

evidence in many eggs of the accomplishment of these earlier stages, and this has been a major difficulty over the past years. Later stages of fertilization are attachment of spermatozoa to the egg surface, activation of the egg and pronuclear formation and growth. These stages are usually considered as achieved if pronuclei and sperm tails are seen in the cytoplasm of the eggs. We provided and evaluated some evidence of pronuclear formation and growth; our data on these stages are obviously preliminary until sperm tails can be positively identified in human pronucleate eggs *in vitro*. Fusion of pronuclei (syngame) is the final stage of fertilization.

If Rothschild had asked "Was fertilization completed?" we would certainly have agreed that it was not. We made no attempt to culture the eggs to syngame and beyond, since it is critical to control the earlier stages first. To demand that syngame is concluded and cleavage advanced before evidence of fertilization can be accepted is far too stringent. It could also be misleading since, as is well known, cleavage (parthogenesis) can proceed without fertilization. It should also be noted that conclusions in many papers reporting fertilization in progress have been based on the evidence of pronuclear stages (for example, 2 and 3). Indeed, Rothschild is hoist with his own petard, for the frontispiece to his book on fertilization⁴ shows a mouse egg with a spermatozoan in the perivitelline space and labelled "A live fertilized mouse egg showing the whole spermatozoan in the cytoplasm". This illustration shows fertilization in the same early stage as that in our figure 4B¹ which presents a human egg with a perivitelline spermatozoan.

Hamilton and Glenister mentioned Menkin and Rock⁵ and Shettles⁶. In fairness to others they should have quoted Petrucci⁷ and especially Hayashi⁸. We gave these four references and discussed them in an earlier communication⁹ quoted in our *Nature* paper. When work on the fertilization of human ova is debated, major consideration must be given to the maturation of these ova. Follicular ova are in the dietyate stage; it is unrealistic to use them for fertilization unless they are freshly at metaphase-II and possess a first polar body. The detection of bodies extruded from eggs alone is insufficient evidence of maturation, for many artefacts resemble polar bodies. It is vital to identify diakinesis, metaphase-I or anaphase-I in some maturing oocytes, since these are transitional stages providing the clue that maturation is in progress. We have furnished critical data on the identification and timing of these stages^{10,11}; earlier work has failed to do so adequately. Some previous workers made attempts to recover human eggs shortly before or after ovulation from the ovary or oviduct, but the difficulties in timing, identification of ovulatory follicles and recovery of eggs are considerable.

Yours faithfully,

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¹ Edwards, R. G., Bavister, B. D., and Steptoe, P. C., *Nature*, **221**, 632 (1969).

² Yanagimachi, R., and Chang, M. C., *J. Exp. Zool.*, **156**, 361 (1964).

³ Barros, C., and Austin, C. R., *J. Exp. Zool.*, **166**, 317 (1967).

⁴ Rothschild, Lord, in *Fertilisation* (Methuen and Co., 1956).

⁵ Menkin, M. F., and Rock, J., *Amer. J. Obstet. Gynec.*, **55**, 440 (1948).

⁶ Shettles, L. B., *Amer. J. Obstet. Gynec.*, **66**, 235 (1953).

⁷ Petrucci, D., *Discovery*, **22**, 278 (1961).

⁸ Hayashi, M., *Proc. Seventh Intern. Conf. IPPF, Singapore 1963*, p. 505.

⁹ Edwards, R. G., Donahue, R. P., Baranki, T. A., and Jones, H. W., *Amer. J. Obstet. Gynec.*, **96**, 192 (1966).

¹⁰ Edwards, R. G., *Nature*, **196**, 446 (1962) and **208**, 349 (1965). *Lancet*, **2**, 926 (1965). *Proc. Sixth World Cong. Fert. Ster., Tel. Aviv, 1969* (in the press).

¹¹ Henderson, S. A., and Edwards, R. G., *Nature*, **218**, 22 (1968).

University News

Professor H. F. Downton has been given the personal title of professor of statistics at the **University of Birmingham**.

Professor N. N. Das Gupta has been appointed Palit professor of physics at the **University of Calcutta**.

Professor E. W. Horton, University of London, has been appointed to the chair of pharmacology at the **University of Edinburgh**.

