rimming steel occurred in the case of some boiler rivets, the brittleness being traced to the presence of nitride 'needles'. Such work is in a direct line with the tradition in these reports, since Stromeyer's work on the effect of nitrogen in embrittling steel was carried out in the laboratories of the Manchester Steam Users' Association, now taken over by the Company which has issued this report. Incidentally, the same tradition can be traced in the work on the notched-bar test, a subject on which Schuster carried out considerable research.

The account of these investigations on engineering parts which have failed is very welcome. Only too often, service failures are hidden in the scrap heap, and careful investigation can be of immense value in minimizing the danger of further fractures from the same cause. These investigations cover both the mechanical and electrical fields. In the latter there is also an article by D. C. Bacon on "Excess Current Protection of Electric Motor Circuits". Among the failures which are reported are those due to the cracking of a riveted seam due to excess riveting pressure, tube failures, butt-welded joints, failure of turbine blades and shaft, fracture of a steam engine crank-shaft, an accident to an electric goods-lift, defective squirrel-cage motor-rotors, the disruption of a hydro-extractor, and the explosion of an air vessel. In all, these reports provide a very considerable amount of information which should be of value both in design and in the maintenance of mechanical and electrical equipment.

The presentation of this work is more than good, the illustrations and micrographs are excellent, and at the low price at which it is issued should appeal to a very wide range of readers. F. C. THOMPSON

UNIVERSITY OF WITTENBERG (1502–1952)

THE Martin-Luther University of Halle-Wittenberg, in the East Zone of Germany, held a celebration during October 18–25, 1952, to mark the four hundred and fiftieth anniversary of its foundation at Wittenberg, nearly two hundred years before the separate foundation of the University at Halle, with which it was merged on reopening in 1815 after being closed in 1813 by Napoleon. The pro-rector, Prof. Leo Stern, acted for the rector, Prof. Rudolf Agricola, who was absent through illness. The following details are given in a letter from one of the West Zone delegates.

The opening ceremony was in the Theatre of Peace at Halle. A colourful scene was provided by the university professors, deans, pro-rectors and rectors in their robes. The celebration on Sunday, October 19, took place in the town church of Wittenberg; Prof. Aland gave the address, and at a church service in the afternoon the sermon was preached by Bishop Dibelius. The ceremony was attended by Hungarian and Roumanian bishops, by a representative of the Chinese Christian Reform Movement, and by the Rev. Edward Charles, from Great Britain. On October 20 there was a function, at which scientific addresses were given, at the Institute for German History, a student youth demonstration in the market, and musical performances (Handel, Bach, Brahms and others). On the following day a special meeting of the Leopoldina Academy was held, with lectures and demonstrations on the theme "Der schwerhörige Mensch". The birthplace of the Leopoldina Academy—Schweinfurt in the West Zone of Germany—was officially represented by its mayor, Dr. O. Schön, and by Dr. J. Helfrich, who had already represented his town at Halle for the tercentenary of the Leopoldina Academy in February 1952 (see *Nature*, 169, 576, and 170, 1105; 1952), and they were most warmly received. There followed numerous parallel sittings of the different faculties, with exhibitions. Receptions were held by members of the East Zone Government, by the regional and civic authorities and by the University Senate, and a performance was given of Handel's opera "Tamerlano". R. C. H. YOUNG

FORESTRY RESEARCH AND ORGANIZATION

TWO papers read at the Sixth British Commonwealth Forestry Conference, held in Canada last year, and now published by the Forestry Commission (London: H.M.S.O., 1952), deserve to be more widely noticed for the scientific importance of their message. The first was by Mr. J. N. R. Jeffers, of the Forestry Commission, London, who discussed the use of statistical methods in forest research. "To-day," he said, "the handling of figures has become a necessity; they are required for administration, management and research, and their collection, analysis and interpretation have become part of the forester's everyday work." The functions of these methods are to provide a sound basis for the design of experiments, to summarize data so that they can be correctly and readily interpreted, and to give an estimate of the probability that the effects indicated by the results are true effects. Statistical methods have become indispensable tools of forest research. It is now a question of making more foresters familiar with them and of asking statisticians to develop new methods when the existing ones are inadequate.

It may be pointed out, in passing, that this is more applicable to the research officer, for the forester's everyday work is, or should be, out in the forests and woods studying the methods of growth and well-being of his trees and their several requirements from the practical sylvicultural point of view on the ground. His job is to produce the timber, etc., of the future by practical sylviculture and constant supervision on the ground. Statistics, though necessary, will not do this.

The other paper was by Mr. N. V. Brasnett, on the "Organization of Sustained Yield in previously Unmanaged Forests". He stated: "For periods within the physical rotations of the species which comprise them, mature, unmanaged forests can be assumed to be in a state of dynamic equilibrium. Large old trees are generally in excess of medium-sized and small trees of the same species, which only have an opportunity of entering the top canopy as overmature trees die. Because no increment is harvested, it has slowed down until it is practically balanced by decay. The smaller trees are not all necessarily younger than the large ones, but may merely be suppressed and even capable of responding to release. Abundant seedlings are liable to appear on the forest floor in most years, but most of them fade away in a few years, leaving only individuals to survive in gaps here and there". The British have the greatest experience in dealing with large areas of tropical and sub-tropical, previously unmanaged forests. British foresters in India for nearly ninety years have been studying and wrestling with the problem of introducing an orderly management and a sustained yield in forests of these types, and a great deal of valuable sylvicultural knowledge has been gathered. The numerous working plans in force throughout India furnish evidence of the advanced position attained. Mr. Brasnett's paper deals with the various problems entailed in introducing a detailed management into the previously unmanaged forest.

