

REVIEWS AND ABSTRACTS

A MALARIA SURVEY OF LIBERIA. By Martin D. Young and Thomas H. Johnson, Jr. Journ. Nat. Mal. Soc. 8(4):247-266. 1949. Under the auspices of the U. S. Public Health Service and the Republic of Liberia, a survey was made to determine the incidence of malaria in Liberia. Between May and October 1948, bloodsmears were made in representative villages and schools from the coast to the mountains of the interior. Thick and thin smears were taken from each subject. Most of the slides were examined at USPHS laboratories in the United States. Density of parasites was measured by the ratio to the white blood corpuscles and it was assumed that 650 w.b.c. represented 0.1 cubic mm. of blood. Of 10,128 blood smears taken, 30.65% had malaria parasites. The percentages of infections for each species of plasmodium were: *P. falciparum*, 83.8%, *P. malariae* 14.2%, *P. vivax*, 2.0%, and *P. ovale* only one case. Infections are compared in age groups. Malaria was hyperendemic throughout the country increasing in intensity toward the interior.

A mosquito survey included the collection of adults in resting places, dissections of salivary glands, and collections of larvae. Apparently no night collections of adults were made. Of 1,153 adult Anopheles taken, 1,087 were *A. gambiae*, 60 were *A. funestus*, 3 were *A. hancocki*, and 3 were *A. nili*. This required 100 man hours of collecting time. The 543 *A. gambiae* dissections showed 6.45% infected with malaria. This species was considered the most important malaria vector. Larvae of *A. gambiae* were able to survive in cracks in mud after pools dried up. The species was breeding in a wide range of pools, water-filled tracks and depressions and containers. *A. melas* larvae were found in salt flats on the coast near Clara Town and this is believed to be the first report of the species from Liberia.

It is interesting to note the report that in this country of many tribes of Negro aborigines, the small number of leaders and better-educated individuals are nearly all descendants of Negroes returned from America! Yet there are many government, mission, and other schools in Liberia.—R. L. Armstrong, East Middlesex Mosquito Control Project, Cambridge 39, Mass.

TWENTY-SECOND ANNUAL REPORT (1949) OF THE DESPLAINES VALLEY MOSQUITO ABATEMENT DISTRICT. Lyons, Illinois. 1950. 29 pp. The report contains some interesting information on the spraying of a forest reserve with DDT. This study involved a careful check on the effects of the application of 0.1 lb. of DDT per acre as a thermal aerosol and by means of a mist blower on various species of mosquitoes, other insects, fish, amphibians, birds and mammals. This work was carried out by William Tietz, Jr. under the supervision of

H. H. Ross of the Illinois Natural History Survey. In addition to the treatment of plots with DDT, one area was sprayed by hand with 5% chlordane. Mr. Tietz concluded that mist applications at 0.1 lb. per acre were not harmful to birds and that the fogging at the rate of 0.1 lb. per acre or 0.5 lb. per acre produced no important depression of the total biota. The report also contains interesting material on routine village fogging with DDT and routine mosquito and fly control operations. Light trap collections show *Aedes vexans* to constitute 68.3% of the catches and *Culex pipiens* 23.2%. The other 17 species caught were present in relatively small numbers. The Desplaines Valley Abatement District contains 76.5 square miles and a population of 195,888.—F. C. Bishopp

EFFECTS OF DDT MOSQUITO LARVICIDING ON WILDLIFE V. EFFECT ON FISHES OF THE ROUTINE MANUAL AND AIRPLANE APPLICATION OF DDT AND OTHER MOSQUITO LARVICIDES. C. M. Tarzwell. Pub. Hlth. Repts: 65(8):231-255. 1950. The effects of DDT and other mosquito larvicides on various forms of life have been investigated for some time. The present paper dealing with the effect on fishes, has been looked forward to by many workers. This careful, detailed study is a must for those who have to consider the effects of their larviciding programs on wildlife.

Other agencies and workers have studied and discussed the effect of single treatments with various dosages of DDT. This paper deals with the effects of repeated applications, such as those necessary for a malaria control larviciding program.

The tests were carried on in small to moderate-sized pools and ponds. As a result, there was little chance for runoff, and concentrations of larvicide were probably built up. For this reason conditions were more severe than would be found in many areas with routine applications.

The toxicity of various solvents was tested in manual applications. Where two or more gallons per acre were used, it was found advisable to use kerosene or some other less toxic solvent. When used at one gallon per acre, the difference between most samples of No. 2 fuel oils and kerosene did not appear to be significant.