Appointments

Sir Frank Schon has been appointed chairman of the National Research Development Corporation in succession to Lord Black.

Announcements

Unesco International Cell Research Organization is organizing an international training course on **Energy-transducing Systems at the Subcellular Level** to be held jointly by the Wenner-Gren Institute and the Institute of Biochemistry, University of Stockholm, August 11-30, 1969. The course will comprise experiments, demonstrations, seminars and lectures. The experimental programme will include isolation and sub-fractionation of mitochondria, electron microscopy, experiments involving oxidative phosphorylation and related reactions. Dr G. F. Azzone, Padova, Italy, Dr J. Bremer, Oslo, Norway, Dr B. Chance, Philadelphia, USA, and Dr M. Klingenberg, München, Germany, have been invited to join the teaching staff of the two institutes for the course, which will be in English. Information regarding the selection of participants can be obtained from Professor O. Lindberg, Wenner-Gren Institute, Norrtullsgatan 16, S-113 45, Stockholm, Sweden.

ERRATUM. In the article "Rotating Neutron Stars and Pulsar Emission" by B. Bertotti, A. Cavaliero and F. Pacini (*Nature*, **221**, 624; 1969) the following corrections are necessary: formula (2) should not contain the factor π ; formulae (3) and (4) should read

$$P_{rr} = \frac{H_0^2 \sin^2 i}{4 c^4} \frac{a^6}{r^2} \omega^4 \left\{ I - \sin^2 \theta \cos^2 \left[\omega \left(\frac{r}{c} - t \right) + \varphi \right] \right\}$$

$$P_{r\varphi} = \frac{H_0 \sin^2 i}{2 c^3} \frac{a^6}{r^3} \omega^3 \sin \theta \sin^2 \left[\omega \left(\frac{r}{c} - t \right) + \varphi \right]$$

Instead of "radiation pressure" always read "electromagnetic stress"; page 625, column 2, lines 24 and 29, m_e should be replaced by m_c ; page 626, column I, line 3 from the bottom, ref. 13 should read "ref. 14, Richards, D. *IAU Circ. No. 2114* (1968)".

ERRATUM. In the review of the book *Functions of the Adrenal Cortex* (*Nature*, **221**, 782; 1969) the word "d-cxy-corticosterone" in line 7 of the third paragraph should read "deoxycorticosterone"; in line 8 of paragraph 4 "C21" should read simply "21".

ERRATUM. The first sentence in the article "Respiratory Activity of Mitochondria from Legume Root Nodules" by P. S. Muecke and J. T. Wiskich (*Nature*, **221**, 674; 1969) should have read "Work on subcellular elements of legume root nodules has concentrated exclusively on the symbiotic bacterial components which form the bulk of these elements and are responsible for nitrogen fixation, but no work has been published on the mitochondrial components."

International Meetings

March 12, Fabian Society Science and Technology Circle, **Wanted—A White Paper on Technology**, House of Commons (H. P. Stern, 8 Ballantrea House, Lyndale, London NW2).

March 24–27, **Institute of Electrical and Electronics Engineers—International Convention and Exhibition**, New York (IEEE, 345 East 47 Street, New York, NY 10017).

March 25–28, **Physiology of Tree Crops**, Bristol (Scientific Liaison Officer, Research Station, Long Ashton, Bristol BS18 9AF, UK).

March 31–April 3, **Eleventh British Theoretical Mechanics Colloquium**, Nottingham (Dr W. A. Green or Dr T. G. Rogers, Department of Theoretical Mechanics, University of Nottingham, Nottingham NG7 2RD, UK).

April 1–2, **Applications of Radio-frequency Techniques to the Study of the Electron Properties of Solids**, Exeter (Dr J. E. Cousins, Department of Physics, University of Exeter, Exeter, Devon, UK).

April 15–16, **Association of Clinical Biochemists—National Meeting**, Leeds (Mr P. M. G. Broughton, Department of Chemical Pathology, School of Medicine, Leeds 2, UK).

April 20–25, **Scientific Careers**, Manchester (Miss D. M. Maskell, Careers Research and Advisory Centre, Cambridge, UK).

April 21–24, **Iron and Steel Institute—Centenary Celebrations**, London (Meetings Department, Iron and Steel Institute, 4 Grosvenor Gardens, London SW1).

