REVIEWS AND ABSTRACTS

BITING BEHAVIOUR OF MATED AND UNMATED FEMALES OF AN AFRICAN STRAIN OF AEDES AEGYPTI. By M. M. J. Lavoipierre. Nature 181 (4626):1781–1782. 1958. Studies were conducted on female mosquitoes of the African strain of *Aedes aegypti* which had been maintained in the Department of Entomology and Parasitology, Liverpool School of Tropical Medicine since 1938. The author points out that although the investigations reported are not directly concerned with ovarian development hormones or ovulation hormones, they might conceivably throw some light on the gonadotropic activity in mosquitoes.

The means taken to assure controlled rearing and test methods are described.

The second day after emergence, mosquitoes were allowed to bite a human, and were thereafter offered blood daily. The percentage of fertilized females feeding decreased sharply during the first 4 days (from approximately 80 percent to 6 percent) with the onset of oviposition. Unfertilized females maintained a high biting level (for the most part above 40 percent) with oviposition level low. Tests through the 11th day showed that this relation continued through several cycles in the fertilized group, with biting decreasing as oviposition began.

Dissection of a control group of mated females showed that biting decreased after oocytes reached the third stage, and that when the females began to feed at the late third or fourth stage of oocyte development, they took smaller meals.

The author discusses the probable explanation for the marked reduction in biting in fertilized females as oocyte development progressed. He points out that pressure is not a factor, since there is a high percentage of feeding by unfertilized mosquitoes, with retained and pigmented eggs and extensive fat body.

He hesitates to speculate with the material at hand in this preliminary paper, but is tempted to suggest that, "the production of increasing amounts of ovulation hormone in the gravid fertilized female inhibits the mechanisms by which the mosquito is induced to feed and that the inhibitory effect is very rapidly removed following oviposition."

Survival rates differed when fertilized and unfertilized mosquitoes were offered daily blood meals. The former dropped from the original 100 percent to almost zero on about the 118th day, whereas the latter survived until approximately day 87. It is likely that the difference was due to factors associated with ova retention rather than with feeding, since two groups of unfertilized females were compared, one fed daily, the other, every 10 days; and the survival rates of the two were almost identical.

It would have been better had the actual number of tested mosquitoes been given, rather than unspecified numbers with percentages. The paper is one worth reading.—H. L. T. D.

PRIMEIRAS PROVAS DE DETERMINAÇÃO DA SUSCEPTIBILIDADE DE ANOFELINOS BRASILEIROS AOS INSECTICIDAS. II—*ANOPHELES (NYSSORHYNCHUS) DARLINGI*, EM ENGE NHEIRO DOLABELA (ESTADO DE MINAS GERAIS). By Rachou, R. G. Moura Lima, M., Paulini, E., and Memoria, J. M. Pompeu. Rev. Bras. Malariol. D. Trop. 9(3): 351–355. 1957. The susceptibility of *Anopheles (Nyssorhynchus) darlingi* adults to DDT in Engenheiro Dolabela, State of Minas Gerais, Brazil, was tested using Busvine and Nash's method. The mosquitoes were collected with human and animal (horse) bait. The corrected mortalities (Abbott's formula) for the first (human bait) set of experiments are:

DDT concentration:	2.00%	1.00%	0.50%
% of mortality:	97.7	69.3	34.1

The results obtained (corrected) for the second set (animal bait) were:

DDT concentrations:	1.00%	0.50%	0.25%
% of mortality:	93.1	62.3	31.0

The LC_{50} obtained by interpolation for the mosquitoes captured with human bait was 0.71, whereas that of those collected with animal bait was 0.37. The LC_{50} were also calculated by the probit method, following Finney (1952): 0.38 ± 0.02 and 0.70 ± 0.03 for mosquitoes respectively captured with animal and human bait. In the last case we considered only the tests performed in the same days with the concentrations of 0.50, 1.00 and 2.00% (heterogeneity chi square not statistically significant). The difference in susceptibility of the two batches of mosquitoes may originate either from the difference of quality and quantity of the blood meals (human-animal) or from the appearance of resistance. All houses of the village have been treated with DDT once, twice, or three times a year since 1946, thus the anthropophylic strain might have been under DDT pressure for 10 consecutive years (in a total of 22 applications of DDT), whereas the zoophylic strain had less chance to suffer from the insecticide. Work to clear up these hypotheses is in progress.—Authors' summary.

