

FOURIER INTEGRALS

Introduction to the Theory of Fourier Integrals. By E. C. TITCHMARSH. Oxford, Clarendon Press, 1937.

THIS book is more than an introduction. Several chapters of the theory, as, for instance, the theory of special (Plancherel, Hilbert) and general (Watson) transforms and of self-reciprocal functions—to which the author contributed substantially—are presented in full and are an excellent basis for further research in modern topics of Fourier analysis.

The book includes a great number of formulas and formal relations; formulas of the classical type as may be found in Burkhardt's article in the "Encyclopädie der mathematischen Wissenschaften"; formulas concerning Bessel functions and Gamma functions; and formal relations underlying modern theories of transforms. Problems of convergence and summability for the ordinary Fourier integrals and for related integrals

are treated with great care in a very satisfactory way. Even Perron's formula for the coefficients of Dirichlet's series is included. The theory of transforms for different L-classes is also presented with much detail. But neither here nor anywhere else does the author introduce general Banach spaces and its operations.

Fourier-Stieltjes integrals are omitted completely. The omission will be felt not only by the analyst but also by the student of applied mathematics who, if properly equipped, can profit greatly from this treatise. The last two chapters are devoted to applications of the theory to the solution of differential and difference equations and of integral equations. They are written in a masterly fashion, combining the classical ease and flexibility of the formal set-up with a rigor which is unprecedented in standard works on the topic and yet does not weigh down heavily on the reader.

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SPECIAL ARTICLES

A PYOGENIC VIRUS IN THE RAT

WE have recently encountered in the white rat an agent closely resembling the known viruses except that it causes extensive necrosis and pus formation in the subcutaneous tissues.

In a number of experiments where rat sarcoma 39 had been mixed before inoculation with various organs of the rat, or with adsorbents employed to remove an antibody from tissue extracts, or had been incubated in such extracts or in Locke's solution, abscesses sometimes arose at the inoculation site, even though all materials had been proved sterile before use. No such occurrence has ever been observed during some twenty years' routine propagation of this growth, suppuration having been restricted to experiments where the sarcoma was treated in some way before implantation. Hence there is no evidence that the agent in question bears any relation to this neoplasm other than that of a chance contaminant, though why it should become manifest only under the conditions just recited we are quite unable to explain.

When aerobic and anaerobic cultures from these abscesses proved consistently sterile on a wide variety of media, and smears of the pus stained in several different ways revealed no organisms of any sort, the suspicion of a virus had to be entertained, though we knew of none whose activities were so eminently pyogenic.

It was found that the agent can be transferred by 10 per cent. extracts in physiological saline or Locke's solution, will pass a Berkefeld W filter, resist drying and retain its viability fairly well for at least seven

days at room temperature or for twenty-one days in the ice-box. It remains active in 50 per cent glycerol-saline for at least a month in the ice-box, and withstands exposure for one hour to 56° C. but not to 60° C. It is killed, also, by 0.05 per cent. formol overnight at room temperature but unharmed by two days' contact with 0.05 per cent. phenol in the ice-box. Ultra-violet light for one minute leaves it undamaged but abolishes its activity after fifteen minutes.

When 0.05 cc of a 10 per cent. extract of pus and abscess-wall are injected subcutaneously into a white rat of the breed used at the Crocker Institute there ensues a vigorous proliferation of the connective tissue accompanied by necrosis and pus formation until, by the third or fourth day, the process is indistinguishable from any bacterial abscess. At this stage the lesion may be as large as 5 × 1 cm, the excess of length over width resulting from the use of a long inoculating needle and flowing of the injected fluid back along its path. The overlying skin is moderately reddened, the surrounding connective tissue intensely congested, and the abscess-wall thick and fibrous. As time goes on more and more pus collects, the fibrous process recedes until the lesion has become a mere thin-walled pus sac, and cure is accomplished in about seven days if the abscess opens on the surface, as it often does, or after several weeks when it is absorbed without rupture.

If there is any constitutional disturbance it can not be very severe, for the animals retain a glossy coat, eat normally, do not lose weight, and none die. There does take place, however, a definite increase in the proportion of circulating polymorphonuclear leuco-