However, in one stand containing comparatively vigorous trees, located at Chungo Creek, approximately 30 miles north of Nordegg, Alberta, trees were found which are believed to be resistant to this pathogen. The resistance was manifested by the overgrowth, or suppression, of otherwise typical cankers which had become established within the wood of the host. Twenty-two trees within this stand were selected at random, felled, cut into short lengths, and examined carefully for any sign of cankers. Cankers were sectioned transversely through their centres.

Six of these trees had only suppressed cankers. They had an average of 10 stem cankers each, and a range of 4-17. Most of the cankers were less than 2 inches long, but one tree had several cankers much longer than this. The average total length of stem cankers per tree for this group was 22.5 inches.

Most of the cankers on the remaining 16 trees were of unrestricted growth, although a minimum of two suppressed cankers was also present on each tree. This group had an average of 31 cankers and a range of 11-68. The average total length of stem cankers per tree for this group was 250.8 inches.

The difference between the two groups in the mean number of cankers present suggests that the resistance mechanism operates at the bark level to prevent infection, in addition to suppressing cankers within the wood. The establishment of the cankers before suppression suggests that the resistance may fluctuate from time to time. Spatial variation within a tree may also occur since the suppressed cankers, in trees with both types, tended to occur in groups.

The six resistant trees were dominants or codominants of 70-80 years of age, with a mean DBH of 5.9 inches. This, together with the fact that this phenomenon was not observed in the overcrowded stands hitherto studied, indicates that manifestation of resistance may be dependent on a certain degree of host vigour. However, the occurrence of cankers of unrestricted growth on trees of similar size and age in this stand suggests that some other factor, or factors, possibly genetical, are operative.—John C. Hopkins.

BRITISH COLUMBIA

Arrangement of Abdominal Ganglia and Flight Muscle Changes in the Ambrosia beetle, Platypus wilsoni Swaine.—It is generally agreed that the structure of the abdominal nervous system of insects is an important indicator of evolutionary relationships and, therefore, systematic position. The more primitive beetles show varying degrees of separation and segmental arrangement of abdominal ganglia. In the more advanced or "higher" groups there is relatively greater fusion of these structures. Among curculionids and scolytids the abdominal ganglia are consolidated into a single mass which includes the meso- and metathoracic ganglia (see Can. Ent. 89: 80-86. 1957).

The Platypodidae have long been considered close relatives of the Scolytidae. There is an interesting contrast in external appearance, however, with representatives of the former being considerably more elongate in general body form. Judging by external appearance and a superficial examination, one would probably not consider these two groups of ambrosia beetles to be closely related.

A biological feature which appears to be typical of the Scolytidae is the reduction of indirect flight muscles during brood production, with subsequent re-development to a functional condition towards the end of the gallery period (Bi-Mon. Prog. Rept. 13 (1) 1957).

Following an opportunity to collect members of *Platypus wilsoni* from galleries in an attacked tree, several specimens were dissected to observe the abdominal nervous system and condition of the flight muscles. It was found that, as in scolytids studied, the abdominal ganglia are fused into one large structure which includes the meso- and metathoracic ganglia. It is actually located anterior to the elongate metathorax. Abdominal nervous system structure, therefore, supports the conclusion based on other morphological considerations, of a close systematic relationship between the Scolytidae and the Platypodidae, notwithstanding the difference in external appearance.

In the 15 specimens examined, both sexes being represented, the indirect flight muscles were greatly reduced. These beetles had all been feeding and ovaries were in later stages of egg production. It appears from this observation, and a report by Roberts (West Africa Timber Borer Res. Unit Tech. Bull. No. 3, 1960) that flight muscle change during the brood production period occurs in platypodid as well as scolytid ambrosia beetles.—J. A. Chapman.

Ambrosia Beetle Preventives.—In 1961, logs were again treated with lindane and Thiodan to compare the relative effect of these two chemicals in reducing ambrosia beetle damage. Results of a similar experiment in 1960 are recorded in the last September-October issue of this report (Vol. 16, No. 5). In that experiment Thiodan was superior to lindane on logs situated in the shade of dense stands. The object of the 1961 experiment was to confirm previous results and to compare the relative merit of the two chemicals on logs beneath dense shade, with sprayed logs exposed to full sunlight.

Phosphamidon, a systemic insecticide of short residual life was also tested, principally because of its reported low hazard to fish. The fish hazard aspect is of interest in ambrosia beetle control because logs stored in water frequently require protection.

Nine Douglas-fir trees were felled in October, 1960. In March, six 4.5-foot logs were cut from each tree. Their diameters averaged 10.2 inches. Half the logs were assembled at a Cowichan Lake locality where they were fully exposed to the sun; the remainder were assembled in the shade at the site used in 1960.

