Convection Plumes and Insects

Peterson and Damman [*Science* **148**, 392 (1965)] show an interesting photograph of plumes rising from elm trees in relatively still evening air. They report that there were no local concentrations of insects in the air, but I am convinced they would have seen such in the plumes had they used binoculars from a short distance. The phenomenon they saw is well known though not often seen. I first saw it on a late-summer evening some years ago, over an oak coppice some 2 meters high. Over every branch ascending at the top I saw stirring columns, like those depicted by Peterson and Damman, maximally about 1½ meters high. I realized that they were composed of mosquitoes only when I came nearer. Then I could see them individually very well. The second time I saw the plumes (my little son drew my attention to them) was on 7 October 1965 over Italian poplars near my house. They were also to be seen over other trees but this time not over small trees, I think, only over trees 10 to 20 meters high. Through binoculars (7 × 50) I could see the mosquitoes very well; they were large mosquitoes, probably *Theobaldia annulata* Sch.

The next day, I saw Peterson and Damman's report, and as it was at the end of the afternoon and the same weather as the day before, I had a look in the garden of "Hinkeloord," the building of the Institute of Forest Research of the Agricultural University at Wageningen, well known to Damman. And behold—the same phenomenon was to be seen there over different trees, not only broadleaved trees, but also coniferous ones—*Cedrus atlantica, Libocedrus decurrens,* and *Sequoidadendron giganteum*. On my way home I saw it over beeches and maples, in and around my garden over *Chamaecyparis lawsoninana, Cedrus*, poplars, and other trees (Fig. 1). But the same phenomenon was also to be seen over a television pole on a neighboring roof, although not over a tree that had lost its leaves. We had a warm autumn and many mosquitoes that year. It was somewhat cloudy and there was little wind. Until 26 or 27 October the phenomenon was to be seen every evening, except on one or two rainy days. I have been told that some years ago, in Zutphen, the fire brigade turned out because the church tower was reported to be burning. The "smoke" proved to be huge masses of mosquitoes dancing over the tower.

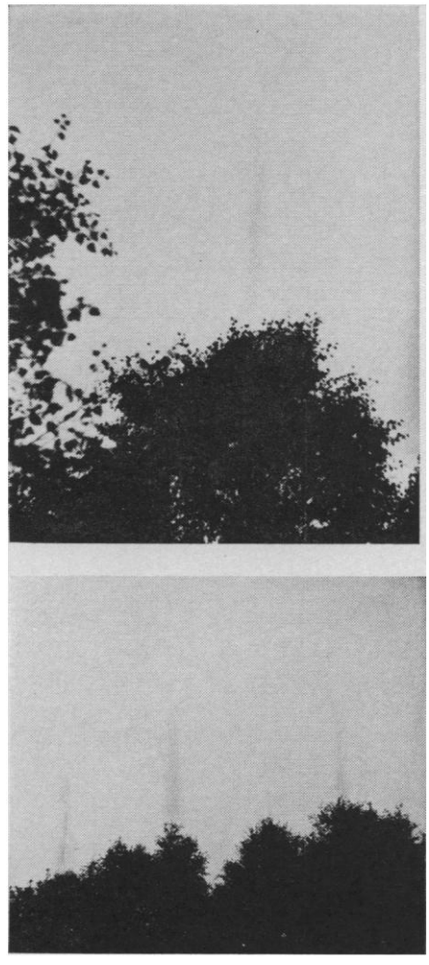

Fig. 1. Mosquitoes in columns above treetops.

It is well known that these mosquitoes seek warm and moist places to dance in. You will not see them near a warm wall but near the gutter of the roof. As Peterson and Damman say, "in the early evening the entire tree crown, as a unit, [is] a reservoir of relatively warm air." As I see it, at high points of the crown there are not only horizontal boundaries between warm and cold air, where the heavy cold air rests upon the lighter warm air while leaves hinder streaming—but also vertical or nearly vertical boundaries, where the system becomes unstable and the warm air streams out of the crown. After a short distance this warm air, perhaps still unsaturated but with rather high humidity, is cooled and becomes saturated. The quantity of moisture is so small that it does not seem possible that it could be visible, but the warmth and moisture are sufficient for the mosquitoes enjoyment. In the case of the television pole, the warmth of the roof is easily conducted through and along the iron pole and rises from there. I think we must forget about hydrocarbon particles becoming visible or serving as condensation nuclei for mist droplets and have a good look at the phenomenon with binoculars.

J. H. WIERSMA
Institute of Forest Research, University of Wageningen, Netherlands

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Communication between Dolphins in Separate Tanks

Lang and Smith show [*Science* **150**, 1839 (1965)] that two dolphins emitted many more "whistle groups" when their tanks were acoustically connected than when the acoustic link was disconnected. Although the authors state that "the acoustic link was connected and disconnected at approximately 2-minute intervals," their Fig. 4 shows the total duration of the eight linked periods to have been 1040 seconds and that of the eight unlinked periods to have been 875 seconds. Moreover, seven of the linked periods were each longer than the unlinked period immediately preceding it. It would be desirable to know what factor or factors dictated the connecting and disconnecting of the acoustic link.

RONALD J. SCHUSTERMAN
Stanford Research Institute, Menlo Park, California

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The periods were made nonuniform to help prevent possible anticipation by the dolphins of the period changes. The bias toward shortening the disconnected periods was introduced to maximize information per unit time. A certain amount of silence during the disconnected periods is informative, but extended periods of silence tend to be uninformative.

THOMAS G. LANG
H. A. P. SMITH
U.S. Naval Ordnance Test Station, Pasadena, California 91107

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