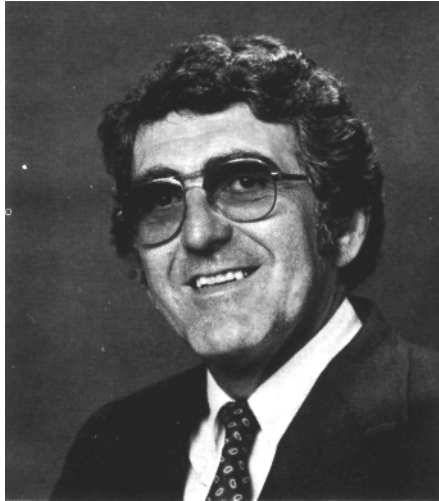


Industry—University Relations

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As I look back — of course, I'm not old enough to look back; the gray is just here so that I look a little more distinguished — I do remember with great fondness the years I spent with the avocado industry, working closely with many of you — through the Society in the years before we actually had a marketing order, then with the marketing order, and of course in later years with the Commission and a continued interaction with the Society. You truly are a remarkable organization, and I mean that most sincerely. If all the commodity groups were as well organized and had your interest in research, your interest in Cooperative Extension, and your interest in the University — I really wouldn't have a very difficult job to do. It has meant a great deal to have an organization like yourselves not only supporting the research in agriculture as related to the avocado industry, but so many of you have worked to make sure that a little bit of the money continues to go to the University of California and to the agricultural research and extension program; and I certainly appreciate it.

I also appreciate the frankness with which this group always deals with us. The Ralph Pinkertons and Jack Shepherds — you really never have any doubt where you stand, you know; if there's a problem, they're very good at letting you know. And of course, one of the great pleasures is the staff and the people that we have within the University that interact with you. Fred Guillimet — I'm very proud of you, Fred, and it's a great pleasure to see you get this (California Avocado Society) award. It is this type of people that make it possible to remain a proud University and for you to remain proud of us.

Of course, one of the nicest things about today is to be part of the program with Bob Platt chairing it. He has taught me that "A" stands for "avocado," and he's taught me a great deal more ... but I won't go into that, Bob, because my wife is here today, too, so I won't betray any confidences. And, of course, he's been a great friend over the years. I have to give a little bit of credit today to Sheila Black, who works in my office, who communicated with a number of you to establish some of this information that I'll talk a little bit about; I don't want to get in trouble with my speech writer.

I do want to discuss several issues, today, to remind you how of important it is to continue to expand our support for agricultural research. I heard what was said before, today, and it does warm my heart that the Society is continuing, not only to have a strong philosophical support for research, but actually putting some dollars there; and it's very important. There's no question about it: in providing food to *everyone*, the task we face not only in the avocado industry, not only in California, not only in the United States, but throughout the world, is a tough one. We constantly hear that we don't need more research for agriculture because we have surpluses. I'm afraid those surpluses are a lot more fragile than many of our political people would like to believe. I think *you* know how fragile a surplus can be.

But we're not only talking about agricultural research so that we have an adequate quantity of food; we're talking about it so that we have a *quality* of life. California's products in many ways contribute to the quality of the diet that's set before us and the quality of our environment. We worked very hard in the last 20, 25 years to be sure that we were maintaining, not only our productivity and the quality of the food that we eat, but the quality of our environment. We've worked diligently with integrated pest management programs and return flow irrigation systems, efficiency of water utilization, efficiency of energy utilization, to insure the adequate supply of our natural resources while minimizing the contamination of our environment.

Of course, agricultural research also means world power. And that's no trivial situation. We're concerned about our position in the world; and as far as I'm concerned, we have a much better opportunity for world leadership a country with our agricultural power than we do with guns. And, of course, it's not bad to have a little bit of agricultural research to help the profit. I think Ralph (Pinkerton) would go along with a profit motive for the agricultural industry. There are people, of course, who believe that, if you're in agriculture and have the opportunity to live in the country and be a farmer, you shouldn't also earn a living. You know, you always hear that, "Gee, look at that! They drive new cars, too!" Just like human beings, you know. I think that's probably all right.

But let's not forget about the supply of food. The world population situation is serious. It increased 82 million people, this last year, to a 4.7 billion level. That was the largest single increase that we've ever seen in any one year. India and China went up 15 million people. The countries that can help themselves the least are increasing the most rapidly. We do get confused, sometimes, about the food supply situation, because we're looking at the market this year — which you have to do, you've got to sell this year's crop, I understand that — but in the long run, folks, we've got a real serious problem! We feel we can only continue to produce food, with our present techniques, to supply the world needs for another 25 or 30 years. That 25- or 30-year period is a pretty short period. We've heard remarks today that it takes 27 years to get a new avocado variety?

We've all seen how quickly that number of years can go by.

