity regarding place in environmental investigations.

Since 1964 we have been conducting a 12-year retrospective study of the significant congenital abnormalities occurring in Missouri. Birth certificate reports of these abnormalities were used, and these records will be checked in the prospective study against hospital morbidity reporting currently underway in Missouri (*1*). In addition to the prospective study of human beings, a statewide surveillance program is being established through the University of Missouri Extension Division to obtain comparable data on congenital abnormalities in domestic swine bred within the State. The Missouri Department of Conservation is obtaining related data on the State's wild rabbit population.

The need for establishing a simultaneous

multispecies prospective surveillance system brought to the surface a number of the following problems.

*Political boundaries.* The first problem was that the political boundaries within which vital statistics reports are obtained may bear little or no relationship to geoecologic environment. In fact, such reporting using county or community boundaries often masks clustering in adjoining areas. The total county rates often reflect an average incidence of cases when, in fact, small adjoining land parcels within several counties may be found to have either unusually high or low rates. This is not surprising since these areas are a geographic and ecologic whole despite the artificial boundaries which man has devised.

In man's zeal to count and measure he has repeatedly attempted to force nature to accept his own political boundaries and section lines. The increasing confusion and litigation over political rights and prerogatives in the use of the water in rivers testifies to his lack of success. Only recently have we begun to admit that the air is no respecter of city or State limits, and that New York and New Jersey, for example, are inseparably bound through their shared problems of air, water, soil, and space. Even less attention has thus far been given to our ecologic dependence upon the rest of the earth beyond our national borders, but this dependence must eventually be recognized and supercede man-made boundaries and priorities.

The marked internal geophysical dissimilarities and the irregularities in the size and shape of the political units being measured often preclude a sufficient characterization of the environment from which vital statistics are being generated. Concern for the exact enumeration of the population base from which a study group is drawn must now be matched by equal attention to the specific environmental locus in which this population is found.

*Multiple species populations.* The second problem was created when species other than human beings were included in the statewide epidemiologic investigation. While we can locate the residence of the urban dweller by city block and house number, this is virtually impossible for the rural resident and his farm animals. Having failed in our attempt to use the rural postal delivery system for locating the farm home, we have concluded that even rural postal delivery would not function unless a local resident assumed responsibility for mail delivery. Ever-changing and often consolidating rural routes bear no relationship to geography other than that introduced by the presence of roads. The mailing address is therefore largely unusable in a geographic investigation.

*Matching populations.* The next problem, common to all epidemiologic studies, was the need for matched control areas for comparison with those areas in which a clustering or a high rate of incidence might be identified. The general custom has been to attempt to fit the environment into the human context or mold, and in the past we have chosen census tracts, subeconomic or market areas, culturally similar zones, political boundaries, or even the number of telephones to establish control groupings. It would seem in such a survey that it is essential first to set the geographic base for such control purposes. The latitude and longitude are the most identifiable starting points, after which matching or stratification for population, soil types, socioeconomic factors, and other parameters may be established.

*Data analysis and display.* Finally, in a continuing epidemiologic surveillance system there is a need for a clear, rapid, and easily accessible method for communication and display of the data. The usual examination for clustering on a semiannual or annual basis through an intermittent or periodic review of data cards prevents the rapid recognition of a problem area. Thus, the problem itself may have changed or disappeared by the time it is recognized and a team of epidemiologists can be mobilized to investigate the possible causes. The disadvantages of retrospective study are well known and these persist, to a large degree, whether the events occurred years or months before. The rapid recognition of clustering of health effects is particularly important to our project, since the shorter gestation periods of the animal species observed allows anticipation of the human births which will occur some months later in those areas in which the environment has been identified as suspect.

Thus, the surveillance system for congenital abnormalities in Missouri was designed using topographic maps, rectangular coordinate

grids, and a digital computer which is programed to store the multispecies data and to furnish printout computer maps showing the coordinate locations of the birth anomalies found. We intend that this model system will be applied to other health parameters of measurement, such as those involving longevity and chronic diseases, and that it may be used to study any biological species within the State and elsewhere.

## Materials and Methods

To implement this system, a set of 600 topographic maps of Missouri was acquired from the U.S. Coast and Geodetic Survey. The maps are overlaid with a rectangular grid system scaled in meters, making it possible to record degrees of latitude and longitude in plane rectangular coordinates. This system of plane rectangular coordinates was established in 1932 for all States (*2*, *3*).

The maps we use are scaled at 1:24,000 (1 inch=2,000 feet), having quadrangle dimensions of 7½ minutes in both latitude and longitude and those scaled at 1:62,500 (1 inch=1 mile), having quadrangle dimensions of 15 minutes in both latitude and longitude. Maps produced to these scales permit the recording of the coordinates of any point within the State to an accuracy of approximately 100 meters.

Data from birth certificates, received each month from the State division of health, are screened for significant anomalies recognizable at birth and coded with a modification of the congenital malformation coding classification of Ingalls and Klingberg (*4*).

