

Eatometer

Although Fallon's "eatometer" [*Science* **148**, 977 (1965)] looks grossly like a feeding analogue of the drinkometer on which it is based, it is fundamentally quite different and far more complex than it needs to be. The drinkometer gives an index not only of when a rat drinks but of how much—this because a tongue lap delivers a reasonably standard quantity into the rat's mouth at each lap. The eatometer, on the other hand, is sensitive only to the temporal dimensions of the animal's contact with the food, yet it relies upon the complicated and expensive drinkometer circuit for amplifying the very small current that passes through the animal's body. For temporal data of this sort all one needs is a microswitch and a very lightly spring-loaded door covering the food container. The microswitch is more reliable than the drinkometer, and so long as it is available by the thousands in surplus depots it costs only about 0.001 percent as much.

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It was after several years of research using a simple food-door arrangement that the eatometer was developed in the Virginia laboratory. The mechanical means of measurement was abandoned in favor of an electronic solution for two reasons. First, recording failures due to mechanical wear and slippage resulted in great losses of data over extended periods of time. Second, systematic observations indicated that food doors were frequently handled by rats which were not eating at the time.

The value of the eatometer as a recording instrument is indicated by the vast improvement in reliability and validity it affords over a mechanical device such as a food door. In our present research, the reliability of the eatometer has been 100 percent, and we find an

almost perfect correlation of eatometer data with observed instances of eating in a standardized time-sampling technique (20 minutes of observation through a one-way vision screen every 2 hours for several weeks).

As for cost, components of a vacuum-tube amplifier for two eatometers (or one eatometer and one drinkometer) may be bought for less than \$20, including relays. A single solid-state amplifying circuit may be built for less than \$7.

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Convection Plumes from Trees

The report and photograph of what appear to be convection plumes, by E. B. Peterson and A. W. H. Damman [*Science* **148**, 392 (1965)], provides a probable explanation for a similar phenomenon observed by us in Florida.

On 16 February 1965, near dusk, while traveling on the Sunshine State Parkway south of Wildwood in eastern Sumter County, a road which passes for several miles through a heavily wooded swamp, we noted plumes ascending from the tops of the larger trees, mostly laurel oak (*Quercus laurifolia* Michx.), although other species were present in the association and may have been involved. The plumes were darker than the background sky and rotated somewhat as they ascended. Their length was probably between 2 and 4 m, certainly more than the 1 m reported by Peterson and Damman. Although no discrete bodies were visible within the plumes, we thought at the time that they were formed by insects, which were exceedingly abundant at the level of the car windshield. Our observation of this spectacle lasted for only a few minutes, probably no more than 4 or 5. The plumes ceased while we

watched, before the falling light intensity would have made them invisible. Climatic factors were similar to those present in the New Brunswick observation of Peterson and Damman. Humidity was high, and air temperature was probably between 20° and 25°C and was falling. Seasonal development of the trees involved was far different, however, for elms in New Brunswick in May would be actively growing, while laurel oak in Florida in February is rather quiescent, the leaves still present and photosynthesizing but with comparatively little metabolic activity.

That the Peterson-Damman effect (if it may be so termed) should be observed twice on different tree species, at different latitudes, and at different seasons, suggests that it may be a moderately widespread phenomenon. Although the infrequency and ephemerality of this effect will make rigorous study of it difficult, nevertheless, now that we are alerted to its existence, attention should be given to recording additional occurrences and the exact environmental conditions present.

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On still summer evenings I have fairly often seen a phenomenon very similar to, perhaps identical with, that shown in Peterson and Damman's photograph. By using binoculars I have found that the plumes I saw were, in fact, swarms of mosquitoes. The swarms rise like slowly wavering plumes of smoke from tree tops, and also from rocks, haystacks, and so forth. It seems quite possible that the mosquitoes in swarming keep to, and accordingly make visible, convection currents of warm air.

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