marsh land near Cocoa, Florida, at various
times of the day over a 24-hour period. Counts
were made over complete body of personnel
after one minute of immobility in the following
typical locations:

a. Laurel tree (good canopy) on road.
b. Palm tree (fair canopy) on road.
c. Middle of bridge (open conditions) over
creek.
d. Laurel tree on marsh land but dry under
tree.
e.—Open pickle weed grounds on marsh land.
f. Mangrove tree (fair canopy) on marsh
land with water under it.

Data derived from these counts indicated that:
a. Migration starts about dawn from open
into shaded areas, in or about the open marshes,
over 1-hour period with the minimum count at
8 A.M. and then increases in the hot sun of late
afternoon.
b. Full migration starts about dusk from
shaded into open marshes. It should be noted,
however, that landing rates of over 100 were
obtained during the night in jungle areas.
c. Dawn flights decrease population in the
open marshes but not to zero. Fairly high
counts obtained in open marshes under bright
sunlight.
d. There was increased activity in open
marshes before dawn and after dusk.
e. Evidence points to dawn and dusk
migration.
f. For practical control, open marshes should
be treated in the “predawn” and forested areas
after dawn.

Migratory habits of Anopheles quadrimaculatus
were studied in swamp areas near Decatur,
Alabama. The data indicated that:
a. This species is completely inactive during
periods of sunlight (resting periods).
b. It does not land or bite under sunlight
conditions or when in flight near resting places.
c. Between sunrise and dark, this species rests
in some dark, cool, damp place such as a tree
hole, hollow log, or empty keg.
d. They leave their resting place during the
hour following sunset.

Since the anopheline adults had practically a
zero landing rate in the vicinity of their resting
places over a 24-hour period, it was concluded
that the adults in this particular location have
acquired a definite preference for specific locales
in which blood meals are daily sought.

It was concluded that control of the adult by
aerosol treatment is feasible.
a. During the day while they are resting in
tree holes.
b. At dusk when they are leaving tree holes.
c. In early morning when they are returning
to tree holes.—Leo Kartman, University of
Hawaii, Honolulu, T. H.

Biological Characteristics of Laboratory-
Reared Aedes atropalpus. H. L. Trembley.

Aedes atropalpus, a species of rock-hole mos-
quitos, has been added to that small group of
mosquitoes which are autogenous. The females
do not require blood meals, or, in fact, any
food at all, in order to deposit viable eggs. A
colony in which the females were fed only a
sugar solution was reared in the laboratory for
more than a year, and in its 26th generation
continued with no apparent loss of vigor. A
colony in which the females received only dis-
tilled water for several generations was thriving
at the time the article went to press. A compari-
sion of the life-cycles of individuals from the
colony routinely offered blood and those denied
blood showed no marked differences. The
females of this species may be induced to bite
when blood meals are offered, but subsequent
oviposition results in comparatively few viable
eggs. Aedes atropalpus may mate in small spaces,
having no seasonal period of comparative inactivity,
and does not exhibit a decrease in the number of
females with the increase in successive gen-

Resistance of Mosquito Larvae and Pupae
to Experimental Drought. George H. Dick

Random field observations in New Guinea
showed that numerous late stage anopheline
larvae were present in rain paddies which had
evaporated to the damp mud stage and subse-
sequently reflooded. Fourth instar larvae of
Anopheles punctulatus survived approximately
120 hours on damp filter paper flooded for 30
minutes at 24 hour intervals.

Experiments are described which attempted to
determine the effects of varying periods of
drought and of periodic flooding on the larvae
of Anopheles walkeri, which breeds in the shady,
grassy margins of swamps and lakes; Aedes
venustus, which breeds in temporary pools; and
Wyeomyia smithii, which finds its breeding
water in pitcher plants.

Oversized filter paper was placed on the bot-
toms of petri dishes and sufficient water from
the collection source was allowed to dampen
the paper without showing a free liquid. Control
dishes were flooded to a depth of ¼ inch. Experi-
mental dishes were covered for maximum
humidity, and control dishes were kept uncovered.
Temperature ranged from 21° C. to 28° C.

Five 4th instar larvae of Aedes vexans were
added to each of 30 dishes and examined as fol-
lows: 15 each after 24 and 48 hours, and 30
each after 72, 96, 120, and 144 hours of con-
tinuous drought. Maximum survival time was
96 hours (17 per cent), while survival at 48 and
72 hours was not significantly different (13 per
cent and 17 per cent). Third instar larvae of
A. vexans, treated as above, gave a maximum
survival time of 120 hours (20 per cent) when
examined as follows: 30 larvae each after 24, 48,
72, 96, and 120 hours of continuous drought.
One dish of 1st and second instar larvae of
A. vexans was examined after 48 hours of drought. The maximum survival time was 48 hours (36 per cent). Although the control groups in these tests showed a decrease, there was always a significant difference between them and the experimental groups.

