50 & 100 YEARS AGO

NATURE

50 YEARS AGO
"The Sun", edited by Prof. Gerard P. Kuiper. — Nothing comparable with this work has appeared since the publication of Vol. 4 of the "Handbuch der Astrophysik" in 1929. A comparison of the two volumes demonstrates impressively the strides solar physics has made in a quarter of a century. The identification of 'coronium', the recognition of H^- absorption, postulation of the carbon–nitrogen cycle, invention of the coronagraph... the discovery of chromospheric flares and their terrestrial effects and of solar radio noise... It is regrettable that the present volume includes no contribution from the U.S.S.R.; but the cause can doubtless not be laid entirely at the door of the editor, who is as well aware as anyone how much solar research carried out in Soviet territories remains a closed book to Western readers.
From *Nature* 2 July 1955.

100 YEARS AGO
It is announced in the *Times* that the Board of Trade and the Trinity House have concluded a contract with Marconi's Wireless Telegraph Company (Limited) providing for the equipment of lightships with Marconi wireless telegraph installations. This arrangement will enable the lightships to communicate with the shore and with one another by wireless telegraphy for the ordinary purposes of the lightship service, and also to report ships in distress.

ALSO
"British Bird Life". By W. Percival Westell. The wearisome procession of books on British birds drags on — a long train of volumes, all of necessity telling the same tale, and for the most part badly... At times Mr. Westell becomes ecstatic, and, blinded by the intensity of his emotions, rushes onwards regardless of obstacles — even of the rules of grammar... This book is profusely illustrated, partly by photographs, some of which are very pleasing, and partly by "original" drawings, all of which are bad.
From *Nature* 29 June 1905.

Gleich and Weizenecker allow only certain locations inside the body to send a signal. They achieve this by placing the object concerned in an inhomogeneous magnetic field which, in most regions, is strong enough to saturate a magnetic particle (Fig. 1a). Only particles situated at sites where the external field is essentially zero are not saturated, and can therefore signal in response to the radio-frequency field. By changing the location of this field-free spot (either mechanically or with auxiliary magnetic fields) the sample can be scanned bit by bit, resulting in a map of the spatial distribution of the magnetic particles.

The images obtained in the initial experiments have a resolution of well below 1 mm. This is surprising, considering that the size of the recording coils (squares with 16-mm sides) and the wavelength of the applied radio-frequency field (around 1 km) are both much larger than the size of the resolved features. MPI can be seen as a form of 'zeugmatography', a term coined by 2003 Nobel laureate Paul Lauterbur[5] in his introduction of MRI as a concept for image formation: when two fields are combined, the first one (here, the radio-frequency field) induces an interaction with the body, and the second one (the inhomogeneous magnetic field) restricts this interaction to a limited region. In this way, there is no imposed wavelength limit and MPI can use harmless radio waves that pass through the body without significant attenuation. Furthermore, the detectors can be much larger than the smallest resolved structure, thereby opening the door to depth resolution and, ultimately, three-dimensional imaging.

Beyond this proof-of-principle demonstration, the practical usefulness of MPI remains unknown. The concept promises to complement existing methods and, in certain applications, to provide a unique internal view. MRI owes much of its versatility to the fact that our bodies (and virtually all materials) are made of nuclei that exhibit weak magnetism. MPI, on the other hand, relies on the detection of magnetic particles with stronger intrinsic magnetism, but in general those particles have to be introduced. Although MPI will reveal fewer details, it will not suffer from any background interference and should resolve structures with excellent contrast.

If the potentially higher sensitivity of MPI can be fully exploited, a fast and powerful imaging technique could be in prospect, as well as relatively cheap mobile scanners, with geometries that can be adapted to particular applications. MRI has continued to astonish us with its ever-increasing sophistication over the past three decades. MPI might offer surprises of its own. ■

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GENE REGULATION

Expression and silencing coupled

Stephen Buratowski and Danesh Moazed

The RNA interference pathway can inhibit the expression of specific genes. It now seems that an essential component of the silencing process is the gene-expression machinery itself.

Molecular biologists have been amazed in recent years by the discovery of an RNA-mediated mechanism for inhibiting the expression of specific genes — the RNA interference (RNAi) pathway. The 'RNA-induced silencing complex' (RISC) contains small interfering RNAs (siRNAs) whose sequence of nucleotide bases can pair with that of a particular messenger RNA, targeting this mRNA for destruction before it can be translated into protein[1]. However, in many organisms this 'post-transcriptional' gene silencing is only part of the story: production of the mRNA can be shut off by a second siRNA complex called RITS (for 'RNA-induced transcriptional silencing').

Schramke *et al.* (page 1275 of this issue)[2] and Kato *et al.* (writing in *Science*)[3] now show that a gene must first be transcribed if it is subsequently to be silenced. More surprisingly, this transcription must be specifically carried out by RNA polymerase II (RNApII), the enzyme responsible for making mRNAs in eukaryotic organisms.

DNA is packed into nuclei by being wrapped around histone proteins to form nucleosomes. RITS represses transcription by recruiting a histone methyltransferase to the target genes. This enzyme modifies histones so as to make the wrapped DNA inaccessible to the gene-expression machinery, creating a silenced nucleosome configuration known as heterochromatin. RITS requires siRNAs for its