LETTERS TO THE EDITORS

COSMOLOGY

Pasteur and Cosmic Asymmetry

Yang and Lee's¹ discovery of the non-conservation of parity in certain interactions of "fundamental particles" has led to a general acceptance of the notion that the structure of the universe is asymmetrical. So far as I know this was first enunciated by Pasteur². The following are his exact words:

"Il faut de toute nécessité que des actions dissymétriques président pendant la vie à l'élaboration des vrais principes immédiats naturels dissymétriques."

"Quelle peut être la nature de ces actions dissymétriques? Je pense, quant à moi, qu'elles sont d'ordre cosmique. L'univers est un ensemble dissymétrique et je suis persuadé que la vie, telle qu'elle se manifeste à nous, est fonction de la dissymétrie de l'univers ou des conséquences qu'elle entraîne. *L'univers est dissymétrique.*"

The first sentence is, I think, the first enunciation of the principle that an asymmetrical phenomenon must have an asymmetrical cause. It would be of great interest to know why Pasteur, who believed that there was a sharp gap between vital and non-living processes, attributed the asymmetry to the universe, and not to a 'vital force' or some such agency acting in parts of it. Pasteur's conjecture may of course be disproved in either or both of two ways, namely by the discovery on other planets of living beings composed mainly of sugars and amino-acids of the D series, or by the synthesis of such beings by men. But until such disproof is forthcoming he deserves full credit for his formulation.

I have to thank Prof. Jacques Monod, of the Institut Pasteur, for most kindly furnishing me with Pasteur's exact wording, and for a valuable comment.

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¹ Yang, C. N., and Lee, T. D., *Phys. Rev.*, **104**, 257 (1956).

² Pasteur, L., *C.R. Acad. Sci., Paris* (June 1, 1874) (reprinted in "*Oeuvres*", **1**, 361).

GEOPHYSICS

Effect of Latitude on the Diurnal Maximum of 'Dawn Chorus'

It is known that chorus, or 'dawn chorus', exhibits a pronounced diurnal variation in its occurrence and that different stations show different local times for the diurnal maxima. These maxima have been shown to be a function of geomagnetic latitude by Alcock¹ and independently by Pope².

The observations used were samples taken at 3-hr. intervals, with a consequent limitation in time resolution (excepting those obtained by the College station). The availability of observations from a large number of stations with a time resolution of 1 hr. during the International Geophysical Year makes it desirable to reconsider the latitude effect.

The data were obtained in various ways. The Geophysical Institute operated field-stations at College and Kotzebue. The data for Dunedin, Wellington, Stanford, Boulder, Seattle, Anchorage and part of those from Unalaska were supplied by IGY Whistlers-West. The data from Bermuda, Washington, D.C., Norwich, Mont Joli, Knob Lake and part of those for Unalaska were supplied by IGY Whistlers-East. The Cambridge point was obtained from Storey's doctoral dissertation³. The time of maximum at Saskatoon was supplied by G. M. Alcock, of New Zealand. The Macquarie result was communicated directly by radio from that station.

With the exception of the last three stations, which used the occurrence of chorus, the diurnal curves were determined from hourly chorus indices. These indices are derived through a subjective estimate of the strength of the phenomenon. Using the strengths can be considered a weighting of the occurrences in favour of those close to the station. The difference between these two techniques of obtaining the diurnal maximum is probably small.

Table 1 gives the various 'whistler' stations used in this work along with the parameters involved.

Fig. 1 is a plot relating the local time of the diurnal maximum to geomagnetic latitude. The arrows attached to the data points indicate the extent and direction of correction for magnetic time. Observations from the eastern stations are plotted with solid points while those from the western stations are plotted as open points. It is apparent that the eastern stations tend to the left of the plot whereas the western tend to the right side. Thus there appears to be an 'east-west effect' in the time of diurnal maximum, which is probably a spurious effect.

Maeda⁴ has considered the effect of a distortion of the Earth's magnetic field by rotation to explain the westward shift of the cosmic-ray equator noted by Simpson⁵. This westward shift would tend to reduce the east-west effect in the northern hemisphere. The Knob Lake station, being closer to the magnetic equator, would have a lower latitude, while the

Table 1

Abbreviation	Station	Geo-magnetic latitude	Eccentric geo-magnetic latitude	Local time maximum	No. of months
CO	College, Alaska	64.9	67.5	14.0	36
KO	Kotzebue, Alaska	63.9	67.1	13.2	13
KL	Knob Lake, Canada	66.1	68.2	8.5	4
UN	Unalaska, Alaska	51.1	54.2	6.4	9
SE	Seattle, Washington	53.8	54.5	6.8	10
ST	Stanford, California	43.8	45.7	3.9	7
BO	Boulder, Colorado	43.9	48.3	5.5	8
NR	Norwich, Vermont	55.1	52.5	6.0	14
MJ	Mont Joli, Canada	60.0	57.1	7.5	9
WA	Washington, D.C.	50.2	47.8	3.4	10
BE	Bermuda	43.7	40.7	2.7	7
CA	Cambridge, England	54.7	52.1	6.0	3
SA	Saskatoon, Canada	60.5	60.3	9.6	1
MQ	Macquarie Island	60.2	64.4	11.0	—
DU	Dunedin, N.Z.	50.5	54.3	4.9	3
WE	Wellington, N.Z.	45.2	48.9	4.2	5