discovered except by the periodic displacement of the centre of light. A number of stars have been found to have companions which move in orbits with periods of a year or two. It is suggested that parallax observations for the next few years may be confined to filling in the gaps made by the omission of stars of early and late types, to the observation of certain specific stars, such as double stars or Vyssotsky's stars with dwarf characteristics, and to unravelling some of the larger discordances.

In the final part of his address, devoted to meridian astronomy, Dr. Jackson pointed out that at present the Royal Greenwich Observatory alone in Britain carries out observations with the meridian instrument for determining stellar positions. Several factors have contributed to this diminution of meridian observations in different countries, among which the economy of photography is important, and some may ask what justification there is for meridian astronomy. The answer is that, while we need accurate positions of only sufficient stars for reducing photographic plates, we require the proper motions of as many stars as possible, of every degree of brightness, of every spectral type, of every kind of variability, and in all galactic longitudes and latitudes, and all this involves the positions at two or more epochs. To determine the average distances of groups of stars too far away for trigonometrical calculations, proper motions are necessary, and they are thus important in investigations concerning the content of the Milky Way system at distances exceeding a hundred parsecs, in addition to showing the systematic and random motions of the stars themselves. This led Dr. Jackson to a discussion of the fundamental systems used, of certain disadvantages inherent in some and also of various ideas for improvements. His address ended with a short account of a very important aspect of meridian astronomy—namely, accurate time determinations—in which the Royal Observatory plays a prominent part, and the results of the photographic zenith tube in action are awaited with interest.

BRITISH JOURNAL OF RADIOLOGY

SIXTIETH ANNIVERSARY

THE May issue of the *British Journal of Radiology* is its diamond jubilee number. The *Journal* is the direct descendant of the *Archives of Clinical Skiagraphy*, which was the first journal to be devoted entirely to radiology. Its first number was dated April 2, 1896; but apparently it is not clear whether it was actually published then or in May of that year.

The *British Journal of Radiology* has had a great influence throughout the world in the development of medical radiology in its widest sense, and the jubilee number includes a number of historical reviews of particular interest. Prof. G. Stead deals with the contributions of physics to the progress of radiology during the past sixty years. It is perhaps singularly fortunate that many leading physicists have always devoted a great deal of effort to the advancement of the applications of physics to medicine. The first presidential address to the Roentgen Society, given by Silvanus Thompson, was apparently a remarkable beginning. Sir Oliver Lodge published a course of six lectures specially designed for medical practitioners. In the present number, Sir John Cockcroft writes on "The Future Role of Atomic Energy in Industry, Science and Medicine", Dr. Russell J. Reynolds reviews sixty years of radiology, and Dr. James T. Case summarizes the evolution of modern radiology. A point of historical interest is that in 1879 Sir William Crookes, without realizing it, had apparently obtained X-rays in the course of his experiments and had sent fogged photographic plates, which had been stored near his vacuum tubes, back to the manufacturers as defective. The account of X-ray apparatus by Mr. Cuthbert Andrews is illuminating. On the historical side, he mentions that "bound in the 1897 volume is what is undoubtedly the forerunner of our modern successful supplements —A Supplement to the Archives of the Röntgen Ray, entitled 'Radiography in Marine Zoology—The British Echinodermata', by Dr. Wolfenden". Of particular interest to radiotherapists are the reviews by Dr. N. S. Finzi on radiotherapy and Dr. A. Lacassagne on radiobiology.

The development of British radiology has depended upon a number of factors. Among the most important of these are probably the recognition of the value of consultation in medicine with special reference to the many aspects of radiology, the applications of physics to both radiodiagnosis and radiotherapy and the interest throughout the years shown by many clinical radiologists in those aspects of fundamental science now called radiobiology. It is clear that the *British Journal of Radiology* has played a great part in facilitating these developments.

ROCKEFELLER FOUNDATION GRANTS

THE National Academy of Sciences, Washington, has initiated a study of the possible biological dangers to present and future generations of exposure to atomic radiation. 250,000 dollars has been awarded by the Rockefeller Foundation for this project. A biophysics research programme on the cultivation of individual animal cells has been devised by Dr. Theodore Puck and his associates in the University of Colorado, towards which the Foundation has made an award of 85,000 dollars. The Foundation has made a research grant of 60,000 dollars to Drs. J. J. Christensen and W. M. Myers for their work in the University of Minnesota in connexion with wheat stem rust. Research on the genetic factors of intelligence and emotional variation in dogs, directed by Dr. C. C. Little at the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine, receives a first-quarter grant of 50,000 dollars.

