

# Bees may suffer in "clean" air

LAWRENCE, Kansas — At first glance, the recently published findings of a University of Kansas research team seem to carry a "For Scientists Only" label.

Who else would care that male sweat bees fumigated continuously with levels of sulphur dioxide low enough to meet federal air-quality standards begin to fly less and less?

Yet Charles Michener, Kansas University Watkins Distinguished Professor of Entomology, makes a good case for the general significance of that discovery. He says that pollutants may be inhibiting reproduction of crop pollinators, such as bees, and slowing down other flying insects that prey on their plant-eating cousins.

Michener was graduate adviser and bee supplier to two entomology graduate students who took part in the study: Michael Ginevan, who left KU in 1978 after finishing the work, and Les Greenberg, who remains a KU graduate student.

D.D. Lane, assistant professor of civil engineering, designed and built the fumigation chamber and has kept it working.

Michener speculates that like male sweat bees, other flying insects also grow sluggish when exposed to low sulphur dioxide levels. Meanwhile, the prey of those flying insects — other less mobile insect that feed on plants — face less threat from their popped-out predators.

"This may mean we're setting ourselves up for bigger and bigger attacks by plant-feeding insects because they're not being controlled by their enemies," he said. "And we have some hints that this is really happening."

For example, years ago one of Michener's colleagues advertised that he would pay a nickel each for cecropia moth specimens. The moth is a relatively rare plant-eating insect, and the colleague collected about a half dozen from Lawrence.

"Then someone appeared with two gunnysacks full that he's collected from a couple of vacant lots around Kansas City."

Michener said that one possible explanation is that the parasitic wasps that attack the cecropia moth "are being killed off or made sluggish by pollutants."

In three tests by the KU research team, male sweat bees were fumigated with low-level concentrations of sulphur dioxide — .14 parts per million (the federal maximum) to .28 ppm-for 16 to 29 days. In all tests, flight activity of bees exposed to the gas, one of the major air pollutants produced by the burning

of fossil fuels, fell off more rapidly than in matched groups of identical, unexposed bees.

In the 16-day experiment, for example, the bees' per-day flight time fell from about 50 percent to about 15 percent with sulphur dioxide levels at .14 ppm.

What's more, the decline in flight activity changed little when the sulphur dioxide dose was doubled to .28 ppm, suggesting that levels lower than 14 ppm also may inhibit flight, according to the researchers' findings, published in the October 1980 Proceedings of the National Academy of Sciences.

Lane said there is "no doubt" that cities such as New York, Los Angeles and Kansas City occasionally reach the 14 ppm level, but that such concentrations also can occur in more remote areas, where the effect on insect populations would be more marked.

For example, public policy is dictating the construction of coal-burning power plants adjacent to coal mines, he said, which could

result in sulphur dioxide levels harmful to flying insects within a four to five-mile radius of the plant.

There are implications to the observed fall-off in flight time besides the advantage that it gives to non-flying, plant-gobbling insects, he said.

During their mating cycle, sweat bees must be airborne in order to mate, he said. Low sulphur-dioxide levels could prevent reproduction. The same may happen to many other flying insects.

Michener added bees are much more important than other insects in plant pollination, with the farm value of crops they pollinate running annually into the billion of dollars.

One interesting aspect of the study is that before Ginevan and Lane teamed up in 1976 to begin their bee study, very little research existed on air pollutants' effects on insects, Michener said.

Older scientific studies had concluded that sulphur dioxide didn't kill insects, he said, so researchers instead had focused on

that pollutant's effects on green plants and mammals, including humans.

"So the earlier

results, we think, are deceptive because the researchers were only looking at mortality," he said.

## PUBLIC SALE

Of Farm Equipment, Tools, Guns, Steam Engines, Hit-Miss Engines, Household Goods, Antiques

SATURDAY, APRIL 11

9:00 A.M.

