demic community in the crucifixion of Vietnam.

Yours faithfully,

KNUT ROGNES

Zoologisk Laboratorium,
Universitetet I Bergen

Who was HeLa?

SIR,—It is twenty-one years since George Gey established the famous HeLa cells in culture. It has been estimated that the weight of these cells in the world today exceeds that of the American negro from whose cervical tumour they originated. That lady has achieved true immortality, both in the test-tube and in the hearts and minds of scientists the world over, since the value of HeLa cells in research, diagnosis, etc., is inestimable. Yet we do not know her name! It has been widely stated that He and La are the first letters of her names but whereas one textbook says the names were Helen Lane another says Henrietta Lacks. My letters to the authors, inquiring the source of their information, like the letter to the hospital from which Gey's paper emanated, remain unanswered. Does anyone know for sure? Would it be contrary to medical ethics in the HeLa cell's coming-of-age year to authenticate the name and let He . . . La . . . enjoy the fame she so richly deserves?

Yours faithfully,

J. DOUGLAS

Department of Applied Biology,
Brunel University

Entropy and Vitalism

SIR,—Without even having read my book[1], Van Kley[2] refers to it as "a new form of vitalism" such that for evolution "different forms of the laws of thermodynamics apply". This is such a gross misinterpretation that I am compelled to object.

On page 22 I state: "I think our classical notions of entropy as they come to us from the presently established laws of physics and chemistry are totally inadequate in dealing with the living system. This does not mean that there is anything mysterious, supernatural, or vitalistic about the living system. It simply means that our classical notions are inadequate".

I should like to stress the word inadequate. For example, the laws of Newtonian mechanics are totally inadequate in explaining the shift in the perihelion of Mercury. Einstein's equations, which explained this quantitatively, are different in the sense that they are more general; Newton's equations are just a special case.

The concept of entropy in information theory is far more general than in classical thermodynamics. Specifically, the entropy, H, as defined by Shannon[3], is

$$H = -K \sum_i p_i \log p_i \qquad (1)$$

where the p_i are probabilities of elementary events on a finite probability space and K is an arbitrary constant. If the p_i are all equal, then

$$H = -K \log p_i \qquad (2)$$

or

$$H = k \log W \qquad (3)$$

where W is the total number of elementary events on the space. But (3) is Boltzmann's definition of the thermodynamic entropy which appears as a special case under Shannon's more general definition.

Schrödinger[4] foresaw that we have given a positive name, entropy, to a negative concept—a measure of a kind of disorder. He proposed that we use the negative value of the entropy, the "negentropy", as a measure of the order or organization. I believe that Schrödinger was wrong. The true measure of the organization is the maximum value of the entropy, H^{Max}, minus the value we actually observe, H^{Obs}. H^{Obs} as a measure of the disorder has no structure, but $H^{Max} - H^{Obs}$ as a measure of the organization is rich in mathematical structure which classical theory neglected but which my theory stresses. It is in this sense a redefinition and extension of the entropy concept.

Consequently, I believe my work reduces the aura of vitalism man has always associated with the living system.

Finally, Van Kley certainly cited the wrong reference for any anti-evolutionary statement. Chapter 9 of my book is initiated by the following quotation from "The Giants" by Kahlil Gibran.

"I am among those who believe in the Law of Evolution; I believe that ideal entities evolve, like brute beings, and that religions and governments are raised to higher planes.

"The Law of Evolution has a severe and oppressive countenance and those of limited or fearful mind dread it; but its principles are just, and those who study them become enlightened."

Yours faithfully,

LILA L. GATLIN

Space Sciences Laboratory,
University of California, Berkeley

1 Gatlin, L. L., *Information Theory and the Living System* (Columbia University Press, New York, 1972).
2 Van Kley, H., *Nature*, **240**, 365 (1972).
3 Shannon, C. E., *The Mathematical Theory of Communication* (University of Illinois Press, Urbana, 1949).
4 Schrödinger, E., *What is Life?* (Cambridge University Press, London, 1944).