DDT emulsions were found to be more toxic than solutions and dusts, and are not recommended where there is valuable wildlife.

Single applications of solutions at 0.4 pounds or more of DDT per acre were toxic, while solutions in dosages of 0.1, 0.05 and 0.025 pounds per acre, and dusts at 0.1 and 0.2 pounds per acre did not kill fish.

Repeated applications of DDT solutions at a dosage of 0.1 pound of DDT per surface acre generally resulted in serious kills of fish after the

tenth application. The type of pond greatly influenced the effects, mortality occurring earliest in barren sand bottom ponds. Generally, routine weekly treatments at 0.1 pound of DDT per acre were significantly harmful to fish and are not recommended for malaria control where fish are important. Routine treatments with solutions at dosages of 0.05 pounds of DDT per acre resulted in harm to fish after the third to eighteenth treatment. No dead fish occurred in ponds routinely treated with 0.025 pounds of DDT per acre. For adequate malaria control, oil solutions applied at doses of 0.05 pound of DDT in one gallon of solution per acre are generally recommended.

DDT dusts can be applied routinely at 0.1 pounds of DDT per acre with little or no significant harm to aquatic organisms.

It is concluded that DDT sprays or thermal aerosols from airplanes can be routinely applied at a discharge rate of 0.1 pound per acre for up to 3 years without harm to fish.

The type of pond or water in which DDT is used greatly influences the onset and severity of toxic action on fishes. Vegetation, organic material, type of water, as well as silt or turbidity are all factors influencing this action.

With repeated applications of dosages of 0.1 pound per acre, DDD, chlordane and DDT are toxic to fish after 10 applications. At dosages of 0.05 pound per acre per week, DDT appears to be somewhat more toxic than chlordane or DDD. Toxaphene was found to be very toxic to fishes, while DDD was considerably less toxic than DDT. No significant effect on fish was noticed at dosages of 0.025 pound per acre with DDT, DDD and chlordane. "For adequate malaria control, oil solutions applied at doses of 0.05 pound of DDT and one gallon of solution per acre, or dusts applied at 0.1 pound of DDT per acre, are generally recommended."—J. W. H. Rehn, U. S. Public Health Service, New York, N. Y.

THE EFFECT OF VARIOUS INSECTICIDAL COMBINATIONS IN INCENSE COILS ON *Culex fatigans*. By H. T. Chang. Incense or smudge coils, containing an insecticide, are widely used in China for protection against mosquitoes. Such coils are especially desirable for use around unscreened dwellings. The most commonly used insecticidal ingredient is ground pyrethrum flowers. The proper concentration of pyrethrum in the combustible filler is unknown. Laboratory studies were made with 59 different combinations against adult mosquitoes, *Culex fatigans*.

The experimental coils were prepared by mixing insecticide, sawdust, and powdered elm bark, adding water until a dough-like mass was formed and passing this through a small tube to form ropes of the material, usually about 1 meter long and 5 mm. in diameter. The air dried weight of one of these was 57 grams and one would burn for about 7 hours.

Approximately 50 mosquitoes were used per

test in one series and about 100 per test in another. These were placed in screen cages of about 3.5 cubic feet. To confine the smoke, a black cloth was placed over the cage. One side of the cage was open and this was placed on a white sheet of paper to facilitate counting of down mosquitoes.

In the first series of tests, in which 40 different combinations were used, counts were made 10 and 20 minutes after the burning coil was placed in the cage. In a second series of tests 19 additional mixtures, as well as two previously tried, were included. In this series, counts of down mosquitoes were made at 5 minute intervals up to 20 minutes after treating with the smoke. In this series the period of exposure to the smoke was limited to 5 minutes. Recovery of knocked down mosquitoes was negligible.

In the first series of tests little or no effectiveness was obtained from coils containing DDT, BHC (Gammexane 0.5%), sulfur, arsenic, D.H.C. activator and derris alone or in combination with pyrethrum. Spraying of the coils with pyrethrins solution was beneficial but impractical. Three Stars brand was as good as any of the commercial lots tested. Coils containing 40% pyrethrum flowers and 3% Thanite gave very good results.

