

in which he discussed the theory of quanta, special relativity, geodesics, invariants, differential equations, the theory of measurement and of space and time.

Perhaps his most direct influence on the philosophy of science has been in these applications of logical construction and other symbolic techniques which first appeared in the *Principia*. Their effect on modern logic (and mathematics) has been incalculable. The success of this analytic approach moved many other philosophers, including the Vienna Circle group of logical positivists, to attempt similar projects in the physical sciences.

Much later in his career (*Human Knowledge: Its Scope and Limits*, 1948) Russell turned again to a sustained attack on the problems specifically related to science and provided a more modern analysis of a number of basic scientific concepts. In this work he presented his analysis of two problems that have been prominent in the philosophy of science: namely, the difficulty of providing a formally correct and materially adequate definition of the nature of probability statements, and the provision of a theory of non-deductive inferences as they are used in the sciences. In 1950 Russell was a founder member of the British Society for the Philosophy of Science.

Characteristically, Russell had no hesitation in attempting the difficult task of bridging the ever widening gap between philosophy and science. In writing *The ABC of Quanta* (1923) and *The ABC of Relativity* (1924) he presented, perhaps somewhat idiosyncratically, the fruits of modern science predigested for philosophers, and demonstrated the benefits of analytic philosophy in a manner palatable to scientists. A Herculean task!

Beyond his philosophy of science, Russell was an indefatigable popularizer of science and an exponent of the application of scientific method to the solving of social, political, moral and philosophical problems. *Our Knowledge of the External World* was subtitled "As a field for Scientific Method in Philosophy". He was undoubtedly among the pioneers who called for social responsibility on the part of scientists and he acted accordingly, in repeatedly analysing the impact of science and technology on society.

Perhaps some insight into the source of Russell's continuing influence is found in the concluding paragraph of *Human Knowledge*. "In this sense, it must be admitted, empiricism as a theory of knowledge has proved inadequate, though less so than any other previous theory of knowledge. Indeed, such inadequacies as we have seemed to find in empiricism have been discovered by strict adherence to a doctrine by which empiricist philosophy has been inspired: that all human knowledge is uncertain, inexact and partial. To this doctrine we have not found any limitation whatever."

Correspondence

Can a Scientific Article be Libellous?

SIR,—In a case before the Court of Appeal, reported in *The Times* (February 13, 1970), a dental surgeon was given leave to take libel action against the British Medical Association and others. The Court held that "a scientific paper in the *British Medical Journal* which was critical of a technique for dental anaesthesia introduced, used and recommended [previously in the same journal] by a named dental surgeon was held by a majority of the Court to be capable of bearing a meaning defamatory of the surgeon in the way of his profession and that it should not therefore be struck out *in limine* as disclosing no reasonable cause of action". While the judges avoided implications as to the likely outcome of such action in court, they maintained that a suit for libel was justified. As suggested in the

dissenting judgment by the Master of the Rolls, Lord Denning, the ramifications of this decision on the scientific world could be serious.

The central issue in the majority judgment was expressed by Lord Pearson, who was reported as saying that "the author's name, practice and reputation have been and were closely associated with the technique in question". Therefore, an attack on the technique held forth the possibility of being an attack on the author and must be entered to jury-decision. In suits claiming libel, the defendant must prove to a jury's satisfaction that his actions did not constitute a personal, subjective defamation of the plaintiff. However, the cost in time and funds to prepare a case to the satisfaction of a lay-jury could be prohibitive to many research efforts and personally ruinous to the defendant.

The Master of the Rolls was reported as expressing that "it would be a sorry day if scientists were to be deterred from publishing their findings for fear of libel actions. So long as they refrained from personal attacks, they should be free to criticize the systems and techniques of others. It was in the interest of truth itself. Were it otherwise, no scientific journal would be safe". On the basis of the judgment in this case, allowing the libel action to proceed, there is clearly cause for concern for all of us. Within the scientific community one accepts that criticism is given and taken. While reputations may be enhanced or damaged in this manner, it rarely becomes a legal issue. However, individual criticism of any research involving commercial interests would appear now to be open to the risk of expensive libel action.

Yours faithfully,

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Should Slides be Seen Blind?

SIR,—The suggestion is in the wind that, in the safety evaluation of drugs and potential food additives, histopathological material derived from studies on animals should be examined "blind"; that is to say, by a pathologist who is not told which material is derived from treated animals and which from untreated controls. If this suggestion is being seriously put forward, and if it applies to the first time that slides are to be examined, then we believe it to be ill-advised.

The pathologist's appraisal of toxicity should begin with a consideration of the overall design of the experiment and of details of mortality and morbidity in animals subjected to each form of treatment. Next he should acquaint himself with the clinical history of each animal. Central to his appraisal will be observations made by the naked eye at necropsy. Subsequent microscopic examination of material taken for histopathology may or may not add to the information already gained; but it is more likely to do so if detailed clinical and post mortem reports are available to the pathologist at the time he examines the slides. In any case, unless he has these reports before him, he cannot be sure that the microtome knife has found all the lesions seen macroscopically, and he may be in doubt as to the exact location and size of lesions. This description is nothing more than a statement of the general principles of sound pathological practice as they apply to the special problems associated with the safety evaluation of drugs and other agents.

Many variables face the pathologist as he examines histological material from toxicity studies. It would be impracticable for him to consider all of them. Awareness