At both localities the treatments were assigned to the logs in such a manner that each spray was applied to one log of each tree, and thrice to each of the butt, intermediate, and top log positions represented. Only the butt halves of the logs were sprayed, the smaller ends being left untreated as checks.

Proprietary brands of insecticides were used in the formulations. Lindane was used as a finely ground wettable powder ("Abol"—50% lindane. Canadian Industries Limited. Distributed by Chipman Chemicals Limited), Thiodan as an emulsion (Thiodan EC 2—Niagara Chemical Division, Food Machinery and Chemical Corporation) and Phosphamidon as an aqueous solution (Phosphamidon 4.8 spray, Ortho Agricultural Chemicals). The finished sprays were diluted with water to give 0.4 per cent by weight of the active ingredients.

Sprays were applied on March 29 with a pressure tank hand sprayer. The bark was thoroughly wetted, giving deposits in the range of 200-250 μgm. of insecticide per square centimetre. Weather warm enough for the beetles to fly and attack did not occur until May 15. In the interval 6.5 inches of rain fell. Judging from studies by associate workers, most *Trypodendron* attacks occurred on the shaded logs between May 15 and 19.

All logs were debarked and examined in August. Shallow holes formed by poisoned beetles (less than one-quarter inch into the sapwood) were not counted as successful attacks.

Logs at the shaded locality were heavily attacked by *Trypodendron lineatum* (Oliv.), but not one ambrosia beetle hole was found in either sprayed or unsprayed portions of any of the logs exposed to full sunlight. To state that the reason for this lack of attack is obscure, is, indeed, an understatement. Lack of attacking beetles was by no means the explanation, because only 150 feet away E. D. A. Dyer had experimental logs that sustained attacks in excess of 200 per square foot. The result is that an assessment of the relative durability of the materials in full sun or partial shade is lost from this experiment, although a few cerambycids and buprestids had attacked the exposed logs. A cursory examination showed that Thiodan prevented more attacks than lindane, but that Phosphamidon had offered no protection.

The relative effect of Lindane and Thiodan in preventing *Trypodendron lineatum* attacks

Log No.	Lindane			Thiodan		
	Sprayed	Check	% Reduction	Sprayed	Check	% Reduction
	Attacks (sq. ft.)			Attacks (sq. ft.)		
1.....	36.9	102.5	64.0	7.1	129.4	94.5
2.....	9.3	52.0	82.1	4.6	35.8	87.2
3.....	21.2	49.4	57.1	19.5	58.4	66.6
4.....	5.4	59.0	90.8	20.2	91.8	78.0
5.....	16.1	66.0	75.6	10.5	56.4	81.4
6.....	7.9	47.6	83.4	3.6	40.4	91.1
7.....	20.3	49.4	58.9	6.2	31.6	80.4
8.....	6.9	24.2	71.5	8.3	36.1	77.0
9.....	10.7	52.5	79.6	10.9	58.9	81.5
Averages...	15.0	55.8	73.7	10.1	59.9	82.0

Turning to results from logs at the shaded site, it can be seen in the accompanying table that again Thiodan (82 per cent reduction) proved superior to lindane (74 per cent reduction). About three times the number of shallow, unsuccessful attacks were found in the Thiodan logs than in the lindane-treated logs. Phosphamidon results are not tabulated because the material failed to stop beetles from entering the wood. Sprayed and unsprayed portions of the Phosphamidon logs averaged 63 and 59 holes per square foot, respectively; the difference is not significant. Because Phosphamidon degenerates rapidly, it would be unwise to judge its potential usefulness for other purposes from these results. It was hoped

that conifer bark would extend the residual life of Phosphamidon as it apparently does with Thiodan which, when used on field and orchard crops, is considered an insecticide of short residual capacity.

The shaded logs were also attacked by a few ambrosia beetles of the genus *Gnathotrichus*, and by the Douglas fir beetle, *Dendroctonus pseudotsugae* Hopk. Thiodan prevented more attacks by both species than did lindane.

If the 1961 results are compared with those of last year, it will be noted that the superiority of Thiodan over lindane was greater in the earlier experiment. Possibly the finely divided lindane wettable powder was superior to the emulsion used last year, or perhaps the 1961 commercial Thiodan emulsion was inferior to last year's improvised emulsion—at least for this particular job.

From this and other work, the superiority of Thiodan over lindane and its related compounds as a scolytid preventive appears to be well established. Several types of Thiodan formulations need to be tested to learn how the greatest efficiency of this insecticide can be realized.—J. M. Kinghorn.

