

A colony was established in 1961 and is now in the seventh generation. The aquatic cycle was completed in a minimum of 13 days when larvae were reared in aerated water from a breeding site. Males and females lived as long as 9 and 13 weeks, respectively. Some females made at least 4 feedings and the maximum number of eggs observed in a raft was 195.

Autogeny was observed for the first time for this species, as about 10 percent of a population possessed this trait.

Literature Cited

- BECK, D. E. 1961. Central Utah County, Utah, mosquito survey studies. *Mosquito News* 21(1):6-11.
- CARPENTER, S. J., and LACASSE, W. J. 1955. Mosquitoes of North America. Univ. Calif. Press, 360 pp.
- CHAPMAN, H. C. 1959. Overwintering larval populations of *Culex erythrorhox* in Nevada. *Mosquito News* 19(4):244-6.
- FREEBORN, S. B., and BOHART, R. M. 1951. The mosquitoes of California. *Bull. Calif. Insect Survey* 1(2):78 pp.
- HAEGER, J. S. 1958. The colonization of *Aedes taeniorhynchus* Wied. (Diptera, Culicidae). *Proc. N. J. Mosq. Exterm. Assoc.* 45:80-8.
- HENDERSON, B. E., and SENIOR, L. 1961. Attack rate of *Culex tarsalis* on reptiles, amphibians and small mammals. *Mosquito News* 21(1):29-32.
- PRATT, H. D. 1959. A new classification of the life histories of North American mosquitoes. *Proc. N. J. Mosq. Exterm. Assoc.* 46:148-52.
- REES, D. M. 1943. The mosquitoes of Utah. *Bull. Univ. Utah, Biol. Series* 33:99 pp.
- SCOTT, O. K., RICHARDS, C. S., and SEAMAN, E. A. 1945. Experimental infection of Southern California mosquitoes with *Wuchereria bancrofti*. *J. Parasitology* 31(3):195-7.
- SEAMAN, E. A. 1945. Ecological observations and recent records on mosquitoes of San Diego and Imperial Counties, California. *Mosquito News* 5(3):89-95.

A SURVEY FOR AUTOGENY IN SOME NEVADA MOSQUITOES

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Autogeny is defined in the dictionary as "self-generation." Roubaud (1929) used the term autogeny to denote the trait which permits unfed females to deposit viable eggs. A further diversity in the meaning of autogeny was used by Spielman (1957), who described autogeny as the absence of a developmental diapause condition of the ovary. Autogeny is now considered by many investigators to encompass those individuals that are capable of developing a fully formed batch of

eggs (stage V) without a blood meal or external source of protein. Attaching the requirements of oviposition or viability appears to be unwarranted, especially in laboratory studies, since these factors are intimately connected with very different stimuli. The criterion used here was based solely on the ability of the females to deposit eggs.

Excluding the genus *Toxorhynchites* which is said to be wholly autogenous approximately 30 species of mosquitoes in the world are reported in the literature as autogenous (Haeger, personal correspondence). Only 12 of these species occur in this country, namely, *Anopheles crucians* Wied., *Culex pipiens molestus* Forsk., *Culex tarsalis* Coq., *Culiseta inornata*

¹ In cooperation with the Nevada Agricultural Experiment Station, Reno, Nevada.

² J. S. Haeger, Entomological Research Center, Vero Beach, Florida, provided the writer with the list of known autogenous species and their references.

(Will.), *Deinocerites cancer* Theobald, *Wyeomyia smithii* (Coq.), *Aedes aegypti* (Linn.), *A. atropalpus* (Coq.), *A. communis* (DeGeer), *A. flavescens* (Müller), *A. punctor* (Kirby), and *A. taeniorhynchus* (Wied.). Only eight of these autogenous observations on the above species were made on populations in this country. Much of the literature pertaining to the eight species is summarized by Chao (1958) and Lea and Lum (1959). Many of these autogenous records can be attributed to serendipity rather than the result of experiments designed to disclose the presence of autogeny. This survey was initiated to ascertain whether autogeny was present and could be detected in some of our common mosquitoes in Nevada.

METHODS. Large numbers of fourth instar larvae or pupae containing only one or two species were brought into the laboratory, reared to adults in small cages (9 x 9 x 11 inches), and held at a room temperature of about 75° F. and a rela-

tive humidity of 75 percent. Pure populations of one species were especially sought. If two species were present, it was necessary that they be easily separable in either the larval or adult stages. After emergence, the adults were provided access to sugar and honey water, raisins, and apple slices. Various ovipositional media, such as absorbent cotton, balls of cheesecloth, and brown paper toweling were placed in the cages of the *Aedes* species and kept moist with water from their respective mosquito-breeding sites. Dishes of distilled water were also available for these species as well as for the species of *Culex* and *Culiseta*. The various media were usually checked daily for eggs. A total of 22 populations of 17 species was checked for autogeny.