The birth anomalies are then sorted into two groups, rural and urban, using the usual residence of the mother during pregnancy as the determining criterion. A list of the rural cases is sent to the field nurse of the Missouri Crippled Children's Service in each district, where up-to-date county road maps are used to determine the exact location of the usual residence of the mother of each child reported to have an anomaly. The road maps are then used to fix the location on the topographic maps to determine the coordinates. In urban cases current street maps of all cities are used in a similar manner to locate the usual residence of the mother during pregnancy. The residence can usually be located within one city block of the actual address. Once the coordinates have been determined, they are recorded on punchcards together with other pertinent information such as sex of child, age of mother and father, date of birth, and type of anomaly for storage on magnetic tape.

Data are retrieved in graphic form as a scatter diagram printed on an outline map by the computer. The map itself is also printed by the computer, using the necessary coordinates of the State and county borders.

All or any segment of the State may be displayed by selecting any four points for use in forming the perimeter of a selected area. Choosing the minimum and maximum values of any four points from the topographic maps and using these points as input for the computer, it is possible to display quickly all cases of birth anomalies that have been reported within that area. The area may be the entire State (fig. 1) or any small segment of it (fig. 2). As with any plotting scheme, the larger the scale selected, the greater the discrimination. The size and location of the area to be shown may be varied at will. A number of adjacent areas may be observed in succession for evidence of clustering.

It is also possible to select for direct observation a particular portion of the case data such as sex, type of anomaly, season of birth, and plurality.

All cases of anomalies within the State are routinely processed monthly and cumulatively as a part of the continuing surveillance system. The majority of reported birth malformations are integrated into this system within 2 months of occurrence, and almost all are included within 3 months. Thus, it is possible to monitor continuously any area of the State to detect any sudden changes in the incidence of cases.

The environment has many physical, chemical, and biological components, and the environmental health center is simultaneously collecting data on a number of parameters for use when indicated in determining the influence of a group of factors on increased incidence of congenital malformations. The geographic location and distribution of components of the environment, mapped in rectangular coordinates, are recorded on punchcards and become a part of

the permanent data file for subsequent computer plotting. These factors include population, river basins, geology and soil types, poisonous plants, mining areas, and other features of the ecology of Missouri.

In addition to data on human anomalies, surveillance will include simultaneous recording and retrieval of data on birth malformations and stillbirths in domestic animals. The environmental health center, in cooperation with the university extension division, recently established a biannual reporting system for abnormal births and stillbirths in swine in one county as a pilot project. The number of swine births in Missouri each year number between 3 and 4 million in comparison to less than 100,000 human births annually. The statistical advantage of working with such large numbers of births is readily apparent. Since live births as well as birth defects are being recorded, the

**Figure 1. Computer generated map showing usual residence during pregnancy of mothers of some of the children with congenital malformations, Missouri, 1965**