A NEW METHOD OF MEASURING SPERM SPEEDS

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In Chandrasekhar's review on "Stochastic Processes in Physics and Astronomy"[1], the following footnote occurs on p. 89: "Fürth made systematic counts of the number of pedestrians in a [street] block every five seconds. . . . It is amusing that by systematic counts of the kind made by Fürth it is possible actually to determine the average speed of a pedestrian!" The principle involved in such determinations is known as probability-after-effect, and it occurred to me that if the average walking speed of a pedestrian can be determined by this method, the same should apply in the case of spermatozoa, though the latter move in three or in certain circumstances two dimensions, whereas in Fürth's problem the pedestrians only moved in one dimension, that is to the right or the left.

Very little is known about the relationship between the speeds at which spermatozoa swim and their fertilizing capacity, or about the effects of changes in the physical and chemical properties of the medium on sperm movement. These gaps in our knowledge are mainly due to the difficulties which have been experienced in measuring the speeds at which spermatozoa swim. Hitherto such measurements have presented great problems, mainly because photographic methods are not readily applicable to dense sperm suspensions. If the suspensions are diluted sufficiently for photography, the spermatozoa may exhibit pathological changes unless protective substances, which interfere with the measurements, are added to the medium. The electrical method of measuring sperm activity cannot be applied to human spermatozoa because the number of sperm per millilitre of ejaculate is not sufficient to cause the 'wave formation' observed in bull and ram semen, upon which the method depends[2]. Recently, Bosselaar and Spronk[3] have reported a new way of measuring what they call the 'motility' and concentration of spermatozoa. Apart from the objections made to the method by the authors themselves, no estimates of sperm speeds are given in that article.

One can, of course, take a high-speed cinemicrograph of a dense suspension of spermatozoa and then project the film frame by frame on to squared paper, marking the consecutive positions taken up by individual spermatozoa and joining these points together by straight lines. The total length of these lines divided by the overall magnification and the duration of the film gives the speed of each spermatozoon. This process is much too slow and expensive for regular use, though it has been used for verifying the experiments described in this communication; moreover, the person joining up the consecutive positions of sperm heads may have to make difficult decisions as to where a spermatozoon on frame 1 has got to on frame 2. One experiment lasting 30 sec., which takes $2\frac{1}{4}$ hr. to analyse by the new method, takes about a week to analyse by examination of high-speed cinemicrographs.

In the probability-after-effect method of measuring the average speed of spermatozoa, a small drop of semen, or semen diluted 1 : 2—1 : 5 with a suitable diluent, is placed on a microscope slide. A coverslip is gently put on top of the drop, which should be of such a size that, after the coverslip is placed on top, the spermatozoa only swim in one plane. This is not difficult to achieve as spermatozoa often tend to swim in one plane when constrained by a coverslip. A cinematograph film is then taken of the suspension, preferably with a phase-contrast microscope. An overall magnification of about 200 is convenient. The camera should run at 4–10 frames/sec. After developing and fixing, the film is projected on to paper on which a circle of known radius r has been drawn; the number of spermatozoa in this circle is then counted on consecutive frames. The circle should be of such a radius that it contains between 10 and 20 spermatozoa. After the counts have been made we have a series of numbers, as in the row labelled n in the accompanying table. The calculation of the average speed of the spermatozoa from these numbers requires no knowledge of mathematics beyond logarithms and the use of standard tables. The average value of these numbers, $\bar{n}$, and the average value of the squares of the differences between consecutive numbers, $\overline{\delta^2}$, are first calculated, as in the table. Suppose that in this experiment the camera speed was 3·7 frames a second, which means that the time interval, τ, between photographs was 0·27 sec.; and that the radius of the circle was 51 μ. The average speed, $\bar{c}$, of the sperm suspension is given by the equation:

$$c = -3{\cdot}6169\, r/\tau \log_{10} (1 - \overline{\delta^2}/2\bar{n}). \qquad (1)$$

The minus sign in front of the right-hand side of this equation arises because $\log_{10} (1 - \overline{\delta^2}/2\bar{n})$ is negative. Substituting the values obtained above in this equation, we obtain $\bar{c} = 120$ μ/sec., the average speed of the spermatozoa in bull semen diluted 1/4 with Ringer fructose at 37° C.

No., n, of sperm in circle	9 10 15 11 12 12 9 10 14 15	Sum, 117
Difference, δ, between consecutive numbers	1 5 4 1 0 3 1 4 1	
δ^2	1 25 16 1 0 9 1 16 1	Sum, 70
Average value of n, $\bar{n} = 117/10 = 11{\cdot}7$		
Average value of δ^2, $\overline{\delta^2} = 70/9 = 7{\cdot}7778$		

To obtain reasonable precision, more counts than ten, a number chosen for purposes of illustration of the method in the table, should be made. When the number of spermatozoa in 75 consecutive circles was counted in a similar experiment, an operation which took $2\frac{1}{4}$ hr., the average speed was found to be 111 μ/sec., with a standard error of 24·5. The actual average speed of the suspension, measured by the slow projection method mentioned above, was 117 μ/sec.