Synthetic Food

SIR,—The present is an especially opportune time for the initiation of a massive, interdisciplinary programme of research and development on the total synthesis of food.

Political as well as scientific leaders are coming to realize that agriculture, in the race with population, can at best only maintain the present 2,000-calorie-a-day diet in the developing countries. The "Green Revolution" and other recent advances are serving to gain time, but in a few years the population will outstrip the food supply *unless* the growth of population is quickly checked—an unlikely possibility—or unless an independent source of food is developed—a possibility that can be realized.

Two circumstances favour the immediate initiation of a major programme for the total synthesis of food. First, there is the availability of many scientists, engineers, and other experts who are now unemployed and would respond with alacrity to a new and challenging opportunity. Second, industry is at a stage at which it could adapt the vast fund of scientific knowledge and engineering experience amassed in the manufacture of synthetic polymers to the production of food.

Why has not a start been made? The answer lies in the problem of securing support for a programme of sufficient magnitude and duration to assure success. Experience in the administration of research has shown that support for a major, imaginative new programme can be obtained only after those proposing the programme have already made a significant beginning on their own resources. Research laboratories today that are competent to undertake a programme on the total synthesis of food already have a full complement of productive projects. Thus a new programme could be undertaken only at the sacrifice of currently successful activities.

The situation is similar to that which led to the beginning of the plantation rubber industry in 1876. Henry Wickham, later Sir Henry, discovered the unusually quick germinating characteristics of the seed of the *Hevea brasiliensis*. He chartered a steamer to bring seedlings growing in baskets of earth from the Amazon to London. Sir William Hooker, Director of Kew Gardens, threw out a collection of rare orchids to make space for the tender, little known seedlings until they should be ready to send to Ceylon, and later to Malaya. Since that time the billions of rubber trees on plantations have all been descendants of these original specimens.

Are there Britons today who have the

vision and the courage of Wickham and Hooker of a century ago?

Yours faithfully,

ARCHIBALD T. MCPHERSON
4005 *Cleveland Street,*
Kensington, Maryland 20795

Announcements

University News

Professor Paul Harrison Temple, University of Dar es Salaam, has been appointed to the **Chair of Geography** at the **University of Birmingham,** from June 1973.

Miss M. Hulme, Withington Girls' School, Manchester, has been appointed to the **University Grants Committee.**

Mr E. D. Mason, Director of Education, County Borough of Tees-side, has been appointed to the **University Grants Committee.**

Professor L. P. Harvey, Professor of Spanish at Queen Mary College, has been appointed to the **Cervantes Chair of Spanish** at King's College, London.

Miscellaneous

Professor R. T. Williams, St Mary's Hospital Medical School, has been awarded the CIBA Medal and Prize of the Biochemical Society for 1972.

Dr John M. Ashworth, University of Leicester, has been awarded the Colworth Medal of the Biochemical Society for 1972.

Professor D. J. Crisp, University College of North Wales, has been appointed to a visiting Professorship at the Federal University of Ceara at Fortaleza and will make subsidiary visits to Rio de Janeiro, São Paulo, Recife, and spend a short period in Argentina and Chile.

Dr R. Lee Clark, president of the **University of Texas, M. D. Anderson Hospital and Tumor Institute,** at Houston, has been chosen the recipient of the **Sidney Farber Medical Research Award,** previously given to Mary Lasker, Sir Alexander Haddow and Senator Lister Hill.

Dr Kent R. Van Horn, Vice-President of the Aluminium Company of America, has been awarded the **Institute of Metals (Platinum) Medal.**

Professor D. Hull, Department of Metallurgy and Materials Science at the University of Liverpool, has been awarded the **Rosenhain Medal** for his contribution in the field of physical metallurgy.

