exist as a bifunctional complex in mammals (as reviewed by Levine et al.[14]) could be caused by a repression of orotate PRTase. Hoogenraad and Lee[15] have shown that uridine can inhibit de novo synthesis of pyrimidine in cultured hepatoma cells by an effect on the level of activity of orotate PRTase. Uridine, uracil and certain other pyrimidine metabolites are in excess in OTC deficiency hyperammonemia and orotic aciduria[5]. The excess of these pyrimidine metabolites could, therefore, be the cause of a repression of synthesis of the orotate metabolizing enzyme complex in spf mice.

Slightly higher activities of CPS, ASL and ARG in spf mice, which are statistically non-significant, would not have any importance, as individual enzyme deficiencies in hereditary urea cycle disorders are not known to cause any remarkable changes in other enzymes of the cycle[16].

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Diolefin analog of a sex pheromone component of *Heliothis zea* active in disrupting mating communication

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Summary. A hydrocarbon (*Z*)-1,12-heptadecadiene, was synthesized from the major sex pheromone of the corn earworm, *Heliothis zea* (Boddie). In field tests, significant disruption of the sexual behavior of *H. zea* males was obtained, comparable to the pheromone (*Z*)-11-hexadecenal. This novel diolefin should be inexpensive, exhibit improved stability, and may lead to improved methods of control.

Disruption of mating communication in moths via air permeation has been accomplished with pheromones and also with non-pheromonal chemicals having structural properties similar to the pheromone components of the target species. The corn earworm, *Heliothis zea* (Boddie), and the tobacco budworm, *H. virescens* (F.) utilize (*Z*)-11-hexadecenal (HDA) as a major component of the females' sex pheromone. A structurally related analog, (*Z*)-9-tetradecen-1-ol formate, was an effective disruptant of mating communication in air permeation trials against these species[2,3]. An olefin, (*Z*)-5-hexadecene, was found to disrupt mating communication in *Chilo suppressalis* (Walker) in field tests, and also inhibited the response of males to pheromone-releasing females in a trap[4].

Aldehyde pheromones are expensive, tend to polymerize when stored in bulk, and present longevity problems in the field due to air oxidation and photosensitivity. Alternative materials with useful behavioral effects, greater stability and reduced cost are potentially useful in insect control. We report the 1st field tests of (*Z*)-1,12-heptadecadiene, a non-oxygenated, doubly-unsaturated hydrocarbon analog of a natural pheromone component that disrupts mating communication of *H. zea*. This analog was synthesized from (*Z*)-11-hexadecenal (Chemical Sample Co., Columbus, Ohio, USA) via a Wittig reaction using methyltriphenylphosphonium bromide (Ventron, Danvers, Massachusetts, USA) and *n*-butyl lithium (PCR, Gainesville, Florida, USA) (Carlson, unpublished data). The diolefin was eluted from a silica gel column with hexane and analyzed by GC on a 1.8 × 2 mm glass column packed with 3% OV-1 held at 110 °C. The major peak contained 99.8% of the material obtained, and eluted at the equivalent of 16.7 carbons, compared to paraffin standards, while the formate eluted at 17.0 and the starting HDA eluted at 17.7 carbon equivalents (table). The increased volatility of DO suggests that equiv-

(*Z*)-11-hexadecenal and some analogs: GC retention indices, retention times

Structure	Notation	RI[a]	Tr/min[b]
(*Z*)-1,12-heptadecadiene	DO	16.70	6.74
(*Z*)-5-heptadecene	Olefin	16.85	7.25
(*Z*)-9-tetradecen-1-ol formate	Formate	17.00	7.74
(*Z*)-11-hexadecenal	HDA	17.75	11.37

[a] Retention indices in carbon number equivalents. [b] Retention times by gas chromatography.

alent formulations should release more DO than HDA in the field.

Fragments were seen at m/e 235 (M+1, 7%), 236 (M, 4%) and 237 (M+1, 3%) by methane chemical ionization mass spectrometry and were consistent with the desired diolefin.

