Oregon's Agricultural
Progress
Spring 1977

Truffle treasure hunt

Agricultural Experiment Station
Oregon State University

Comment

John R. Davis
Director

Food crisis: heavy issues must balance

When this was written, extremely cold weather, over-extended gas distribution systems and a general shortage of natural gas and fuel oil had brought civilization in the Mid-Eastern states to a halt. Schools and businesses were closed, more than two million persons were out of work, some were leaving their homes and human and economic losses generally were frightening.

What brought about this national crisis? Obviously, the balance of nature was tilted by unusual atmospheric patterns beyond human control. But other causes also out of balance could have been controlled and reduced the extreme hardships.

First, the shortage of natural gas may have been moderated if the Alaskan pipeline had been initiated earlier and if off-shore and other oil exploration had been permitted to proceed as planned. Delays in construction of electric generating plants—either nuclear powered or coal fired—placed a heavy burden on fossil fuels for power and heat. Delays in developing newer sources of fossil fuels were a result of concern for natural environment—in Alaska for the migration patterns of caribou and other animals and in the case of off-shore drilling, for the well-being of marine life and the continued existence of some threatened species.

As we look back several years, was our caution really worth it? Were the trade-offs made to protect the natural environment worth the cost this winter? Or could a better balance have been forecast at that time; one that would have moved simultaneously toward environmental protection, energy and fuel development, energy conservation and stimulation of new technology?

Agriculture is in the same boat today as the fuel issue was several years ago. Again, nobody seems to be listening. For example, federal and state regulations are partially responsible for forcing some small farmers out of business because of economics of scale. Also, pesticide regulations may lead to the demise of some crops and native forest and brush species if insects or diseases are allowed to spread uncontrolled.

Hastily and poorly planned application of pesticide regulations occurred several years ago in Central and South America when most of those countries followed the example of the United States by banning the use of DDT. Almost immediately, the loss of life from malaria rose to alarming proportions. Now those countries again are using DDT to control insects and to improve human health—an example of developing regulations without clear and logical thinking about the consequences.

The average citizen of the United States spends only 17 percent of take-home pay for food, the best bargain anywhere in the world. So an increase in food prices will not have a great effect on the average standard of living. The effect on all economically disadvantaged people will be substantial, however. But someday soon we may have a food crisis in part of the United States because of plant or animal diseases or insect infestations. The possibility of occurrence of such crises in the developing nations is very high indeed.

So before we suffer the same consequences in food supply as we've seen with energy, let's give some thought to a rational balance in our planning and our actions. Neither the scare tactics of one-way amateur ecologists nor the economic production-at-all-costs attitude should prevail. Nor should either extreme dictate our future with poorly developed legislation. We owe it to the public and our children to think, legislate and regulate with clear minds.

Contents

Richard Floyd, Editor
Experiment Station Communications

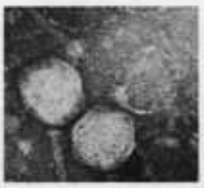
Linda McCormick, Assistant Editor
Editor, Oregon's Agricultural Progress

David King, Assistant Editor

Cover

One picture may be worth a thousand words, but is one pound of truffles really worth $200? See story beginning on page 8.

Vol. 3, No. 4, Oregon's Agriculturel Progress, a quartarly reseerch report ia publishad by tha Oregon Agricultural Experiment Stetion, John R. Devis, Director and sant free to Oregon residents. Address requasts to Editor, AdS 416 R, Oregon Stata University, Corvallis, OR 97331, or saa your County Extansion Agant. Written matarial mey be reprinted provided no endorsemant of a commarcial product is statad or impliad. Plaasa cradit Oragon's Agricultural Progress end Oregon Stata University. To simplify tachnical tarminology, trada namas of products or equipment sometimes will be used. No andorsemant of product namas is intanded nor is criticism implied of products not mentioned.



Departments

Hidden enemy can be stopped in 'starters'

Two Oregon State University microbiologists have documented for the first time that starter strains of bacteria used in commercial fermentation harbor viruses which can be released during the manufacture of some dairy products.

The research of William E. Sandine and Alan R. Huggins shows the viruses pose a potential threat to the fermentation industry. Fermentation is used commercially to make cottage, cheddar and other cheeses, buttermilk, yogurt, sausage, pickles, sauerkraut, streptomycin, acetone and butanol and livestock silage.

"For years, tremendous amounts of time and money have been invested by the dairy fermentation industry to control virulent viruses from infecting starter bacteria during milk fermentation," said Sandine.

"Now, in a paradox situation, we discover the main reservoir for these viruses probably is not the outside environment but the bacteria themselves."

