moderately reactive aromatic hydrocarbons have half-conversion times equal to or somewhat less than that of ethylene. This result confirms a previous investigation of the irradiation of diluted auto exhaust mixtures in which aromatic hydrocarbons including the xylenes, styrene, and trimethyl benzenes were found to disappear at rates equal to or exceeding that of ethylene (*4*).

Good evidence for ring fragmentation was found in the rate of decrease in the absorbance of the aromatic carbon hydrogen stretch bands. Aldehydes, peroxyacyl nitrates, and formic acid were identified among the reaction products.

The limited number of measurements which have been made of the eye irritation and plant damage potential of irradiated aromatic hydrocarbon nitrogen oxide systems (*2, 5*) indicate moderately positive effects, but much more extensive data are needed. Knowledge of whether aromatic hydrocarbons are present at significant concentrations in urban atmospheres is essential. In a series of gas chromatographic measurements, the Los Angeles atmosphere was analyzed for benzene, toluene, and the xylenes (*6*). Concentrations of aromatic hydrocarbons in the 0.1 to 0.2 ppm range were found in moderate smogs. Olefins are usually found in these concentrations.

A. P. ALTSHULLER
I. R. COHEN
S. F. SLEVA
S. L. KOPCZYNSKI
Division of Air Pollution, Robert A. Taft Sanitary Engineering Center, Cincinnati 26, Ohio

References

1. P. A. Leighton, *Photochemistry of Air Pollution* (Academic Press, New York, 1961), pp. 254–71; C. S. Tuesday, "The atmospheric photooxidation of trans-2-butene and nitric oxide," in *Chemical Reactions in the Lower and Upper Atmosphere* (Interscience, New York, 1961), p. 15; E. A. Schuck, G. J. Doyle, N. Endow, *Air Pollution Found.* (*Los Angeles*) *Rept. 31*, (1960).
2. E. R. Stephens, E. F. Darley, O. C. Taylor, and W. E. Scott, *Intern. J. Air Water Pollution* **4**, 79 (1961).
3. A. J. Haagen-Smit and M. M. Fox, *Ind. Eng. Chem.* **48**, 1484 (1956).
4. A. P. Altshuller and C. A. Clemons, *Anal. Chem.* **34**, 466, 747 (1962).
5. W. J. Hamming *et al.*, *Gasoline Composition and the Control of Smog.* Joint report by Western Oil and Gas Association and the Los Angeles County Air Pollution Control District (1961); L. G. Wayne and J. A. Orcutt, *J. Occupational Med.* **2**, 383 (1960).
6. A. P. Altschuller, T. A. Bellar, S. P. McPherson, "Hydrocarbons and aldehydes in the Los Angeles atmosphere," paper presented at 55th annual meeting of the Air Pollution Control Association, Chicago, Ill. (1962).

22 June 1962

Australites and Antarctica

Abstract. A meteorite crater in the Wilkes Land region of Antarctica has been postulated as an explanation of the origin of australites. Geophysical data suggest that such a feature may have been located.

It has been suggested recently (*1*) that australites (tektites found in the southern two-thirds of Australia and in Tasmania) may have been splashed from Wilkes Land in eastern Antarctica by the impact of a large meteorite or asteroid. The site of impact was placed in Wilkes Land because this region is most distant from southern South America and South Africa, areas where tektites have never been discovered (*2*).

Eastern Antarctica is a Precambrian shield area, much of which is probably underlain by granite-gneiss (*3*); granite-gneiss crops out on the Adelie Land coast, and seismic evidence suggests its presence at latitude 78°S, longitude 135°E (*4*). Such rock could produce glass of tektite composition if heated to volatilization temperatures (*5*).

A meteorite impact crater may exist beneath the ice of Wilkes Land. Striking gravity minima have been found in the vicinity of 71°S, 140°E (Fig. 1), almost exactly in the place predicted (*1*). A composite gravity profile across the feature shows a negative free air gravity anomaly of about 150 mgal (Fig. 2). In this figure, French values (*6*) have

