pects of pre-implantation development are comprehensively covered by T. Ducibella (surface changes and cell–cell interactions in trophectoderm), R. M. Borland (transport processes in the mammalian blastocyst, the trophectoderm as an epithelium), G. A. Schultz and E. B. Tucker (protein synthesis and gene expression) and C. M. Warner (RNA synthesis and RNA polymerase activity). On the reproductive side, J. E. O'Grady and S. C. Bell provide an exhaustive review of uterine aspects of implantation; M. A. H. Surani describes protein changes in uterine fluids at the time of implantation; R. J. Aitken deals with delay of implantation, and the signals that may switch embryo and uterus on and off; M. Beato discusses the synthesis of one particular uterine protein, uteroglobin. M. H. Kaufman reviews his work on the effects of anaesthetics on gametogenesis and post-implantation development, in the context of clinical studies.

It is sad that the only hint of the intellectual excitement of the field, and of the beauty and amazing ingenuity of the mammalian embryo, comes in the Editor's introduction. The articles themselves tend to get bogged down in experimental detail, often contradictory. One consequence of selecting authors who are themselves actively working in a rapidly moving area is that one gets up-to-the-minute information, much of it still unpublished; a less desirable consequence is that the viewpoint is inevitably one-sided. Some of the articles are definitive reviews of a topic (Aitken; O'Grady and Bell) but most are of the nature of progress reports. Such a collection requires stringent editing. Able research workers are not necessarily good writers; Dr Johnson fields an impressive team but allows them too much freedom.

Many linguistic errors and misprints mar the pages: I spotted 54 in one 80-page article, without picking any editorial nits over hyphens or punctuation. The heterogeneity of misprint-density suggests that proof-reading was left to individual authors. There are also infelicities such as "Neither results strongly support . . . "; all 'less than' signs are omitted from probability levels in one chapter; and why choose a typeface that distinguishes l from 1 if you then abbreviate chlorine as Cl throughout? The typed text is photographically reduced to a size that I (and others to whom I showed the book) found tiring to read.

These are minor criticisms. I wholeheartedly welcome the appearance of the new series, and congratulate publishers and Editor on their enterprise. I urge anyone with an interest in developmental biology or reproductive physiology to buy this volume, and to get their libraries to buy it too. It is worth the money for the comprehensive reference lists as well as for the articles themselves.

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Antinucleon physics

Antinucleon–Nucleon Interactions. Edited by G. Eskpong and S. Nilsson. Pp. xvii+600. (Pergamon: Oxford and New York, 1977.) £22.

THE ANTIPROTON was discovered in 1955 and the antineutron a year later, so antinucleons have only recently come of age. The interaction of these particles with nucleons is an active research field, and in the past few years has been the subject of a number of specialised symposia of which the latest was held in Stockholm in July 1976. These published proceedings of this meeting contain 8 invited review papers and about 50 research contributions. The discussion following each talk has not been recorded.

The existence of antiparticles suggests the intriguing possibility of bulk antimatter in the Universe. A cosmology symmetric between matter and antimatter has been championed for a number of years by H. Alfvén (Stockholm) who reviewed this topic. There is no evidence for galaxies or other distant regions of antimatter, but neither can their existence be ruled out from direct experimental measurements.

All other talks came down to Earth and covered aspects of antinucleon behaviour in the laboratory. The construction of separated antiproton beams of high intensity, in particular at the CERN and Brookhaven proton synchrotons, has greatly enhanced the scope of low and medium energy experiments in the last few years. Antiprotons transported at a few hundred MeV/c can be brought to rest in targets and used to study the $\bar{N}N$ system at very low energies. This topic was reviewed by T.E.O. Ericson (CERN). Theoretical models predict the existence of $\bar{N}N$ states bound by the strong nuclear interaction, but these have not been established definitely by experiment. Antiprotons can, however, certainly be bound to nuclei by the Coloumb force to form antiprotonic atoms. X-ray transitions between levels have been studied and a number of interesting results obtained including a measurement of the antiproton magnetic moment.

Formation experiments are a powerful technique for studying hadron resonances. At the appropriate centre of mass energy, the colliding particles coalesce briefly to create a single particle, which then decays. To study posible meson formation, a conventional nucleon target requires a beam of antibaryons, in practice antiprotons. A clear review by E. Eisenhandler (Queen Mary College, London) outlined the considerable recent progress in this field. A few years ago suggestive enhancements were seen at various mass values in the antiproton–nucleon total cross sections. More recently these bumps were seen also in the $\bar{p}p$ elastic channel. The investigation of other channels, in particular two-meson final states provides much additional information. Angular distributions for $\bar{p}p \to \pi^0\pi^0$; $\eta^0\eta^0$; $\pi^0\eta^0$ were presented by a Bari–Brown–MIT collaboration, and results for polarisation in $\bar{p}p \to \pi^+\pi^-$; $K^+ K^-$ by a QMC–Daresbury–Rutherford collaboration.

When the Fermilab accelerator started operation, antiprotons in the 100 GeV/c region were produced quite copiously. At these momenta, however, particle separation using electrostatic or even RF fields becomes prohibitively difficult. An ingenious scheme has been used where antiprotons arising from antilambda decay in a short neutral beam were then transmitted to the experiment. At 100 GeV/c, annihilations are reduced to perhaps only a tenth of all $\bar{N}N$ interactions. These annihilations were reviewed by J. G. Rushbrooke (Cambridge). Experiments are still exploratory, measuring multiplicities, topological cross sections and inclusive production spectra. Annihilations at medium energies, and related processes, were covered by J. R. Fry (Liverpool). High energy non-annihilation interactions, where baryon and antibaryon are still present in the final state, were reviewed by S. Nilsson (Stockholm).

Two invited theoretical reviews were given. H. Miettinen (SLAC) discussed progress in antiproton physics mostly within the framework of quarks and duality diagrams. Both he, and also G. F. Chew (Saclay and Berkeley) in a more speculative review, considered the possibility of 'baryonium' states which do not have the conventional quark–antiquark structure of mesons.

Some plans for future facilities were outlined in contributed papers, but unfortunately the symposium came a little too early to include recent ideas on antiproton beam cooling and the possibility of storing antiprotons and colliding them with protons, thus giving rise to collisions at superhigh energies.

The editors and publisher have produced an attractive volume which should be of considerable interest to specialists in the field. **P. I. P. Kalmus**

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