RECENT PUBLICATIONS

Béique, R. Étude sur la mouche-à-scie du peuplier, *Trichiocampus viminalis* (Fall.) (Hyménoptère: Tenthredinidae). Can. Ent. 93: 1085-1097. 1961.

Blais, J. R. Spruce budworm outbreaks in the lower St. Lawrence and Gaspé regions. For. Chron. 37: 192-202. 1961.

Blais, J. R. Aerial application of insecticides and the suppression of incipient spruce budworm outbreaks. For. Chron. 37: 203-210. 1961.

Bourchier, R. J. Laboratory studies on microfungi isolated from the stems of living lodgepole pine, *Pinus contorta* Dougl. Can. J. Bot. 39: 1373-1385. 1961.

Boyer, M. G. Variability and hyphal anastomoses in host-specific forms of *Marssonina populi* (Lib.) Magn. Can. J. Bot. 39: 1409-1427. 1961.

Campbell, I. M. Polygyny in *Choristoneura* Led. (Lepidoptera: Tortricidae). Can. Ent. 93: 1160-1162. 1961.

Clark, R. C. A new record of *Leptinillus validus* (Horn) in North America. Can. Ent. 93: 1010. 1961.

Clark, R. C., and N. R. Brown. Studies of predators of the balsam woolly aphid *Adelges piceae* (Ratz.) (Homoptera: Adelgidae) IX. *Pullus impexus* (Muls.) (Coleoptera: Coccinellidae), an introduced predator in eastern Canada. Can. Ent. 93: 1162-1168. 1961.

Cockerill, J. The effect of chlordane and thiram on damping-off and seedling growth. For. Chron. 37: 211-216. 1961.

Cook, J. A. Growth reduction in lodgepole pine defoliated by the needle miner, *Evagora* (*Recurvaria*) *starki* Freeman. For. Chron. 37: 237-241. 1961.

Dance, B. W. Spore dispersal in *Pollacia radiosa* (Lib.) Bald. and Cif. Can. J. Bot. 39: 1429-1435. 1961.

Edwards, D. K. Influence of electrical field on pupation and oviposition in *Nepytia phantasmaria* Stkr. (Lepidoptera: Geometridae). Nature 191: 976, 993. 1961.

Edwards, D. K. Activity of two species of *Calliphora* (Diptera) during barometric pressure changes of natural magnitude. Can. J. Zool. 39: 623-635. 1961.

Gardiner, L. M. Immature stages and biology of *Hyperplatys* spp. in eastern Canada. Can. Ent. 93: 1011-1016. 1961.

Griffiths, K. J. The life history of *Aptesis basizona* (Grav.) on *Neodiprion sertifer* (Geoff.) in southern Ontario. Can. Ent. 93: 1005-1010. 1961.

Hedlin, A. F. The life history and habits of a midge, *Contarinia oregonensis* Foote in Douglas-fir cones. Can. Ent. 93: 952-967. 1961.

Hopkins, J. C. Studies of the culture of *Atropellis piniphila*. Can. J. Bot. 39: 1521-1529. 1961.

Hopping, G. R. Techniques for rearing *Ips* De Geer. Can. Ent. 93: 1050-1053. 1961.

Huntley, J. H., J. D. Cafley, and E. Jorgensen. *Armillaria* root rot in Ontario. For. Chron. 37: 228-236. 1961.

Jackson, C. A 40-cubic-foot air-conditioned cabinet. Can. Ent. 93: 1154-1160. 1961.

Linzon, S. N. Field grafting with healthy and needle-blighted eastern white pine trees and the expression of disease symptoms. Can. J. Bot. 39: 1287-1292. 1961.

MacGillivray, M. E. and G. A. Bradley. A new subgenus and species of *Toxopterella* Hille Ris Lambers from *Sorbus*. Can. Ent. 93: 999-1005. 1961.

McMullen, L. H. and M. D. Atkins. Intraspecific competition as a factor in the natural control of the Douglas-fir beetle. Forest Science 7: 197-203. 1961.

Pointing, P. J. The biology and behaviour of the European pine shoot moth, *Rhyacionia buoliana* (Schiff.), in southern Ontario I. Adult. Can. Ent. 93: 1098-1112. 1961.

Smirnoff, W. A. and C. F. MacLeod. Study of the survival of *Bacillus thuringiensis* var. *thuringiensis* Berliner in the digestive tracts and feces of a small mammal and birds. J. Ins. Path. 3: 266-270. 1961.

Vaartaja, O. and P. J. Salisbury. Potential pathogenicity of *Pythium* isolates from forest nurseries. Phytopathology 51: 505-507. 1961.

ROGER DUHAMEL, F.R.S.C., Queen's Printer and Controller of Stationery, Ottawa, 1961