A NEW FLIGHT-INTERCEPTION TRAP FOR ARTHROPOD SAMPLING[1]

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ABSTRACT: We designed a flight-interception trap to assess arthropod abundance and biomass as part of a ruffed grouse study. Traps were constructed of acrylic plexi-glass, relatively inexpensive, and durable. Our design was simple and efficacious in sampling airborne insects and some terrestrials. We captured multiple orders, with several families within most orders.

Arthropod abundance and biomass can be estimated by many different methods (Byerly et al. 1978, Southwood 1978, Bechinski and Pedigo 1982, Ellington et al. 1984, Schotzko and O'Keeffe 1986, Cooper and Whitmore 1990). Factors to consider when choosing a sampling method include the ability of certain insects to cling to vegetation, inclement weather, precipitation, and even the presence of morning dew, as these factors may influence the efficacy of a particular sampling method. In addition to environmental factors, frequency of sampling and observer bias must also be considered when choosing a method.

As part of a ruffed grouse (*Bonasa umbellus*) ecology study, we wanted to obtain data on flying insect populations in different forest cover types. Because of our need to sample daily and under all weather conditions, traditional methods (sweepnet, vacuum sampling) were not practical. Consequently, we developed a flight-interception trap modified from Nijholt and Chapman (1968) and Masner and Goulet (1981) that served our purpose.

Constructed of acrylic plexi-glass (0.20 cm thickness), our trap was approximately 31 cm in height and width (Fig 1.). Each trap consisted of four 31 x 31 cm panels. The first panel served as a base and had four 7.6 x 31 cm sides attached, which formed a reservoir to hold the fixing and preserving agent (5-10% formalin). Two panels were placed on the base and intersected medially to form the "trap" and to provide stability. The remaining panel was placed on top of the intersecting panels to serve as a rain guard. Panels were glued together and sealed using a combination of all-purpose construction adhesive and silicon caulk.The cost of materials to construct one of our flight traps was approximately $7.30 (1998 U.S. dollars).

Our design was used to assess relative abundance, biomass, and family richness of flying insects among cover types. Traps were placed directly on the ground within existing vegetation. We checked traps 5 times each week from 25 May to 5 July 1998. With proper care and handling, we found traps

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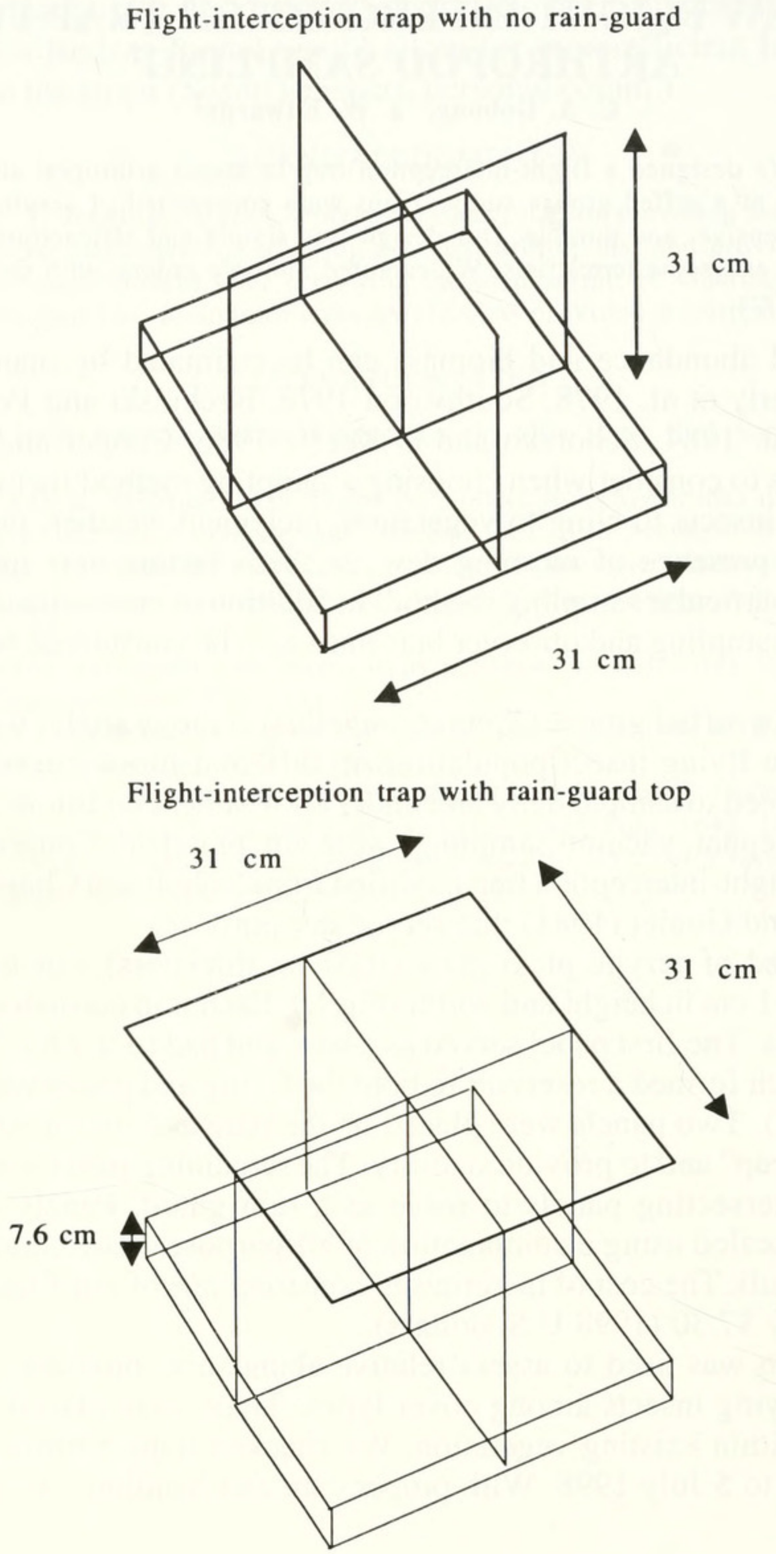

