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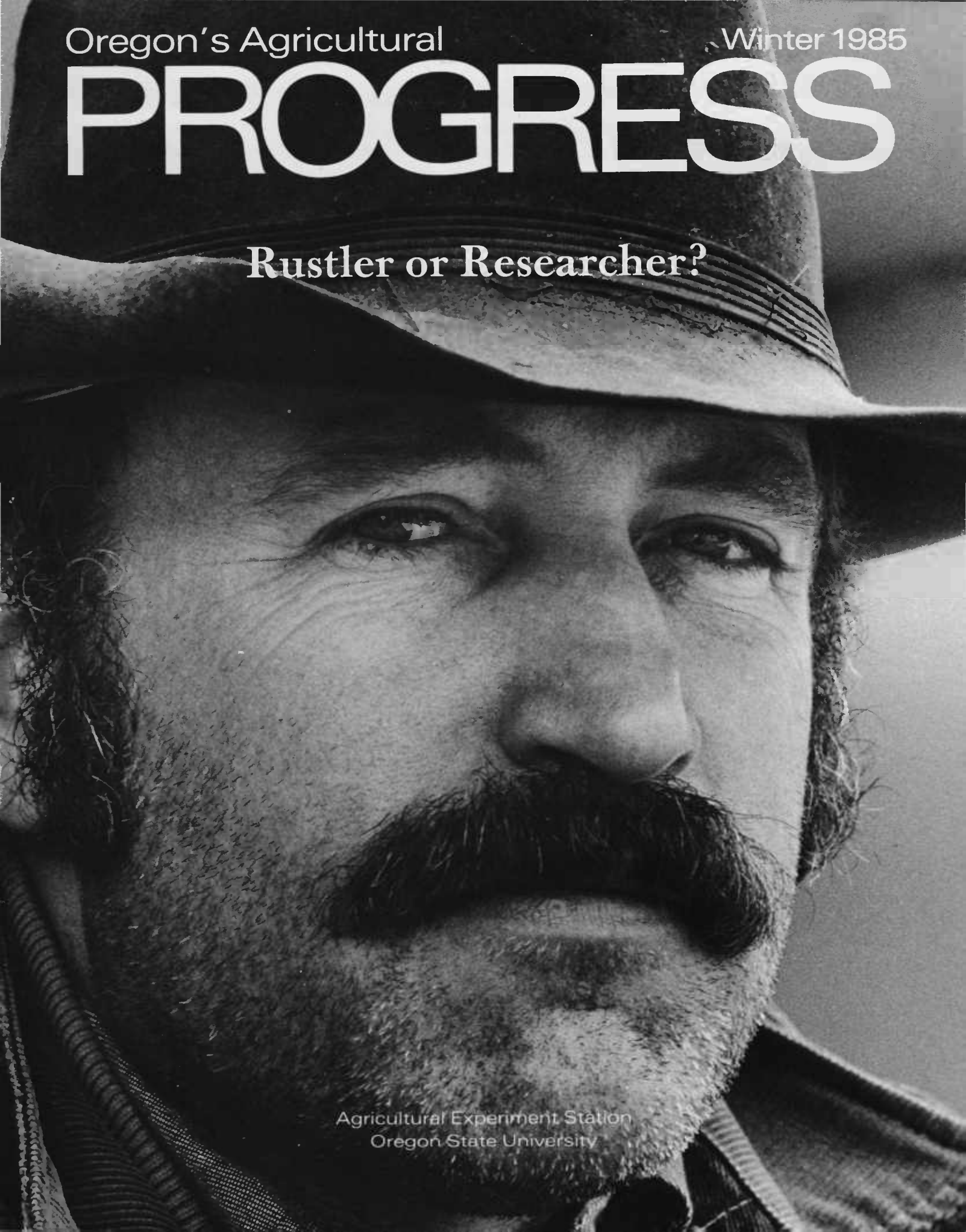
Winter 1985

Rustler or Researcher?



Agricultural Experiment Station
Oregon State University

An Editor's Note

There are some things which cannot be learned quickly, and time, which is all we have, must be paid heavily for their acquiring.

Ernest Hemingway wasn't writing about scientific data in that passage. But a lot of scientists and graduate students at Oregon State University would argue that he could have been.

Our cover story looks at a day and a half in the lives of a group of researchers. They are collecting data on a topic of continuing controversy in Eastern Oregon—the interplay among elk, deer and cattle on public and private rangeland.

The researchers' moments are not filled with drama, like the action-packed scenes of television's "Wild Kingdom," you will learn. They pay heavily—in time—for the information they acquire.

Other articles focus on studies of hard red wheat, of a deadly viral disease threatening Columbia River salmon, and of opossums that live in the city.

There is no "Comment" column. John R. Davis, the column's author and director of the Agricultural Experiment Station since 1975, has been named director of special programs for the College of Agricultural Sciences. Acting director of the Experiment Station is Robert E. Witters, a crop scientist and former associate director of the Station.

—Andy Duncan, Editor

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Richard Floyd, Director
Experiment Station Communications

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Cover: Dennis Sheehy directed what may be the most ambitious study of its kind ever undertaken in Oregon. See page 12. (Photo by Dave King)

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update

Treasure Valley strategy

A popular practice in growing onions and sugar beets in the Treasure Valley—applying herbicides when planting beds are prepared in the fall—also works with potatoes and sweet and field corn, an OSU researcher has found.

"We've got three years' data for potatoes and two years' for corn and it looks very effective for controlling broadleaf weeds and grasses. The data suggest we have the same advantages as with sugar beets and onions," said Chuck Stanger, an agronomist at OSU's Malheur Agricultural Experiment Station at Ontario.

Until about five years ago, most Treasure Valley onion and sugar beet growers, who produce their crops with furrow irrigation, applied herbicides at planting time in the spring.

"The advantage when you spray a herbicide over the top of the beds in the fall," Stanger said, "is that you avoid compacting the soil with the additional use of tractors in the spring when the soil is wet. Also, the herbicide has time during the winter to thoroughly soak into the soil."

In the last four years, about 80 percent of the onion and sugar beet growers in the Treasure Valley have switched to applying herbicides in the fall, the researcher estimated.

For potatoes, two herbicides seem to work effectively when applied in the fall, Stanger said. One is metribuzin, sold under the trade names Sencor and Lexone. The other is pendimethalin, sold under the trade name Prowl. Both are registered for use on potatoes in the spring and probably will be registered for fall use within months, he said.

For corn, there are also two herbicides that seem to control weeds effectively when applied in the fall, said Stanger. They are metolachlor, sold under the trade name Dual, and alachlor, sold under the trade name Lasso. They probably will be registered for fall use on corn within two years, the researcher said. □

Treasure Valley farmers like this one already apply herbicides in the fall when preparing beds for the spring planting of onions and sugar beets.

The early cow

The early cows will get the first and last meals in a grazing study beginning next month.

Scientists at the Eastern Oregon Agricultural Research Center, headquartered at Burns and operated by the Agricultural Experiment Station and the U.S. Department of Agriculture's Agricultural Research Service, are going to study early-spring and late-fall grazing.

"One of the main things behind this is that we think we're missing out on early and late growth in Eastern Oregon that's quality forage," said Ray Angell, the range scientist who will direct the study.

The study will be at the center's Squaw Butte research facility about 30 miles west of Burns.

"We plan to put animals on range covered with native plants like bluebunch wheatgrass and Idaho fescue around the first of March, a couple of weeks earlier than most people do in this area, and take them off that in mid-May, several weeks early, so we get some forage regrowth," said Angell.

"Most years, if you wait until late June to take them off spring range the soil moisture is gone and you get no forage regrowth," Angell added. The regrowth, he explained, should provide valuable dry forage for cattle brought into the area early the next spring.

In another part of the study, researchers plan to let cattle graze in the spring on crested wheatgrass. They will move the cattle to ungrazed range covered with native grasses in the summer while the crested wheatgrass is "resting" and regrowing, then move the animals back to the crested wheatgrass in the fall for additional grazing.

Working with Angell will be fellow range scientist Rick Miller and animal scientist Harley Turner. They also work at the Eastern Oregon Agricultural Research Center. The researchers will study the condition of forages at various points through the grazing season. They also will study which forages cattle eat and how grazing affects the plants.