Sandine and Huggins surveyed more than 60 domestic starter strains and found more than half had viruses.

"The others probaby do, too, but we have not found a way to coax them to release viruses," said Sandine.

Cells can have two kinds of viruses. The temperate virus is harmless to the host cell and rarely causes cell breakdown. The other, a virulent virus,

can take over machinery of the cell so it produces virus genetic material and protein which are combined and released as intact viruses when the cell breaks down.

The virus' function in the cell is to serve as a means of genetic exchange. It can carry genetic material from one cell to another and sometimes can insure survival in a harsh environment.

Both host and virus cooperate to determine whether it will be virulent or temperate. A particular virus may be virulent on one host and temperate on another.

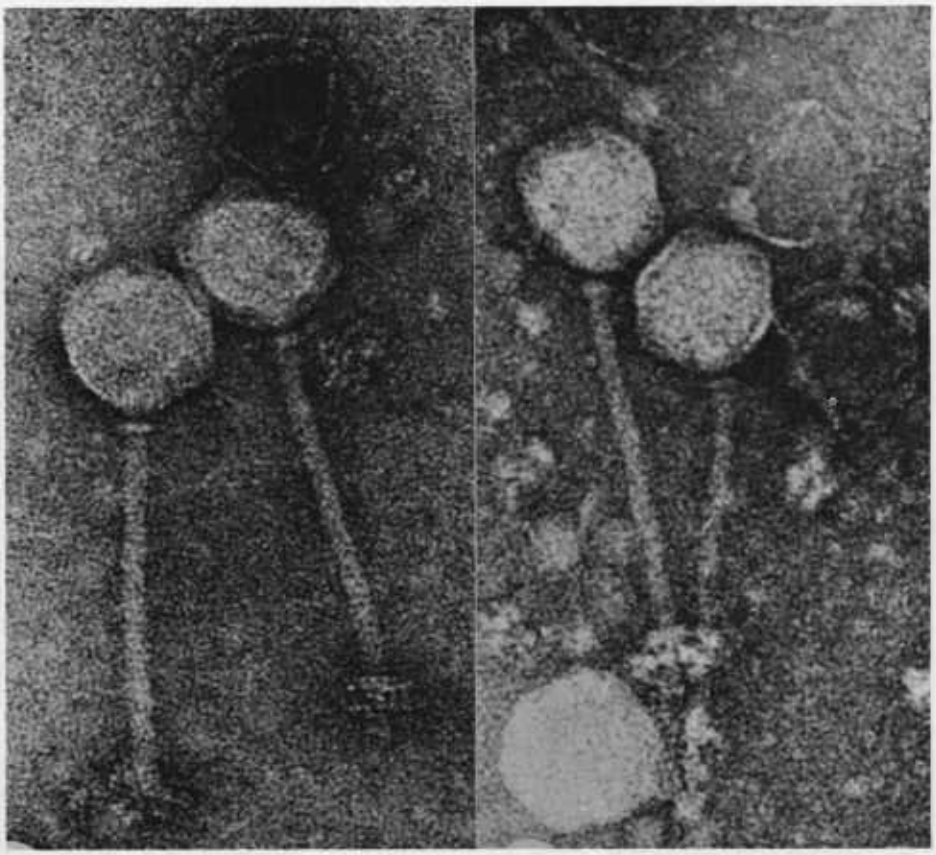
"That is why we can find indicators for temperate viruses and that is why temperate viruses can be released that may be virulent for other cells in the starter mixture," said Sandine.

The scientists used electron microscopy to select a bacterium which harbors a temperate virus. They grew it with a second bacterium for which that temperate virus was virulent. As a result of growing together, the temperate virus infected the second bacterium so a large number of viruses were produced.

"This, no doubt, occurs under industrial conditions and provides for the dissemination in a fermentation plant of large numbers of viruses," said Sandine.

Temperate viruses are not difficult to detect. The microbiologists treated bacteria with ultraviolet then let them grow. If the cell has a temperate virus, it will take over and break down the cell. Then the virus is harvested by high-speed centrifugation and examined under an electron microscope.

Alan Higgins adjusts equipment used in fermentation research project.



Electron micrographs show one type of temperate virus found in some strains of bacteria. Note head and collar structure (left) and baseplate details (right).

Sandine pointed out that their research has produced two unresolved questions:

1. How to cure bacteria of temperate viruses so the fermentation industry can use strains that will not be a source of viruses.

2. What are the consequences of cells harboring these temperate viruses.

"Since toxins sometimes are produced by certain disease-causing bacteria during these interactions, the temperate virus must have some influence on the metabolism of cells," said Sandine.