April 23, **Government Information, Services and Finance available to the Plastics Industry**, London (Secretary, Plastics Institute, 11 Hobart Place, London SW1).

April 27–May 16, **Microbes as Models for the Investigation of Biological Problems**, Jerusalem (Professor M. Shilo, Institute for Microbiology, Hebrew University—Hadassah Medical School, POB 1172, Jerusalem, Israel).

May 19–21, **Industrial Catalysts**, Milan (FAST, Piazzale Rodolfo Morandi 2, 20121 Milan, Italy).

June 16–19, **Antiviral Substances**, New York (Jean Fitzpatrick, New York Academy of Sciences, 2 East 63 Street, New York, NY 10021).

June 24–25, **Practical Application of SI Units**, Brussels (Conference Organizer, PERA, Melton Mowbray, Leicestershire, UK).

June 25–28, **Biochemistry and Physiology of Alkaloids**, Germany (Professor H. R. Schütte, Institut für Biochemie der Pflanzen, 401 Halle, Saale, Weinberg, Germany).

Sabbatical Itinerants

In the hope of providing some practical assistance in the good cause of mobility between laboratories, *Nature* is proposing to advertise the needs for housing of families about to take up periods of sabbatical leave. To begin with, no charge will be made for advertisements like this. It is hoped that a period of experiment will show what form these advertisements could most usefully take and whether they are effective.

Wanted: Furnished flat or house in London or within commuting distance, for American physicist and mycologist wife, with 4 daughters (aged 13 to 18), from July or August 1969 until approximately August 1970. Please contact L. Slifkin, Department of Physics, University of North Carolina, Chapel Hill, NC 27514, USA.

BRITISH DIARY

Monday, March 10

INSTITUTION OF ELECTRICAL ENGINEERS (at Savoy Place, London, WC2), at 5.30 p.m.—Discussion meeting on "The Failure of Reinforced Plastics, particularly by Creep and Fatigue", opened by Mr M. J. Owen and Mr W. Carswell.

UNIVERSITY OF LONDON (in the Botany Theatre, University College London, Gower Street, London, WC1), at 5.30 p.m.—Professor P. R. Bell: "The Archegoniate Revolution".

INSTITUTION OF ELECTRICAL ENGINEERS (joint meeting with the Automatic Control Group of the I.Mech.E., at 1 Birdcage Walk, London, SW1), at 6 p.m.—Informal discussion on "Mating the Control Valve with the Process Systems".

PLASTICS INSTITUTE, MERSEYSIDE SECTION (at the Stork Hotel, Liverpool), at 7.30 p.m.—Mr G. Allen: "Polymer Structure and Property Relationships".

Tuesday, March 11

SOCIETY FOR ANALYTICAL CHEMISTRY, SCOTTISH SECTION (at the University of Strathclyde, Cathedral Street, Glasgow, C1), at 4 p.m.—Dr R. Fihil: "Complexometric Titrations".

ZOOLOGICAL SOCIETY OF LONDON (at the Zoological Gardens, Regent's Park, London, NW1), at 5 p.m.—Mr C. J. Mettam: "Functional Design and Evolution of the Polychaete *Aphrodite aculeata* L."; Dr G. B. Corbet: "Distribution of the Pygmy Hippopotamus *Choeropsis liberiensis*"; Film: "Ripples in the Reeds".

INSTITUTION OF ELECTRICAL ENGINEERS, JOINT IEE/IERE MEDICAL AND BIOLOGICAL ELECTRONICS GROUP (at St Bartholomew's Hospital, London, EC1), at 5.30 p.m.—Dr A. Richens: "Nerve Impulses".

INSTITUTION OF MECHANICAL ENGINEERS, AUTOMOBILE DIVISION (at 1 Birdcage Walk, London, SW1), at 6 p.m.—Mr A. L. Russell: "Amphibious Vehicles".

SOCIETY FOR ANALYTICAL CHEMISTRY, MICROCHEMICAL METHODS GROUP (at "The Feathers", Tudor Street, London, EC4), at 6.30 p.m.—Discussion meeting on "Specific Ion Electrodes" introduced by Dr G. J. Kakabadse.