But we do have new opportunities. Fifty years ago, Marconi said that the astounding advance of science has brought us to the stage where the things that are done today, would have been foolish to even dream of a few years ago. And, indeed, we find ourselves today dreaming of things that would have been foolish to even think of a few years ago. And we call those, if you're following the world of science and investment today, "biotechnology" and "genetic engineering." These buzz words have led to a major investment — development of dozens of new companies in the West Coast area — and a great hope for plant biology and the development of new varieties in the future.

Genetic engineering is really not anything new; it's just a new technique. All the work that Bob (Bergh) does in trying to develop new varieties is just simply the business of recombining some of the genetic material in the plant in hopes of coming up with a better combination that leads to disease resistance or better productivity. Fortunately, some of our scientists working at the frontiers of knowledge have learned ways to splice the deoxyribonucleic acid, which is the backbone of very minute pieces of information in the chromosome. Perhaps we will be able to insert disease resistance into a plant where none exists today. One of the great advantages is that, instead of 27 years and hundreds of acres of land, we can now do some of these experiments by the thousands and tens of millions in test tubes, and do them much more rapidly. We have succeeded, in recent years, in actually inserting a gene from a bacterium — a bacterium that is resistant to an antibiotic — into a petunia. Now, I don't suppose that raises great excitement in this group, to know that you could now buy a petunia that's resistant to an antibiotic; but believe me, it is a major development. It's the first time we've been able, by these techniques, to actually insert a gene from another type of organism, like a bacterium, into a plant and have it express itself. This plant now, this petunia, is growing along happily; and the seed from it is true to type and does have a resistance to the antibiotic.

The bacteria are a source of genetic material and, of course, easy to screen; and we now have found that there are bacteria that are resistant to the herbicide "Roundup." There are a lot of growers here in the room that use "Roundup" as a herbicide. As you know, you wouldn't dare use it on many annual crops, but if we can insert this gene from the bacterium into a commercial plant, it's possible then that that plant will have resistance to "Roundup," and you'll be able to use the herbicide in a crop that would now be susceptible to it.

One area that's of interest to you people because you've supported research through the Avocado Commission on it is the problem of frost and cold susceptibility in plants. As you know, if avocados are exposed to temperatures in the 15 to 18 degree range, it's a little bit hard on the foliage; they tend to wither and fall. And, of course, tomatoes, beans, and similar annual plants are very susceptible at temperatures below 27 or 28 degrees. Steve Lindow, of the University of California at Berkeley — supported, as I mentioned, by the Commission and other commodity groups — has learned that there is a bacterium that grows in the plant that is what we call an ice nucleation bacterium. The plant will cool, of course, to whatever temperature is present in the atmosphere; but it doesn't really freeze until about 15 degrees. If the bacterium is present, it provides a nucleus and ice crystals form. It's the ice crystals that do the damage to the plant. If you

kill the bacterium, with a bactericide, then the plant will actually tolerate 15 to 18 degrees with no damage, for a number of hours. I think some of you have seen Steve's reports on this. Now, by manipulation of this bacterium through genetic engineering techniques, he has been able to make a bacterium, just like the one that's in the plant that does not cause ice nucleation. You can put this on the plant, it will compete with the other bacteria, and you'll have frost resistant plants.

Of course it's not surprising that there are a lot of people in the country that are scared to death of the idea of putting these bacteria out in the world, and he's running into major resistance at the federal level; however, I think it will be a success. It will take great financial and political support to get him there, just as it will take great financial and political support to keep these programs going. But these are the kind of programs that are the hope for the future. These are the kind of projects that make me believe that we *will* keep the avocado industry in business, that we will continue to feed the world; and, of course, I'm excited about that.

Remember, though, we've got about 25 to 30 years left. The scientists that are going to solve our problems 25 to 30 years from now are in the first grade this year. I think some of you have been hearing about our K-through-12 programs in California. We're not too proud of them. So when you think about where your industry is going to be down the road 25 or 30 years from now, of course think about your agricultural research and extension program in the University of California, and don't forget to think about the K-through-12. That's where we're going to make the new scientists who are going to educate the people that are going to come along and do the job for us in the future. Frankly, I'm concerned. We see too many folks coming to the University that are not prepared. I think that could have as great an impact on your industry down the road as some of the research that we're talking about here today.

Our present research looks pretty good. We're doing some things that I'm proud of. One of them that I was going to mention is the fruit ripening that Dr. Lee, Dr. Coggins, and Dr. Young, who is now deceased but who worked hard for the industry, developed. Now, I don't have to talk about it. You ate it, today, noon; and if you've ever served a banquet for 300-and-some people hard avocados, you know, as I do, that controlled ripening and marketing ripe fruit is a major step. I know Ralph (Pinkerton), you've believed in it a long time. I'm sure that most people go to the grocery store today—you see them by the thousands in the Bay Area — picking up some fruits and vegetables for dinner that evening. A hard avocado doesn't quite make it. You probably don't want it for next week, you want it tonight.