The Three Stars brand and the pyrethrum-Thanite combination showed up well in the second series of tests also. The chlorinated hydrocarbons chlordane and toxaphene, as well as those mentioned above, had no merit in combination with pyrethrum. The addition of 3% of Pyrenone, which contains pyrethrins and Piperonyl Butoxide, results in an effective combination. Mixtures of pyrethrum and tobacco were quite effective.—R. H. Nelson. (Abstract of unpublished paper. Paper as submitted contained material that required revision and condensation. The author could not be reached, so the editor has printed Mr. Nelson's revision or abstract in place of the original, longer version.)

CAN MALARIA BE CONTROLLED IN THE PHILIPPINES BY DDT RESIDUAL SPRAYING OF HOUSES? By Howard F. Smith and Francisco J. Dy. *Acta Medica Philippina* 6(2): 81-111, 1949. Reports from different parts of the world have mentioned the effectiveness of DDT residual sprays in houses and outbuildings as a malaria control measure. This article by Drs. Smith and Dy informs us, however, that DDT residual spraying in Philippine houses and outbuildings to control *Anopheles minimus flavirostris* Ludlow was not effective in controlling the disease nor reducing this species of anopheline. The authors are of the opinion that their apparent failure was most likely due to the wild nature of the vector because it does not stay indoors long enough to permit sufficient contact with the DDT treated surfaces. The authors' preliminary observations indicate also the type of building materials such as nipa and bamboo, used in rural Filipino communities, did not retain DDT residue as well as wood and

other building materials. The experiment was conducted over a period of 12 months in three separate groups of malarious communities. Of a total of 1704 mosquitoes collected over a period of 8 months from the floor of a number of houses that had been sprayed, not a single *A. minimus flavirostris* was found among 253 other anopheline and 1451 culicines.—H. H. Stage.

AN OUTBREAK OF SYLVAN YELLOW FEVER IN UGANDA WITH *Aedes (Stegomyia) africanus* THEOBALD AS PRINCIPAL VECTOR AND INSECT HOST OF THE VIRUS. By K. C. Smithburn, A. J. Haddow, and W. H. R. Lumsden. Ann. Trop. Med. and Parasit. 43(1):74-89. 1949. Through the employment of rhesus monkeys stationed as sentinels in the canopy of uninhabited forest, a focus of sylvan yellow fever was located and defined. The sylvan outbreak continued for at least 5 months. *Aedes africanus* was identified as the sole mosquito host and vector among the species captured; the disease was transmitted by the bite of wild-caught members of the species, and yellow fever virus was repeatedly isolated from the same species over a period of 3 months.

Yellow fever virus was isolated from a monkey which had received inoculations of *Phlebotomus* spp., but only after an uncommonly, but not impossibly, long incubation-period. Further studies are required to determine if *Phlebotomus* spp. can play a part in the epidemiology of yellow fever.—Authors' summary.

PROCEEDINGS AND PAPERS OF THE SEVENTEENTH ANNUAL CONFERENCE OF THE CALIFORNIA MOSQUITO CONTROL ASSOCIATION HELD JOINTLY WITH THE ANNUAL CONFERENCE OF THE AMERICAN MOSQUITO CONTROL ASSOCIATION. February 7, 8, 9, 1949. Edited by H. F. Gray, R. F. Peters, and G. E. Washburn. The meetings were held at the University of California in Berkeley and at the Hotel Claremont in Oakland, California, and were presided over by various representatives. The American Mosquito Control Association of a year prior to the meetings no longer exists. It has been incorporated under the laws of the State of New Jersey and is now known as the American Mosquito Control Association Incorporated.

An excellent color reproduction of a portrait of the late Professor William B. Herms is included in the *Proceedings* in memory of the beloved Professor of Parasitology, University of California, and "Savant in Malariology, Father of California Mosquito Control; Inspiration to Mosquito Control Workers Everywhere."

S. D. Macready reports on 3 years observations in the use of DDT residual spray for the control of *Anopheles albimanus* in tropical labor camps. Diesel oil is being used as the vehicle for DDT rather than kerosene and is applied to camp walls to an average height of ten feet. Two treatments a year have proven entirely satisfactory and all anti-larval measures have been stopped except in some localized breeding places.

The problem of insect vectors of yellow fever in the Anglo-Egyptian Sudan is discussed by Dr. E. S. Horgan. It is brought out that in a major epidemic of yellow fever in the south-western Sudan the part played by *Aedes aegypti* was probably negligible. Strong circumstantial evidence indicated that the most important vectors were *Aedes vittatus* and *A. fuscifer* (with *taylori*). This does not mean that *A. aegypti* is of minor importance, and much attention is paid to its control in the Sudan.