RESULTS. As shown in Table 1, ten species, i.e., *Aedes campestris* Dyar and Knab, *A. communis*, *A. dorsalis* (Meigen), *A. melanimon* Dyar, *A. nigromaculis* (Ludlow), *A. niphadopsis* Dyar and Knab, *A. schizopinax* Dyar, *Culiseta in-*

TABLE 1.—Results of a survey for autogeny in 17 mosquito species in Nevada, 1961

Mosquito species	Locality collected	Number of specimens reared (♂ and ♀)	Number of days to first egg	Number of eggs deposited
<i>Aedes campestris</i>	Hazen	1000	10	900
<i>communis</i>	Sierra Nevada Mts.	800	21	55
<i>communis</i>	Ruby Mts.	2000	..	0
<i>dorsalis</i>	Wadsworth	2000	14	57
<i>dorsalis</i>	Fallon	650	15	19
<i>melanimon</i>	Wadsworth	150	11	39
<i>nigromaculis</i>	Wadsworth	1000	17	15
<i>niphadopsis</i>	L. Winnemucca	200	10	8
<i>niphadopsis</i>	Gerlach	400	12	92
<i>niphadopsis</i>	Hazen	900	10	400
<i>schizopinax</i>	Gerlach	400	10	17
<i>fitchii</i>	Halleck	350	..	0
<i>hexodontus</i>	Mt. Rose	500	..	0
<i>increditus</i>	Glenbrook	2000	..	0
<i>increditus</i>	Bowers Mansion	500	..	0
<i>pullatus</i>	Lamoille Canyon	200	..	0
<i>sierrensis</i>	Mt. Rose	250	..	0
<i>Culiseta incidens</i>	Mt. Rose	2000	27	1 ¹
<i>Culex apicalis</i>	Verdi	200	..	0
<i>erythrorhoxus</i>	Hazen	200	9	15 ¹
<i>peus</i>	Verdi	420	..	0
<i>tarsalis</i>	Fallon	900	5	100 ¹

¹ Egg rafts.

cidens (Thomson), *Culex erythrothorax* Dyar, and *C. tarsalis* were noted to contain some autogenous individuals. Of these, autogeny has heretofore only been reported in *Aedes communis* and *Culex tarsalis*.

Based on the numbers of eggs deposited, autogeny appeared to be fairly common in *Aedes niphadopsis*, *A. campestris*, and *Culex erythrothorax*, and less so in *A. communis*, *A. dorsalis*, *A. melanimon*, *A. nigromaculis*, *A. schizopinax*, and *Culiseta incidens*. This trait was most pronounced in the population of *Culex tarsalis* in which more than 25 percent were probably autogenous. Very few dissections of *tarsalis* females were negative for the presence of fully developed eggs.

No autogeny was observed in *Aedes increpitus* Dyar, *A. fitchii* (Felt and Young), *A. hexodontus* Dyar, *A. pullatus* (Coq.), *A. sierrensis* (Ludlow), *Culex apicalis* Adams, and *C. peus* Spieser. These negative results may mean only that autogeny was absent in the population sampled.

These results, plus unpublished data on autogenous investigations by the Florida Entomological Research Center, certainly lend credence to the theory that autogeny is not a rare phenomenon. The paucity of autogenous species in the past is due in part to the singular habit of most in-

vestigators of immediately furnishing blood meal (host or arm) to field-collected mosquitoes in an attempt to obtain viable eggs. Studies specifically designed to uncover autogeny should unearth many more species.

SUMMARY. Larvae and pupae of 11 field-collected species of mosquitoes were reared to adults in the laboratory. Following emergence, the adults were provided with sugar and honey water, raisin apple slices, and ovipositional media. Autogeny (egg deposition only) was noted in the following 10 species: *Aedes communis*, *A. campestris*, *A. dorsalis*, *A. melanimon*, *A. nigromaculis*, *A. niphadopsis*, *A. schizopinax*, *Culiseta incidens*, *Culex erythrothorax*, and *C. tarsalis*. Of these autogeny has heretofore been reported only for the first and last species name.

Reference Cited

- CHAO, J. 1958. An autogenous strain of *Culex tarsalis* Coq. *Mosquito News* 18(2):134-7.
- LEA, A. O., and LUM, P. T. M. 1959. Autogeny in *Aedes taeniorhynchus* (Weid.). *Journal Econ. Ent.* 52(2):356-7.
- ROUBAUD, F. 1929. Cycle autogène d'attente et generations hivernales suractives inapparentes chez le moustique commun *Culex pipiens* C. R. Acad. Sci. Paris 188(10):735-8.
- SPIELMAN, A. 1957. The inheritance of autogeny in the *Culex pipiens* complex of mosquitoes. *Amer. Jour. Hyg.* 65(3):404-25.

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