Banquet Address: PEOPLE, PESTS AND SOME PLANS

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Your program since 9:30 this morning has offered a pretty complete roster of the birds and beasts we call pests.

Most of these flying, crawling, and burrowing species are our economic enemies. They compete with us in one way or another for the same feed and food; they let the water out of our ditches; and they whitewash our city statuary. Some of them share our viruses and bring us new ones.

But we'll have to admit that, to a good many species, this is a gathering of some of the animal kingdom's greatest pests.

As the ultimate in predators, we have fished out our running streams, we've dried up a good many so they don't run any more, and we've done away with the biggest and fiercest predator that was here when we came--the California grizzly. By sheer numbers, we are occupying and paving over thousands of acres where jack rabbits grazed and ground squirrels dug. There are some strong indications that our clumsiness, our carelessness, or ignorance, may do as much damage to other animal life on this planet as our predaciousness.

And many of you are professionals, careerists in reducing the populations of field mice and gophers and other competitors of man—the ultimate vertebrate pest--in his farming operations.

But still the gophers have reason to love us. Especially in California. We plant alfalfa; we fertilize; and we irrigate. We get such lush growth that we can make seven or eight cuttings a year. The gophers share the fields with us and multiply. There could never be so many without us.

And the meadowmice must love us, too. Anybody from the San Joaquin Valley knows how they have shown their appreciation of California fanning this year. Without our well drillers and alfalfa growers, where would the meadowmice be?

Surely the coyotes and the foxes, the skunks, and opossums must love us. Their increase has been on the boom scale, a population explosion. The coyote started out as a lonely predator of the prairie dogs and squirrels. Then we came along with our lambs and chickens. While we've been spreading our civilization out into the sagebrush, the coyote has been backtracking along our trail. He can make a living now anywhere from California to Maine.

And the starlings love us. In our capitals we put up nests for them, our buildings with fine classical cornices and ledges. And we plant parks full of trees for them to roost in.

Our milo fields are all a blackbird could ask. Valley farmers are hosts to millions.

Man the predator—certainly man the fanner—seems to be the greatest friend of all the birds and beasts that plague him.

We can probably say that the California way of farming has made California fanners the most over-run hosts to vertebrate pests in the agricultural world. We can certainly say, too, that new pests—and here I don't mean people--are on their way. I'm told that the starlings are just exploring here now. The relatives are coming later. We'll see, and hear, a lot more of them.

Our problem is: How do we keep from being such good hosts to our small vertebrate guests?

I have been told by experts that right now the vertebrate pest control man is woefully underequipped for the job we have created for him. For insect and fungus control, the pest control operator is a generation ahead. He has dozens of dusts and sprays on his shelves, specific ones for specific crops and pests, and new materials developed each year and tested by chemical companies and land-grant university researchers in the 50 states.

When it comes to vertebrate pests, he reaches up on the shelf and finds just about the same equipment that was there 75 years ago. Strychnine was being used in the 1880's to kill wolves on the western plains. How we have the anticoagulants for rat control. And there's compound 1080, though the restrictions almost make it unusable. There's not much else that's new.

Somehow, perhaps as a tradition of agriculture, our animal and bird losses have been looked on as a sort of "act of God." We

just shared a little with them.

We're getting a much clearer look at farm economics now, though. The damage is clearly a serious leak in the farmer's profit line. At today's costs he has to stop all the leaks. There just isn't room for us and 1000 mice to an acre.

Those of you who are in pest control professionally might well say you are in on the ground floor of your field. There is almost unlimited room in development of its methods, materials, and ideas.

In the University we recognize, too, that here is a field that's barely tapped. We are gearing up right now, over on the Davis campus, planning a full-scale University approach. We have taken the first steps.

First, though, a little more about the problem: We know California's intensive agriculture does encourage far bigger build-ups of rodents or birds than the pasture, corn, and woodlot pattern of the Middle West. We can always hear the echo of voices telling us we have simply upset the balance of nature.

I'm sure we have. Every animal born affects the balance. And people do. But it's now the static balance our balance-of-nature advocate usually envisions. We know all the species—man included—show a disposition from time to time to outbreed their predators and other population limiters. Eventually, though,

starvation, the predators, parasites, or diseases, catch up.

In the Valley we can watch the cycle. We plant sugar beets or alfalfa and, we improve the carrying capacity of our land for meadowmice. Soon the hawks and the owls show up. Here's nature balancing itself. Then the farmer starts harvesting hollow beets, sometimes 20 to 25 per cent of them eaten into shells by meadowmice. The balance of nature doesn't look so promising.

