speeds reached by the 'singles' of last century were not, generally speaking, very noteworthy (as the author truly points out), a fact mainly attributable to their unscientifically conceived ports and blast-pipes.

The wheel now turns full circle, and the reader may re-open these pages to find himself engrossed in the technics of art. It would have been kind if he had been directed towards that remarkable publication "Technical Studies in the Field of the Fine Arts" (Fogg Art Museum, Harvard University), which, for several years past, has been disseminating knowledge of just the sort which—in this particular domain—Dr. Richardson is so rightly anxious to increase, and for which he is

striving to gain appreciation. In this connexion, Fink's ingenious researches into the cleaning of pottery by electro-endosmosis would have made a charming pendant to the chapter on ceramics.

Thus one can go on: it is an unending theme, as limitless as the powers of applied physics themselves. This volume should be widely read; schools would do well to add it to their libraries without question; for other folk it will be found to be considerably more than a 'scientific bed-book', although it might sometimes well serve that purpose. Here, in fact, is a cross-section of twentieth-century activity, seen in sharply defined relief against its historical background.

F. I. G. RAWLINS.

PERIODICITY IN MALIGNANT GROWTHS

The Periodicity and Cause of Cancer, Leukaemia and Allied Tumours

with Chapters on their Treatment. By Dr. J. H. Douglas Webster. Pp. xv+178. (London: Baillière, Tindall and Cox, 1940.) 12s. 6d.

DR. WEBSTER'S main thesis is that malignant tumours do not grow continuously but show alternating periods of activity and quiescence. This behaviour is attributed to the nature of the life-cycle of the virus responsible for the disease. The full period for one part of the cycle is thirty-three weeks, but the great majority of cases show half periods and multiple periods.

In spite of the elasticity that is apparently allowable, it is very doubtful if Webster has established his main point. Naturally, interest centres around the evidence of periodicity to be found in untreated cases. Unfortunately in such cases we usually have to rely upon the account given by the patient. Thus, if a patient first notices a lump in January and says that it remained stationary in size until the middle of July, when it suddenly began to grow rapidly, then the period January–July represents a full period of quiescence. Those of us who have actually measured tumours over considerable periods may perhaps be forgiven the belief that the apparent discontinuity in the behaviour of the tumour is very likely an expression of psychology rather than of tumour growth.

Bashford is quoted as having been the first to establish experimental evidence of periodicity in tumour growth. The rhythms observed by Bashford and his colleagues were expressed in terms of the percentage of successful inoculations. Unfortunately this evidence, even if it were germane,

would have to be discounted, since modern genetic experiments have shown that these rhythms are artefacts. This statement cannot be fully discussed here; nobody has brought any serious criticism against the genetic evidence, although it must be admitted that several people choose to ignore it. In general it may be stated that experimental work lends no support to the idea that malignant growth is fundamentally rhythmic in character. It is possible that rats and mice do not live long enough for the rhythm to be shown, but this argument loses force when applied to the rabbit, an animal in which virus-induced tumours have been observed over considerable periods without elucidating any fundamental rhythmic pattern.

As further evidence in support of his main thesis, Webster quotes several instances in which the time of recurrence was successfully predicted in cases undergoing treatment. Here it is not necessary to make any assumption concerning the nature of malignant growth; all that need be assumed is that the growth-rates of tumours are fairly closely grouped about a mean value.

Whilst few would deny that malignant growths may sometimes show surprising periods of quiescence or sudden changes in growth-rate, evidence that alternating periods of growth and quiescence should be regarded as the normal sequence independent of any treatment is still lacking. It is, of course, possible that variations in a virus may be responsible for some of the more obscure points in the behaviour of malignant cells. Up to the present, evidence on this point comes entirely from the laboratory. The data supplied by the clinician cannot as yet be said to have added anything of value.

P. A. GORER.