THE MOSQUITOES OF MINNESOTA (DIPTERA: CULICIDAE: CULICINAE). By A. Ralph Barr. Univ. Minn. Agric. Exper. Sta. Tech. Bull. 228. 154 pp., 42 plates, 132 figs. 357 refs. 1958. This is a new publication on the mosquitoes of the State rather than a revision of the bulletin written by this reviewer in 1937. Nine genera and 47 species are included in the work. Of these, 26 are *Aedes*, 5 *Anopheles*, 6 *Culex*, 4 *Culiseta*, 2 *Psorophora*, and one each of *Mansonia, Orthopodomyia, Uranotaenia*, and *Wyeomyia*.

Descriptions and keys are given for adult females, male terminalia and larvae. Separate keys are presented for adult females of the *Aedes*

communis and *Aedes stimulans* groups. The illustrations by Sylvia Barr, the author's wife, are excellent. Information on the biology of each species is up-to-date and quite comprehensive. Locality records are not listed in the remarks on geographical distribution. The bulletin has been edited with care and the information is well-documented. This is an outstanding work which students of mosquitoes should obtain while it is available.—William B. Owen, University of Wyoming.

ANNUAL REPORT OF THE MALARIA DIVISION, HEALTH DEPARTMENT, TRINIDAD AND TOBAGO, 1957. The Malaria Division, Port of Spain, Trinidad, West Indies. 71 pp. "There was no epidemic of malaria in any part of the Colony during the year." This is from the report's first chapter, Malaria Studies. Other chapters are: Entomological Section; Anopheline Investigations; Malaria Control; Tobago-Malaria Eradication Programme; Anti-*Aedes aegypti* Measures, 1957; and, General. Special Reports appended are: 1. Bromeliad Re-infestation and Residual Malaria in Sangre Grande, Trinidad, T. W. I.; 2. The Effect of Malathion, Diazinon, Dipterex, and Parathion Formulations on 4th Instar Larvae of DDT-resistant *Aedes aegypti* in Trinidad, T. W. I.; 3. Malaria Transmission and the *A. bellator-A. aquasalis* Population Complex in Fishing Pond, Trinidad, T. W. I.; 4. Resistance of Bed Bugs (*C. hemipterus*) to DDT.

The mortality for each year from 1940 to 1947 (inc.) is listed, with 348 deaths reported for 1940, with a gradual decline to 20 and 6 for 1956 and 1957, respectively. It is pointed out that only one blood smear in 1956 and one in 1957 were taken to support the cause of death. The remaining 24 were unsupported by parasitological findings. Morbidity reports list 20,691 malaria cases in 1940, with a sharp drop in 1945—attributed to the formation of the Malaria Division in 1943—until 1957 when only 452 cases appeared. Of 2,402 slides made and examined for parasites, 433 (18.03%) were positive. Of these, 364 (84.07%) were *Plasmodium falciparum* infections, 67 (15.47%) *P. vivax*, and 2 (0.4%) *P. malariae*.

The report of the Entomologist, T. A. Omardeen, includes a summary of laboratory investigations. There were identified more than 112,500 anopheline adults and 6,900 larvae. *Sabathes cyaneus* larvae from a treehole were among specimens submitted by the *Aedes aegypti* recheck team. Totals of 997 *A. bellator* and 929 *A. aquasalis* adults were dissected and examined for sporozoites and oocysts. All were negative.

Bromeliads, as breeding places for *A. bellator* larvae, were destroyed by copper sulphate sprays and by manual means. Intensive control and survey measures were pursued.

A grand total of 109,701 houses were sprayed in the residual DDT program.

The chapter on anti-*aegypti* measures outlines the problems encountered, particularly treehole and eaves gutter breeding, and discusses dieldrin spraying. We read an optimistic note near the chapter's conclusion—"Provided no serious problems are encountered in the next couple of years, there is every hope that *Aedes aegypti* would soon be completely eradicated from Trinidad and Tobago."

Resistance of *Aedes aegypti* to DDT was observed after the yellow fever epidemic of 1954, and BHC was then used in eradication campaigns. Other insecticides were tested as a precautionary measure. Malathion, diazinon, dipterex, and parathion formulations were tested against 4th instar larvae of DDT resistant *aegypti*. Eighteen concentrations of each insecticide, ranging from 0.001 ppm to 5.0 ppm were used; 1,000 larvae for each concentration. Parathion was most effective, malathion next; but malathion because of its lower toxicity to mammals was chosen as the best for use in the eradication program.

The report is a bulky one, almost a hundred pages, 8½ by 14 inches each, stapled together. It is well-documented, with numerous graphs, charts, tables, and supporting data.

In concluding, we refer to Dr. William Reeves' visit to Trinidad, mentioned in "News and Notes," *Mosquito News*, Dec. 1958, page 332.—H. L. T. D.