

## Trapping of Air-borne Insects on Ships on the Pacific (Part II)<sup>1</sup>

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This is the second report on the trapping of air-borne insects in connection with the project "Zoogeography and Evolution of Pacific Insects" (see Part I, Gressitt and Nakata, 1957, *PROC. HAW. ENT. SOC.* 16 (3) :363-365). This report covers the period from January to December, 1958. Thanks are expressed to Rear Admiral S. H. Evans, U.S.C.G.; Lt. (jg.) Charles L. Smith, M.S.T.S. Operations Officer; officers and men of the U.S. Navy; the Military Sea Transportation Service; and the U.S. Coast Guard stationed in Hawaii for their cooperation. Also, we are grateful for assistance and advice from David Blumenstock of the U.S. Weather Bureau, Martin Sherman of the Entomology Department, Hawaii Agriculture Experiment Station, and the Hawaiian Aeronautics Commission. We are grateful to the California Spray Chemical Co. for sending us additional "deadline" adhesive material. Carole Worthington, Carl Isenberg, Solomon Kalima, and Shinsaku Kimoto have helped in the work. The diagram of the wind sock trap was made by Dorothy Rainwater.

The cubical aluminum frame traps with removable screens on five sides (see Part I) were put in operation on Honolulu-Guam-Philippines and on Honolulu-Guam routes of M.S.T.S. ships. Resin-castor oil "deadline" mixtures were painted on the screens which were exposed for 24 hours. On each trip, 50 screens (44.3 cm. square) were kept in a single 45 x 50 x 68 cm. aluminum container. These screens were operated from Honolulu to the Philippines and then back to Guam as indicated by the arrows (Table I). On the Guam cruises, screens were operated both ways as indicated by the arrows (Table II). The traps were not in commission for the 24 hours immediately after leaving or before entering a port.

Two types of traps were used aboard the Coast Guard ships: the above cubical trap with screens, and a trap utilizing a wind sock. The first experimental wind sock trap consisted of one end of an 25 cm. diameter can with vertical rod set in ball-bearings and evenly spaced hooks soldered on the back end. A medium weight muslin sleeve, 60 cm. long,

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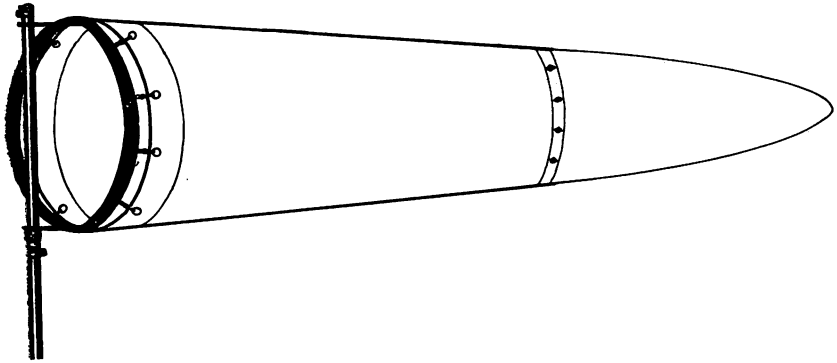


FIG. 1. Diagram of wind sock insect trap.

with grommets at the periphery of the larger opening was attached to the hooks of the frame by a cord threaded through holes; and a 30 cm. long cone-shaped nylon net was fastened on to the outer end of sleeve by several buttons. The second trap (fig. 1), was made from a 50 cm. diameter, 3 x 38 mm. flat iron bar ring welded to two 38 cm. bar strips at right angles. A heavy muslin sleeve, 60 cm. long with grommets, was fastened by metal snaps on to the bar ring, and, on opposite end, a 60 cm. rounded apex net was positioned to the sleeve by buttons. The complete wind sock frame was rotated on a 1.5 m. vertical galvanized pipe.

The nylon nets were first dipped into a 5 percent endrin water mixture; then momentarily were allowed to dry, after which an aerosol spray containing DDT and pyrethrum was applied to the inside of the net. In order that the chemicals applied would have longer residual effect, the nets were changed during sunset hours.