The researchers plan to analyze long-term soil moisture records to determine how early, on the average, ranchers need to pull cattle off range to assure that forage begins regrowing. They also plan to study various cattle stocking rates. □

Dave King

OSU researchers think "bare patch," a fungal disease, is a problem only when wheat is sown in non-tilled fields. No-till grain production is gaining popularity in Oregon.

'Bare patch' disease found in Oregon no-till plots

A fungus disease common in Australia has been linked to Northwest grain crops grown with the no-till method.

Called "bare patch," the disease was discovered in no-till wheat test plots planted by researchers Vance Pumphrey and Dane Hane at OSU's agricultural experiment station at Hermiston. The disease also has been found in southern Idaho and eastern Washington.

"I'm telling growers that right now the total crop loss is almost nil, probably less than a tenth of a percent," said Bob Powelson, recently retired OSU plant pathologist.

Bare patch is thought to be a problem only when wheat is sown in non-tilled fields. In Australia, the disease is becoming an increasing problem because erosion problems have led to widespread no-till farming.

No-till grain production is gaining popularity in Oregon, too. In 1984, Oregon farmers used it on more than 70,000 acres, mostly in the Columbia Basin and the northeastern part of the state.

Bare patch attacks plant roots and occurs in a wide range of soils. Infected areas have been mistakenly identified as spots of herbicide damage.

"The fungus was in the Northwest before crops were ever grown, probably a couple of million years," said Powelson. "It's an example of how a change in management practices, like the move to no-till farming, can create a new problem." □

Possums in

By Richard Browning

They enjoy accommodations with views of parks or, in some cases, the Willamette River, and they live in some of Corvallis' best neighborhoods. They may settle down, limiting themselves to three or four dwellings. But they wouldn't think of paying taxes, or rent for that matter.

They prefer not to involve themselves with the less exciting, daytime activities in the city. They'd rather snuggle the kids into a pouch (quite family oriented) and head out for a night on the town. They're usually home before the sun rises, after stops at favorite eateries (they're fond of fresh fruit and pet food and have been known to enjoy midnight snacks in compost piles).

"They" are urban opossums.

Karen Meier, who recently completed a wildlife science graduate program at OSU under the supervision of Agricultural Experiment Station researcher Charles Meslow, combed the shadowy night areas of Corvallis from April 1981 through March 1982 looking for opossums.

"I studied the city-dwelling opossum because people have a need to have contact with wildlife," said Meier. "I

Paradise

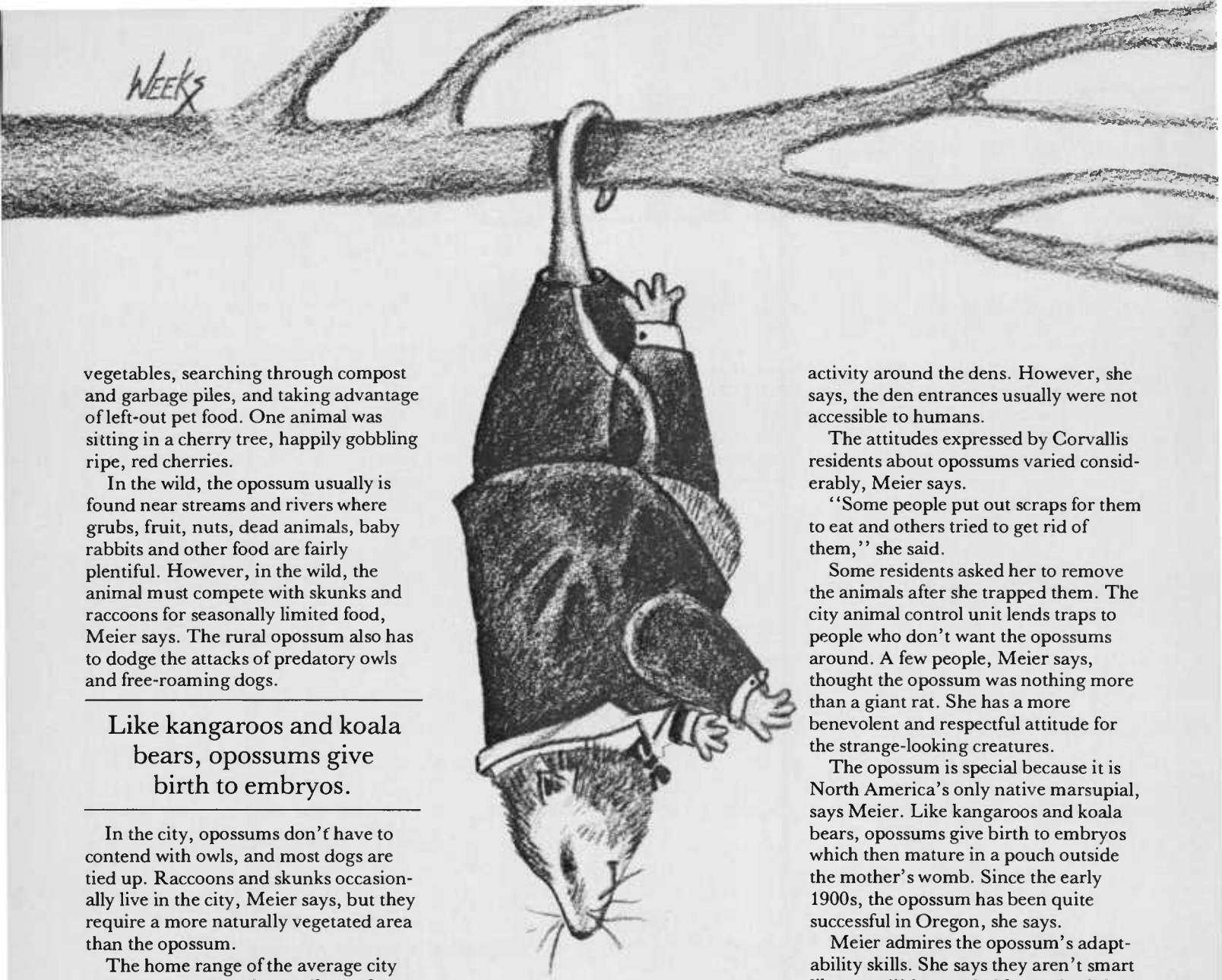
grew up in Chicago and I'm very sensitive to the availability of wildlife in the city."

Some city people, she said, don't get to see much wildlife because they rarely make it out to the country. So some have bird feeders so they can observe birds, and some leave out food scraps so they can watch an opossum move about in their backyards in the moonlight.

"People evolved with nature and have a basic psychological need for contact with wildlife," said Meier. But urban opossums may not be living such "wild" lives since they started moving into Corvallis about 10 years ago.

Meier says the urban opossum appears to live a more stable, if not a more "natural," life than its country cousin. One reason for the stable lifestyle is a steadier, more abundant food supply in the city. Like bears, opossums are omnivorous, eating almost anything.

Meier captured the critters in live traps, attached radio transmitter collars to them, and then tracked them around town from just after sundown until just before dawn. She found her nocturnal companions munching on garden



vegetables, searching through compost and garbage piles, and taking advantage of left-out pet food. One animal was sitting in a cherry tree, happily gobbling ripe, red cherries.

In the wild, the opossum usually is found near streams and rivers where grubs, fruit, nuts, dead animals, baby rabbits and other food are fairly plentiful. However, in the wild, the animal must compete with skunks and raccoons for seasonally limited food, Meier says. The rural opossum also has to dodge the attacks of predatory owls and free-roaming dogs.

> Like kangaroos and koala bears, opossums give birth to embryos.

In the city, opossums don't have to contend with owls, and most dogs are tied up. Raccoons and skunks occasionally live in the city, Meier says, but they require a more naturally vegetated area than the opossum.

The home range of the average city opossum appears to be smaller and more stable than the range of the rural opossum, Meier says. She found one opossum's home range within just one city block. The city animals simply don't have to go as far to get food, escape predators, or find a suitable place to spend the day sleeping.

The typical urban opossum accommodations, by the way, are suitable to a "man or woman about town" lifestyle. Meier found them living in fashionable crawl spaces under homes, and one of them had made itself a studio apartment in an attic. Often, however, when they need a place to flop for the day they'll curl up in a cozy wood or brush pile. They sometimes share their dens with other opossums.

"Usually they aren't very sociable animals, but they aren't territorial either," said Meier.

Of the opossums she studied, about 80 percent had home ranges in residential areas; about 15 percent were in agricultural, park or riverfront areas, and the rest were in commercial or industrial sectors. About three-fourths of their dens were in or under manmade structures, and most opossums concentrated their den use to four or five dens.