"We would like to know what all those influences are. We think they may raise or lower the optimum temperature for growth of the bacterial cell, they may change what the bacterial cell can do to the raw product being fermented and they also may result in the production of bitter-tasting end products or other compounds causing off flavors in foods."

Sandine, whose long interest in starter culture viruses was sharpened by research during a year at New Zealand's Dairy Research Institute, is looking ahead.

"A new phase of research will be to determine whether viruses that look alike necessarily are alike in terms of what bacteria they affect," he said.

"With the help of microbiologist Lyle Brown in our department we are using enzymes to fingerprint the genetic materials of temperate viruses. The enzymes are so specific they split the virus' chromosome at specific points. If two viruses are identical, you get the same pattern of breakdown."

As a result of the Sandine-Huggins research, some of the starter companies have begun additional testing on starter strains to make sure they do not mix together a bacterium carrying a temperate virus which is virulent for another bacterium in the mixture.

The result could be more control—and efficiency—in providing starters to trigger the fermentation process. More precise control of the behavior of the bacteria in the strains could eliminate some undesirable flavors and perhaps create some exciting new ones.

Groundsel: Pasture pest more potent than tansy

A familiar face is becoming a new enemy for Oregon's livestock industry.

Groundsel, a common annual weed found in many parts of the state, can cause liver damage in livestock equal to or greater than tansy ragwort, Oregon State University animal nutritionist Peter Cheeke has found.

"Groundsel produces liver damage identical to that caused by tansy ragwort poisoning," Cheeke said. "Although it can be controlled with chemicals, the weed frequently is found growing in alfalfa fields and in grain fields seeded in the fall and used for spring pasture. I know some farmers have quite a bit of groundsel in their fields when they make the first cutting of alfalfa."

OSU weed expert Arnold Appleby confirmed Cheeke's information on groundsel control.

"Groundsel control is much more complicated than control of tansy ragwort. It can be found in alfalfa, wheat, row crops and some pastures and each crop has its own method of control. But because it is an annual and must compete with the main crops, it is not as serious a problem in well-managed pastures," Appleby said.

Cheeke became interested in the yellow-flowered weed several years ago when a case of groundsel poisoning was reported in California. Other problems later were reported.

"Several calves died from liver damage resembling tansy poisoning. We found the mother cows had eaten hay contaminated with groundsel before the calves were born and determined groundsel exposure had occurred before birth," the California researchers reported.

Animal scientist Peter Cheeke examines common groundsel plant.

At OSU, Cheeke tested the potency of groundsel poisoning. He found fatal poisoning with groundsel occurs faster than with tansy ragwort.

"Rations containing five percent groundsel and five percent tansy ragwort were fed to two groups of rats. The group fed groundsel died more rapidly than did those fed tansy."

The information about groundsel comes in the midst of a major investigation into the nature of tansy poisoning in livestock. Cheeke said he and other researchers hope to find out why some animals are more susceptible to tansy poisoning than others.

"The alkaloids in groundsel and tansy are not toxic until they are converted in the liver," Cheeke said. "It may be related to the workings of the gastro-intestinal tract. Some animals may not absorb the alkaloids and may not convert them, or the alkaloids might be destroyed somewhere in the gut."

To test the theories about toxin formation, Cheeke took liver samples from rats, mice, cattle, horses, chickens, sheep, rabbits, guinea pigs and Japanese quail, then incubated the samples with tansy alkaloids and surveyed the rate of toxin formation. Some surprises were noted.