Erratum

IN the article "Normal Incidence Radiation Trends on Mauna Loa, Hawaii" by R. F. Pueschel *et al.* (*Nature*, **240**, 545; 1972) the second transmission equation in Table 1 should read $T = 0.9075 + 0.000005175t - 0.00272 \sin\left(\frac{2\pi t}{365}\right) + 0.00164 \cos\left(\frac{2\pi t}{365}\right)$

Addendum

IN the article "Mercury in Lake Sediments; a Possible Indicator of Technological Growth" by Aston *et al.* (*Nature*, **241**, 450; 1973), the term parts per billion (p.p.b.) was not defined. The usage throughout was American; 1 p.p.b. is equivalent to one part in 10^9.

International Meetings

March 12, **Electron Sources for Microscopy and Related Techniques.** (Meetings Officer, Institute of Physics, 47 Belgrave Square, London SW1.)

March 12–15, **American Society for Neurochemistry.** (Centre for Continuing Medical Education, The Ohio State University College of Medicine, 320 West Tenth Avenue, Columbus, Ohio 43210.)

March 12–16, **Symposium on Nuclear Data in Science and Technology.** (Dr L. Hjärne, Nuclear Data Section, Division of Research and Laboratories, International Atomic Energy Agency, PO Box 590, Vienna A-1011, Austria.)

March 14, **Aspects of Process Development.** (Assistant Secretary, Society of Chemical Industry, 14 Belgrave Square, London SW1.)

March 14–15, **Sensory Appraisal of Difficult Foods.** (Dr D. N. Rhodes, Meat Research Institute, Langford, Bristol.)

March 15, **Spectroscopy and Anemometry by Photon Correlation Methods.** (The Institute of Physics, 47 Belgrave Square, London SW1.)

March 19, **Pesticides and the Processed Food Industries.** (Conference Secretary, Society for Chemical Industry, 144 Belgrave Square, London SW1.)

March 20, **Soil Responses to Long Periods Under Uniform Management.** (Executive Secretary, 14 Belgrave Square, London SW1.)

March 25–30, **International Symposium on Hepatotoxicity.** ("KENES", Organizers of Congress and Special Events Ltd, PO Box 16271, Tel Aviv, Israel.)

March 26–27, **Spring Conference for High Speed Photography.** (C. W. Husbands, Central Unit for Scientific Photography, Royal Aircraft Establishment, Farnborough, Hampshire.)

March 26–28, **Conserving Our Resources.** (Conference Secretary, Society for Chemical Industry, 14 Belgrave Square, London SW1.)

Reports and Publications

not included in the Monthly Books Supplement

Great Britain and Ireland

Statistics of Smoking in the United Kingdom. Edited by G. F. Todd. (Research Paper 1, 6th Edition.) Pp. 132. (London: Tobacco Research Council, 1972.) [3011

A Key to the Freshwater Fishes of the British Isles, with Notes on Their Distribution and Ecology. By Dr. Peter S. Maitland. (Scientific Publication No. 27.) Pp. 139. (Far Sawrey, Ambleside: Freshwater Biological Association, 1972.) £1.20. [112

Wildfowl 23. Pp. 144+16 plates. (Slimbridge: The Wildfowl Trust, 1972.) £1.75; $5.50. [112

The Royal Society. Report of Council for the year ended August 31, 1972. Pp. 98. (London: The Royal Society, 1972.) [112

The British Council. Annual Report 1971/1972. Pp. 95. (London: The British Council, 1972.) [112

Estuarine Research: a Report on the Natural Environment Research Council Estuaries Forum held in the Summer of 1971. Pp. 20. (Publications, Series C, No. 8.) (London: Natural Environment Research Council, 1972.) [112

Bulletin of the British Museum (Natural History). Zoology, Vol. 24, No. 3: Miscellanea. Pp. 157–228. (London: British Museum (Natural History), 1972.) £3.40. [412

Life with Diabetes. By Arnold Bloom. Pp. 30. (London: British Medical Association, 1972.) 13p. [412

University of Oxford. Annual Reports, 1970/1971. Pp. 27. (Oxford: The University, 1972.) 50p. [412

Proceedings of the University of Newcastle upon Tyne Philosophical Society, Vol. 2, No. 1: The German Linguistic Atlas. By A. W. Stanforth. Pp. 1–14. (Newcastle upon Tyne: University of Newcastle upon Tyne Philosophical Society, 1972.) [512