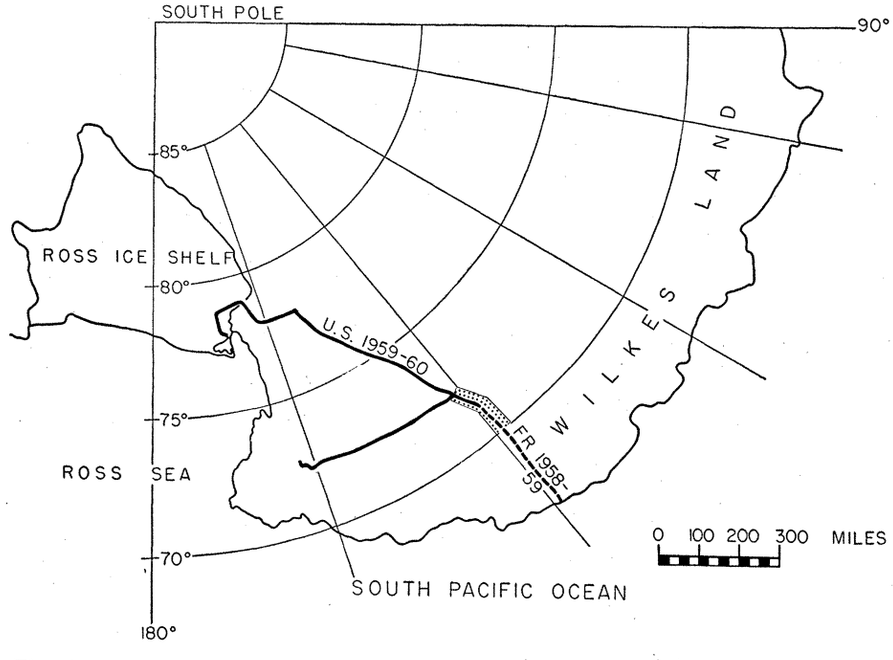

Fig. 1. Australian quadrant of Antarctica, showing location of pronounced gravity minima (stippled). [After American Geographical Society map of Antarctica, 1962]

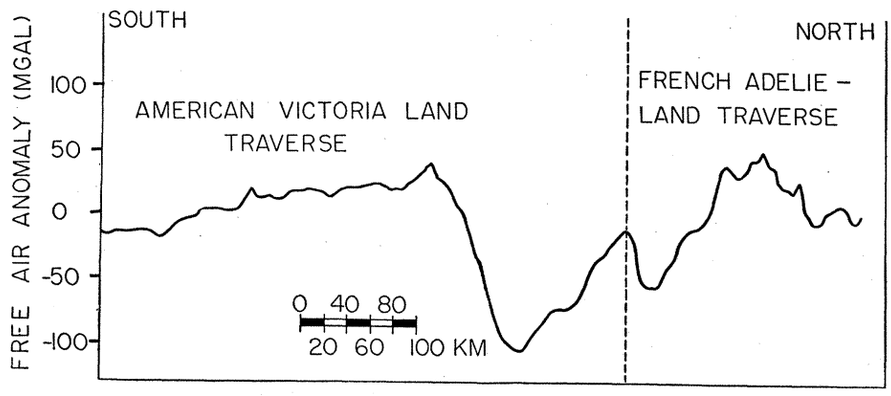

Fig. 2. Free air gravity anomaly profile in the vicinity of 71°S, 140°E. [After Rouillon (*6*) and Weihaupt (*7*)]

19 OCTOBER 1962

been arbitrarily adjusted downward by 13 mgal to coincide with American data (*7*). Similar, pronounced gravity minima have been found for Canadian meteorite craters (*8*). The magnitude of anomaly was found to be related to the size of the crater and to the volume of pulverized rock which the crater contained. Data for the Wilkes Land feature fall on a smooth curve extrapolated from values for the Canadian craters.

Seismic measurements suggest the existence of a depression in the rock surface at this position (*7*). The actual change in elevation of sub-ice topography may account for about 50 mgal of the total anomaly (*7*). Still, this leaves about 100 mgal to be explained by other factors. Even with a density contrast as high as 0.5 g/cm^3, a minimum of 4 km of glacial drift would be necessary at this position to account for the anomaly (*7*). This is an unreasonably large thickness for such material. If, however, it is assumed that the anomaly is caused by fragmental rock similar to that found in Canadian craters, a more normal density contrast is obtained (0.13 g/cm^3). About 16 km of such material is required to produce the anomaly; this agrees well with the predicted crater depth (*1*).

The ice surface above the site of gravity minimum and rock surface depression "shows considerable relief," which is in "sharp contrast" with the adjacent ice plateau (*7*). The close spatial association among these ice surface irregularities, the rock surface depressions, and the gravity minima, suggests that they may be related. Perhaps the relief of the ice surface at this locality was caused by movement of the ice sheet when it filled a crater gouged by meteorite impact. If so, the fact that it remains noticeable suggests that the postulated impact event may have occurred as recently as 5000 years ago, which is estimated as the age of australites (*9*).