The nets were changed daily, and a total of 21 days of trapping was done at the station "Victor", a coast guard weather and rescue station located between the Hawaiian Island chain, Japan, and the Bonin Islands. The screen traps were operated, with daily screen changes, one way between Honolulu and Yokosuka, Japan, and, with one set of screens exposed per week, at the station (Table III).

Records (Table III) representing the trapped specimens collected both in cone-shaped and rounded apex nets indicate that the latter type tends to injure specimens to a much greater degree, probably because of a greater air circulation within the net crushing or entirely blowing specimens out of the net. The former does not impair specimens, because of the lesser air movements at the cone-shaped bottom. The week-long exposure of the screen trap at station "Victor" probably permitted in-

TABLE I. Insects collected from screen traps on ships traveling from Hawaii to the Philippines and returning to Guam as indicated by arrows (4 cruises).

Longitude	24 hours periods of trapping at sea					
	PHILIPPINES		NEAR GUAM			HAWAII
	← →	← →	← →	←	←	←
	120°-137°E	137°-146°	146°-157°	157°-168°	168°-172°	172°E-171°W
Coleoptera						
Coccinellidae.....			1			
Scolytidae.....			1			
Anthribidae.....						
<i>Araecerus</i> .....	1	1	2		1	
Homoptera						
Cercopidae.....			1			
Hemiptera						
Lygaeidae.....			1			
Diptera						
Sciaridae.....						1
Chironimidae.....	1					
Acalyptrate.....			1			
Chloropidae.....			1			
Ephyridae?.....				1		
Hymenoptera						
Chalcididae.....			4			
Ceraphronidae.....	1					
Formicidae.....	2		4			
Apoidea.....			1			

TABLE II. Insects collected from screen traps on ships traveling from Honolulu to Guam and returning to Hawaii (3 cruises).

Longitude	24 hours periods of trapping at sea						
	NEAR GUAM		NEAR KWAJALEIN			HAWAII	
	↔	↔	↔	↔	↔	↔	↔
	144°-151°E	151°-160°	160°-168°	168°-177°	177°E-172°W	172°-166°	166°-158°W
Coleoptera							
Cerambycidae:							
<i>Chlorophrous annularis</i> (Fabr.)					1		
Anthribidae.....		1					
Bruchidae.....		1					
Diptera							
Culicidae: <i>Culex</i> ?					1		
Sciaridae: <i>Sciara</i> ?							
Drosophilidae.....			1				
Hymenoptera	3						
Formicidae.....	1		1				

TABLE III. Insects collected from screens and wind sock traps on ships en route from Hawaii to station "Victor" and on to Yokosuka, Japan (2 cruises).

JAPAN		YOKOSUKA,		STATION "VICTOR"***			HAWAII	
		←		←				
Longitude		142°-154°E	154°-164°	164°E	164°-166°	166°-175°	175°E-177°W	177°-166°
Fragments		Trap						
Araneida								
Argiopidae								
(Young)	Screen	1						
Isoptera								
Rhinotermitidae								
<i>Coptotermes</i>	Wings	Screen					2	
Rhinotermitidae								
<i>Coptotermes</i>		Net		2				
Unknown?	Abdominal sternite	Net*		1				
Coleoptera								
Coccinellidae		Net		1				
Staphaylinidae		Net		1				
(small)								
Unknown?	Third thor. sternite	Net*		1				
Diptera								
Drosophilidae	Wings & abdomen	Screen				1		
Lepidoptera								
Gelechiidae?		Net		1				
Hymenoptera								
Aganotidae		Net		2				
Braconidae	Wing	Screen	1					
Formicidae	Wing & thorax	Net*		1				

\*Insect fragments collected in rounded apex type net.

\*\*A total of 21 days of trapping at station "Victor", and each other longitude column represents a single day of trapping at sea.

sects to be blown off the screens as the adhesive dried.

From the above data and those presented in the previous report, it is apparent that only a small number of air-borne specimens have been caught to date. Several years of work will be required in the future to obtain needed information on the degree of dispersal and the types of insects involved in such dispersal. In general, most of the specimens secured in our traps were representatives of smaller more weakly flying groups of insects, and other small arthropods. More specimens were taken close to land than in mid-ocean, corroborating findings presented in the first paper of this series.