Covent Garden Community Association. Report. Pp. 25. (London: Covent Garden Community Association, 1 Shelton Street, 1972.) [512

Technical and Specialised Periodicals Published in Britain: a Selected List. Pp. 264. (London: Central Office of Information, 1972.) [612

Some Fundamental Aspects of Urea Technology. By Dr S. M. Lemkowitz, Dr M. G. R. T. de Cooker, and Professor P. J. van den Berg. Pp. 102. (London: The Fertiliser Society, 1972.) [612

Philosophical Transactions of the Royal Society of London. B: Biological Sciences. Vol. 264, No. 864: The Growth of Children at Different Altitudes in Ethiopia. By E. J. Clegg, I. G. Pawson, E. H. Ashton and R. M. Flinn. Pp. 403–437. (London: The Royal Society, 1972.) 90p; $2.50. [612

Fifth Report of the Countryside Commission for the year ended 30 September, 1972. Pp. vii+52. (London: HMSO, 1972.) 57p net. [712

Department of the Environment. Getting the Best Roads for Our Money: The COBA Method of Appraisal. Pp. 17. (London: HMSO, 1972.) 32p net. [712

Loch Morar Survey. 1972 Report. Pp. 8. (London: Loch Morar Survey, 80 Palewell Park, SW14, 1972.) [712

A Little Book About Our Hearing, How We Measure Sound, How We Can Protect Ourselves Against Noise and What We Can Do To Make Noisy Machines Quieter. Pp. 14. (Hemel Hempstead, Herts: Atlas Copco, 1972.) [812

Education: A Framework for Expansion. (Cmnd. 5174.) Pp. iv+49. (London: HMSO, 1972.) 31½p. [812

PEP Broadsheet No. 539: Overseas Nurses in Britain: A PEP Survey for the United Kingdom Council for Overseas Student Affairs. By Michael Thomas and Jean Morton Williams. Pp. iii+54. (London: Political and Economic Planning, 1972.) £1. [812

Father of the Man. By Professor T. D. Foster. (Inaugural Lecture delivered in the University of Birmingham on 9 March, 1972.) Pp. 17. (Birmingham: The University, 1972.) 25p. [1212

Into Action: Plan for a Modern Employment Service. Pp. 27. (London: The Employment Service, Department of Employment, 1972.) [1212

Hillingdon Natural History Society. Bird Report, 1965–1970. Pp. 55. 50p. Mammal and Reptile Report, No. 1. By A. R. J. Paine. Pp. 9. 30p. Mammal and Reptile Report, No. 3. Edited by A. R. J. Paine. Pp. 16. 35p. (Uxbridge, Mddx.: Hillingdon Natural History Society, 4 Heron Close, 1970 and 1971.) [1212

Department of the Environment. Design Bulletin No. 26. New Housing and Road Traffic Noise—a Design Guide for Architects. Pp. 29. (London: HMSO, 1972.) 25p. [1312

Government and High Technology. By John Jewkes. (Third Wincott Memorial Lecture delivered at the London School of Economics and Political Science, 31 October, 1972.) Pp. 24. (London: The Institute of Economic Affairs, 1972. Published for the Wincott Foundation.) 50p. [1312

Patterns of Research. Pp. 44. (Newcastle-upon-Tyne: Procter and Gamble, Ltd., 1972.) [1312

Tin Chemicals for Industry. (TRI Publication No. 447.) Pp. 32. (Perivale, Greenford, Middx.: Tin Research Institute, Fraser Road, 1972.) [1412

Industrial Relations Training. Pp. 14. (London: The Commission on Industrial Relations, 140 Gower Street, WC1, 1972.) *Gratis.* [1512

Zoology Leaflet No. 3: The Giant Panda, *Ailuropoda melanoleuca* (David). Pp. 4. (London: British Museum (Natural History), 1972.) 3p. [1512

United Kingdom Atomic Energy Authority: Research Group. Report AERE—R 7245: Radioactive