Today we have houses moving out into farmland and range, and people who are essentially city folk are meeting nature head-on. People plant shrubs and trees and lawns. And they water and fertilize them. And who comes to live with them[1]? Gophers and moles. And sometimes rattlesnakes, just trying to balance nature by eating the gophers.

The farmer can't wait for enough owls and hawks to do a control job for him. And the suburban ranch house owner is reluctant to let snakes get numerous enough to balance nature in his back yard.

As I mentioned, the efficiency of farming in California invites the pests. The more we intensify, the more pests we get. Wherever there has been a big change of an agricultural area to a single pattern of cropping, some bird or rodent pest has found a new home.

We fertilize the range and we increase its carrying capacity

for mice and gophers. We plant new grapevines, and we increase the land's capacity for rabbits. We grow milo and the blackbirds harvest it. They thrive so veil even the Audubon Society takes a liberal view of a beautiful bird and recognizes it as a pest. Our rice fields spread down from the Sacramento Valley into the San Joaquin, and the muskrats go along.

Specialization does it. But in California, and increasingly in other states, agriculture specializes because it must. All of our work in the Agricultural Experiment Station and Extension Service encourages uniformity and scale to beat the costs of land, water, machines, and marketing. And to get the uniform quality today's markets demand. We can almost say that if you can't do a farm job today by machine, you can't do the job. That goes for pest control.

In many countries of the world, and some places in this country, growing orchard and berry crops is possible only by actually screening out the birds. At the California scale we have to come up with something better than that. We used to get good control of gophers by dropping poisoned carrots in their runways. It worked, but it was a hand job. It's been priced out of the picture.

Happily, here is an instance where we can report some progress. Out of a "brainstorm" session at Davis came the idea for a

mechanical gopher, a machine that drills convenient tunnels through a gopher-infested field and salts the tunnel with lethal grain. The mechanical gopher works. The gophers use the runways and eat the grain. The machine has become a standard piece of farm equipment. Maynard Cummings says 100 of them are already in use.

So, to get rid of the pests of modern, large-scale, machine farming, we'll have to turn to more machines and new methods. But first comes basic knowledge to build methods on. There's a world of room for work on biology of our pest species, and on their relationships to the land, the crops they raid, and to other animals.

Much is already known, of course. Dr. Howard and Dr. Longhurst, working on our Hopland Field Station in Mendocino County, found, for example, that they could fertilize out the ground squirrels. These rodents don't like a heavy ground cover. But this encouraging find was balanced off by an influx of pocket gophers. They thrived in the fertilized fields. And when the fertilized range was pastured, back came the ground squirrels.

The blackbirds that infest our milo fields in the valley don't live in the milo. They nest in the tule swamps and commute to the fields. Our people see a fair chance that some kind of ecological control will work, possibly a cleanup of the roosting and nesting areas. But little is known of blackbird ecology. There's a lot more room for work on environmental control of pests.

In the plant sciences and entomology we have been learning a lot in recent years about biological control. In the vast unexplored territory of vertebrate pest control, maybe we can't laugh off the idea that some forms of biological control may be possible.

Last month's issue of the USDA's "Agricultural Research" bulletin gave attention to some new grain sorghums. Their sharp awns turn the birds to an easier diet. There seem to be some other possibilities, too, in a high-tannin milo that repells blackbirds.

If it isn't feasible to control ground squirrels and gophers with rattlesnakes, maybe it's not out of reason to put viruses to work for us. We use them on caterpillars.

There's a lot of catching up to do, and there's also some sharp looking ahead. Because we have problems that aren't here yet.

We can take a good example from the plant sciences and pear decline. Here was trouble at the bud union of the trees, where the scion was grafted on the rootstock. Trouble came in the same spot some years earlier in Southern California's citrus disaster, quick decline. The two tree diseases pose an unanswered question: Is disaster hanging over all orchard crops that grow on budded trees? Plant science is starting to look for the answer, to go deeply into fundamental understanding of cell structures.

Pest control has some problems in the future too that need similarly basic studies. We've known that the starling would some

day be a California resident. Starlings have been visitors in California for about 20 years. The sad fact of history is that they move in and out of an area for about that long before they decide to stay all year. Winter flocks have been getting bigger in Fresno, Tulare, and Kern counties. Last fall the early starlings arrived in Kern early enough to catch late emperor grapes on the vines, and we recorded our first commercial damage. It appears, too, that olive growers are in for trouble.

We still think of starlings as city birds, drowning out Washington's 5 o'clock traffic sounds with their noise. But they're economic pests now, when they eat 3 to 4 tons of feed in Oregon and Idaho cattle feedlots, and roost 5,000 to a tree in Oregon holly groves. The trees actually suffer from excess nitrogen. The answer to the starling problem is a long way ahead of us.