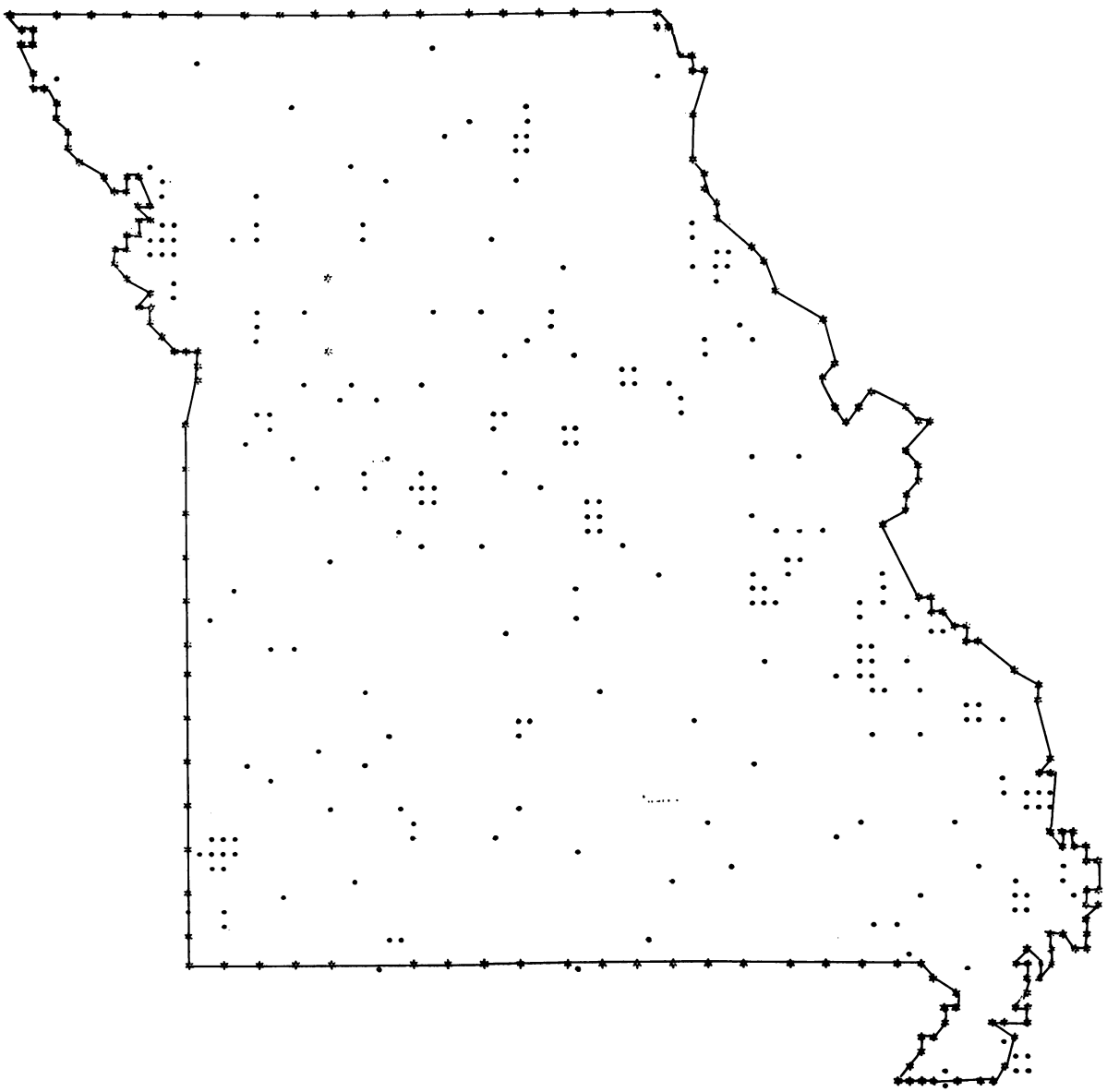
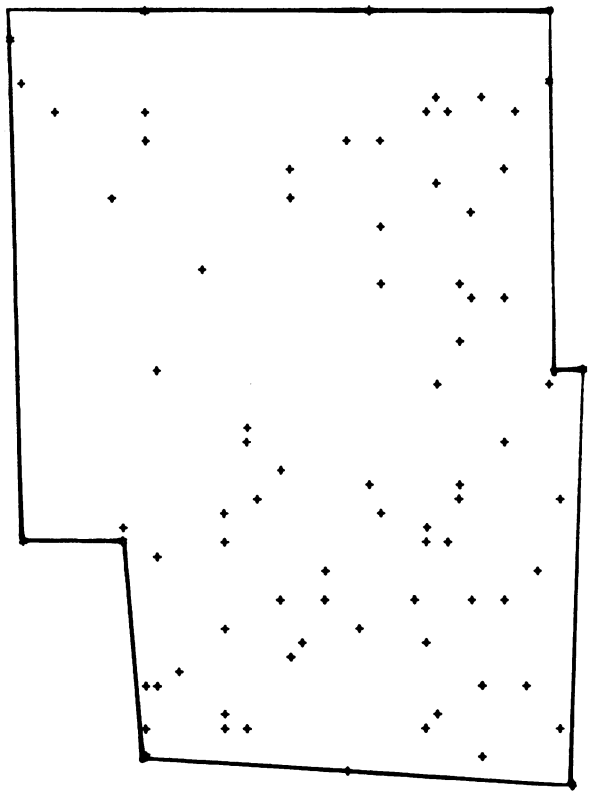


**Figure 2. Computer generated map showing location of farms from which congenital malformations in swine were reported, Nodaway County, Mo.**



rates per thousand live births can also be selectively printed out on the computer map.

Each county extension director uses county agricultural records to supply the environmental health center with a mailing list of all swine producers in his county. The year is divided into two farrowing periods, and at the end of each a letter, brochure, and reporting form are mailed to each producer. The letter explains the survey and contains information on reporting procedures. The brochure lists the reasons for the survey and contains pictures of visible anomalies that may occur in swine. The reporting form, to be completed by the producer, asks the total number of sows bred, the number that farrowed, the number of stillbirths, and the number and type of anomalies observed. The respondent's address and the distance and direction from the nearest town is asked so that the farm can be incorporated into the total coordinate system. This information and a county map are used to locate the farm on the rectangular grid maps.

All practicing veterinarians are also being supplied with cards through the school of veterinary medicine for reporting cases of congenital malformations and stillbirths in farm animals and domestic pets. Since the total base population in these cases is not known, such reports cannot be used to calculate incidence rates. Each case reported is, however, considered as an index case and is investigated by the field epidemiologists. The precise location of the farm and pertinent information on local herds are obtained during the investigation. Types of animal abnormalities can then be compared with those occurring in human beings. This information from veterinarians will also aid in rapidly identifying otherwise hidden epidemics in local areas in species other than swine.

