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18 August 1965

Convection Plumes from Trees

There is nothing in Peterson and Damman's report "Convection plumes from *Ulmus americana* L. [*Science* **148**, 392 (1965)] to show that the plumes they observed were not aggregations of small dipterous insects, which, as has been well-known for centuries, characteristically form under just such conditions as those specified in the report. Indeed, the authors' illustration and detailed description would fit almost exactly many of the recorded instances of crepuscular swarming by mosquitoes and midges. Such observations are widespread and numerous. *The Mosquitoes of North and Central America and the West Indies*, by Howard, Dyar, and Knab (Carnegie Institution of Washington, 1912) contains a rich store of them. There (vol. 1, p. 125) we read of small gnats swarming in a light breeze as the sun set, where "from the top of nearly every tree three or four . . . strange, smokelike columns could be seen standing up in the air, always straight but not always vertical, some of them being inclined at small angles." There, incidentally, we can read also (vol. 1, p. 124) of the "Mückenpeitscher"—the people of Fischhausen who mistakenly gave a fire alarm when they saw gnats swarming above a church steeple!

The likelihood is, then, that the plumes reported by Peterson and Damman ("the precise composition [of which] remains unknown") were aggregations of small Diptera. The authors' summary dismissal of this possibility ("there were no local concentrations of smoke or insects in the air that could have contributed to the phenomenon") cannot be taken seriously by readers familiar with waterside swarms of mosquitoes and midges (which are of course aquatic in their early stages) and familiar also with the practical difficulties of detecting small insects sheltering high in the crowns of trees. Indeed, tree-top swarms often provide the first evidence of the presence of such insects.

Under the circumstances, the only logical course is to assume that the plumes observed were indeed insect swarms—at least until the authors offer factual evidence to the contrary. And let us not speak of a "Peterson-Damman effect" [*Science* **149**, 764 (1965)] until reasonably sure that we have something novel to describe.

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22 November 1965

Peterson and Damman's article and the letters by Ward and Beckner, Hackman [*Science* **149**, 764 (1965)], Drapeau [*ibid.* **150**, 509 (1965)], and Rigby (*ibid.* p. 783) prompt me to remark that this phenomenon of plume-like appendages observed near the top of trees and other high objects is well known to students of two-winged flies (*Diptera*) and to offer the following introduction to its literature: J. A. Downes, *Trans. Roy. Entomol. Soc. London* **106**, 213 (1955), and *Proc. Intern. Congr. Entomol. 10th* **2**, 425 (1958); P. A. Glick, *U.S. Dept. Agr. Tech. Bull.* **673** (1939); A. J. Haddow *et al., Trans. Roy. Entomol. Soc. London* **113**, 249 (1961); H. Oldroyd, *The Natural History of Flies* (Norton, New York, 1965).

Oldroyd's book presents an admirable account of swarming in flies, with references to a number of papers, one of which (Haddow *et al.*) includes 6 pages of bibliography referring to occurrences of insects at heights from the ground. Downes, in the later paper, gives a summary and bibliography of the habit in biting flies such as mosquitoes and punkies, and in the earlier paper he includes a figure (very similar to one by Peterson and Damman) of plume-like swarms over a 25-foot spruce tree. Glick gave a lengthy bibliography and showed that insects occur at considerable height.

I have observed the phenomenon several times; the most vivid recollection is of plumes trailing leeward in the wind from tops of tall tamarack trees on the shore of the "eau" at Rondeau Provincial Park, Ontario.

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22 November 1965

Gegenschein: Photographs

In our report "Gemini V experiments on zodiacal light and gegenschein [*Science* **150**, 53 (1965)], we made the statement, "No previous attempts to photograph the gegenschein have been successful." The statement should have been, "No previous attempts to photograph the gegenschein without airglow contamination have been successful." As a consequence of our original statement, we have received letters directing our attention to a paper by Osterbrock and Sharpless [*Astrophys. J.* **113**, 222 (1951)] and an article by Struve [*Sky and Telescope* **10**, 215 (1951)].

The photograph by Osterbrock and Sharpless shows a diffuse illumination in the gegenschein direction which is probably the counterglow. We have a number of unpublished balloon-camera photographs which also show diffuse illumination in the approximate anti-sun direction. It is our opinion, however, that the presence of the patchy terrestrial airglow above the camera makes it impossible to identify as extraterrestrial any other dim, diffuse phenomenon photographed from below the airglow layer. For example, reports of motion and parallax of the gegenschein [Elvey, *Astrophys. J.* **77**, 56 (1933)] are much more indicative of airglow effects than of the presence of a true extraterrestrial source of light.

It is therefore in identifying the gegenschein as an extraterrestrial illumination that we consider the Gemini V photographs to be unique.

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