BOOK REVIEWS

Most Secret War: British Scientific Intelligence 1939–1945

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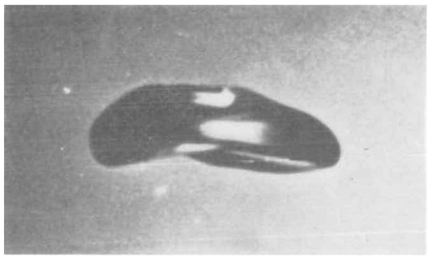

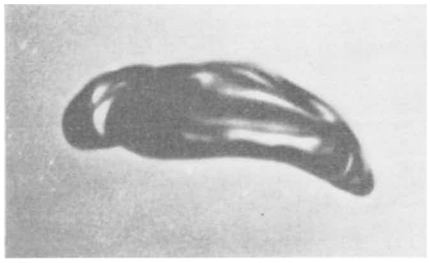

Figure 11 A large falling water drop flattens and develops a depression in its base before breaking up (width of drop approximately 2 cm)

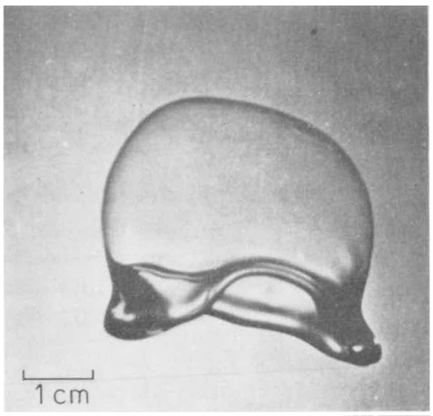

Figure 12 A large falling water drop blows up to form a thin rapidly expanding 'bag' supported on a toroidal ring of liquid that later breaks up into large drops

mum size of raindrops. Another possibility, suggested by wind tunnel observations, is that drops of $D_0 > 5{\cdot}5$ mm disintegrate when their undersurfaces are frequently bombarded by much smaller raindrops.

In tracing the development of a single raindrop I have sought merely to illustrate some basic physical principles and problems, but this is only a small, perhaps trivial, part of a much larger problem, namely what governs the duration, intensity and distribution of rainfall? Here we are concerned with the growth of a population of drops competing among themselves for the available moisture, within space and time scales determined by the air motions in the clouds and which, in turn, are modified by the rain. This interaction between cloud dynamics and particle physics forms the essential content of cloud physics and holds the key to the prediction of rainfall and, perhaps eventually, to its partial control ■

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Book reviews

Looking back

Most Secret War: British Scientific Intelligence 1939–1945 R V Jones
London: Hamish Hamilton 1978 *pp* xx + 556 *price* £6·95

On 19 September 1939 Adolf Hitler, in a broadcast speech from Danzig, said 'Wir haben eine Waffe worin wir nicht angegriffen werden können'. It was fairly clear from the context (in so far as anything in Hitler's speeches was ever really clear) that he was referring to the Luftwaffe: but the English newspapers (doubtless using a tiny dictionary giving: Waffe, 'weapon', without the alternative 'branch of the armed forces') asked: 'What is Hitler's secret weapon?'. Whitehall re-echoed the query (overlooking the fact that the newspapers, not Hitler, had contributed the word 'secret') strongly enough for the Air Ministry to obtain authority to send a scientist to look through the files of the Secret Service to search for anything relevant.

The eminent were doubtless too busy, but there was an available security-cleared physicist, R V Jones – available because the progress of radar development had lowered the priority of his task, infrared detection of aircraft (to which Lindemann had diverted him from an intended study of the infrared spectrum of the sun). The Air Ministry, alerted by Tizard to the science gap in Intelligence, had already taken steps to make him available for just this purpose. When approached about it, four months before the outbreak of war and four and a half months before his own 28th birthday, Jones said 'The man in that position could lose the war – I'll take it'. His assignment to Air Intelligence was fixed for 1 September 1939. Then the fortunate misinterpretation of Hitler's speech made it only days instead of further months before he reached the inner sanctums of British secret intelligence. Jones found in the files a few expensive enquiries after crack-pot inventions; a total lack of planned coverage of, for example, the German 'Order of Battle' for military technology; and a system of dealing with reports which could do little more than grade them as right or wrong, and could make no use of the report which was wrong but might be related to the truth, unless it fell within the province of some specialised intelligence-analysis section in one of the ministries: most agents' reports on technical matters would be of this kind, and there was no specialised intelligence section to receive them. The 'Oslo report' – a sketch of a number of German development projects in military technology, sent in by an anonymous well-wisher to our cause and received soon after Jones' arrival, was of the kind which was only capable of being graded possibly, or partly, right: and would have been discarded if Jones had not kept a copy.

Of course, there *were* secret weapons: both sides for example started that war under the illusion that they alone possessed the secret of radar. The first of the unforeseen technical developments by the enemy to make a major impact on the air war was the introduction of long-range radio-navigational beams for blind-bombing of targets in England. Until these beams were directly detected on the night of 21–22 June 1940 the Intelligence case for their existence was good, but inconclusive, and moderately complex. Appreciation of the evidence was bedevilled by T L Eckersley's renunciation of his own (essentially correct) calculations of the range of propagation of a 30 MHz signal to a receiver at an altitude of 20000 ft. Who can blame Tizard (a chemist) for giving more weight to the dismissive judgment of the country's senior expert on radio propagation than to that of a young physicist new to the arts of intelligence? But it was to cost him much influence in the subsequent course of the war, and it had the consequence that it was Jones himself, far the youngest person present, who had to present the evidence to a meeting of Winston Churchill and the Air Staff.