Since 1957 the Missouri Department of Conservation, through its Game Research Section, has also been collecting data on the reproduction of populations of the cottontail rabbit in selected areas of Missouri. Annual rates for fetal resorption have been determined for the selected areas as an indication of fertility changes and embryonic abnormalities. Although these baseline data are not available on a statewide basis, they are being used to supplement the information available on human beings and domestic animals in those areas of the State for which they are available. It will be possible to collect such data on this species from other regions of the State when necessary to supplement the analysis of human and domestic animal surveillance. All data are keypunched and stored on magnetic tape and are available at any time for retrieval and printout display in whole or in part.

## Discussion

The distribution and fluctuations in disease incidence have long been graphically represented on standard international, national, and local geographic maps (*5*, *6*). Topographic maps with rectangular coordinates have been used by the U.S. Armed Forces and other Government agencies; in some States land surveyors use the maps, and the $x$ and $y$ coordinates are used as a part of the legal description of

real property (*3*, *7*). Such maps have not, however, been widely used in the health field.

Other systems in health investigations have required that cases of illness be grouped by some common political or geographic characteristic such as county, State, or census tract (*8*, *9*). Since diseases show no regard for political boundaries, this method does not always represent the true epidemiologic or ecologic picture. If, indeed, environmental factors do affect the health of a total and multispecies population within an area then it should be possible to study that population in detail without the restriction of unrelated political boundaries. The need, therefore, is to be able to consider the population of all species under study without regard for artificial boundaries. Differences sometimes occur in small contiguous areas that are not reflected in the overall rate of a larger subdivision. With this system cases of congenital anomalies or other health effects can be geographically represented, and at the same time environmental variables can be located and identified in any segment of the State.

There are, of course, some disadvantages to a plane coordinate system of this type. Since the surface of the earth is curved, no part of it can be represented on a plane without some distortions and discrepancies resulting. The larger the area the greater will be the discrepancy. Thus it has become necessary to provide some of the larger States with two or more sets of grids. This factor must be taken into consideration when locating a point within any State border.

One major problem in translating from occurrences to rates is the lack of specific data on the human population for each segment being examined. The population in Missouri has been quite stable during the last 10 years except in four areas which are growing quite rapidly (*10*). If in fact the incidence of clustering does change within a particular area for a given time, it is necessary to determine the rates based upon the population of the area. For human beings, we can only select segments based on counties or census tracts for which population data are currently available or construct an area-adjusted map as described by Levison and Haddon (*11*). However, the Census Bureau is currently exploring the use of the topographic map for future census data. Such census coordinates will supply the base population data necessary for the more accurate determination of rates for human beings in the future.

This is not a problem with the data on swine because the base population will be available. The number of live births for each farm reporting is included with the malformation data; it will therefore be possible to calculate rates per farm or for a selected area directly from this data.

By establishing a surveillance system for congenital malformations based on rectangular coordinates, we are constructing a model which can be applied to the relationship of most environmental factors to any selected disease process. As multiple species are included in this system, a change in the incidence of cases will be more quickly and readily identifiable than such a change in incidence in human beings alone.

Since most domestic and wild animals have a shorter gestation period than human beings, any detrimental environmental factor should induce a change more quickly in these species. By carefully monitoring the clustering of high rates of abnormalities in these species, a prospective watch for a similar change in human beings may be established. Any such change in the abnormality rate of the species under surveillance will call for a careful epidemiologic investigation to determine the validity of the reporting and the possible factors responsible for change. Such an investigation will be greatly enhanced by having readily and permanently available in computer map form many of the environmental constants and variables that contribute to the ecology of the specific area.

The method described has a definite advantage over pin maps or other manual plotting methods as it is faster, more accurate, and more flexible, and the storage capacity is virtually unlimited. Since the coordinates of current case reports and baseline data regarding many environmental factors are stored on magnetic tape, recall and comparison of any or all data are possible with a minimum of cost and time. This system can be easily adapted to any medium sized digital computer having adequate output equipment, such as a printer, cathode-ray tube, or digital plotter, and to any situation in which numbers may vary widely, in which vis-

ual aids are important, and in which there is a need to evaluate the interrelationships of many variables. This system will enable us to locate quickly an individual or a collection of individuals, environmental components, and events that may contribute to the overall occurrence of the problem under investigation.


### Summary

A multispecies surveillance system for congential abnormalities has been established by the environmental health center of the University of Missouri. This system is based on the use of topographic maps of Missouri, an *x,y* coordinate system, and a digital computer for rapid and periodic handling of data.

The topographic maps are overlaid with a rectangular coordinate grid which permits the recording of any geographic point in Missouri to an accuracy of 100 meters.

Data on congenital anomalies from birth certificates for human beings, from records provided by swine producers to the extension division, and from records on wild animals maintained by the State department of conservation are included in this system.