Fig. 1. Flight-interception trap used in arthropod sampling in Randolph County, West Virginia in 1998.

durable and usable over multiple seasons.

Trap design was simple and efficacious in sampling airborne insects and some terrestrials. We captured multiple orders and multiple families within most orders (Table 1; Dobony 2000). Other flight trap designs typically sample in only 1 dimension or plane. We believe that our design increases sampling effort by sampling in 2 planes. Moreover, other traps typically are suspended above ground. Our traps were placed on the ground within vegetation in order to sample the "zone of availability" for young ruffed grouse chicks. When properly constructed and positioned, our flight-interception trap was only impacted by extreme environmental conditions (e.g. high winds).

Table 1. Percent of total capture (N = 5358) and families (N = 175) in each arthropod order captured in Randolph County, West Virginia, 1998.

Order	% Total Capture	No. of Families	Order	% Total Capture	No. of Families
Blattaria	<1.0	1	Neuroptera	<1.0	2
Coleoptera	41.3	52	Odonata	<1.0	1
Collembola	<1.0	3	Orthoptera	2.0	4
Diptera	26.7	44	Phalangida	4.4	1
Hemiptera	5.0	12	Plecoptera	<1.0	3
Homoptera	5.6	10	Psocoptera	<1.0	2
Hymenoptera	13.6	30	Thysanoptera	<1.0	1
Lepidoptera	<1.0	6	Trichoptera	<1.0	1
Mecoptera	<1.0	2			

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THE UNIFIED NEUTRAL THEORY OF BIODIVERSITY AND BIOGEOGRAPHY. Stephen P. Hubbell. 2001. Princeton University Press. 375 pp. $29.95 paper.

In this book, the author develops a formal mathematical theory that unifies the study of geographic distribution of species (biogeography) and the study of species richness and relative species abundance (biodiversity). When a specialization process is incorporated into the classic theory of island biogeography, the generalized theory predicts the existence of a universal, dimensionless biodiversity number. In theory, this fundamental biodiversity number, together with the migration or dispersal rate, completely determines the steady-state distribution of species richness and relative species abundance on local to large geographic spatial scales and short-term to evolutionary time scales.

A DICTIONARY OF ENTOMOLOGY. G. Gordh & D.H. Headrick. 2001. CABI Publishing. 1032 pp. $140.00 Cloth.

Entomologists now have a comprehensive and updated resource that leaves Torre-Bueno far behind. This book is a fully cross-referenced collection of over 28,000 terms, names, and phrases used in entomology, incorporating an estimated 43,000 definitions. This alphabetical listing or dictionary, covers insect anatomy, behavior, biology, ecology, histology, molecular biology, morphology, pest management, taxonomy, and systematics. This book should be an essential reference source for all professional entomologists as well as students of entomology and related disciplines.