Meier found that opossums went about their business without much concern for the amount of human activity around the dens. However, she says, the den entrances usually were not accessible to humans.

The attitudes expressed by Corvallis residents about opossums varied considerably, Meier says.

"Some people put out scraps for them to eat and others tried to get rid of them," she said.

Some residents asked her to remove the animals after she trapped them. The city animal control unit lends traps to people who don't want the opossums around. A few people, Meier says, thought the opossum was nothing more than a giant rat. She has a more benevolent and respectful attitude for the strange-looking creatures.

The opossum is special because it is North America's only native marsupial, says Meier. Like kangaroos and koala bears, opossums give birth to embryos which then mature in a pouch outside the mother's womb. Since the early 1900s, the opossum has been quite successful in Oregon, she says.

Meier admires the opossum's adaptability skills. She says they aren't smart like a rat ("they probably wouldn't keep up with a rat in a maze"), but they know how to make the best of their surroundings. People often think opossums are stupid, she says, because they see them during the day when they are normally asleep and they appear groggy and slow. At night, she found them to be quick and agile.

Sometimes she would find one that would play dead. However, you usually have to harass them a bit before they'll use that ancient protective ploy, she says.

Overall, the opossum is getting along nicely in Corvallis. They have plenty of food and shelter, they cause almost no damage, and they don't seem to spread any diseases, she says.

"My feeling," she said, "is that it's a pretty easy life in the city for an opossum—if it doesn't get hit by a car." □

Sudden Death for Salmon

Researchers hope to head off a virus threatening one of Oregon's most prized resources, its fish

By Joe Cone

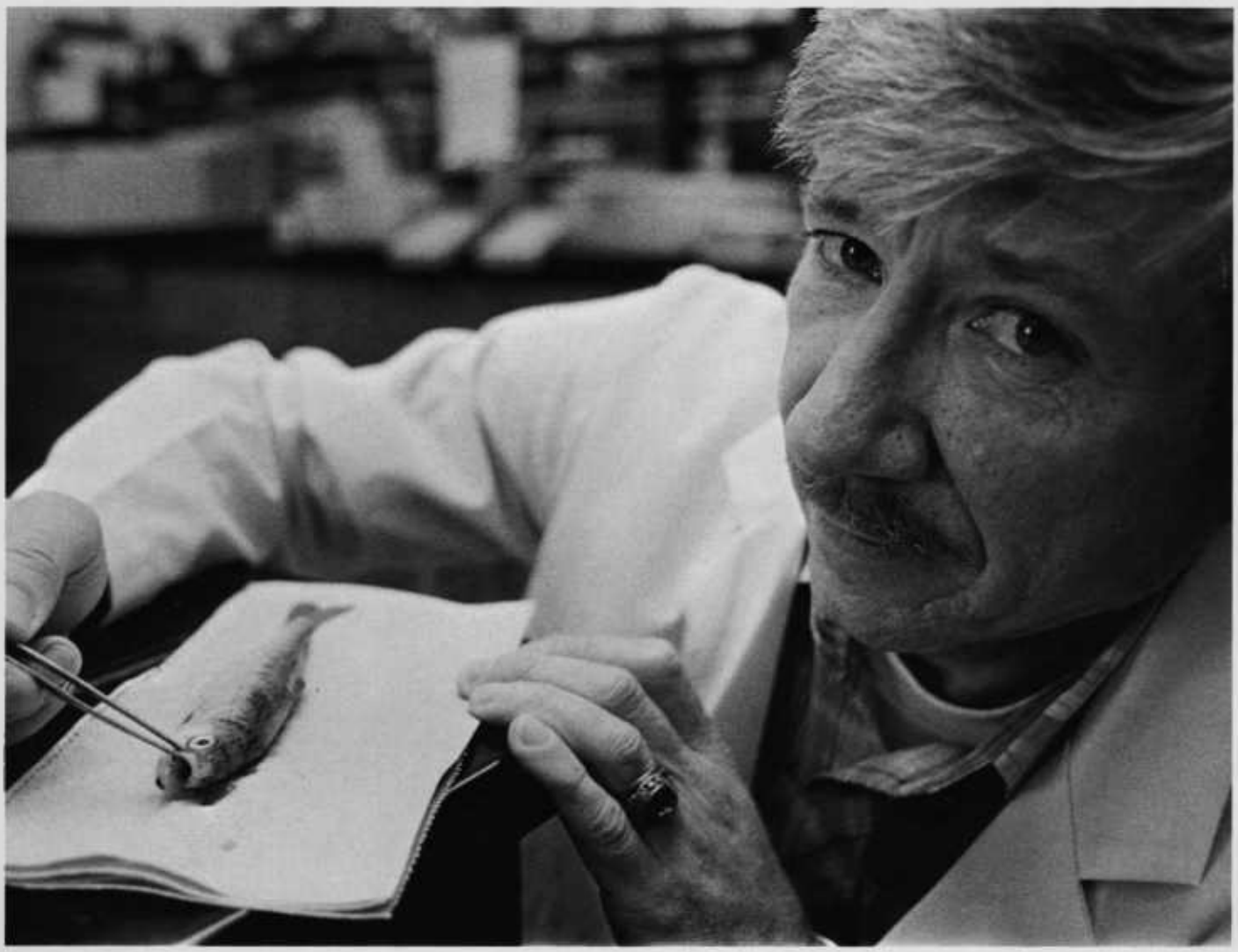
Oregon's salmon resource has suffered enough from poor ocean conditions the last few years to not need additional trouble from freshwater hatchery operations. But since 1980 a catastrophic virus has been killing off salmon stocks at hatcheries in Oregon, as well as in Washington, Idaho and Alaska. Now scientists stationed at OSU are responding successfully to this grave threat to one of Oregon's most prized resources.

The disease strikes suddenly at a hatchery. The first danger sign may be the bulging eyes of tiny salmon in the incubator trays. Hours later, when these fish have swollen and turned brown, other fish in an incubation tray or throughout an entire holding pond may be affected and dying.

Warren Groberg, a fish pathologist with the Oregon Department of Fish and Wildlife stationed with the OSU Department of Microbiology, has seen these sudden and mysterious outbreaks more times than he would like.

"It just explodes," Groberg says of the disease. "Usually it's in the realm of what I would call catastrophic mortality. Ninety-five percent mortality is very typical."

Researchers call the disease IHN, short for infectious hematopoietic necrosis. Outbreaks of the virus were rare at lower Columbia River basin hatcheries in Oregon and Washington



Researcher Warren Groberg checks a young salmon killed by the IHN virus. The gills of fish infected with the virus often are whitish. Dave King

before 1980. But in the five years since, salmon mortality has increased at a frightening pace.

The number of eggs and young salmon lost to the disease has increased forty-fold during this time; during 1981-82 alone, for example, the mortality and egg loss in the Columbia Basin was 14 million young chinook, and sockeye salmon and steelhead trout. This amounts to a dollar loss of between $30 million and $100 million, depending on the value given to the spawning adult fish.

"To me, it's much more profound to go out to a hatchery when this is going on," says Groberg, "and watch those fish go into a lime pit. To have been there at the spawning when the hatcherymen are taking these eggs for weeks on end, and then they see their year's work going into a hole in the ground. You really feel like a jerk for not being able to convince them that you'll be able to do something about this disease next year."

OSU scientists led by John Fryer, chairman of the microbiology department, have been making progress on understanding the disease. Fryer and pathologist Groberg collaborated on a report, published in 1982 by OSU's Sea Grant program, that documented the increased occurrence of the disease and alerted hatchery operators of its danger.

Groberg has spent years working on IHN, and he's developed a theory of why the virus suddenly began exploding in the lower Columbia River basin in 1980 (the theory is outlined in OSU Agricultural Experiment Station Technical Paper 6576, available through the microbiology department).

This amounts to a dollar loss of between $30 million and $100 million.

Piecing together the evidence, Groberg backtracked to the upper Columbia and Snake River area, where steelhead hatcheries suffered outbreaks of IHN in the late 1970s. The young fish that survived the epidemics, Groberg believes, became carriers of the disease.

These carriers from the upper Columbia infected fish in the lower Columbia through a calamitous chain of events in which fisheries managers' plans backfired and natural forces exploded.