We are very proud of the program we've been carrying on in pest management in cooperation with the industry and the Commission. Leaf roller has become a serious problem in a couple of the counties in California — Riverside and Ventura, especially, had up to 60% of their fruit infected by this — and the research done on the control of the leaf roller is significant. Especially the work done with the pheromones. Pheromones are one of our new pest management techniques — of course, it's a "fun" technique to talk about, because it's kind of sexy. A pheromone is a sex attractant. Female insects produce a hormone which attracts the male. Harry Shorey, who did some of this work at Riverside, used to call it "love at first sniff." The hormone can be used in a trapping mechanism — one, to count pests and determine when appropriate pesticides should

be applied or, two, to actually cause confusion in the mating process and reduce the populations accordingly.

One of the reasons the avocado marketing order began and one of the projects that this Society was probably supporting as early as any is the root rot problem caused by *Phytophthora*. (I used to be able to say it but I'm slipping again, George — I'm going to need a couple of new lessons.) We are pleased to have Dr. Coffey with us, who is continuing the work that Dr. Zentmyer carried on for so many years — and, of course, Fred (Guillimet). The selection of resistant root stock varieties has been an important part of this work; and you have all supported it, not only with your money and your emotional support, but with your prayers. Today, we have some of the resistant Guatemalan varieties that we're pleased are being used commercially. We're also excited about the development of some of the fungicides, especially the systemics, that may help in control of the fungus.

Black streak has also been a nasty new one that "snuck up" on us a few years ago. We think we're learning something about the virus that's involved in it, and hope that heat therapy will actually help produce some clean plants to put out in the groves. But, believe me, when we talk about biotechnology and genetic engineering, viruses — especially in tree crops in California — are "biggies." Those of you that are also citrus growers don't have to be reminded of how tough viruses and viroids are to deal with in tree crops. We have a great deal to learn about both of these.

What all this means is that we have great opportunities, but we must have better public support. We're concerned about our state support for the University. We continue to decrease the University's budget a little bit each year, especially the budget that goes for research, supplies and expenses, and faculty salaries. It simply is not possible to attract a faculty member to the University of California when you're paying them less than you start an apprentice mechanic. I don't think it makes good sense to ask a person to get a Ph.D., spend a couple of years on a post-doctoral program, move to the University and compete in the world of science, buy a hundred thousand dollar home, and pay him \$25,000 a year. If you can figure that one out, you've got a better accountant than I do.

The federal support situation is even worse. In 1945, 40% of the nation's research and development budget went to agriculture. Today, it's less than 2%. We haven't been hungry in a long time — unfortunately, I guess. We do have an improvement in the attitude in the Executive Branch. I think we have the best attitudes in Secretary Block and Deputy Secretary, Dick Lyng, and our new Assistant Secretary for Science and Education, Orville Bentley, that we've had in a long time. I'm pleased with the attitude in the President's Chief Science Advisor, Keyworth; he seems to understand the problem. And so we're hopeful.

I'm extremely concerned about the situation in Congress. If you don't listen to anything else I've said here today, if you don't believe there's anything else that matters, please listen to this situation. California sends hundreds of millions of dollars to Washington every year from your tax money that comes directly from agriculture. Everyone is aware of how important it is to support our nation's government, but we'd also like to have a little bit of it come back to us. The House Ag Appropriations Subcommittee makes the

major decisions on where that money goes, as related to agricultural research and extension activities. We don't have one member of that Subcommittee from the State of California. California is the largest producer of food and fiber in the United States— produces over 10% of the nation's gross value in this area — and we don't have one member on that Ag Subcommittee. Not only that, none of the other western states do, either — Washington, Oregon, Utah, Nevada, Arizona, New Mexico, none of them have anybody on that Ag Appropriations Subcommittee. I think if we don't do anything else in a political sense, we have *got* to work hard to get one of our Congress persons on that subcommittee. Mr. Jamie Whitten, from Mississippi, decides what's going to be done with ag funds for research; and he generally decides there isn't going to be much done with it — unless it helps Mississippi.

I think if there's an issue that is actually holding back the development of the science of agriculture in this country right now, it's the House Subcommittee on Appropriations for Agriculture. And I hope that all of you will work to get somebody from California on that subcommittee.

In closing, I'd like to remind you that the scientific developments in agriculture and medicine have always followed the major break-throughs in science. We heard from Marconi a while ago; and, we know that his discoveries led to major developments in our business and science world. The development of antibiotics during World War II led to enormous explosions in this area. Now we have an opportunity with biotechnology and genetic engineering. Our agricultural industry will be able to benefit in many ways from new technologies and continue to be a world leader in the area *if* we have the resources to meet this challenge and to take advantage of this opportunity. I hope we can keep this leadership position.