economy. Basic research will increase relative to applied research, so that there will be a greater variety of fundamental research findings on the basis of which applied research can be conducted. The potential which resides in the areas of nutrition, biochemistry, public health, preventive medicine, and other areas will be more nearly capable of full achievement. The bias in favor of contriving new compounds instead of systematically conducting an empirical study of existing compounds will be reduced. And the amount of exclusively imitative research, and of other types of research of secondary importance aimed at finding a patentable vehicle for a "blitz" sales promotion campaign, will be reduced or even eliminated.

This latter phenomenon of duplicative activities is a major element in drug research today, as conditioned by its patent orientation. Basically, there is an over-intensive exploitation of those approaches known in the past to have yielded profitable drugs. Since the number of known approaches is limited, it is within the capacities of major firms to explore several of them, and since all firms are conscious of the commercial advantage of being able rapidly to duplicate the successful new drugs which their rivals may find, the research programs of large drug firms tend to duplicate, at least in part, the programs of their major rivals. (This was attested to not only by many witnesses at drug industry hearings, but also by the near-simultaneous discovery of several drugs by two or more firms.) This constitutes a compounded misallocation of resources: not only are scarce talents diverted from basic to applied research, but wasteful duplication of effort on precisely the same applied research projects seems to be common.

Much of the criticism of the "molecular manipulation" approach can be most appropriately directed at this phase of the industry's operations. The ideal manipulated molecule is one which is pharmacologically identical with the profitable product of a rival, but is legally distinct in the sense that a patent may be obtained. However, it is the latter criterion which is crucial, not the former, and the typical me-too version of an existing drug is of dubious superiority, if not absolutely inferior, to the original drug which it is intended to supplant. The most impressive testimony regarding the prevalence of misdirected research in the major drug houses came during the Kefauver hearings from two physicians who formerly served as medical directors for major firms. Dr. A. Dale Console, formerly with Squibb, when asked whether there was much drug research which produces nothing worthwhile and is not intended to, replied:

"I think the majority of it is in that category . . . and I should point out that with many of these products, it is clear while they are on the drawing board that they promise no utility; they promise sales. It is not a question of pursuing them because something may come of it . . . it is pursued simply because there is profit in it." [12]

He also reported that imitative research could crowd out productive work:

"When a 'crash program' comes along in which some product is being pushed in order to get it out before a competitor gets it out, it is not unusual for a worthwhile research program to be postponed so that the people can be taken off it to be put on the 'crash program'. Very frequenty some of these programs are never picked up again. So I think that good research is actually hampered by this type of thing." [12]

Dr. Haskell J. Weinstein, formerly with the Roering division of Pfizer, denounced industry managements for wasting the time of their research personnel:

"Their talents should not be expended on patent-bypassing chemical manipulations, on ridiculous mixtures of drugs, or inconsequential additives to established drugs. Since the number of well-trained capable scientists is severely limited, their potential should not be wasted. The long-term benefits of the appropriate utilization of the abilities of these skilled individuals would be immeasurably greater." [13]

This illustrates some of the subsidiary distortions in applied research resulting from the patent incentive: not only modified molecules, but the development of often irrational combinations of existing drugs which lack flexibility and compound the problems of dosage and toxicity, and the devising of additives which

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[12] Hearings on Administered Prices, *op. cit.*, part 18, p. 10379.
[13] *Ibid.*, part 18, p. 10254.