The bioassay method for studying disruption of mating communication in the corn earworm via air permeation in the field has been described elsewhere[5]. The DO was evaporated from closed No.3 Beem® embedding capsules, each containing 5 mg of the material. Each capsule was attached to a wooden stake at a height about 15 cm above the plant canopy. A treatment consisted of 16 equally-spaced evaporators within a 100 m^2 plot. At the center of each plot was a cone-trap[5] baited with 3 virgin female *H. zea*. The experiment consisted of 6 trapping sites in a peanut field (2 rows of 3 traps each) with 100–180 m between traps. The treatments were applied to every other site and each time the traps were checked the treatment were moved to the adjacent site. The traps were inspected 9 times from July 11–23, 1980. Each time the treatment was moved to a previously untreated trap site, the number of males captured by that trap was reduced. Traps at untreated sites captured a mean of 12.4 ± 2.7 (SE) males/trap per trapping interval and traps in DO-permeated areas captured 1.9 ± 0.5 males/trap per trapping interval. These means are statistically different, ANOVA, at the 1% level of significance. The greatest reduction relative to the controls was 91.9% and the least reduction 75%.

Inhibition of the corn earworm was determined by placing 2 cone traps 50 m apart in a corn field for 6 nights. Each night each trap was baited with 3 virgin *H. zea* females. An embedding capsule containing 5 mg of DO was attached adjacent to the female's cage in 1 trap. The treatment was alternated nightly between the traps. The traps without DO captured a mean of 23.3 ± 1.2 (SE) males/trap per night while traps baited with DO and females captured a mean of 18.5 ± 0.9 (SE) males/trap per night. The means are statistically equivalent, ANOVA, at the 5% level.

Disruption of mating communication in the tobacco budworm was attempted in a tobacco field for 5 consecutive nights, August 1–6, 1980, using the same technique. Control traps captured a mean of 2.6 ± 0.5 (SE) males/trap per night while traps in the treatment area captured a mean of 3.8 ± 0.8 (SE) males/trap per night. The means are statistically equivalent, ANOVA, at the 5% level.

It appears that electron density around the position occupied by the oxygen atom in the natural pheromone, HDA, may be very important; thus, its substitution with a double-bonded carbon as in DO is possible with retention of activity. Interestingly, while the formate disrupted both *H. zea* and *H. virescens*, DO disrupted mating communication only in *H. zea* when released at the same single rate described here. This failure in *H. virescens* suggests that, while isosteres, analogs, enantiomers and cogeners of insect sex pheromones have variously demonstrated effects as attractants, inhibitors or disruptants, it is not yet possible to predict such effects.

Comparable reduction in catch of *H. zea* using HDA in the air permeation technique in a Hercon formulation were 90–100% over approximately the same period of field trapping as the present work, while reductions using the formate in Conrel hollow fibers were also 90–100%. Direct comparison of results with HDA and formate to the 75–92% reductions found here with DO are not appropriate since different formulations were used, but preliminary results are encouraging. Also, it is possible that a blend of DO with small amounts of aldehydes and/or formates may approximate the activity of the best aldehyde blend[6].

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Phosphate mediated regulation of some of the enzymes of carbohydrate metabolism in *Neurospora crassa*

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Summary. The levels of FDP aldolase, isocitrate lyase, isocitrate dehydrogenase, malate dehydrogenase and glucose-6-P dehydrogenase were found to be rugulated by inorganic phosphate in the growth medium. The possible regulatory aspects have been discussed.

It has been suggested that phosphate exerts a direct control on the selection of primary and secondary metabolism of the cell[1]. Though the regulation of secondary metabolism by inorganic phosphate is well documented[2–4], information on the role of inorganic phosphate in the regulation of enzymes is scarce. The present study is focused on the role of inorganic phosphate in the regulation of some of the enzymes of carbohydrate metabolism. These studies may be useful for understanding the regulation of secondary metabolism through control of the levels of enzymes involved either directly in a biosynthetic pathway or in providing intermediates.

Table 1. Changes in growth, glucose utilization and ketoacids in *N. crassa* grown under low and high phosphate conditions

Growth condition	Growth (dry wt, g/l)	Glucose uptake (g/l)	Ketoacids (mg/l)
Low phosphate (KH_2PO_4 0.01%)	4.8	25.5	302.1
High phosphate (KH_2PO_4 1.0%)	5.7	42.3	209.7