Dr. Edwin D. Kilbourne, of Cornell University Medical College, is working on latency or activation of viruses, towards the expenses of which the Foundation has granted 48,000 dollars. The University of Chicago is to receive 50,000 dollars for its programme of training in statistics for scientists. The State Institute for Human Genetics, Upsala, Sweden, has been awarded 50,000 dollars. The work will be shared with the University of Upsala and the Royal Agricultural College. Prof. A. Rossi-Fanelli's work at the Institute of Biological Chemistry, University of Rome, will be supported over a period of four years by a grant of about 30,000 dollars, and that of Prof. P. Desnuelle at the Institute of Bio-

logical Chemistry, University of Aix-Marseille, over a period of five years by a grant of 25,000 dollars.

Research in biomathematics under Dr. Irwin Bross, of the Cornell University Medical College, is to be supported by a five-year grant of 50,000 dollars.

Among other grants made by the Rockefeller Foundation for the first quarter of 1956 are the following: Prof. T. Park, University of Chicago, experimental ecology, 10,500 dollars; National School of Agriculture and Livestock, Managua, Nicaragua, laboratory and field equipment; Prof. F. Buchthal, University of Copenhagen, physiology, 14,000 dollars; Institute of Pharmacology, University of Padua, virology, 10,000 dollars; Prof. S. Bezzi, University of Padua, organic chemistry, 10,000 dollars; University of Florence, Institute of Botany, 9,000 dollars; University of Utrecht, Biophysical Research Group, 12,000 dollars; Prof. Per F. Scholander, University of Oslo, experimental biology; Royal Veterinary College, Sweden, equipment for animal physiology.

Numerous grants towards travelling and study expenses and towards the costs of various congresses were also made. Forty-five fellowships were awarded in the following subjects: agriculture (23), biology and medicine (5), humanities (5), medical education and public health (7), social sciences (5).

OVULATION DURING DELAYED IMPLANTATION AND OTHER REPRODUCTIVE PHENOMENA IN THE BADGER (*MELES MELES* L.)

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REPRODUCTION in the European badger has been the subject of controversy for many years, and one authority or another has made claims for each month of the year to be that of the mating season. Those investigators[1-3] who have recently examined the reproductive pattern comment at length on the prolonged period of delayed implantation. Fischer[1] calculated from embryological data obtained from badgers in Germany that mating took place during July–September, that implantation (delay of from 4 to 5 months) occurred in December and January and that cubs were born during January–March. Notini[2] stated that in Sweden mating occurred in May, that implantation was delayed for seven to eight months and that the cubs were born in March. Preliminary observations by Neal[3] in south-west England suggested that mating occurred not only in April and May, but also during July–September. Implantation usually occurred in December and parturition followed within sixty days. All these investigators have recovered blastocysts or embryos at different times of the year, but none has made an exhaustive histological examination of the ovaries and reproductive tract, or counted the corpora lutea.

Since the date of the first report, Neal[3] and his collaborators have maintained intensive observation of the numbers and behaviour of badgers at various localities in Gloucester and Wiltshire, but mainly on the Quantock Hills, Somerset. More than fifty animals, cubs and adults, were obtained for dissection as the result of being run over by motor-cars, killed by badger-diggers, keepers or pest-control officers. The specimens were difficult to obtain, and have taken nine years to accumulate, but the series covers the entire cycle and pregnancy except for July. The ovaries have been serially sectioned, and sections of the reproductive tract have been examined. The uterus of each animal was carefully opened and searched or washed out for blastocysts, and serial sections were cut of the uterine tubes of those animals that had recently ovulated.

Examination of the fixed material indicates that the reproductive pattern in the badger is complex and variable. Maturing, mature and recently ruptured follicles are present in the ovaries in February and March, but the earliest date for recovery of blastocysts is April 30, 1955. During April–July the average number of blastocysts is 2·3 per animal (range 1–3); the number of corpora in these animals averages 4·0 per animal (range 3–6). The excess of corpora may be explained by not finding all the blastocysts or by loss due to degeneration. Twice as many animals (13) during this period had corpora in varying stages of development or retrogression (average 4·0 corpora per animal, range 2–7), but no ova, cleavage stages or blastocysts were found. In June, animals with blastocysts in the uterus and an equivalent number of corpora in the ovaries also possessed large, maturing follicles.

During the period August–December many differences can be detected; all but one of twenty adult females had blastocysts (average number 3, range 2–5) in their uterine horns. There is a significant rise in the average number of corpora to 6·2 per animal (range 2–11), and maturing follicles were also present in animals killed in late September. An adult female killed on October 16, 1954, gave an explanation for the findings. Four recently ruptured follicles and five retrogressing corpora lutea were present in the ovaries; of the latter, two corpora looked more degenerate histologically than the other three. Three healthy blastocysts were in the uterus, and in serial sections of one uterine tube there were two degenerate and apparently unfertilized ova. This and other similar examples indicate that the number of corpora increases during the period of delayed implantation due to ovulation during delay, and there is evidence from several animals that it can occur more than