theory is difficult to refute when, in fact, there are few, if any, competent alloy developers unaware of dislocations. At the present time, dislocations *are* a significant part of the "classical point of view on strengthening of materials."

I think there can be no dispute about the utility of dislocation theory for "rationalizing observed strengths." A glance through any contemporary symposium volume on fracture, deformation, or mechanical properties makes it clear that dislocation theory forms the foundation for any science (as opposed to technology) of mechanical behavior of materials.

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Medical Instrumentation

Duncan A. Holaday is to be commended for his excellent survey "Where does instrumentation enter into medicine?" [*Science* **134**, 1172 (1961)]. He perhaps was more harsh in some of his criticism than someone outside the medical profession could be. However, his solutions to the dilemma—to train physicians in engineering and to bring engineers into hospitals—pose further dilemmas.

Let us consider the first problem: Where does a physician get such training? Only one or two institutions offer a training program honestly aimed at instrumentation. The several biomedical engineering programs offered elsewhere are directed toward developing an engineer with cross-disciplinary training for research—not a man who is a specialist at measurement.

Measurement systems are largely electrical or electronic, so one would expect to find electrical engineers with the necessary training. However, instrumentation is an unwanted by-product in most university electrical-engineering departments. The trend is toward training physicists for applied research, and instrumentation is no longer "respectable."

In any attempt to bring the engineer into the hospital there are two distinct obstacles. First, nonengineering administrators generally have little understanding of what an engineer is, beyond "someone who knows about electronics, radios, and so on." Consequently, in all but a few hospitals the

salaries for electronics personnel are set at the level of the local radio-TV repair man—usually less than a recent engineering graduate receives. If one wishes to attract a man with several years' experience who can bring valuable, up-to-date techniques into the hospital, one must offer a professional salary.

I feel that most engineers interested in a career as a specialist in medical instrumentation will be research-type men who will want to conduct their own research programs in addition to tackling measurement problems for physicians. Consequently, a second big question is raised: Is the engineer to be a professional staff or faculty member or just a technician? Few capable, experienced engineers will accept the latter position.

It is obvious that there are few engineers with the background to make medical judgments; however, a basic problem of instrumentation is that of finding how to obtain significant measurements. We already have too many gadgets produced by well-meaning engineers who don't know the medical problems, or by medical personnel who asked for a device but did not authorize an engineering study of the over-all measurement problem.

No real advances in medical instrumentation will be possible until both physicians and engineers consider each other specialists and are willing to work together on a professional level. It seems apparent that either of Holaday's solutions will require a re-education of both physicians and engineers.

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Sias is undoubtedly correct in his conclusion that both physicians and engineers will need training in the other's art before they are able to work together effectively.

Programs to indoctrinate engineers in biomedical areas are beginning to appear. It is true that the emphasis is toward research rather than applied instrumentation, and toward biophysics and bionics (the application of life processes to the solution of engineering problems) rather than medical engineering. Efforts in these areas should, nevertheless, generate mutual respect and, in the course of time, solutions to more immediately practical problems.

Those who have the greatest stake in medical instrumentation might give some thought to helping. Physicians and hospital administrators could profitably make space for engineers to work in their laboratories. Instrument companies would be well advised to remove their development engineers from factory drafting boards, where the engineers continue to make conceptual mistakes in designing instruments for use in patient care, and accept opportunities to place these engineers in hospitals where the latter can witness the causes of earlier failures and participate in field trails of new attempts.

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Selling Methods

Out of profound respect for *Science* and its readers, many of whom are also contributors and advisers to *Encyclopaedia Britannica*, I am compelled to comment on your editorial "The company they keep" [*Science* **134**, 75 (1961)].

The editorial gives the strong—but erroneous—impression that a recent Federal Trade Commission order affecting Encyclopaedia Britannica deals with current selling methods. This is not true.

The original action by the FTC on which the citation was based was taken in May 1958 and involved complaints received by the FTC prior to that time.

Our salesmen have always been instructed, under penalty of immediate discharge, not to use the kind of irregular sales presentation that led to the FTC complaints. As soon as these individual complaints were brought to our attention, we took immediate steps to insure against their recurrence.

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Encyclopaedia Britannica,
Chicago, Illinois

Here is the sequence of Federal Trade Commission documents on which my editorial on the Encyclopaedia Britannica, Inc., was based: (i) a "Complaint," filed 5 May 1958, serving notice to the Britannica company to appear at FTC hearings; (ii) an "Initial Decision," filed 30 August 1960, ordering the company to "cease and desist" from certain sales practices; and (iii) a "Final Order," filed 16 June 1961, ordering the company to "cease and desist" from certain sales practices, following the company's appeal of the initial decision.—J.T.