polymers with acidity has been submitted for publication to the *Lancet* since the above was written. Chemical analysis based on mechanical expansion might be extended to oxygen tension with a chelate encased in polyethylene. Since the battery runs for two weeks, extended *in vivo* animal experiments of these types are possible.

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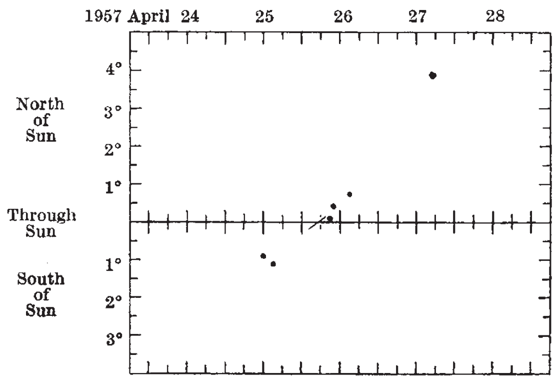
[Attention may be directed to a paragraph in *Nature* of May 4, p. 898, referring to a similar device demonstrated at the Rockefeller Institute and briefly announced on April 9.—*Editors.*]

The Sunward Tail of Comet Arend-Roland

Comet Arend-Roland (1956*h*) displayed in late April a remarkable spike-like tail directed roughly towards the Sun. This tail developed from a diffuse fan-shape on April 22 to a long and narrow spike attaining its maximum reported length of 15° on April 25.9 u.t., according to the observation of Fogelquist[1]. By April 29 the sunward tail had essentially disappeared. Van Biesbroeck[2] reported it as being a "slender jet 4° long" on April 24.1 and estimated a length of some 13° on April 25. No observations of length on April 26 are yet available to me, so it appears that the maximum extension of the sunward tail took place some time during April 25–26.

The direction of the spike has been measured on six photographs of the comet, and the deviations of the Sun from the great circle projections are plotted in Fig. 1. The photographs, which were transmitted to *Sky and Telescope Magazine*, were made by R. Fogelquist (Upsala, Sweden); C. F. Capen, jun., and B. A. Smith (State College, New Mexico); T. Sjogren (Hovas, Sweden); E. Mendoza and M. Krebs (MacDonald Observatory); and W. S. Butts (Pullman, Washington), and have been used with their permission.

From Fig. 1 it is apparent that the sunward tail swung round in position angle fairly uniformly with time and that its extension passed through the Sun within an hour or two of April 25, 17h., 1957. The Earth crossed the plane of the comet's orbit on April 25, 18h., 1957, according to the orbit calculated by Candy[3]. This time of crossing appears to be established to within an hour, in complete agreement with the time that the spike pointed towards the Sun.



Projection of comet spike near Sun

Fig. 1

No extraordinary physical theory appears necessary to account for the growth of the sunward tail by more than 10,000,000 miles in a few days and its similarly rapid decline. The sunward tail must almost certainly have resulted from the concentration of cometary debris over an area in the orbital plane. Seen at moderate angles to the plane, the material possessed too low a surface brightness to be easily observed, but seen edge-on it presented a concentrated line of considerable intensity.

The icy model[4] for the cometary nucleus provides a ready explanation for the sunward tail. The ices and free radicals sublimating from the surface of the nucleus carry with them a certain amount of fragile low-density meteoritic debris at ejection velocities somewhat smaller than the gaseous kinetic velocities. Sizeable pieces of icy material should be included in this ejection process, but at very low velocities. Once in space, under the action of sunlight, the individual icy fragments suffer sublimation on the sunward side. A jet action effectively reduces the solar attraction of an icy fragment for a short time and may move the remaining meteoritic debris away from the Sun with respect to the nucleus at velocities up to 1 km./sec. or even more. Such material will be confined largely to the plane because small velocities of ejection normal to the plane can change the inclination of the individual orbit by only a small amount. The effects of light pressure and corpuscular radiation on small low-density particles will again tend to spread them in the orbital plane.

Occluded ices and gases, escaping slowly from the meteoritic particles, can provide a small source for molecular radiations, so that the sunward tail need not give an entirely continuous spectrum. Arend-Roland is very likely a 'new comet' in the sense used by Oort[5]; Candy finds a slightly hyperbolic orbit. Even so, the comet may well have ejected the orbital debris during this first close perihelion passage.

The above deduced geometrical aspects of the sunward tail are essentially those described clearly by Bredichin[6] as early as 1877.

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[1] Fogelquist, F., U.A.I. Circ. No. 1598 (May 10, 1957).
[2] Biesbroeck, G. Van, Harv. Ann. Card, No. 1358 (April 26, 1957).
[3] Candy, M. P., U.A.I. Circ. No. 1585 (Feb. 20, 1957).
[4] Whipple, F. L., *Astrophys. J.*, **111**, 375 (1950); **113**, 464 (1951).
[5] Oort, J., *Bull. Astro. Neth.*, **11**, 91 (1950).
[6] Bredichin, T., *Ann. l'Obs. Moscow*, **3**, 1 (1877).

Absorption Spectra arising from the Photolysis of Lead Tetramethyl

In a recent communication[1], details were given of some unknown absorption features occurring during the flash photolysis of lead tetramethyl. While continuing this work, exposures have been obtained in which the most intense band at 3196 A. is apparently resolved into a series of Q-like heads. The satellite band at 3096 A. is also characterized by a central strong line-like feature and this also could be attributed to a Q head. There is no doubt that the bands 3196 A. and 3096 A. are related, since they