The *x,y* coordinates of the location of each case are determined and recorded along with other parameters. This method permits the recording and selective retrieval of data without regard to manmade political or geographic boundaries. Thus, the factor of place is well defined over a large area for an extended period of time.



### REFERENCES

(*1*) Silberg, S., et al.: Surveillance of congenital anomalies in Missouri, 1953–64. Arch Environ Health (Chicago) 13: 641–644, November 1966.

(*2*) Wraight, A. J., and Roberts, E. B.: The Coast and Geodetic Survey—150 years of history. U.S. Government Printing Office, Washington, D.C., 1957.

(*3*) U.S. Coast and Geodetic Survey: Plane coordinate systems. U.S. Government Printing Office, Washington, D.C., 1948.

(*4*) Ingalls, T. H., and Klingberg, M. A.: Implications of epidemic embryopathy for public health. Amer J Public Health 55: 200–208, February 1965.

(*5*) Simmons, J. S., et al.: Global epidemiology. J. B. Lippincott Co., Philadelphia, 1954.

(*6*) Gentry, J. T., et al.: An epidemiological study of congenital malformations in New York State. Amer J Public Health 49: 4, April 1959.

(*7*) Anderson, C.: Use of plane rectangular coordinates in California. Surveying and Mapping 12: 128–131, April–June 1952.

(*8*) Drosness, D. L., et al.: The application of computer graphics to patient origin techniques. Public Health Rep 80: 33–40, January 1965.

(*9*) Babbott, J. G., and Ingalls, T. H.: Field studies of selected congenital malformations occurring in Pennsylvania. Amer J Public Health 52: 12, December 1962.

(*10*) U.S. Bureau of the Census: United States census of population: 1960. General population characteristics, Missouri. PC (1)–27B. U.S. Government Printing Office, Washington, D.C., 1961.

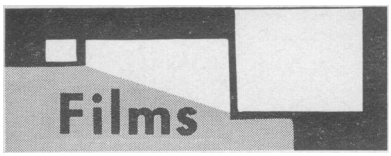
(*11*) Levison, M. E., and Haddon, W., Jr.: An area adjusted map—an epidemiologic tool. Public Health Rep 80: 55–59, January 1965.


## Drownproofing

Parents can now teach children how to protect themselves from drowning by following the directions on a new wallet card published by the Public Health Service.

Drownproofing consists of a series of arm and leg movements performed in the water by a person moving up and down instead of forward, as in swimming. If performed correctly, drownproofing allows a person to survive for hours, even in rough water. Information on the card was prepared by the Injury Control Program of the National Center for Urban and Industrial Health in cooperation with the American Red Cross.

The card contains other safety information for use around the water. The card, "Safety Tips In-Out-and-Around the Water," may be obtained free in quantities of up to 100 by writing to the Injury Control Program, National Center for Urban and Industrial Health, 222 East Central Parkway, Cincinnati, Ohio 45202.




**Teaching the Mentally Retarded. A positive approach.** *Motion picture, 16 mm., black and white, sound, 23 minutes, 1967. Not cleared for television. Order No. M–1453–X. Produced by the University of Texas for the Southern Regional Educational Board.*

AUDIENCE: Restricted to agencies and institutions serving the retarded and to professional persons with training in mental retardation. The film may be shown to the public for educational purposes if such showing is supervised by a professional person trained in behavior-shaping techniques.

SUMMARY: Illustrates the use of a system of teaching based on rewards or positive reinforcement. Follows the progress made by four severely retarded children during a 4-month program in which self-care—toilet training, dressing, eating—and manners were emphasized. Illustrates that even the seriously retarded can learn rather complex skills. Although the film deals with the retarded in an institutional setting, the principles of teaching also apply to the less severely retarded who may reside in the community.

AVAILABLE: Free short term loan from the National Medical Audiovisual Center (Annex), Chamblee, Ga. 30005, Attention: Film Distribution. Purchase from DuArt Film Laboratories, Inc., 245 West 55th Street, New York, N.Y. 10019. (Sale of this film is restricted to professional persons or groups working in the field of mental retardation.)

**Hands of Action.** *Motion picture, 16 mm., color, sound, 40 minutes; not cleared for television, not intended for public showing. Order No. M–1455–X. Produced by the Trauma Committee, North Carolina Chapter of the American College of Surgeons, under a grant from the Emergency Health Services Branch, Public Health Service.*

AUDIENCE: Emergency vehicle operators, ambulance attendants.

SUMMARY: Depicts a physician instructing ambulance attendants in emergency care. The physician explains, in layman's language and with graphic examples, the recommended procedure for handling blocked airways, bleeding, open wounds, and broken bones. He briefly describes the nature of the respiratory and circulatory systems, the danger of infection from open wounds, and the types of broken bones which attendants might encounter. He uses real and simulated injuries to illustrate correct procedures for emergency care. The film is intended for use by an instructor in a training program for emergency vehicle operators. It is divided into four distinct parts, and the instructor may stop the film for discussion after each part. No portion of the film may be cut or omitted from any complete showing.