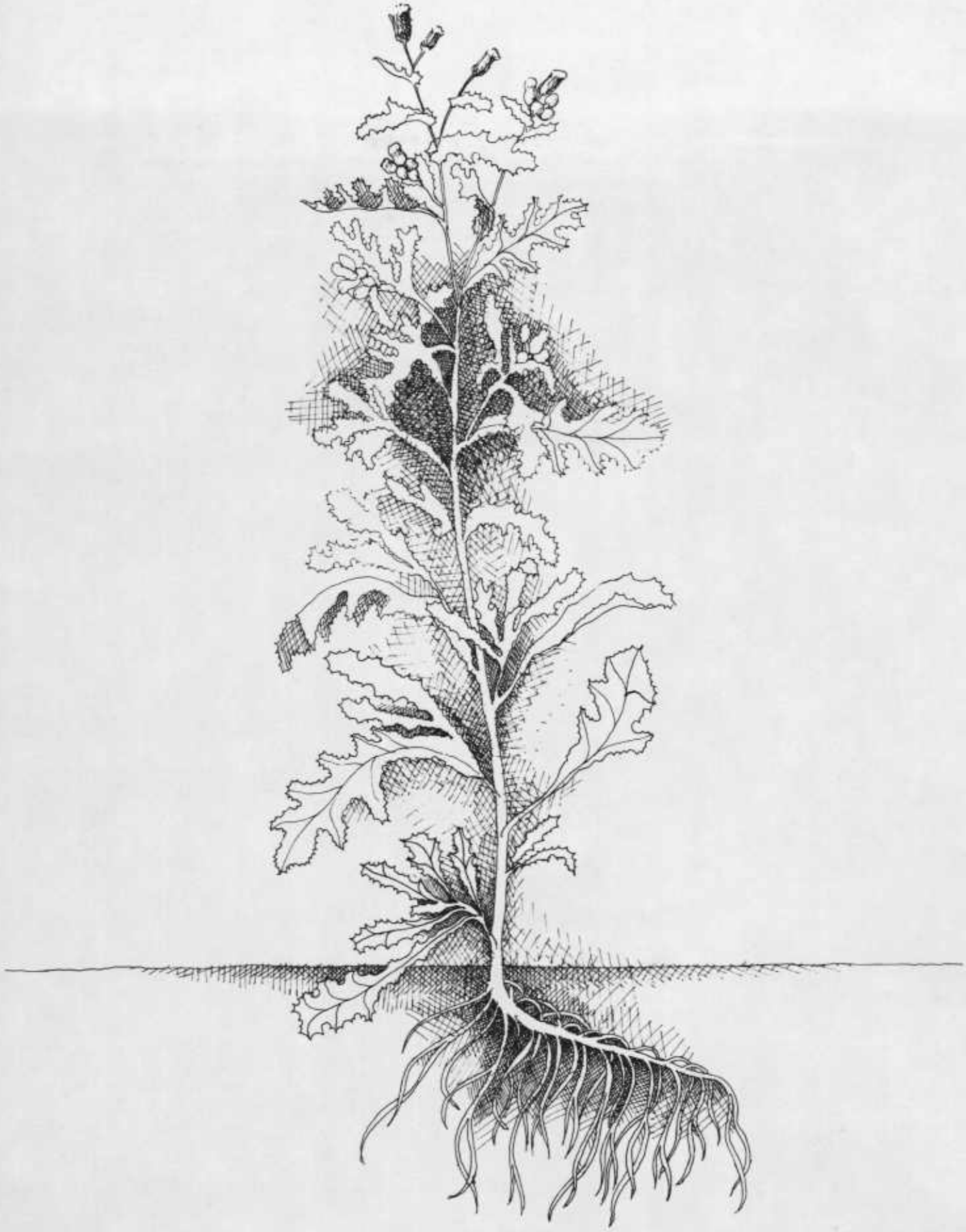
"We found rabbits have high rates of conversion but very low rates of tansy poisoning. Also, chickens had a very low rate of conversion but they die quickly from tansy poisoning," he said.

Another theory Cheeke tested was a commonly held belief that sheep are less susceptible to tansy ragwort poisoning because their rumen fluid contains certain materials which destroy ragwort alkaloids.

"We incubated tansy with rumen fluids from both sheep and cattle and found sheep rumen fluid definitely did not decrease the toxicity of the tansy," Cheeke said.

For now, the answer to why some animals resist tansy poisoning better than others seems to be related to both liver metabolism and to alkaloid absorption. Cheeke is experimenting with certain dietary additives that might limit the production of toxins in the liver.

"It is too early to say whether those additives will work," Cheeke said. "But as soon as we can find out what makes one group of animals resistant, we may be able to extend these findings to cattle and horses."



". . . it is doubtful whether truffles will ever become economically important in this country . . . but scientifically the subject is of remarkable interest . . . Low as this organism may be on the scale of plant development, one finds in it characteristics of the highest life, these all running through the whole gamut of animate things like a connecting thread. Each new truth we learn

concerning any organism, however simple, teaches us more about all life and the reasons behind it; and this is perhaps one justification for pursuit of pure science, if such justification ever be needed."

Helen M. Gilkey, 1932
from the Gilkey papers,
OSU Archives

Ruffles (and flourishes) for truffles

Now, 44 years after she wrote those words, the pursuit of pure science by Helen Gilkey is becoming economically important.

James Trappe, a principal mycologist (one who studies fungi) with the U.S. Forest Service, and Edward Trione, USDA Agricultural Research Service biochemist, have received a grant from a California corporation to study the samll aromatic subterranean fungi called truffles. The scientists, both with appolntments at Oregon State University, are studying the possibility of commercial truffles production.

