We thank the Officers of the Entomology Research Institute, Research Branch, Canada Department of Agriculture; Ottawa, for the identification of the parasites.—J. C. E. Melvin and L. D. Nairn, Forest Research Laboratory, Winnipeg, Man.

A Study of the Dispersal of Balsam Woolly Aphid Crawlers by Small Animals—A Study was initiated during 1966 to determine whether the motile stage of the balsam woolly aphid (*Adelges piceae* (Ratz.)) was dispersed by phoresy. "Fall-traps" designed to collect small creatures that frequent the forest litter were set out in aphid infested stands of grand fir (*Abies grandies* (Dougl.) Lindl.) on Vancouver Island, and amabilis fir (A. *amabilis* (Dougl.) Forbes) near Vancouver.

The traps consisted of 1-gal anti-freeze containers set into the earth with their rims at ground level. Pieces of ¼×12×12 inch plywood supported by a large nail through each corner served as covers. The covers were placed about 1 inch above the traps to allow the entry of small animals from the sides, but minimize the capture of airborne aphids from above. Each trap contained about 1 qt. of water, plus a small amount of wetting agent (anterox) to hasten the drowning of the captives and to wash the crawlers off them.

A 5×8 inch card with a 3×6 inch gridded center section treated with tanglefoot was placed on each trap cover. Examination of the sticky cards, coincident with the weekly emptying of the traps, provided an indication of the effectiveness of the covers and an indication of the abundance of aphids dropping in the vicinity of the traps.

Any larger animals caught were washed thoroughly and disposed of in the field. In the laboratory, the washings and trap contents were poured through a series of soil screens (40, 60, 80, and 120 mesh). The coarse mesh screens removed leaves and other large debris whereas the fine particles, including the crawlers, were collected by the 120-mesh screen. To obtain a fairly uniform distribution, the fine matter was washed through a No. 4 filter paper laid flat in a 20 mesh screen. The dried filter papers were held flat by a plastic square scored with a ½-inch grid and the entire surface of the filter examined under a dissecting microscope.

Table I shows the results of 296 trap collections from four sample areas. The traps captured a number of insects, mostly ground beetles; mammals, mostly *Sorex* sp.; and a mixture of frogs, newts, and salamanders. If the above organisms were absent, the traps were considered empty even though they occasionally contained earthworms and centipedes. The incidence of crawlers in the traps increased when either mammals or amphibians were captured even though two of the four sample areas had low aphid populations. Table II shows data taken from the sample area with the highest aphid population.

The overall average number of crawlers per empty trap collection was 0.20, maximum 0.62 for a sample area with a high balsam woolly aphid population. The sticky cards in the latter area caught 7.80 crawlers per square inch each week. That is, if the traps were uncovered approximately 300 aphids per week would have fallen into each trap.

TABLE I

The occurrence of crawlers of *A. piceae* in fall-traps in relation to other organisms captured in all areas.

Trap contents	No. of samples	No. of samples containing crawlers	% of samples containing crawlers	Average no. of crawlers per sample*
Empty	66	8	12	1.6
Insects	176	23	13	1.9
Mammals	47	14	30	2.6
Amphibians	7	3	43	4.7

*Based on the number of samples containing crawlers.

TABLE II

The occurrence of crawlers of *A. piceae* in fall-traps in relation to other organisms captured in an area with a high aphid population.

Trap contents	No. of samples	No. of samples containing crawlers	% of samples containing crawlers
Empty	16	6	37.5
Insects	52	17	33.0
Mammals	16	12	75.0
Amphibians	4	3	75.0

Crawlers of the balsam woolly aphid that fall to the forest litter may be transported by small animals. However, the relative numbers so transported appear to be insignificant and the chance of a crawler dropping on a small animal would be slight. It was not possible to determine whether crawlers carried into the traps were living or dead, but the data suggests that the crawlers do not initiate the phoresy by way of response to body warmth of either the mammals or the amphibians.—T.A.D. Woods and M. D. Atkins, Forest Research Laboratory, Victoria, B.C.

FOREST MANAGEMENT

Erratum: Vol. 23, No. 4, p. 8, third line under "FOREST MANAGEMENT" should read "1,000 stems per".

FOREST PRODUCTS

Electrical Resistance of Wood vs. Stress.—The Wood Physics Section of the Vancouver Forest Products Laboratory has found that the direct-current electrical resistance perpendicular to the grain of western red cedar changes with stress applied parallel to the grain.

An increase in tension stress to approximately 2,000 psi over a 30-second period decreases the resistivity by approximately 1.5%. The resistivity increases again almost linearly when the stress is relieved. The observations were made at controlled climatic conditions of 45% relative humidity and 72°F on specimens that had been electrically conditioned for approximately 45 minutes prior to testing.

In the time interval of investigation the resistivity changes observed seem to be little affected by climatic fluctuation, piezo-electric charge development, and stress-induced change in equilibrium moisture content. The observation suggests that a direct resistivity measurement, under certain conditions of controlled environment and fairly short time spans, might be used to replace more conventional strain-measuring techniques used in mechanical dynamic or quasi-static testing of wood; for example, monitoring the resonance frequencies in non-destructive vibration tests could be conceived as a technically possible application.—Lars Bach, Forest Products Laboratory, Vancouver, B.C.

A Kinetic Study of the Degradation of Wood-Glue Bonds—Using ultra-violet spectrometers and gas chromatographs, the degradation of the glue-wood bond has been studied as a chemical (hydrolysis) reaction (Gillespie, R. H., Forest Prod. J. 15(9) 369. 1965). A mechanism for this degradation is proposed and has been found to follow first order kinetics. A plot of log(a—x) versus time was linear for the above systems; thereby indicating first order kinetics, "a" representing final formaldehyde concentration and "x" representing formaldehyde concentration at any time "t". Kinetic results for four formaldehyde glues (melamine, urea, melamine-urea and phenol) and the glue-wood species of these glues have been obtained. The kinetic results include half