AVAILABLE: Free short term loan from National Medical Audiovisual Center (Annex), Chamblee, Ga. 30005, Attention: Film Distribution. Purchase from DuArt Film Laboratories, Inc., 245 West 55th Street, New York, N.Y. 10019.

**Mammography Diagnosis: Normal, non-malignant breast.** *Motion picture. Part I. TFR–1179A, 30 minutes; Part II. TFR–1179 B, 30 minutes.* **Mammography Diagnosis: Malignant breast disease.** *Part I. TFR–1307A, 35 minutes; Part II. TFR–1307B, 38 minutes . 16 mm., black and white, sound television film recordings, 1966 and 1967. Related film:*

**Mammography Technique, K–1162.** *Produced by the National Medical Audiovisual Center for the National Center for Chronic Disease Control.*

AUDIENCE: Restricted to persons listed in the Directory of the American College of Radiology. Radiologists not listed in the directory should address requests for this film to: Program Representative for Mammography, Cancer Control Program, National Center for Chronic Disease Control, Bureau of Disease Prevention and Environmental Control, Public Health Service, Washington, D.C. 20201.

SUMMARY: "Normal, Non-Malignant Breast" outlines the classification and describes the appearance of the normal breast, variations of the normal and non-malignant diseases of the breast, with accompanying differential diagnoses. Shows more than 125 mammograms simultaneously to illustrate each point; includes discussions with examples of difficulties encountered with mammography. "Malignant Breast Disease" outlines the appearance of malignant diseases; shows more than 175 mammograms to illustrate each point. Includes an expanded section on indications for mammography and its potential use in reduction of mortality from breast cancer.

AVAILABLE: Free short term loan from National Medical Audiovisual Center (Annex), Chamblee, Ga. 30005, Attention: Film Distribution.

**Bold New Approach.** *Motion picture, 16 mm., black and white, sound, 28 minutes, 1967; cleared for television. Order No. AM–1367. Related film:*

**A Community Mental Health Center: The new way.** *Order No. M–1527–X. Produced by the Mental Health Film Board for the National Institute of Mental Health.*

AUDIENCE: Health-related organizations and community leaders.

SUMMARY: Introduced by Dr. Stanley F. Yolles, Director of the National Institute of Mental Health, who reviews the Community Mental Health Centers Act, the legislation which resulted from President Kennedy's recommendation for "a bold new approach" to the treatment of the mentally ill. As a psychiatrist describes to an architect the various components and services of a community mental health center, the two men design a center model that is endorsed by civic leaders. At intervals, the scene shifts to actual mental health programs, illustrating the five essential services of a mental health center: inpatient service, outpatient service, partial hospitalization, emergency service, and consultation and educational services. Other special services for children, alcoholics, and drug addicts are shown, as well as the means of coordinating rehabilitation and other programs necessary to provide comprehensive mental health services to all individuals of a community in need of them.

AVAILABLE: Free short term loan from the National Medical Audiovisual Center (Annex), Chamblee, Ga. 30005, Attention: Film Distribution. Purchase from: DuArt Film Laboratories, Inc., 245 West 55th Street, New York, N.Y. 10019.

# Program Notes

### *New D.C. Detoxification Center*

A 25-bed detoxification center in the District of Columbia for the emergency care of alcoholics opened December 1, 1967. By Christmas, it was nearly full with persons who voluntarily admitted themselves.

This facility of the District of Columbia Department of Public Health provides 24-hour nursing care and treatment, along with referral to followup health and rehabilitation services.

The center was designed to serve as a substitute for confinement, conviction, and punishment through police and court channels. It is expected that in the near future most of the persons admitted will be brought there by the police.—*D.C. Health News and Notes*, January 1968.

### *Environmental Health Training*

The Monroe County (N.Y.) Department of Health and the Rochester Institute of Technology have established a cooperative educational program for training environmental health sanitarians.

The program is open to majors in biology and chemistry. Students will spend alternating 13-week periods at the institute and at the health department during the last 3 years of a 5-year curriculum. The final 13 weeks will be devoted to a thorough environmental survey of a selected community.

The students will complete the program with a B.S. degree, fully qualified as professional sanitarians.

### *Hostels for Mental Retardates*

The first three of a network of hostels (residences) to be established in New York State for mentally retarded adults who are capable of working and living in the community with little supervision will be located in New York City, Nassau County, and Monroe County. The three hostels are to serve 100–120 persons.

These hostels will be homelike community residences, such as studio apartments, in which the mentally retarded adults can live under the supervision of houseparents. Housekeeping facilities, homemaking services, common dining areas, and recreational activities will be provided.

The residences will be built by the State or by a local government and community organizations with State assistance.

### *"Coffees" Draw Expectant Mothers*

Educational programs offered expectant mothers by the San Miguel County (N. Mex.) Health Center, Las Vegas, met with better response when billed as "coffee hours" rather than "parents' classes."