In the late 1970s, the Army Corps of Engineers began an experimental project intended to improve the survival of young steelhead from the upper Columbia by trucking and barging the fish around the Columbia dams and putting them out to sea from the lower Columbia River.

Joe Cone

OSU microbiologist Jo-Ann Leong is using genetic engineering to develop a vaccine that will protect fish from the IHN virus.

The problem with this strategy was that the fish weren't imprinted with their native upper Columbia and Snake River waters (imprint refers to a smell-related familiarization process that takes place while the fish swim downstream). They didn't know how to get back home, and they strayed in Oregon and Washington streams and along the Columbia. To make matters worse, in 1980 Mount St. Helens blew up, causing major changes in the river environment and disrupting fish migrations.

"That coincided with the year that the returning adults were first coming back from the major barging and trucking of Idaho fish," Groberg notes, "so that in 1981 there was a large amount of straying of all the fish in the Columbia. But in 1981 there was also this rapid increase of IHN in the lower Columbia where it had never been seen before."

Since 1980, 13 Columbia River basin hatcheries have had epidemics of IHN. There is no known cure for the disease, which attacks the blood-forming tissues of the little fish. Prevention has become the watchword at Oregon hatcheries.

Workers run tests on adults that return to the hatcheries to spawn and throw out eggs from contaminated fish. Since contaminated water in the hatcheries may be another, even more dangerous, cause of disease transfer, they filter water and keep it as clean as possible.

But these are BAND-AIDS. Hatchery managers hope to be able to keep IHN in check until researchers can develop a more lasting remedy. Researcher Groberg reluctantly describes a grim scenario that could devastate Columbia River salmon production.

"IHN may continue to spread, because so many populations of fish out there now in the Columbia system are carriers of the virus, and as a few of those continue to stray to other hatcheries, we may see new introductions."

The research of OSU microbiologist Jo-Ann Leong offers hope of controlling IHN. Leong has already developed a technique that helps in early detection of the disease. With support from the

Bonneville Power Administration, she developed a laboratory procedure for diagnosing the virus in less than 48 hours. This is a considerable advantage over earlier diagnostic methods, which took from two to eight weeks.

She reports progress in producing a life-saving vaccine.

However, her procedure is difficult for many laboratories to perform because it requires the use of radioactive tracing and other sophisticated techniques. Leong now hopes to develop a simplified procedure.

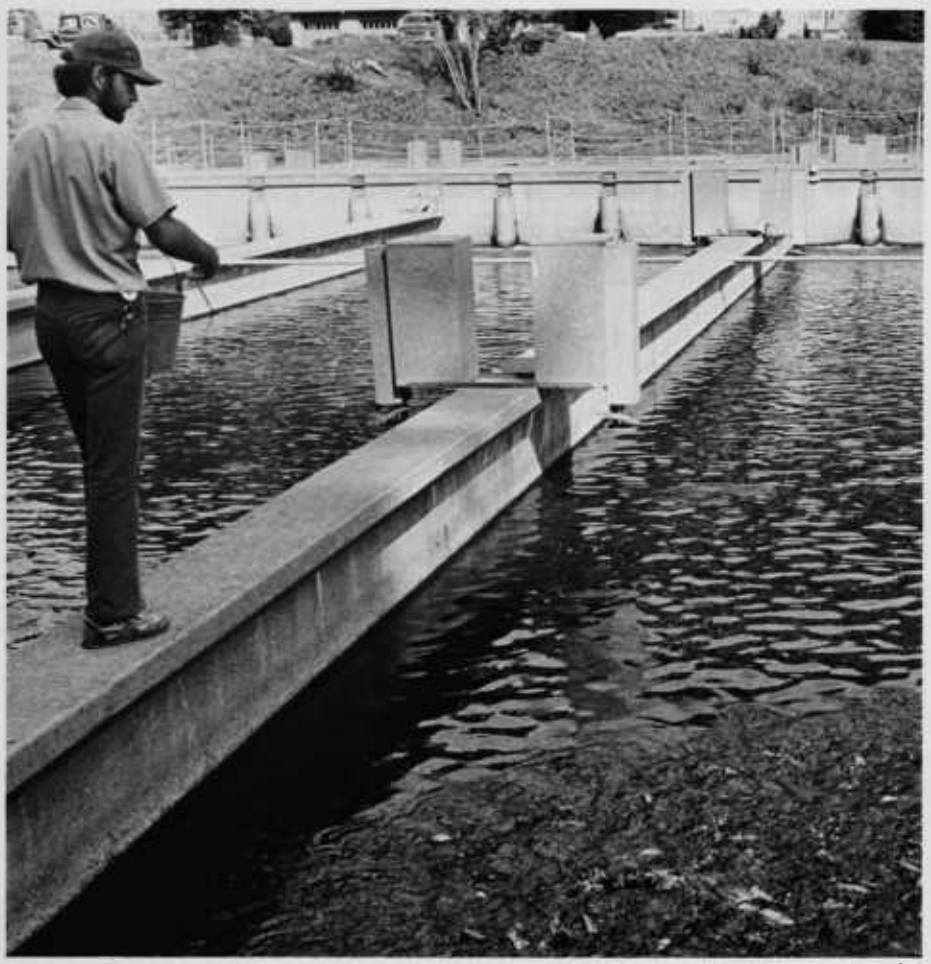
Also, she reports progress in producing a life-saving vaccine (discussed on page 15 of the Spring-Summer 1984 issue of *Oregon's Agricultural Progress*) that would protect young salmon and steelhead by immunizing them.

Most vaccines, polio vaccine for instance, use a weakened virus to prompt the threatened host to build up antibodies against the infection. The problem with this kind of vaccine is that it can mutate back to a disease-causing form, Leong explains. The vaccine she is developing should prevent these problems.

Using genetic engineering techniques, she has isolated a small portion of the genetic material of the IHN virus. This viral gene can be placed into a harmless bacterium and the bacterial agent then used to immunize fish. This "subunit vaccine," as she calls it, can't cause disease because not all of the virus' genes are present.

If development proceeds on schedule, Leong anticipates that her IHN vaccine could be available in three years. Like others concerned about the future of the salmon, Leong has a sense of urgency.

"When you have a very limited resource—managers are trying to restock the Columbia at the present time—it's a problem. IHN is a real management problem. You don't want to destroy the fish. They're such precious animals at this point...." □



Joe Cone

The IHN virus can sweep rapidly through a holding pond like this one at Leaburg on the McKenzie River, killing all the young salmon.

They'd Like a Home Wher

By Andy Duncan

At any time of the year, the Agricultural Experiment Station usually has several persons doing field studies in relatively remote parts of Oregon. Often, the researchers are graduate students supervised by Experiment Station scientists. The following article about a study of elk, deer and cattle gave the editor of *Oregon's Agricultural Progress* a chance to get away from his desk for two days. It is offered as a peek into what life can be like for field researchers.

It is spring but it's cold on the ridge. Not freeze-your-toes-off cold, like it can be in winter in this part of the Blue Mountains in northeastern Oregon. But the low-pressure system moving through from the Pacific has brought gray skies and a chilling wind.

Despite the weather, Dennis Sheehy and four others on the ridge are waiting patiently for elk to show up. Photographer Dave King and I are along to do a story on Sheehy's study of how elk and deer compete or do not compete with cattle for forage.

With binoculars and a telescope, the researchers doggedly sweep the pines around a meadow below that is maybe the size of 50 of my standard measures of outdoor space, football fields. They're looking for telltale movement.

My first day wasn't ... like watching "Wild Kingdom."

I'm watching Sheehy, a fascinating character.

He looks more like a cattle rustler than a university Ph.D. candidate when he pushes up the brim of his battered cowboy hat and grins through a couple of days' whiskers and his thick sideburns and mustache. I know the husky ex-Marine has seen tougher times. A bullet in Vietnam almost tore his right arm off at the tricep, cutting short his soldier days. He doesn't seem to notice how cold it is. His old denim jacket and the vest underneath are unbuttoned. Too intent on finding elk to notice, I decide.

As the afternoon progresses, the wind blows harder and a mist begins to fall. Eventually, that sends me into a pack for gloves and a hat to supplement the big parka I've sunk into. Near twilight, a couple of mule deer stroll into the far side of the meadow, bounding away when they see us. Two members of the party decide to walk along the ridge to scan open country to the west. All remaining eyes stay fixed on the meadow until the scouts return, having seen a deer but no elk.

Finally, the last light fades into the blustery mid-April evening.