Mosquito workers would be interested in reading an account of mosquito control problems in Japan given by Major Walter J. LaCasse. An excellent history of mosquito borne diseases in Japan, together with discussions on mosquitoes as disease vectors, is given.

Public health problems relating to the viral encephalitides in the Far East and the Pacific Islands by W. McD. Hammon is a very interesting account of the vectors and mosquito borne disease of the Islands with a discussion on the possibilities of the introduction of certain diseases to the United States.

The role the Public Health Service plays in the malaria program carried on cooperatively with State Health Departments is adequately handled by G. H. Bradley. It has as its objective the eradication of malaria from the continental United States.

T. D. Mulhern's report from New Jersey, with special reference to the utilization of temporary versus permanent control methods, M. W. Provost's discussion on mosquito problems in Florida, P. W. Ruth's paper on mosquito control in Virginia, J. L. Clarke's report from Illinois, D. M. Rees' report from the Utah Abatement Association, E. E. Lynch's two-year summary of air-spraying in Delaware and A. H. Dahl's progress of mosquito control in California give the reader important information on control operations in these states.

In A. W. Lindquist's discussion of pre-hatching treatment for mosquito control he states that the method may have widespread use in many areas on many types of mosquitoes, such as flood water, salt water, and Alaskan *Aedes*, and snow water mosquitoes. He further states that the good results obtained are probably due to the ease with which newly hatched larvae are killed.

The problem of the use of new insecticides as residual sprays against adult mosquitoes is covered by G. H. Bradley while the toxicity of insecticides to man and animals is covered by A. B. Lemmon. Their effect on wildlife is discussed by O. B. Cope.

The place of education in a mosquito abatement program by Dorothy B. Nyswander and the relationship of mosquito abatement agencies to other agencies of government by S. B. Freeborn gives a clear picture of the responsibilities engendered in mosquito control operations.

The research on mosquito control by the Bureau of Entomology and Plant Quarantine during 1948

is given in the *Proceedings* as well as specific projects such as the use of tide gates, low-lift pump, and transportation on salt marsh.

The above plus the many subjects discussed in the symposium make the *Proceedings* well worth adding to any mosquito control worker's library. —John D. DeCoursey, Bureau of Medicine and Surgery, Navy Department, Washington, D. C. (Editor's note: copies of these *Proceedings* are available at CMCA headquarters, P. O. Box 649, Berkeley 1, California. \$2.50.)

HANDBOOK FOR MOSQUITO RESEARCHERS: STUDIES OF JAPANESE MOSQUITOES. 1948, pp. iv-210, 84 figs. (in Japanese). SASA, Manabu, of the Research Institute for Infectious Diseases, Tokyo, and ASANUMA, Kiyoshi of the Natural Resources Research Institute, Tokyo; Publ. by Tokyo Shuppan Co., Ltd., 350 yen.

This volume, originally conceived as a text for students of Japanese mosquitoes, nominally covers many phases of interest to such workers. Introductory generalizations on the importance of mosquitoes are followed by a list of species including 5 *Anopheles*, 15 *Culex*, 17 *Aedes*, and one species each for 7 other genera. Twenty-five pages are devoted to ecology of adults and larvae, hibernation problems, and geographic distribution. Descriptions and keys for classification of eggs, larvae, pupae and adults are treated in 140 pages. Investigative methods, including collecting, rearing and dissections are only briefly outlined, as are assay methods for anti-malarial drugs and the use of mosquitoes in virus research. The bibliography includes 180 titles.

In the authors' note concluding the volume, acknowledgment is made of help received during brief contact with W. J. La Casse and Sachu Yamaguchi, authors of "Mosquito Fauna of Japan and Korea" (see *Mosquito News* 8(4):200-201) and from others.

The paper stock available for printing in Japan in 1948 was obviously of very poor quality, although half-tones included on 3 inserted pages of superior stock are excellent.

A translation of the foreword, table of contents, keys to adult Japanese *Culex*, bibliography, and authors' note, has been accomplished by Toyohi OKADA, Japanese dipterist employed by the Scientific and Technical Division, Economic and Scientific Section, General Headquarters, Supreme Commander for the Allied Powers. Copies of the translation have been forwarded to the Army Medical Library and to the Office of Technical Services, Washington, D. C. Other copies have been furnished the 406th Medical General Laboratory, Tokyo, and the Public Health and Welfare Section, GHQ, SCAP.—D. J. Pletsch, International Health Div., U.S.P.H.S., Washington, D. C. (Ed. Note: In April, about 360 Japanese yen equalled \$1.00 U. S.)