A series of weekly "coffee hours" that the center held in 1967 was well attended, drawing from 16 to 46 participants per session. The group sipped coffee, saw films, and discussed pertinent topics.

The sessions were attended not only by prenatal patients but also by university home economics students and high school seniors (men included) from a nurse aide class under the State vocational education department.

### *Mumps Vaccine Put to Test*

A recent live mumps vaccine was used in a Georgia county in January 1968 in an attempt to halt an epidemic. Developed by Merck, Sharp and Dohme, the vaccine was licensed by the Public Health Service on January 4, 1968, for mass manufacturing and distribution.

In White County, a seige of mumps had extended from the beginning of the school year until the Christmas vacation. It reached about 40 percent of the pupils in one elementary school and threatened to spread to three other schools.

County school officials appealed to the State health department for aid, and the drug company made immediately available enough vaccine to immunize about 220 susceptible children. On January 17, Mrs. Dorothy N. Payne, the county public health nurse, vaccinated 194 children.

### *Social Workers in Health Offices*

Nine public health social workers have been assigned to the regional offices of the New York State Department of Health. One of the social worker's responsibilities is answering questions for the State's new health information and referral service.

The department established the service in January 1968. It provides any State resident with free and confidential answers to any question on health or health-related problems.

Hospitals, nursing homes, and medical care have been the major subjects of telephone inquiries, according to Elizabeth W. Heinmiller, director of the health department's office of public health social work.

### *Legislators Try to Stop Smoking*

Forty New York State senators and assemblymen enrolled early in 1968 in a 6-week course to break the smoking habit. Sessions were held each Tuesday in the State capitol.

The withdrawal course was given under the supervision of Dr. Donald T. Frederickson, district health officer for central Harlem (Borough of Manhattan), and the smoking control program director for the New York City health department.

### *Diabetes Screening in Pennsylvania*

The Pennsylvania Department of Health's continuing diabetes screening survey is expected to reach approximately 170,000 residents during 1968. In 1967, a total of 152,182 persons participated in 217 screening programs sponsored by the department in 49 counties.

The main objective of the screening is to discover residents with undiagnosed or potential diabetes and to refer these persons to family physicians for definitive diagnosis. The program is not intended to test residents with known cases of diabetes.

# phr synopses

**WADDELL, SAMUEL J. (Columbia University College of Physicians and Surgeons): *The Parkinson's Disease Information and Research Center. Public Health Reports, Vol. 83, May 1968, pp. 391–395.***

In 1964 the Parkinson's Disease Information and Research Center at Columbia University was established by the National Institute of Neurological Diseases and Blindness, Public Health Service. It is the first neurological information center in a planned national network of specialized neurological information centers to be supported by contract funds.

This center is concerned with basic sciences covering neurological research, including anatomy, pathology, physiology, pharmacology, chemistry, and clinical extrapyramidal disorders.

Any person working in the biomedical sciences or the paramedical professions can use the services of the center. These services include (*a*) searches and bibliographies on demand, (*b*) publication of a weekly alerting list, which gives citations of recent documents on Parkinson's disease and Parkinson-related research, (*c*) verification of references accompanying manuscripts or galley proofs, (*d*) development of interest profiles on scientists affiliated with the center or writing on Parkinsonism, (*e*) production of a thesaurus on Parkinson's disease, which now contains 5,000 entries, (*f*) translation of documents, (*g*) reproduction of documents on request, and (*h*) maintenance of a directory file of scientists working on Parkinson-related research. The information center is composed of the bibliographic unit, the thesaurus and indexing unit, the systems unit, and the clerical unit.

**PELL, SIDNEY (E. I. du Pont de Nemours & Co.): *Epidemiologic studies in a large company based on health and personnel records. Public Health Reports, Vol. 83, May 1968, pp. 399–403.***

Information for epidemiologic studies in a large, widely dispersed population of employees can be obtained economically, since most of the required information is generated routinely and is readily available through computer retrieval systems. The large numbers of observations available increase the reliability of the data and reduce the length of time required to obtain answers to epidemiologic questions.

The size and dispersion of the population, however, results in a proportionate loss in the degree of surveillance over the sources of certain types of information. One way of coping with this problem is to confine the study to a probability sample or a segment of a company's employees. If the investigator uses the entire population, he will have to modify his objectives in accordance with the limitations thus imposed on the data.

**O'SHEA, ROBERT M. (State University of New York, Buffalo), and GRAY, SHIRLENE B.: *Dental patients' attitudes and behavior concerning prevention. National survey. Public Health Reports, Vol. 83, May 1968, pp. 405–410.***

A national survey of the attitudes, beliefs, and behavior of 1,520 adults concerning dental health was conducted in October 1965 by the National Opinion Research Center.

Responses to the questionnaire were related to age, sex, race, income, educational level, and community size. Half the persons in the survey sample had not visited a dentist within a year, 26 percent had not visited a dentist in 3 years, and 1 percent had never been to a dentist. Only one in three adults went to the dentist for checkups or prophylaxis; the other two went because of symptoms or because of an identified need.