Located along Rt. 322, one mile east of Blue Ball, East Earl Twp., Lancaster Co., Pa.

### Farm Equipment

John Deere 4020 Diesel Tractor on steel tank wheels, straight shift, John Deere 350 Crawler with Bucket, New Under Carriage, John Deere 1010 Row Crop Tractor on steel with Two Row Cultivator, John Deere A Tractor on steel, John Deere 4-16 Rollover Trip Bottom Plow, with new bottoms, Oliver 365 3 16' Trip Bottom Plow, John Deere 1240 Cornplanter with New Fingers, Insecticide and Fert., New Holland 275 Baler, 3 pt John Deere Pitmanless Mower, 3 yrs old, John Deere 210 Transport Disc, 3 yrs old, New Holland Super 717 Harvester with Wide Row Corn Head and Harden knives, 2 Dion Forage Wagons with Flotation Tires, used 4 yrs, John Deere 65 Hopper Blower, Zimmerman Table Blower, 16 Bale Elevator, Zimmerman Field Sprayer, 3 yrs old, John Deere 4 Section Harrow, 12' Metal Drag and Land Leveler, Ward 3 pt Single Bottom Plow, 9 Cultipacker, Massey Harris 20 Disc Grain Drill, Massey Harris Wheel Rake, New Holland 518 Manure Spreader, Two Row Potato Planter, Grader and Plow, Two Row Stauffer Transplanter, new barrel, New J D Cylinder, Farm and Hog Trailer 7 ton 18 Flatbed Wagon, 500 gal Tank with Pit Pump on Trailer, Hog Feeders and Troughs, 40 of 9 Silo Pipe and Gooseneck, Hardy Portable Sprayer with engine, Air Compressor with 5 H P motor, Electric Gas Pump, 150 New Copper Spouting, Kurtz Binder Wheel, Bale Boxes, Corn Sheller, Vise, Anvil, Motors, Belts, Bolts, 2 Bench Saws, Electric Chain Saw, Saw Buck, Hand and Power Saws, 3 Woodworking Lathe, Tool Boxes, 3/4' Socket Set, Open End and other Wrenches, Water Pump, Pipe Fitting, Log Chains, Ladders, Scrap Iron, plus more farm tools not listed

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## PUBLIC SALE

HOLSTEIN DAIRY HERD AND FARM IMPLEMENTS

FRI., MARCH 27

11:00 A.M.

On the premises in Marion Township, Berks County, Pa. Close to North Marion Mennonite School Turn north at Millardsville on Route 422, East of Myerstown on to Wintersville Road. Go to second crossroad. Turn right to sale. Watch for sale signs.

### HOLSTEIN DAIRY CATTLE

30 Head Of Holstein Grade Dairy Cattle; 20 Milk Cows, Some Fresh And Some In Various Stages Of Lactation. Good Producing Herd. 9 Head Bred Heifers; One Service Age Bull; One Yearling Bull.

### FARM IMPLEMENTS

1200 David Brown Tractor; Sauder Loader, Like New; No. 352 N. H. Grinder & Mixer; J.D. No 110 Haybine; Gehl Harvester; Corn Head and 6' Pickup; Wood Corn Picker; No. 68 N.H. Baler; N.H. Manure Spreader With Hydraulic End Gate; Mc L 14' Wheel Disc; Brillion 12' Cultmulcher; Cultipacker; Harrow; Small Harrow For 3-Bottom Plow; Disc On Wheels; Trailer-Type Sprayer With 30' Boom; Wheel Disc; No. 110 J.D. Forage Wagon; Grove Forage Wagon; 3 Flatbed Wagons; N.H. Forage Wagon; Oliver Superior 20 Disc Grain Drill On Rubber; Trailer with 7 1/2 x 16' Diamond Plate Bed; Wagon With Hay Racks; Silage Trailer; Mc.C Chopper; Gehl No. 99 Hythrow Blower, Used 1 year; J.D. Hopper Blower; J.D. Ensilage Blower; J.D. No. 494 Corn Planter; David Bradley Side Rake; Snowplow; 4" Gram Auger; Cattle Waterer; 3-Point Ground Scoop; Post Hole Digger; Incomplete Chore Boy Pipeline Milker With 34' 1 1/2" Glass Tubing; 3 Roof Ventilators; Wheelbarrow; David Brown Wheel Weights; Feed Cart; Milk Cans; Cow Clippers; Dehorner; Fence Posts; Tobacco Lath; Tractor Tire Chains; 4 Handyman Jacks; Range Shelter And More Items Not Listed Used On A Farm. Not Too Many Small Items, So Be On Time!