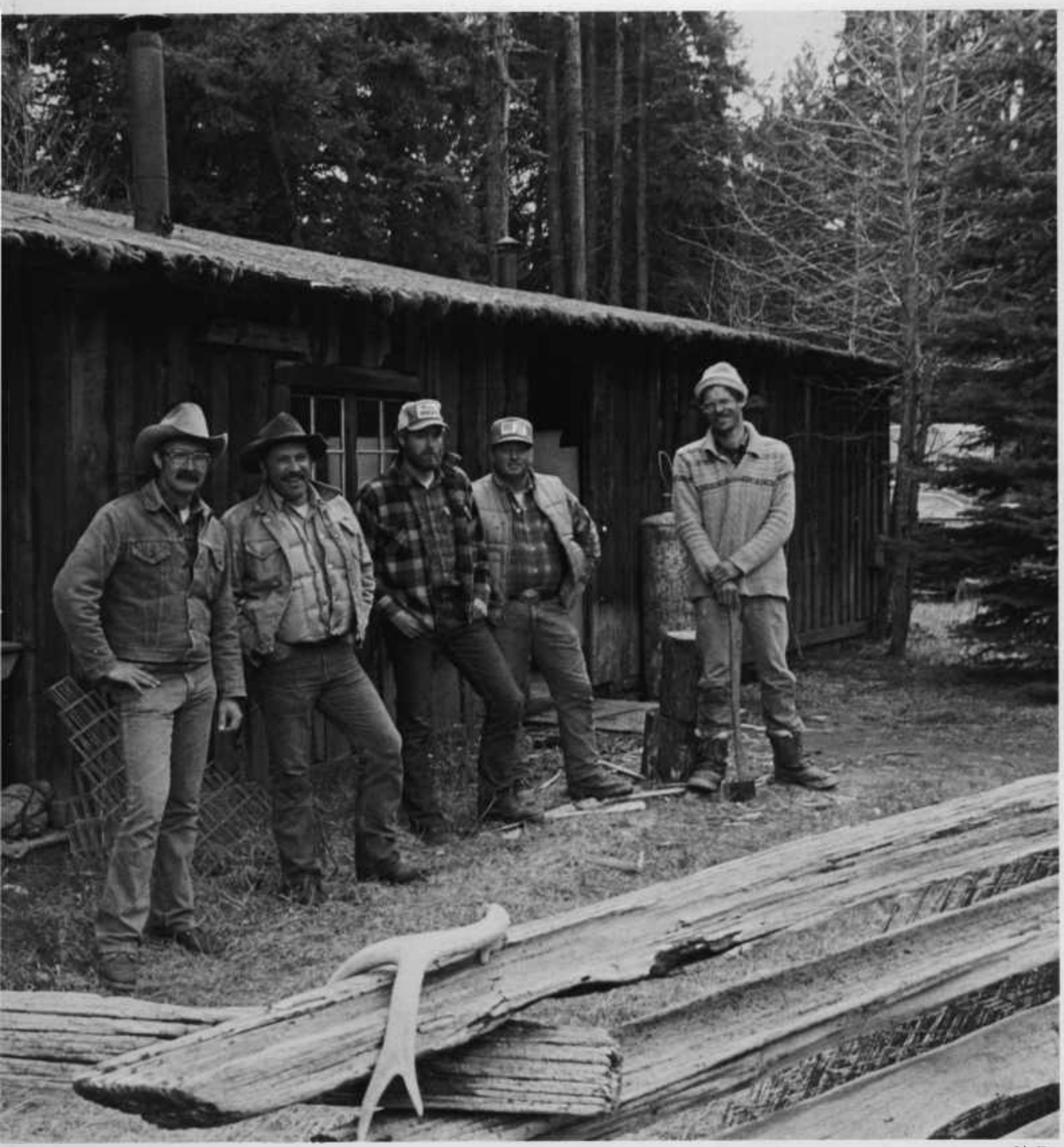
No one says much as our little group trudges over ground still soggy from snowmelt to a couple of four-wheel-drive trucks. I already know why there are chains around the huge knobby tires. Still, the two miles in the dark back to the old cabin where we're staying amaze me. Neither truck turns over on the muddy hills and gullies.

* * *

My first day of observing Sheehy in the field wasn't like watching "Wild Kingdom" on TV, where months of action are condensed into minutes of film. Nothing particularly exciting happened. But that's what research like he is doing involves, mostly, he pointed out later. For hours and days and

Researchers Marty Vavra, Dennis Sheehy, Steve Christe

e the Packrats Don't Roam



en, Ron Slater, and Mike Snider, left to right, stand by the cabin that was "base camp" for an OSU study of elk, deer, and cattle competition. Dave King

months and years, you do things that become very routine, like observing wildlife, clipping forage samples with little grass shears and putting animal fecal specimens into brown paper sacks.

And you do those things in all kinds of weather, because the animals don't hoof it indoors and lie down by a cozy fire when it snows, or flop in front of the air conditioner during a heat wave.

Between stints in the field, you're in an office or the library on the campus. There you read about related research and analyze data, trying to draw conclusions—or at least insights—from it.

Sheehy is comfortable in both situations.

He has a bachelor's degree in Chinese and Asian studies from the University of Oregon, and a master's degree in rangeland resources from OSU.

And he's no stranger to the back country. He grew up on a ranch at Durkee, Oregon, just south of Baker and not more than 120 miles as the crow flies from where he is now. After the service and undergraduate school, he did his master's study of how sagebrush fits into deer diets and worked on Oregon Department of Fish and Wildlife studies of mule deer fawns and antelope fawns. He also ran a cattle ranch in Wallowa County, which he still operates in partnership with his father, for several years before returning to OSU in 1981 to study toward a doctorate in rangeland resources.

Sheehy's wife and three children lived with him near the elk study site part of last summer. He misses them when he's off doing field work. But it's obvious he's comfortable with the rugged, slice-of-yesteryear life.

* * *

Back at the cabin, rain beating on the tin roof, Sheehy and the others move through a series of chores that have become second nature during the three years of the study. They throw wood into an old stove made of a 50-gallon barrel, splash a little of the brown water roaring down nearby Johnson Creek over dishes left from the previous meal, peel potatoes, and so on.

Soon the cabin, owned by a local rancher and long ago the cook shack for a logging camp, is warming and filling with the aroma of potatoes and pork steaks sizzling on a butane stove.

For the visitors' benefit, the regulars analyze the accommodations.

Sheehy and Mike Snider, a reseacher from La Grande Sheehy hires to help him from time to time, have the most experiences to draw on. They say the cabin, which is several miles and in the heart of winter a long horseback ride from the nearest ranch house, can be a peaceful but lonely place when you're there by yourself, especially when the snowdrifts get high.

"Talking with yourself isn't that bad," says Snider. "It's when you start arguing."

The packrats around the cabin aren't good company, he adds, casually mentioning that they have annoying "races on the roof" and that it took him four shots with a .22 rifle one winter evening to kill a particularly fearless rodent that was knocking coffee cups off the rack.

"Talking with yourself isn't that bad."

"You really don't realize how big those things are until you wake up nose to nose with one in the middle of the night," adds Marty Vavra with a wave of the spatula he is wielding at the cookstove. A range scientist and superintendent of OSU's Eastern Oregon Agricultural Research Center at Burns, Vavra is Sheehy's graduate program adviser. Speaking of the packrats, Vavra's eyes grow large but he does not smile.

The other two members of the research group, Ron Slater and Steve Christensen, work for Vavra as research technicians and help Sheehy when needed. They've done their share of forage clipping duty. Now they are busy with various kitchen jobs.

The jovial Slater remarks, not for the first time, on the exquisite smell of the pork steaks. Vavra slaps one on his plate. My glance at the photographer confirms that we're both thinking of the lax refrigeration procedures at the cabin and the horror of trichinosis. Moments later, we dig into our pork. It is delicious.

Meal consumed, dirty dishes stacked in a sink with no water pipe connected to it, we head for bed on the heels of Sheehy's cheery warning that we'll be getting up at 3:30 a.m. so we can be on the study site at the appropriate time, daylight.

The photographer, Christensen and I go to a little trailer parked outside and

Photos by Dave King

Life on Johnson Creek: Sheehy, far left, chops firewood; Varva, left, cooks dinner. Above, Sheehy serves the morning coffee at 3:45 a.m.