COMMENTARY ON A MALARIA SURVEY OF MACHAKOS DISTRICT BY J. C. J. CALLANAN. By

D. Bagster Wilson. *East African Med. Journ.* 26(12):386-390. 1949. *Comment.*—There may be some doubt about the detailed interpretation of these results but they give in the first place a very comprehensive picture of the distribution and endemicity of malaria in Machakos District. They also show how great a disturbance seasonal malaria can create among the Bantu tribe of the Akamba, as it still does. There is no doubt at all that such outbreaks are responsible for a great deal of sickness among these people. A great proportion of the breeding of *A. gambiae*, which is almost the only vector found, occurs in streams, with some also in springs, and the facilities for such breeding are to a great extent dependent on the condition of fullness or otherwise of these streams.

It is difficult to indicate, in most cases, what may be regarded as the "normal" endemic indices, either for an area or for individual places. Such apparent inconsistencies in the endemic indices as have already been pointed out, possibly arise from the normal occurrence of seasonal variation superimposed on what was an exceptional epidemic. Thus in Table IV the spleen rates have fallen from their high peak in the major epidemic, but parasite rates are tending to reflect the rising seasonal tide of malaria and show no corresponding decrease. This is even more so in Table III, in which at the first examination the spleens were at their greatest but parasite levels had already begun to drop, whereas at the second examination spleen rates were falling but parasite rates beginning to rise again. Unfortunately there are few clear comparisons between conditions before this epidemic started and later; but the few shown in Table III give a clear enough indication of a very low initial endemic level (possibly following a succession of years of slight malaria) being raised to a peak figure by the year's events.

Summary.—A series of parasite and spleen rates in children in the Machakos District of Kenya is recorded. These were observed over the period of an epidemic of malaria, and their significance in relation to this epidemic is discussed.—Author's Summary.

SUMMARY OF THE ANNUAL REPORT OF THE ALAMEDA COUNTY MOSQUITO ABATEMENT DISTRICT, OAKLAND, CALIFORNIA. Prepared by Harold F. Gray, 1-A Court House, Oakland 7, Calif. Feb. 1st. 1950. A comprehensive and orderly report reflecting the business acumen and engineering ability of the District's management. It includes the operation and maintenance of the District and how its services are performed.

Covering an area of 445 square miles with a population of 700,000 and a budget of \$101,297.97, financed by a tax rate of 1.6 cents per \$100.00 of assessed valuation, the residents of the County are getting services worth much more.

Four genera and 17 species of mosquitoes have been collected. Brief non-technical information

concerning these species is given and should prove to be of value to the layman in his understanding of the problems involved in mosquito control. The Anopheles group is rare in the District. The news that canine filariasis or dog heartworm is enzootic in the San Francisco Bay region is of particular interest. Where this disease is endemic various mosquitoes have been identified as vectors, particularly such common species as *Culex pipiens* and *Aedes aegypti*. Investigations carried out by I. M. Roberts, D.V.M., in East Oakland recently, has thrown more light on canine filariasis in that region. Reasons for the low count of microfilariae found in California dogs compared with average cases studied in the Southeastern States would be welcome. The fact that the largest number of animals examined in the study were from an area infested with *Culex pipiens*, *Culex tarsalis*, and *Culiseta incidens* has caused the Authority to investigate further the respective life histories of these species with a view towards a more critical approach to control.

It is noted that West Coast residents share, with most other U. S. citizens, a belief that the mosquito control authority can and should extend their control to flies, rats, and other pests, thereby giving recognition to the effectiveness of mosquito control. Also the problem of breeding outside of the district's boundaries is met by actual spraying of adjoining infected areas. The solution, of course, is to secure the organization of mosquito control in adjacent territory.

Construction of dykes, re-claiming salt marshes, bushing of streams, building access roads and trails, tractor work, equipment maintenance, catch basin treatment in cities and urban areas, the use of various insecticides, management and use of personnel, and publicity (a feature with which mosquito control authorities are notoriously reticent), are all a part of a report with which each mosquito control agency should avail itself.—J. S. Gibson, Warwick County, Virginia.