At that time Jones had the advantage of uniqueness: apart from mathematicians who broke codes he was the only scientist on the inside of the intelligence system. Any physicist could then have made himself of inestimable value to intelligence, not only by prompt recognition of what is scientifically possible and what is not (in the exploitation of electromagnetic waves, for example, quite rudimentary principles constrain the possible performance of a system, though years of engineering effort and ingenuity may be needed to make it work). In addition to this he could contribute the research scientist's modes of thought: for intelligence and scientific research alike demand rigorous deduction from suspect premises. In one respect Jones was personally unique, in his ability to make a report. Every good scientist writes well, if it is just a matter of marshalling a case (those who can't, aren't): but very few have Jones's assiduously cultivated gift for matching the style to the occasion.

In October 1940 Air Marshal Joubert woke up to the fact that our knowledge of German Air Force technical exploitations of radio, together with the knowledge of how we obtained that knowledge and could

Getting down to basics

Fundamental Physics with Reactor Neutrons and Neutrinos: Papers from a workshop held at Grenoble 10–11 October 1977 (Institute of Physics Conference Series No 42) Till von Egidy (ed) *London and Bristol: The Institute of Physics* 1978 *pp* x+180 *price* £16

This volume contains five chapters consisting of a number of contributions in related fields. The first chapter deals with the properties of the neutron itself, there being seven contributions dealing with recent lifetime measurements, new values for the magnetic moment, searches for an electric dipole moment and correlation functions for neutron beta-decay, etc, all preceded by an overview of the subject by T Ericson and concluded by some thoughts on future experiments on the properties of free neutrons by N Ramsey. For me the most exciting contribution to this chapter was the report by W Paul and U Trinks on the magnetic confinement of neutrons, allowing as this does for much more accurate estimates of the neutron lifetime.

The second chapter consists of eight contributions dealing with the study of symmetry violations which can be made with reactor neutrons. Here I was especially struck by the contributions illustrating the considerable improvements in polarised neutron beams. In chapter three we find five contributions on neutrino physics including a theoretical study of low energy neutrino reactions by H Fritzsch. Chapter four consists of three contributions on experimental facilities for fundamental neutron and neutrino physics at reactors and a review of the workshop by V Telegdi. The last chapter is a collection of short comments addressed to the principal contributions. None of these did I find particularly illuminating.

The contributions are all relatively short with the happy consequence that the authors do not get bogged down in technical details, either experimental or theoretical, which would obscure the principal features of their reports from all but the most specialised of readers. The result is a most informative volume for the physicist who wishes a review of recent developments in neutron and neutrino physics associated with high flux reactors.

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try to get more, resided in the mind of one man and could be eliminated by one bomb: he ordered Jones to get himself a deputy. So, on 5 November 1940, the present reviewer joined him in a ring-side seat for the Air War, and indeed for all aspects of the war conditioned by novel scientific applications. Our number grew a little after that, but the team remained a small one to the very end of the war.

This reviewer is clearly not the right person to look to for finding faults in this book: he read it in draft, and shaded a judgment or two at that stage. To the best of his belief it is as true in fact and balance as it can be made. He will not try to draw the morals from this book (not all of which belong only to war and to history) nor to underline those made by the author himself: let the reader do that. He has done more than enough already in starting to tell the story which is told in the book itself.

This is a story which could not be honestly told until a lapse of more than thirty years allowed the secrecy ban on the breaking of the German machine-codes to be lifted. Before that, there had to be a conventional attribution to fictitious agents in high places in Germany. With the revelation that they did not exist came the danger of discrediting the many gallant people in occupied territory who risked, and lost, their lives gathering pieces of information about things they did not understand: and, because they did not understand, reported imperfectly. Jones has gone to considerable pains to set the record straight in their honour; and the achievement in which we (ADI (Science), Air Ministry) can take greatest pride is having taught ourselves how to make good use of the inexact material these sources supplied: the first stage of that learning was when we told ourselves 'Never laugh at an underground aerodrome – there's probably something there'.

Thirty and more years is a great strain on the memory. Jones's memory is exceptionally good. The occasion to give some Staff College lectures, and a certain Nelsonian capacity for writing his own regulations, enabled him to refresh his mind about these events, and to preserve some records, including ADI (Science) reports (which are now publicly accessible). The result is a very good story, very well told. Read it. Physicists may like to notice that concurrently with its publication (on 27 February 1978 – the anniversary of the Bruneval raid) its author had two papers, one experimental and the other theoretical, in the *Proceedings of the Royal Society*, on radiation pressure of light in a dispersive medium.

SIR CHARLES FRANK

Book notes

Itinerant-Electron Magnetism: Proceedings of the International Conference held at Wadham College, Oxford, 12–15 September 1976 (Reprinted from the Journal Physica, Vol 91 B and C) R D Lowde and E P Wohlfarth (eds) *Amsterdam: North Holland* 1977 *pp* viii+350 *price* $63·25

From all accounts this was a highly successful conference but the printed pages of the proceedings convey little sense of excitement. There are 42 papers, covering