Vavra and Slater stay in the cabin. Snider and Sheehy grab bedrolls and start for the dilapidated barn (with Snider muttering that the hay where they will sleep is "infested with packrats").

* * *

The research project started in 1982 with funds from the Oregon Department of Fish and Wildlife. Sheehy is conducting the study on 10 square miles in Morrow County about 20 miles east of Heppner. The land is owned by ranchers Ray French and Eb Hughes.

Sheehy's goal is to "determine if the seasonal use of the study area by elk and deer in the winter and spring has any effect on the spring and summer use of the area by cattle—in quantity and quality of forage." Five activities are leading him to that goal:

—Classifying the "plant communities" on the study area and observing how elk, deer and cattle use them.

—Studying the diets of the animals by analyzing fecal samples.

—Clipping forage samples during winter, spring and summer.

—Analyzing the digestibility and nutritional value of the forage.

—Using computer techniques to integrate the data.

Aerial photos helped Sheehy "pretype" the study area into nine plant communities. Then he went through by truck, horseback, foot—whatever worked best— and classified communities according to the frequency of plant species there.

During that time, and field work that came later, he recorded data when he observed elk, deer and cattle. That included anything that might be useful in the final analysis, such as what the animals were doing, the temperature and the time of day. He used 8-mm cameras and time-lapse photography to study animal behavior.

Sheehy and helpers collected animal fecal samples. Ron Slater is analyzing them at a laboratory at the Union experiment station near La Grande.

The study involves what is probably the most ambitious forage sampling work ever done in Oregon, according to Vavra. For the original three years, he and Sheehy put together a sampling schedule that included clipping forage in January, March, April, May and July.

Elk usually move down onto the land, Sheehy explained, in late January and stay until late spring when they go higher again. Deer use the area heavily

Andy Duncan

in early spring, largely on their way to higher country from the farmland and ranges below. Ranchers move cattle through for several days in the spring and fall on the way to and from higher ranges.

For the sampling, Sheehy selected stands in the nine plant communities that contained distinct combinations of grasses and forbs, the primary foods of cattle, elk and deer in the area.

After an initial clipping before the elk arrived, he put cages over portions of the plots to keep various animals from grazing on them. That allowed him to have forage samples from plots that hadn't been grazed at all, plots grazed by elk and deer, plots ungrazed by elk and deer but grazed by cattle, and so on.

The clipping plots are about two feet in diameter, the size of a steel hoop he uses to outline them. In the peak forage time, the spring, it took him as long as

Left: An elk darts through a clearing. Below: Ron Slater looks through a telescope for elk. Opposite page: Sheehy jots down data about forages.

Andy Duncan

2½ hours to clip and classify the plants in a two-foot-in-diameter plot. In the winter, he cleared the snow and mowed plots, doing classification work later.

"I figure if you start multiplying it out, we clipped more than 2,000 plots a year and more than 6,000 the first three years," he says with an air of disbelief. "I've had 42 people help me clip—wives, kids, grad students, professors. It just takes time. Some I've paid and some, I twisted arms. I had to train most of them first."

Sheehy notes that he plans to do, or arrange for, three additional years of forage sampling on a much smaller scale to increase the accuracy of his study. That work will continue after he writes his doctoral thesis on the project.

Asked if his ranching background will make some people wary of his findings, he says:

"There's no doubt people are polarized on both sides of the subject. The ranchers seem to be worried that the excellent forage years we've been having will mask the negative effects of elk and deer. That's the main reason we're gonna clip three more years. I think one reason I was acceptable to agricultural and wildlife people is that, yeah, I've ranched all my life. But I've also worked as a wildlife biologist for the fish and wildlife department. I consider myself a relatively unbiased person and I'm gonna try to get all the facts.

"There's no doubt people are polarized on both sides."

"As far as I'm concerned personally, and this has nothing to do with my data, the world doesn't operate in black and white. It's in shades of gray. Elk are probably having an effect on forage production for cattle in some places. In others, they probably aren't. It probably depends on the time of year and other factors. When I'm through, I'll have an idea of what's happening here, given the conditions during this time period, but not necessarily over in Wallowa County. I hope it will put another piece in the puzzle."

He plans to draw his data together with a computer-mapping process that hasn't been used in Oregon on this type of study. He'll code the entire study area by use of the geographic information systems technique, called GIS for short. There can be codes for lots of categories: plant communities, soil types, land ownership, where animals were observed, slopes, etc. The computer will synthesize the maps to give a relative picture of how the animals used the plant communities during the field study seasons.

He hopes to submit a report of findings to the Oregon Department of Fish and Wildlife by June, 1985.

Andy Duncan

* * *

The first thing I notice stepping from the trailer into the dark is that the rain has stopped. After having strong but welcomed "camp coffee," the kind where you throw grounds right in the water, we get in the trucks and bounce and dive up to a clearing near the ridge overlooking the big meadow. We're in spying position by 5 a.m., but the elk are still sleeping, or whatever. Sheehy shares a Thermos of steaming coffee.

"The ranchers and fish and wildlife biologists around here have treated me real well, maybe because I can talk their language," he tells me. "The first year of the study, I horsed it, stayed down at the French ranch in the hired hand's cabin. It was about a six-mile ride up here and I'd leave at daylight and get in three hours after dark. As soon as the snowdrifts melted enough, I moved up to the cabin on Johnson Creek."

"I think one reason Marty signed me up for this study is that he figured he could turn me loose and not give it a second thought compared to, say, someone from Chicago. A person could get himself killed pretty easy packing cages out here in the winter."

He doesn't have a perfect record, he points out.

"I've got a lot of advice for new grad students starting a study. One of the main things is, don't go after the data too quickly. I spent two months the first year putting cages out with a horse and packhorse. I found out later that a month earlier or later I could have done it in a week with a pickup or a snowmobile."

We spot two elk trotting across a small opening.

The day grows brighter. It's cool, but nothing like yesterday. Sheehy is getting concerned about the elk situation so we return to the trucks to check spots where they might be. Several of us ride in the back of the pickups. Some of the "roads" are narrow ribbons of mud across steep mountainsides. I decide to dive uphill if we slide over.

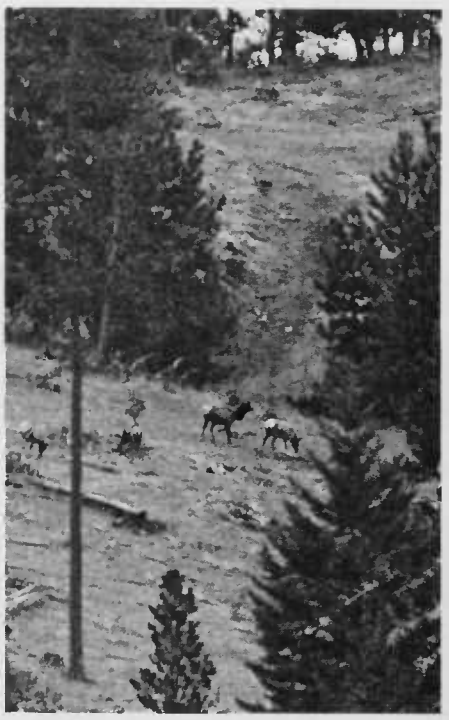
There are two groups of Rocky Mountain elk living on the study area, Sheehy says. He's afraid they've both moved to higher country. They haven't. We spot two elk trotting across a small opening a couple of hundreds yards from our moving truck. They disappear in the trees but moments later a herd is spotted on a distant mountainside.

Mike Snider leans into the tedious job of clipping a forage plot. Andy Duncan

"That's probably the only chance you're gonna have to get around some elk," Sheehy tells me, explaining that it won't be possible to drive closer to the animals. Grinning, Vavra says he, Christensen and Slater will guard the trucks. The sun is shining as the photographer and I grab some gear and start down the hillside, wondering why the three are skipping the hike. The answer comes quickly.

Dennis Sheehy and Mike Snider are in better shape than I guessed, and the elk are in superb shape. I learn that jogging around a park near the campus at lunchtime is not the ideal warmup for big-game stalking. Several hours later, we bring back photographs (with a magnifying glass, you can see the elk in them).

In the trucks again, we drive to a "plant community," where Sheehy and the others clip forage plots and the photographer and I document the procedure. Then we return to the cabin. It is 2 p.m., time for breakfast and lunch. □



Rocky Mountain elk graze on a far-off hillside on the mountainous study area.

