recordings it could be determined that $n=0.545\times10^{-4}$ and $n=0.548\times10^{-4}$ for *L. mon.* and *L. disp.*, respectively. These values correspond to a unit-cell edge $a=104.3$ and $a=104.0$ Å for *L. mon.* and *L. disp.* Assuming a spherical shape of the protein particles in the lattice, the above dimensions give the diameters 90.3 Å for *L. mon.* and 90.1 Å for *L. disp.* With a density of 1.27 of the polyhedra the molecular weights of the proteins are 297,800 and 292,900, respectively. The values are about 7% higher than those reported from studies on vacuum-dried or osmium-fixed polyhedron preparations.

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Spruce Bark Beetle, *Ips typographus*: Pheromone Production and Field Response to Synthetic Pheromones

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The spruce-infesting bark beetle, *Ips typographus* (Linnaeus) attacks healthy trees and is considered one of the most aggressive and serious pests of spruce in Eurasia. The attack behavior of this beetle has been the subject of repeated discussion in Europe for more than 200 years [1]. Studies in recent decade, especially in North America, have demonstrated the importance of insect-produced chemical compounds (pheromones) when bark beetles initiate boring in living trees [2]. Four compounds known as pheromones in other *Ips* species have been identified from *Ips typographus* [3], but their biological significance has not been established.

This report presents some results of gas chromatographic analysis of hindguts of male beetles at various times during the gallery construction and flight response of beetles to synthetic pheromones under field conditions.

The hindguts of male beetles initiating attack contained among other compounds about equal amounts of *trans*- and *cis*-verbenol. There were higher quantities in males fighting the resin flow of living trees than in beetles boring in logs. When males have succeeded in boring the nuptial chamber, the hindgut also contained 2-methyl-6-methylen-2,7-octadien-4-ol (ipsdienol). After the females had started laying eggs, an additional compound, 2-methyl-6-methylen-7-octen-4-ol (ipsenol) appears in the hindgut of the male.

According to glc, *trans*- and *cis*-verbenol were produced when male beetles were exposed to oleoresin or to α-pinene [3]. Ipsenol or ipsdienol were not formed in unfed or fed beetles which were exposed to mycene. This result is in contrast to results from similar studies in other *Ips* species [4, 5]. The presence of ipsdienol and ipsenol was not detected in every individual male initiating galleries, but seems to be limited to beetles exposed to certain unknown conditions.

Ipsdienol and the two verbenol isomers, supported with α-pinene gave an approximately 5 times higher response to flying beetles than did other combinations of the compounds (Table 1.) When ipsenol was added, the attraction effect was repressed. Ipsenol may be considered part of a mechanism for regulating the density of beetle attack, similar to that observed in some *Dendroctonus* species [2]. The observations indicate no significant difference between males and females in their response to the various combination of compounds. When tubes with ipsdienol, verbenol, and α-pinene were put on healthy trees, the beetles colonized and killed the trees. The use of synthetic pheromones opens up new possibilities for controlling *Ips typographus*.

Table 1. Number of *Ips typographus* trapped in response to synthetic pheromones, June 10–12, 1975, Eidskog, Norway (100 mg of α-pinene, 50 mg of each other compound, time period 1–2 h depending on flight activity)

Source material: *cis*-verbenol *trans*-verbenol α-pinene and:	Mean number (8 replications)	Range
Ipsenol + ipsdienol	7.3	0–18
Ipsdienol	34.4[a]	10–90
Ipsenol	4.9	1–11
None	6.4	0–15
Control (no bait)	1.0	0–2

[a] Significant at 1% level by a multiple-range test.

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Chlorflurenol Increases Branching of Evergreen Azaleas (*Rhododendron cv*)

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Morphactins [1] have been reported to repress apical dominance and induce a wide range of other growth responses [2–4]. Branching can be induced on chrysanthemum [4] and other species [2, 3] but morphactin use to increase branching of azaleas has not been reported. Fatty acids have been used to stimulate branching of azaleas [5]. In a greenhouse "Erich Schaame" or "Red Wing" azaleas growing in 20-cm pots were sprayed to drip with chlorflurenol (IT 3456 – Celamerck, Ingelheim, Germany) containing 0.1% Tween 20 (sorbitan polyoxyethylene monolaureate). Branch numbers were counted at time of treatment and 4 or 6 months later.

Very large increases in branch numbers followed spray applications of 10 ppm or more chlorflurenol on "Red Wing" (Table 1). Most new branches on 100-ppm-treated plants were stunted and the new leaves were small, curled inward and darker coloured [2]. Large numbers of new branches were formed on every mature branch with a concentration at the apex. At 30 ppm a few new shoots were similarly retarded but at 10 ppm no new shoots were stunted in appearance. "Erich Schaame" responded similarly. As little as 3 ppm chlorflurenol resulted in a significant increase in branches