We need fundamental work on vertebrate population dynamics, on the influences upon population. We need to know much more about stresses, these forces that sometimes make an overcrowded population, such as the lemmings, unable to reproduce, much as male-sterilized flies cause a population collapse. We could learn much more about the effects of supersonics, an interesting though right now a dubious possibility in animal control.

We need to know how much damage we may be doing with pest controls we now use. How much do we affect lakes and rivers, and

the fish that live in them, and the ducks that eat the fish? Dr. Rudd at Davis has looked into this. His findings tell us there is a lot more we ought to know about the chemicals we use in agriculture and industry, about what happens to them after we use them, and how far they reach out along the food chain. He's convinced that men are sometimes ignorant, sometimes careless, and sometimes clumsy, in using materials that call for much knowledge, extreme care, and skill.

There is surely room for the most highly trained people, economic zoologists in the most professional sense, at every stage in pest control development.

And here is the function of the University. Our approach to a field of professional activity in the University of California is the three-way approach that distinguishes this country's unique land-grant colleges and universities: the closely integrated programs of teaching, research, and public service or extension.

Here, then, is what we are setting in motion at Davis:

We have already begun a new teaching curriculum in wildlife management. This is a new undergraduate field of study at the University level, and it is built around fundamental fields where Davis has always been strong. The major will be in the Department of Zoology, which is in the College of Letters and Science but is a basic field for education in all the animal sciences. The wild-

life management curriculum will cross over lines into fields that relate to wildlife: agronomy, botany, physiology, and others. The degree will be a bachelor of science in zoology with emphasis on wildlife. In preparation the Department of Zoology is adding a new professor whose special field will be teaching and research in wildlife.

In this interdepartmental discipline we are planning at Davis an educational program that will prepare students for the widest range of careers dealing with animal life: in federal and state regulatory agencies, in control work, in teaching, and in research.

It is a distinguishing mark of the university approach that teaching and research are inseparables. Scientific experiment and discovery is the basis of our teaching, and so it will be in our new wildlife program at Davis.

We're making plans now for a field laboratory designed especially for research in the broad area of wildlife studies. Our plans call for distinctive facilities for basic work in vertebrate ecology, behavior and population dynamics of fish and game animals, pests, parasites, disease vectors, and other forms of wildlife important to human welfare. We already have a building shell, covering 3,000 square feet, set up out on the west end of the campus. *By* summer we hope to have some bird and mammal work under way. In the next few years we plan to have a broad program of research in

full swing, with faculty members and graduate students in all fields related to vertebrate animals--people from many departments of the College of Agriculture, College of Letters and Science, and School of Veterinary Medicine. Biologists from State and Federal agencies will be able to make good use of the laboratory.

These will be closely-allied programs of research and teaching. The combined program will be a solid foundation in California for the growing profession represented here today. And, as a third integrated part, we are planning now for the program of public service that will go with it, training sessions and field days in the pest control field, designed with and to serve the profession and its work.

The field for imagination is wide open. We must encourage the best students, with native imagination, with scientific adventure and drive in them, to see vertebrate studies and the control of our vertebrate competition as a life work. We need the best students in our undergraduate wildlife curriculum and we need them as graduate students and researchers—and as practicing economic zoologists.

I don't think anyone is going to suggest that we have a dearth of problems for this new teaching curriculum, research laboratory, and service program. In fact, people both in the University and on the outside assure me we are belatedly getting into

one of the most neglected fields of scientific endeavor.

One of the county farm advisors in our Agricultural Extension Service made a survey of orchard operators in his area. He asked each one what he regarded as his chief problem. More than 60 per cent of his county's orchardists said the chief problem was not disease, or fertilization, or rootstocks, but vertebrate pests-rodents and birds.

Our animal pest problem goes well beyond economic damage and nuisance, right into people's lives. Many serious and debilitating diseases are shared by wildlife and man. As our population grows, as people move out into what was animal territory, and we all become more crowded, all animals—birds and mammals--post the threat of passing on disease to us.

So, in the interests of public health, agricultural welfare, and, of course, the city beautiful, we are headed into an expanding; program of University teaching, research, and service. We hope to pull into this program the brightest young minds we can attract. Their inquiry, imagination, and inventiveness, we can be certain, will bring you and the whole field of vertebrate pest control innovations we aren't even dreaming about today.

I think that, beyond question, with our laboratory, and others that are certain to come, producing new information—and

with our new curriculum, -and. others, producing young scientists educated for your special field--we will see constant advance in the scholarship, the practical success, and the recognition of vertebrate pest control as a profession.