At Journey's End

A goal that developed from a confused teenager's musings in Quang Tri Province, South Vietnam, in 1967 was reached in March in Inner Mongolia by an adviser for the United Nations.

The teenager and the adviser are the same person—Dennis Sheehy, OSU doctoral student in rangeland resources.

Sheehy joined the Marines after finishing high school at Baker, Oregon, in 1965 and then suffering through a disastrous first year of college. He was promptly sent to Vietnam to serve in an infantry platoon. Five months later, he was entertaining the idea of asking for reassignment to a unit set up to work closely with South Vietnamese villagers.

An enemy rifle bullet shattered his right arm and his budding plan.

"I was so confused over there, and during the six months back in the states in the hospital," he says looking back. "But I had this idea I'd get a degree in Asian studies and try to go back to Vietnam in some type of rural development job. I thought maybe I could do some good that way, help the South Vietnamese people."

A bullet in Vietnam almost tore his right arm off.

Sheehy's re-entry into college was a shock, as it was for lots of young men just back from the jungles of Vietnam and still hoping the United States would win the war.

"I'd just gotten out of the hospital and I hadn't been at the U of O two weeks when there was a big antiwar demonstration," he says. "I was watching it, trying to put all this into perspective, when darned if three of my cousins from Eastern Oregon didn't go marching by. That really got me."

But he stayed in school. To improve his chances of getting a job in Vietnam, he expanded his plan, majoring in Asian studies and Chinese. Four years later, he received a bachelor's degree with a double major in those areas.

The war dragged on, and Sheehy's hopes of returning to Vietnam evaporated when the United States finally ended its involvement there. But the desire to work in Asia stayed with him, and the U of O degree recently helped him do just that.

Sheehy now has a master's degree in rangeland resources from OSU, is the veteran of two range-related studies with the Oregon Department of Fish and Wildlife, has ranching experience, and is nearing completion of a Ph.D in rangeland resources at OSU.

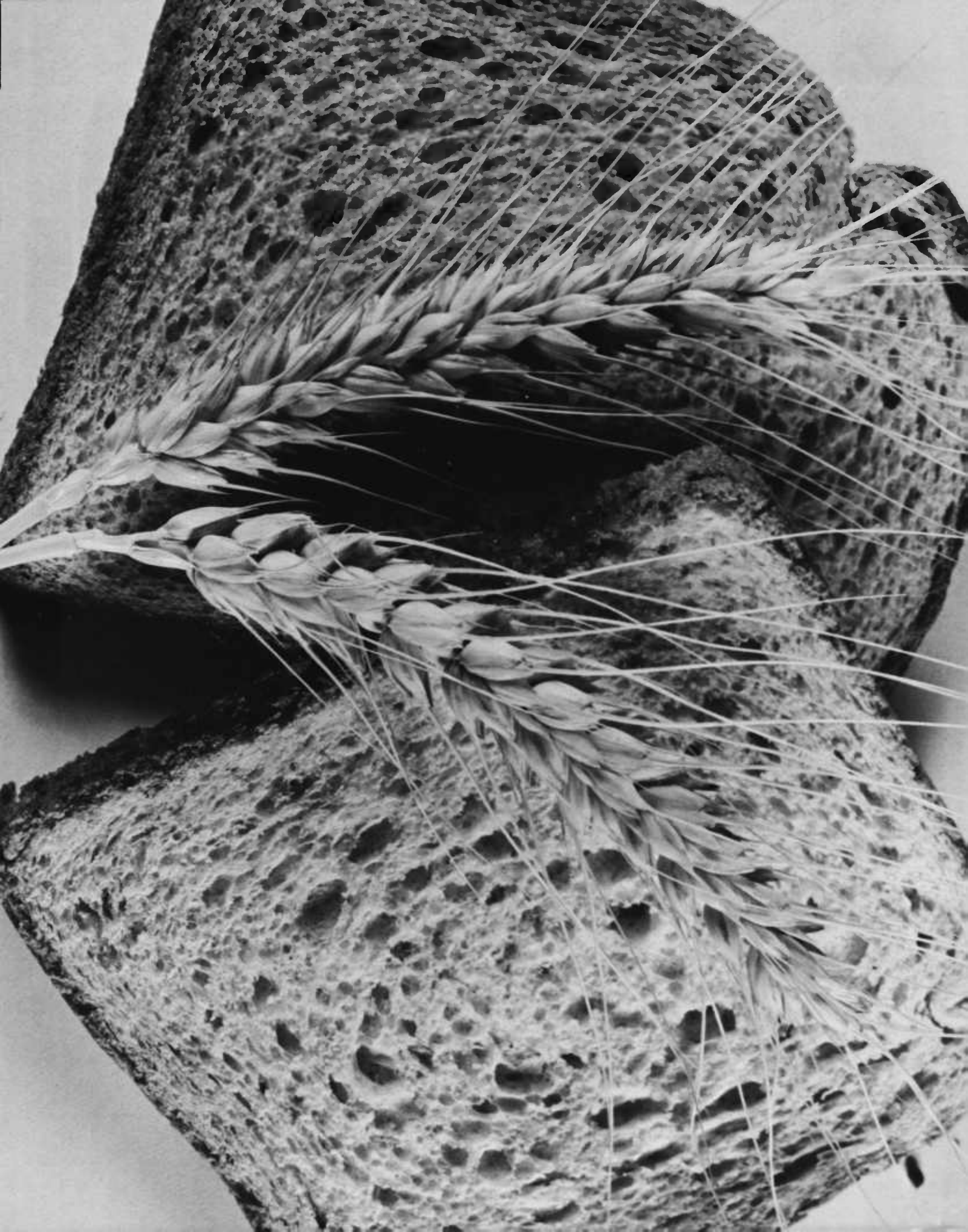
Couple those credentials with his knowledge of Chinese and you have the perfect candidate for a job as an adviser for the United Nations Range Development Project in Inner Mongolia, part of Mainland China. The area is similar to Eastern Oregon's high desert, and the government there is anxious to improve forage on the land so it will support more beef cattle.

As an adviser, Sheehy is spending the month of March in Inner Mongolia. At a date not yet set, he and his wife and three children will return to the area for a three-year assignment.

They will spend seven months during each of the years in Inner Mongolia and the other five in Oregon, where Sheehy will be able to supervise follow-up field work related to his OSU doctoral thesis study of competition for forage among elk, deer and cattle. □

Dave King

Sheehy, involved here in the seemingly never-ending chore of clipping forage, hopes his doctoral study will "put another piece into the puzzle" of how elk and deer affect rangeland also used by cattle.



White Knuckles, Red Wheat

A soft market for soft white wheat has Oregon farmers scared and scientists eyeing a variety not grown much here

A bread boom in Asia, static soft white wheat markets worldwide, and some promising research findings are increasing the chances that Northwest farmers will start growing more hard red wheat, the kind produced mostly on the Great Plains and in the Midwest, a prominent OSU crop scientist believes.

If that happens it will reverse, at least temporarily, a 160-year trend toward increased production of soft white wheat in the Northwest, says Warren Kronstad, head of an internationally known cereal grain development program based at OSU. (Hard red wheat is used to make bread. Soft white wheat, which makes up about 95 percent of the wheat grown in the Northwest, is used in pastry and noodles.)

"The brown sack lunch is becoming a worldwide thing. People all over, but especially in Asia, are starting to want a sandwich," said Kronstad. "And here our farmers sit with piles of surplus soft white wheat, watching hard red wheat from Montana and Colorado go down the Columbia River to the Orient and get premium prices.

"We certainly don't want to give up our soft white wheat. But we can't afford to keep so many acres of it," said the scientist, whose research team developed Stephens, the highest-yielding, most popular soft white wheat grown in the Northwest.

"With research and better farming we can keep increasing the quantity and quality of soft white wheat," the researcher added, "but we still have to export 85 percent of it to a limited overseas market."

Soft white wheat was first grown in the Northwest in about 1825 and production of it here generally has risen ever since, including several periods of sharp increases in production. The option of growing hard red wheat didn't seem very promising until recently.

The more protein in wheat, the better its milling and baking qualities for making bread, Kronstad explains.

Soft white wheat, which grows well in the Northwest, has a low protein content (6 to 9 percent). That is why it is best suited to making pastry and noodles. Hard red wheat is good for breadmaking because of its higher protein content (up to 14 or 15 percent). But the Oregon farmers who have grown a small amount of hard red wheat through the years have had trouble getting an acceptably high level of protein.

