

before you know how to go about solving it. In developing that knowledge is basic research and it is relevant because it is directed toward getting more information that will help us in solving this technological problem that we have.

Mr. BROWN. Have you figured any way of estimating relative levels of effort or dollars in these two areas? Do you make an effort to do so for budgetary or planning purposes or anything of that sort?

Dr. MACARTHUR. A quantitative measure of how much you should spend in basic research is very difficult, even in the private sector.

Let's take the private sector. Private industry which has a good measure of success, a profit-and-loss statement, has been struggling with this problem for many years, and you will find that they haven't come up with a magic formula as to how much they should put in research. It is strictly intuitive and to a certain extent based on what they can afford to put in from their profit margin for that year. The way we go about it is we look at each area and get an idea of what the problems are, what the opportunities are and how much we feel is necessary to capitalize on what we have. I must say it is a qualitative judgment of how much should be spent in basic research.

Mr. BROWN. This would vary from laboratory to laboratory also, I presume?

Dr. MACARTHUR. Yes, indeed. Some of our laboratories like NRL do a great deal of basic research, other laboratories do very little basic research. It depends on the mission of the laboratory, it depends on how much they are doing with universities.

Mr. BROWN. When you brought up this question of 3 to 6 percent discretionary funds, the thought occurred to me as to whether this could or is used on basic research or whether it is all directed at some developmental type of problem.

Dr. MACARTHUR. Well, let me answer that question this way. Although the money that we give in discretionary funds comes out of our research budget category we also give the lab director the freedom to spend it on basic, applied, or technological problems. We don't attach any strings to it because in certain cases some of the most successful work—because you can see a product at the end of the work—comes out of the applied work.

On the other hand, some very good scientific work has been done with this type of money. It is up to the individual lab director how he will utilize it. This determination, and its success determines how much he gets the following year.

Mr. GLASS. I would say about 30 percent of the dollars are at the very fundamental end of the spectrum, about 70 percent of these discretionary funds are used in the more applied area.

Mr. BROWN. The examples you gave, and this is probably good judgment in the situation since you are presenting it to Members of the Congress, the examples dealt with hardware results.

Dr. MACARTHUR. That is right, more componentry than fundamental work.

Mr. BROWN. But there are, I suspect, many examples of basic research which is difficult to evaluate, and I presume you have the responsibility to evaluate the excellence of new knowledge?

Dr. MACARTHUR. The quality of the work.