Tuesday, March 11—Thursday, March 13

INSTITUTE OF METALS (at Church House, Great Smith Street, London, SW1)—Spring Meeting.

Wednesday, March 12

ROYAL INSTITUTION, HISTORY OF SCIENCE DISCUSSION GROUP (at 21 Albemarle Street, London, W1), at 1 p.m.—Professor R. A. Kekwick, FRS: "The Ultra-Centrifuge—the Achievement of the Svedberg".

UNIVERSITY OF LONDON (at the Royal Postgraduate Medical School, Du Cane Road, London, W12), at 2 p.m.—Dr J. C. Wagner: "Asbestos and Cancer".

GEOLOGICAL SOCIETY OF LONDON (at Burlington House, Piccadilly, London, W1), at 5 p.m.—Dr Z. R. Beydoun and Dr H. R. Bichan: "The Geology of Socotra Island, Gulf of Aden"; Dr L. Clark: "The North Elgon Depression, Eastern Uganda".

INSTITUTE OF FUEL (in Room E54, Shell-Mex House, Strand, London, WC2), at 5 p.m.—Annual General Meeting. 6 p.m.—Professor J. M. Beér: "Fuel Research in the Universities".

UNIVERSITY OF LONDON (at Bedford College, Regent's Park, London, NW1), at 5.15 p.m.—Lord Platt: "Limitations of Academic Education in Training for Medicine".

INSTITUTION OF ELECTRICAL ENGINEERS (at Savoy Place, London, WC2), at 5.30 p.m.—Mr J. H. Rhodes: "Data Communications".

INSTITUTION OF ELECTRICAL ENGINEERS (joint meeting with the Automatic Control Group of the I.Mech.E., at Savoy Place, London, WC2), at 5.30 p.m.—Discussion meeting on "Naval and Marine Applications of Automation Techniques" opened by Mr K. P. Balme, Mr D. J. Strong and Mr M. J. Switman.

INSTITUTION OF THE RUBBER INDUSTRY, LONDON SECTION (at the Eccleston Hotel, Eccleston Square, London, SW1), at 5.30 p.m.—Mr C. E. Worrell: "Calendering"; Mr J. W. Kyle: "Recent Advances in Conveyor Belting".

UNIVERSITY OF LONDON (in the Botany Lecture Theatre, University College London, Gower Street, London, WC1), at 5.30 p.m.—Professor W. Hayes: "The Evolution of Transmissible Genetic Elements in Bacteria".

SOCIETY OF ENVIRONMENTAL ENGINEERS (in the Mechanical Engineering Department, Imperial College, London, SW7), at 6 p.m.—Dr G. D. Reynolds: "Environmental Test Specifications" (open discussion).

SOCIETY OF CHEMICAL INDUSTRY, FOOD GROUP—Nutrition Panel (at 14 Belgrave Square, London, SW1), at 6.15 p.m.—Annual General Meeting and Retiring Chairman's Address.

INSTITUTION OF ELECTRONIC AND RADIO ENGINEERS, SOUTHERN SECTION (joint meeting with the IEE, in the Lanchester Theatre, University of Southampton), at 6.30 p.m.—Mr R. D. Holland: "VLF Radio Communication".

PRESENTATION OF TECHNICAL INFORMATION GROUP (at University College London, Gower Street, London, WC1), at 7 p.m.—Dr G. S. Brosan: "Can Technologists Communicate?" (3rd Kapp Memorial Lecture).

PLASTICS INSTITUTE, SOUTH WALES AND MONMOUTHSHIRE SECTION (in the New Building, University of Wales Institute of Science and Technology, Cardiff), at 7.15 p.m.—Mr P. Morgan: "Plastics Materials for Chemical Plant".

Wednesday, March 12—Thursday, March 13

MINISTRY OF TECHNOLOGY; MANAGEMENT TODAY; and the UNIVERSITY OF BRADFORD (at the Cairn Hotel, Harrogate), at 9 a.m. daily—National Conference on "The Management of Technological Innovation".

Thursday, March 13

INSTITUTION OF ELECTRONIC AND RADIO ENGINEERS, JOINT IEE/IERE MEDICAL AND BIOLOGICAL ELECTRONICS GROUP (at the Institution of Elec.