EFFECT ON THE DARK RICE FIELD MOSQUITO OF FEEDING ON COWS TREATED WITH DDT. F. E. Whitehead. Journ. Econ. Ent. 42(2):393-394. 1949. A technique is described for caging mosquitoes on cows treated with DDT and obtaining fatality records resulting from such feedings. Data taken on 1160 mosquitoes (*Psorophora confinnis* A-L) gave the following indications: DDT applied to cattle has no repellent effect. DDT applied to cattle at the rate of 20 lbs. of 50% wettable powder in 100 gallons of water will kill from 53 to 84 per cent of the mosquitoes feeding on them for a period of 9 days, but very few thereafter. Applied at the rate of 5 lbs. per 100 gallons, there results a fatality rate of approximately 75 per cent for a 3-day period and then drops off rapidly. It is thought that the reason for the comparatively low fatality rates resulting from these feedings may be due to the small amount of time these mosquitoes spend on the cows in obtaining a blood meal. These results cast considerable doubt on the soundness

of recommendations that cattle be sprayed with DDT to protect them from mosquitoes.—Author's summary.

DADE COUNTY ANTI-MOSQUITO DISTRICT 15TH ANNUAL REPORT, 1949. 14 pp. Fred H. Stutz, Director; James H. Heidt, Entomologist, Rm 1909, Dade County Court House, Miami, Fla. Salt marsh species were more annoying than *Psorophora confinnis*; there were no flights of these in 1949. Salt marsh breeding *Aedes sollicitans* has a marked resistance to DDT and has increased in breeding and annoyance since 1946. No *Anopheles quadrimaculatus* were caught in mosquito light traps. Airplane spraying covered approximately 32,254 acres at .2511¢ per acre excluding truck servicing, mixing and supervision. The district participated in sand fly studies. Space spraying of DDT at drive-in theaters proved effective against sand fly adults.—John W. Scott, State of Vermont Department of Agriculture, Montpelier, Vt.

MOSQUITO SURVEY IN VERMONT, REPORT #2, 1949. 8 pp. John W. Scott, Mosquito Research Engineer, State of Vermont, Department of Agriculture, Montpelier, Vermont. The overall mosquito annoyance in Vermont was light as a result of a dry summer for 1949; the town of Newport was an exception. Early spring type, single brooded mosquitoes were predominant; few flood water species appeared. Space spraying against adult mosquitoes was reduced to a minimum.—J. W. S.

SUMMARY OF THE ANNUAL REPORT OF THE SALT LAKE CITY MOSQUITO ABATEMENT DISTRICT FOR 1949. Prepared by Don M. Rees, 401 City and County Bldg., Salt Lake City, Utah. Control of mosquitoes within the District was very effective and no large broods escaped during the season. There was approximately 50% reduction in average nightly light trap catch in 1949 compared to previous 5 year average. Two invasions of *Aedes dorsalis* from outside the District occurred; a severe flight in June, a lighter flight in September. Continuously breeding *Culex tarsalis* within the District was still the dominant species trapped. Climatic conditions with the exception of May were favorable for mosquito control. Additional equipment purchased included a station wagon, jeep, and two 3-wheeled motorcycles. Airplane larviciding was used for the first time in the District. Pre-hatch treatment for control of *Aedes dorsalis* appears to be satisfactory: results of such treatment made in fall against early spring broods in 1950 will be observed. Approximately 250 acres of gnat (*Leptonops kertezi* var. *americanus* Carter) producing ground was successfully treated during 1949.—J. W. S.

ANNUAL REPORT UNION COUNTY MOSQUITO EXTERMINATION COMMISSION 1949. 15 pp. 6

plates. George E. Powers, Supt. and Secretary, 324 North Ave., Cranford, N. J. Unique cover showing biting mosquito on front-face and life story of mosquitoes on back-face, all in color. Includes 4 photos of headquarters and new shops. Low rainfall during season 15.05 inches with above average temperatures. Mosquito light trap average 1.3 per night for 1949, and 34.0 for 1948. Pre-emergence spray of 5% DDT in fuel

oil was applied to pooled waters in February and March for residual effect. A Caterpillar motor was installed as power unit for Lawrence salt marsh pump. A Tifa fog generator and 3 pick-up trucks were purchased. A new larvicide mixing room and repair shop were built. Newark Airport expansion and new super-highway construction on Elizabeth salt marsh will create breeding problems.—J. W. S.

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