Sale Time: 11:00 A.M.

Sale Order: Small Items, Farm Implements, Cattle

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Hoover & Martin, Clerks

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## CONSIGNMENT HORSE SALE

SATURDAY, MARCH 28

11:00 A.M. Sharp

Tack sold at 9:30 A.M.

Horses Hitched at 9:00 A.M.

(If weather permits)

KEISTER'S MIDDLEBURG AUCTION SALES, INC.

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## PUBLIC SALE

FRIDAY, APRIL 3

AT 8:30 A.M.

Located in Cumberland Co., 7 miles west of Carlisle and 3 miles east of Newville. Watch for sale signs along Rt. 641 leading from Carlisle to Newville.

### Farm Machinery

Massey Ferguson 165 tractor; John Deere 40 tractor; John Deere cultivators for 40; John Deere lever harrow; John Deere fluffer; Oliver two 16 in. bottom cushion trip plows; New Holland 69 Hayliner Baler with thrower; 2 rubber tired wagons with hay racks.

Oliver side delivery tractor rake; 28 ft. bale elevator; Harvester grain elevator; hay and grain elevator; Brillion cultipacker; Oliver disk harrow; 3 pt. Massey Ferguson 7 ft. tractor mower; New Holland spreader (good); snow blade; Ford tractor jack; saw mangle; 3 creasote poles; seed cleaner; grindstone; 2 sump pumps; power take off shafts; two wheel trailer.

### Museum Pieces

Domestic gas engine; one-horse corn cutter; one-horse grain drill; Oliver A409 sulkey plow; small Conestoga wagon with lynch pins; one-horse bob sled; shaving horse; York 2 row corn planter; fanning mill; one-horse plow; one-horse cultivator; good sleigh; one-horse jumper; two one-horse corn planters; one-horse hay tedder and two bob sleds; boring machines.

### Horse Drawn Equip. & Primitives

Several good two-horse wagons with good beds and seats; dump rake; New Idea push hay loader; iron wheel wagon with bed; IHC two horse walking plow; Oliver steel beam walking plow; Oliver wooden beam walking plow; 3 shovel plows; Syracuse plow.

McCormick two-horse corn plow; two-horse mower; running gears of wagons and wheels; 3 sets buggy shaves; buggy two-horse pole; steel wheels and axles; IHC burr mill.

### Special Mention

ONE OWNER 1966 CORVAIR 4 DOOR SEDAN WITH 67,000 ORIGINAL MILES

Buggy wheels and axles; single trees; double trees; spreaders; blacksmith vise; runners for bob sleds; buggy jacks; shad belly saws; several wooden wheelbarrows; two wooden tubs; several grain cradles; forks and shovels.

### Harness & Butcher Equipment

12 horse collars; fly nets; 6 sets of front gears and 2 sets of britchmens; iron kettles; 3 foot; grinder; stuffer; flesh forks; meat bench.

A LOT OF CHAIRS AND ROCKING CHAIRS (Some with cane seats)

LARGE IRON PILE - 3 WAGON LOADS OF SMALL ITEMS.

NOTE: No sale here for 49 years. It is hard to tell what will be uncovered. This is a very small list.

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