The survey data on beliefs in the efficacy of dental visits and of toothbrushing showed almost universal acceptance by the respondents. Variation was between the "much" and "some" responses rather than the "little good," "none," and "don't know" responses. These attitudes seem to have relatively little effect on actual behavior (going to the dentist within the year and going for preventive treatment).

Only about one-fifth of the persons with elementary school educations had been to the dentist during the year. Two-thirds of the college graduates, however, and three-fourths of persons with postgraduate and professional training had done so. Only 16 percent of persons earning $2,000 or less per year had visited the dentist, but 76 percent of those with incomes of $15,000 or more had visited the dentist.

# phr synopses

**CANNEFAX, GEORGE R. (National Communicable Disease Center, Public Health Service), HANSON, ALBERT W., and SKAGGS, ROMULUS, Jr.: *An investigation of sorbing substances in the FTA-ABS test for syphilis. A preliminary study. Public Health Reports, Vol. 83, May 1968, pp. 411–416.***

In an investigation of sorbing substances in the fluorescent treponemal antibody-absorption (FTA-ABS) test, uninoculated medium was found to have sorbing efficiency similar to media in which 22 spirochetal species or strains had been cultivated. Pancreatic digests of casein and yeast extracts were found to be medium components responsible for the sorbing effect. Sorbing effect was found in both fractions where deproteinized yeast extract was fractionated into 80 percent ethanol soluble and insoluble fractions. The ethanol soluble fraction was found to have sorbing efficiency equivalent to FTA-ABS sorbent in comparative testing of 30 syphilis serums and 23 reactive nonsyphilis serums. Peptides or peptide present in yeast extracts and hydrolytic decomposition products of casein are suspected to represent the sorbing substances or substance.

**KAUFMANN, ARNOLD F. (National Communicable Disease Center), and FEELEY, JAMES C.: *Culture survey of* Salmonella *at a broiler-raising plant. Public Health Reports, Vol. 83, May 1968, pp. 417–422.***

*Salmonella* culture surveys of a vertically integrated broiler operation were conducted at intervals over a 2-year period. Salmonellae were isolated from 18.2 percent of 1,400 fecal samples and from 29.3 percent of 324 samples of feed and feed ingredients. A self-perpetuating cycle of infection was suggested by the isolation of the same serotypes from the live birds, their feed, and the poultry meal incorporated in the feed.

The poultry meal, which was rendered offal from the company's own processing plant, served as the major source of feed contamination. Salmonellae were isolated from 94 percent of 48 poultry meal samples examined. Another major source was the fishmeal added to the feed. Isolations were made from 44 percent of the 34 fishmeal samples. The hatcheries appeared to be unimportant in the perpetuation of infection in the operation.

**KATZ, SELIG H. (New York State Department of Health), and HARRO, DALE E.: *Screening for PKU in New York State. Public Health Reports, Vol. 83, May 1968, pp. 423–426.***

Since January 1965 New York State law has required all newborn infants to be tested for phenylketonuria. Regulations prescribe the Guthrie inhibition assay procedure as the only test currently fulfilling the legal requirement.

Results of all tests are reported in duplicate to the submitting hospital as less than 4 mg. (negative), 4 mg. or greater (positive), or inadequate. Infants whose initial Guthrie tests show levels of 20 mg. or greater are referred for immediate clinical evaluation; those with levels between 4 mg. and 20 mg. are retested.

Since the inception of the mandatory testing program, 77 infants have been diagnosed as having phenylketonuria, yielding an apparent incidence of approximately one in 13,000 live births. All newborn infants in New York are now being tested as required.

The total cost of the program is $227,000 per year. It costs approximately $10,000 to detect a case of PKU in an infant. The cost of each determination performed is roughly 66 cents.

**WRIGHT, HARLEY T. (University of Missouri Medical Center), MARIENFELD, CARL J., and SILBERG, STANLEY L.: *"Place" in environmental epidemiology. A rectangular coordinate method. Public Health Reports, Vol. 83, May 1968, pp. 427–433.***

A multispecies surveillance system for congenital abnormalities has been established by the environmental health center of the University of Missouri. This system is based on the use of topographic maps of Missouri, an $x,y$ coordinate system, and a digital computer for rapid and periodic handling of data.

The topographic maps are overlaid with a rectangular coordinate grid which permits the recording of any geographic point in Missouri to an accuracy of 100 meters.

Data on congenital anomalies from birth certificates for human beings, from records provided by swine producers to the extension division, and from records on wild animals maintained by the State department of conservation are included in this system.

The $x,y$ coordinates of the location of each case are determined and recorded along with other parameters. This method permits the recording and selective retrieval of data without regard to manmade political or geographic boundaries. Thus, the factor of place is well defined over a large area for an extended period of time.