Research in the field and in the lab may be changing that.

"Generally, people have thought plant stress near the end of the growing season is what is needed to up the protein in hard red wheat, because a wheat plant produces the protein and then the carbohydrates," said Kronstad. He explained that late stress cuts off carbohydrate production, resulting in a higher percentage of protein in the wheat.

"Our growing conditions aren't right for that. But our research suggests you can do it another way," he said. Applying nitrogen fertilizer when wheat plants are in their flowering stage in the spring helps produce grain with a greater percentage of protein, Kronstad says.

"In the case of the Willamette Valley, the irrigated areas around Pendleton and Ontario, and the higher rainfall, nonirrigated areas of Eastern Oregon, you can get the nitrogen down to the wheat roots with water," said the researcher.

"We aren't writing off the dryland areas, either," he said, mentioning studies at OSU's agricultural research facility at Moro. "There seems to be some promise of getting nitrogen into the wheat leaves in those areas."

There is promise elsewhere, too. Lab studies suggest there may be an alternative to trying to grow hard red wheat with a protein content equal to that of the wheat grown in areas with more suitable climates. It hinges on protein quality, rather than quantity, explains Kronstad.

The protein in hard red and other wheats that goes into flour is in the endosperm, the inner part of the seed. Researchers at the Plant Breeding Institute at Cambridge, England, have found that one type of protein in the endosperm, called glutenin, has a strong influence on breadmaking properties of grain. Hard red wheat containing glutenins with components, or subunits, having a high molecular weight are especially good for making bread, researchers have found.

That's where Kronstad and his colleagues see promise.

"What I'm saying is that if you develop a hard red wheat variety for Oregon with the appropriate high molecular weight glutenin subunits, it may not be critical to get high protein content. It may be possible to make wheat with 12 percent protein have good breadmaking qualities."

Dave King

Wheat breeder Warren Kronstad examines hard red wheat in an OSU greenhouse.

With that goal, Kronstad's research group has teamed up with another one headed by OSU botany professor Ralph Quantrano. Graduate students working for Quantrano use a process called electrophoresis, which separates the genetic material DNA by molecular weight, to identify wheat kernels with glutenin subunits with a high molecular weight.

"It's beautiful," said Kronstad. "You don't even have to destroy the kernel and yet you have the ability to screen the parents and progeny of wheat lines (potential new varieties being developed) and identify those with good milling and baking properties."

That could cut as much as five years off the time needed to develop a new hard red wheat variety, he says. Wheat lines now are checked for milling and baking quality later in the variety development process when there's enough grain for actual milling and baking tests at the U.S. Department of Agriculture's Western Wheat Quality Laboratory in Pullman, Washington.

With support from the Oregon Wheat Commission, Kronstad and Quatrano plan to collaborate on more sophisticated genetic work. One goal—extremely ambitious, Kronstad admits—is to isolate genes that control storage proteins in wheat and use genetic engineering techniques to insert desirable protein storage genes into new wheat varieties.

Advances in that area could be used on any type of wheat grown in Oregon, Kronstad points out. He notes that his group plans to continue doing laboratory and field research with winter and spring durum wheat, a high-protein type good for making pasta, and with hard red spring wheat, used in breadmaking.

The hard red wheat most promising for Oregon, he emphasizes, is the winter type, planted in the fall as is most soft white wheat grown in the state.

The major part of the wheat breeding is being done at OSU's Hyslop Agronomy Farm near Corvallis, at the Sherman Experiment Station at Moro, and at a site near OSU's Columbia Basin Agricultural Research Center at Pendleton.

Field trial locations for hard red and durum wheat breeding lines include sites in the Condon and La Grande areas and at the Agricultural Experiment Station's branches at Union, Klamath Falls, Ontario, Redmond and Medford. Kronstad's research group has access to additional durum and hard red wheat lines through its cooperative work with CYMMT, the International Maize and Wheat Improvement Program, headquartered near Mexico City.

Last year, Oregon farmers planted hard red winter wheat on only about 2 percent of the 1.2 million acres where they planted wheat. Kronstad points out that a switch to significantly more hard red wheat would cause problems as well as solving some.

"Agronomists like Vance Pumphrey and Floyd Bolton are looking at the cultural practices it would require. And I know it would cause problems with storage and transportation. It'll take work in those areas. But I'm hearing from the growers that they're hurting and ready to take a look at this," he said.

Matt Kolding and Chuck Rhode, cereal grain breeders at the Columbia Basin Agricultural Research Center at Pendleton who are testing Kronstad's hard red wheat breeding lines, are hearing the same thing.

"People are coming to the station to ask about putting hard red wheat in their circles (circular, irrigated agricultural fields in the Columbia Basin), and we don't have enough answers for them. We will have in three or four years, though," said Kolding.

"Besides variety testing, we're looking at fertilization rates, rate of seeding, different row spacings, and we may do some irrigation studies," he said, noting that agronomist Pumphrey is directing the cultural research in the Columbia Basin.

"It's beautiful. You don't even have to destroy the kernel."

"We already have a hard red winter wheat variety that yields equal to Stephens (the best-yielding soft white wheat mentioned earlier). But the protein level isn't high enough," said Kronstad, noting that the variety came from crossing winter and spring hard red wheat.

"What I'm telling the wheat growers is, let's don't piddle around the next 20 years. Let's put the time and money into it and find out about hard red wheat in four or five years.

"In five or 10 years, I'd like to see our hard red wheat acreage up to 20 percent of the total acreage and 30 percent of the total yield. That's our goal."□

—Andy Duncan

profile

John Yungen

He'd never seen a marijuana plant

Being in charge of one of OSU's branch agricultural experiment stations must have its low moments. But you'd never know it talking to John Yungen.

In his quiet way, the superintendent of the Southern Oregon Agricultural Experiment Station at Medford is Mr. Positive. Yungen says he is doing what he likes and likes what he is doing—period. A questioner has to work hard to sift out additional details of his professional life among the pears, apples, onions, corn, blueberries and other crops studied at the facility.

You can learn a lot quickly by watching him, though.

Yungen is constantly on the go, checking on crops growing in experiments, pitching in to help technicians move irrigation pipes, collecting research samples. He has the tanned, taut, contented look of a person who does physical labor out-of-doors and loves it.

That doesn't seem to fit with his duties as superintendent, a job he moved into three years ago after 27 years as an agronomist (field crop researcher) at the Medford station.

As superintendent, he inherited paperwork that could keep a person working at a desk almost permanently, to say nothing of responsibilities like speaking to civic groups and working with grower organizations.

But, when pressed for his feelings, Yungen says he likes the new chores.

"I'm not the administrative type," he says bluntly. "I was sort of forced into the superintendent's job when Porter (former superintendent Porter Lombard) took a position on campus. But I have a good administrative assistant, Nancy Porter, and Pete Westigard (a longtime station researcher) and other good personnel to help me. I've found that I really like the challenge. I like meeting with the growers, the fruit people and all. I feel the work is worthwhile."

David Sugar, the station's orchard manager, confides that Yungen has a strategy for staying content.

"My impression is that John wouldn't be satisfied if he couldn't do field work," says Sugar, "so he puts in a long day and then comes back most evenings to do his paperwork.

"You have to remember," adds Sugar, "that John lived in a house on the station for 23 years, until he built one a mile away a couple of years ago. He raised his three children on the station. It's been his life. He really cares about the fate of agriculture in this area. He's always been available to anyone who came for help, from the home gardener to the large grower."

There must be highs and lows in the job, a persistent questioner told Yungen one day recently while the superintendent examined farming equipment in a shed at the station.

Mulling over the statement, Yungen furrowed his brow, then smiled and began telling the story of his brush with what some describe as Southern Oregon's "number one cash crop."

"I'd never seen a marijuana plant," he said, "until one day when the sheriff's office called to ask me some questions about them. I said I knew nothing but that I had a 1942 agricultural bulletin from Illinois on growing hemp for making rope. It came out during the war when the Japanese had The Philippines, where most hemp was grown.

"Later, I drove down to the sheriff's office just to see a marijuana plant they had growing in a pot. I wanted to know what they look like, just in case someone tries planting a patch on a remote corner of the experiment station."

Subject closed—with such highs, who'd have time for lows, the questioner concluded. □ **—A. D.**

Possums in Paradise

(See page 6)

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Oregon's Agricultural Progress

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