Sixty 4th instar larvae of Wyeomyia smithii were set up 12 to a dish and examined as follows: 12 each after 48, 96, 144, and 192 hours of drought. Maximum survival time was 192 hours (83 per cent). The survival was irregular for the intermediate time groups. At 144 hours survival of the experimental group equaled the controls (48 per cent and 42 per cent) whereas at 192 hours the experimental were 83 per cent as against 33 per cent of controls.

One hundred 4th instar larvae of Anopheles walkeri were examined on the following schedule: 10 after 24 hours and 15 each after 48, 72, 96, 120, and 144 hours of drought. After examination the dishes were kept flooded. Maximum survival time was 120 hours (27 per cent) and the mortality was limited up to 96 hours. The 27 per cent which survived the maximum time were injured and decreased to 7 per cent, 48 hours after return to flooded conditions.

Groups of larvae were then subjected to drought broken at 24-hour intervals by a 30 minute period of flooding. Fifteen 4th instar larvae of Aedes vexans, 30 3rd instar A. vexans, 15 4th instar Anopheles walkeri, and 12 4th instar Wyeomyia smithii were used. This was of no obvious benefit to A. vexans and W. smithii larvae, but A. walkeri survived 120 hours longer than those in continuous drought.

One hundred twenty-five pupae of Aedes vexans were set up as in the above series, the number in each dish depending on numbers available daily from cultures. Each dish was examined at 24-hour intervals and the number of imagines recorded. No control was used. No emergences were recorded after a maximum of 72 hours of standing, and imagines emerged from 94 per cent of the pupae.

These experiments indicated that larvicide programs should include depressions in the damp mud stage which may subsequently be flooded.—Leo Kartman, University of Hawaii, Honolulu, T. H.

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Observaciones hechas al azar en la Nueva Guinea demostraron que numerosas larvas anofelinas en su última fase de muda se encontraban en charcos de agua pluvial que se había evaporado hasta el estado de lodo húmedo y después vuelto a inundar. Cuatro larva de Anopheles punctulatus en estado de muda quedaron vivos después de aproximadamente 120 horas en papel de filtro húmedo inundado durante 30 minutos a intervalos de 24 horas.

Se hace una descripción de experiencias mediante las cuales se intentó averiguar los efectos de períodos variables de sequía y de la inundación periódica de larvas de Anopheles walkeri, los cuales se criaban en los márgenes herbosos y sombreados de pantanos y lagunas; Aedes vexans, que se criaban en charcos pasajeros, y Wyeomyia smithii, que busca el agua en que se cria en hebras ascídicas.

Se colocó papel de filtro de tamaño un poco grande en el fondo de plátillos "petri" y el agua suficiente, montado de las fuentes en las cuales se hicieron las capturas, para humedecer el papel sin dejar líquido libre visible. Los plátillos de control se inundaron hasta una profundidad de .64 cm. Se taparon los plátillos experimentales para conservar la humedad máxima y los plátillos de control se dejaron descubiertos. La temperatura fluctuó entre 21° C y 28° C.

Cinco larvas de Aedes vexans en el 40 estado de muda fueron depositados en cada uno de 30 plátillos y examinados como sigue: cada uno de 15, después de las 24 y las 48 horas, y cada uno de 30, después de las 72, 96, 120 y 144 horas de sequía continua. El tiempo máximo de sobrevivencia fue 96 horas (17%), aunque la sobrevivencia a las 48 y 72 horas no fue marcadamente diferente (13% y 17%). Larvas de A. vexans en la 3a muda, tratadas como queda indicado más arriba, dieron un tiempo máximo de sobrevivencia de 120 horas (20%) al ser examinados como sigue: cada una de 30 larvas después de las 24, 48, 72, 96 y 120 horas de sequía consecutiva. Un plátillo de 14 larvas de A. vexans en la y 2a muda fueron examinados después de 48 horas de sequía. El tiempo máximo de sobrevivencia fue 48 horas (36%).

Aunque los grupos de control en estas experiencias indicaron una disminución, siempre se observó una diferencia significativa entre ellos y los experimentales.

Se colocaron 60 larvas de Wyeomyia smithii en su 4a muda en plátillos de 12 cada uno y se examinaron como sigue: cada uno de 12 después de las 48, 96, 144 y 192 horas de sequía. El tiempo máximo de sobrevivencia fue 192 horas (83%). La sobrevivencia fue irregular en los grupos de tiempo intermedio. A las 144 horas, la sobrevivencia en el grupo experimental fue igual que en el de control (48% y 42%), mientras que a las 192 horas, la de los experimentales fue 83% comparado con 33% de los de control.

Fueron examinados 100 larvas de Anopheles walkeri en su 4a muda según el siguiente horario: 10 después de 24 horas y cada una de 15 después de 48, 72, 96, 120 y 144 horas de sequía. Después de examinados se conservó inundados los plátillos. El tiempo máximo de sobrevivencia fue 120 horas (27%) y la mortalidad fue limitada hasta las 96 horas. El 27% que sobrevivieron el tiempo máximo habían sufrido.