The feature described previously appears to be consistent with the presence of an impact crater in Antarctica as predicted (*1*), but the proof is not conclusive. The practicability of conducting a detailed geophysical program to define this feature in greater detail is being investigated.

RICHARD A. SCHMIDT
Geophysical and Polar Research Center, University of Wisconsin, Madison

References

1. V. E. Barnes, *Sci. Am.* **205**, 58 (1961).
2. I confirmed the absence of tektites in these areas through correspondence with representatives of various geological surveys.
3. F. L. Stillwell, *Australian Antarctic Expedition 1911–14 Ser. A*, (1918), vol. 3, pt. 1, p. 1; M. G. Ravich, *Inform. Bull. Soviet Antarctic Expedition No. 2* (1958).
4. A. P. Crary, personal communication (1962).
5. J. F. Lovering, *Nature* **186**, 1028 (1960).
6. G. Rouillon, *Compt. Rend. Acad. Sci. (Paris)* **251**, 762 (1960).
7. J. G. Weihaupt, *Univ. of Wisconsin Geophysical and Polar Research Center Research Report No. 1* (1961).
8. M. J. S. Innes, *J. Geophys. Research* **66**, 2225 (1961).
9. G. Baker, *Mem. Natl. Museum Victoria No. 23* (1 July 1959).

19 July 1962

Letter Recognition within Words Flashed Left and Right of Fixation

Abstract. Neural activity related to eye movements has been proposed as a reason for superior recognition of words to the right of fixation. Predictions from such propositions were verified in our experiment. The distribution of recognition errors among letter positions on the left is relatively symmetrical, while the distribution on the right increases from fixation.

Mishkin and Forgays (*1*) concluded that superior recognition of English words exposed tachistoscopically to the right, rather than to the left, of an observer's fixation point occurs because the reading sequence of English proceeds toward the right, thus selectively training the right visual hemifield. Hebb (*2*) proposes that temporal-spatial neural networks, whose activation corresponds to the conscious recognition of the words, are built up as a result of reading. Activity in the frontal oculomotor areas of the cerebral cortex, present when the observer is reading from left to right and necessarily preceding the overt eye movements, forms an integral part of the neural network. Thus, such an incipient eye movement toward the right when a familiar word appears on the right of fixation facilitates the activation of the network. Since observers are not accustomed to reading English from right to left, a perceptual process having a left directional motor component is not strongly established.

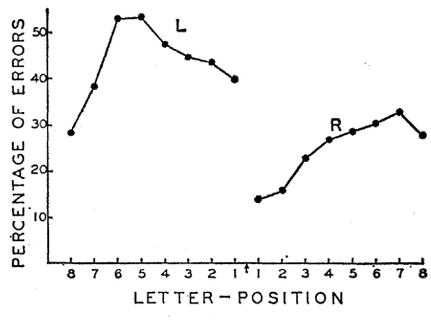

Fig. 1. Percentage of errors left (*L*) and right (*R*) of fixation (indicated by small arrow) at each letter position.

Heron (*3*) hypothesized the existence of a post-exposure, sequential reading of persisting physiological traces, with the sequence analogous to the succession of ocular fixations across the visual field when a stimulus is continuously present. Thus, for words at the left, the observer first focuses his perceptual process toward the left on the beginning of the word, and then reads toward the right. The primary tendency toward the beginning of the word conflicts with the tendency to read toward the right, and perceptual accuracy suffers. When the word is presented to the right of fixation, however, no such conflict occurs. Direct evidence for the relevance of these eye movements comes from the discovery of greater perceptual accuracy for the stimuli on the side of fixation toward which the first eye movement is directed after the tachistoscopic exposure (*4*).

Anderson and Crosland (*5*) long ago suggested that perceptual "attention" might be sequentially distributed in tachistoscopic exposure from left to right, with maximal clarity near the leftmost letter position because of a primacy effect. Harcum (*6*) has also inferred such an effect, on the assumption that the elements which show fewer errors have been favored by primacy, that is, the sequential process began in the visual areas onto which these elements were projected.

Directional characteristics of the stimulus elements themselves affect the distribution of errors, and, hence, the inferred direction of the perceptual process (*7*). Therefore, on the basis of Heron's argument, described previously, Finkel and Harcum (*8*) predicted not only superior recognition of normally printed words in the right visual field but also superior recognition in the left visual field for words printed in left-right mirror image. Also predicted was a greater "primacy effect" for the elements nearer fixation in the left visual field with mirrored words, and in the right hemifield with normally oriented words. For the mirrored words, both