For centuries, truffles have been associated with Old World culinary delights. Recipes for their preparation are found in French cookbooks published as early as 1700. Pharoah Cheops savored the aromatic seasoning quality of truffles 5,000 years ago, and classical writings contained numerous references to truffles.

Because truffles grow underground and appear not to have any root structure, they were a puzzle to many of the pre-microscope era scientists. Some explained truffle existence by saying they were created by thunder and deposited underground.

The world knows much more about truffles today, mostly because of the work of Helen M. Gilkey, the late professor emeritus of botany at Oregon State College.

In 1903, Gilkey moved to Corvallis and entered Oregon Agricultural College (now OSU). Her outstanding artistic talent led to an appointment as an undergraduate assistant in the Department of Botany where she began as a botanical illustrator. She obtained her master's degree in 1911 and in 1912 entered the doctoral program at the University of California at Berkeley. It was in Berkeley she began research in what was to become her prime scientific interest: taxonomy of the truffle fungi.

Douglas-fir trees inoculated with truffle fungi grow in Trappe's laboratory.

After earning her doctorate in 1915 and working as an illustrator, Gilkey accepted the herbarium curatorship at Oregon Agricultural College in 1918.

In December, 1920, Gilkey proclaimed in an article written for *The Sunday Oregonian* that she had found the first recognized truffles native to Oregon. This began an Oregon-based research career that helped her earn distinction as North America's authority on truffles.

In 1951, Gilkey retired from active teaching but pursued her truffle research. Maintaining a small office on the OSC campus, she worked for the Agricultural Experiment Station and other research groups.

In 1965, James Trappe was working in Portland as a mycologist for the Pacific Northwest Forest and Range Experiment Station on reforestation projects. In his studies on the forest soil and the fungi it contained, he had discovered a few truffles. At first he was curious about the aromatic truffle fruiting bodies, but then he became intrigued and began studying them more closely.

In 1965, Trappe became project leader of an OSU forest soil project. One day, in the Botany Department he mentioned that since he was in Corvallis he hoped he would have more time to study truffles.

A look of concern came over Prof. Charles Leach, a friend, who said, "We must get you down to see Helen right now."

As they entered Gilkey's office she was in the middle of packing her prized truffle collection to be shipped to the New York Botanical Gardens. She had decided it was time to move out of the office and make room for someone else.

"Please don't be offended if I keep packing," she said. "But this is a project I must get done, or I will never do it."

Trappe was impressed by Gilkey and began telling her about his background and his interest in studying truffles. A conversation that was meant to be just a short chat extended into a two-hour discussion.

About half way through the discussion Trappe noticed Gilkey had stopped loading boxes and had started unloading them.

"I hope you don't mind me asking," he said. "But why are you unloading the boxes?"

Gilkey turned, looked him straight in the eye and said, "It has been my greatest desire to leave this herbarium collection in Oregon, but there has just not been anybody to take care of it and work on it. I was afraid it would deteriorate in the back of a closet somewhere and much of this work would be lost. But now I have found someone who will use and study them, so I leave them with you."

Oregon came within an hour of losing one of the world's finest herbarium and truffle collections.

The collection was moved to Trappe's office. He told Gilkey she could work on them any time she wished. Over the next five years she usually came twice a week. Soon, through deft tutoring, more than 50 years of research was transferred from Gilkey to Trappe and the truffle legacy at OSU continued.

In 1976, a new chapter was begun.

With truffles selling for between $150 and $250 a pound, Trappe and Trione are trying to find whether truffle fungi can be grown in the laboratory and then used to inoculate the roots of trees. If successful, it could lead to a commercial industry where truffles are harvested from orchardlike plantations of trees.

Trappe, now considered a world truffle expert, said, "Truffles and many wild mushrooms obtain their energy directly from the roots of specific trees like Douglas-fir and filberts in a mutually beneficial relationship called mycorrhizae, meaning 'fungus root.'

"Without this relationship most, if not all, Douglas-fir seedlings would die soon after planting," said Trappe. "Although there are many types of mycorrhizal fungi that can do this job, if we can promote the truffle fungi to help the seedlings, we will make a good thing even better."

The world has several hundred known species of truffles and many more unknown. Of the European and African species only about 10 are prized for their culinary qualities. Up until now, none of the North American species has been adequately evaluated for table use.

But Trappe may be changing that situation. He has been analyzing the qualities of the *Tuber gibbosum* (the humped truffle) which is quite common on the roots of Douglas-fir trees in Oregon.

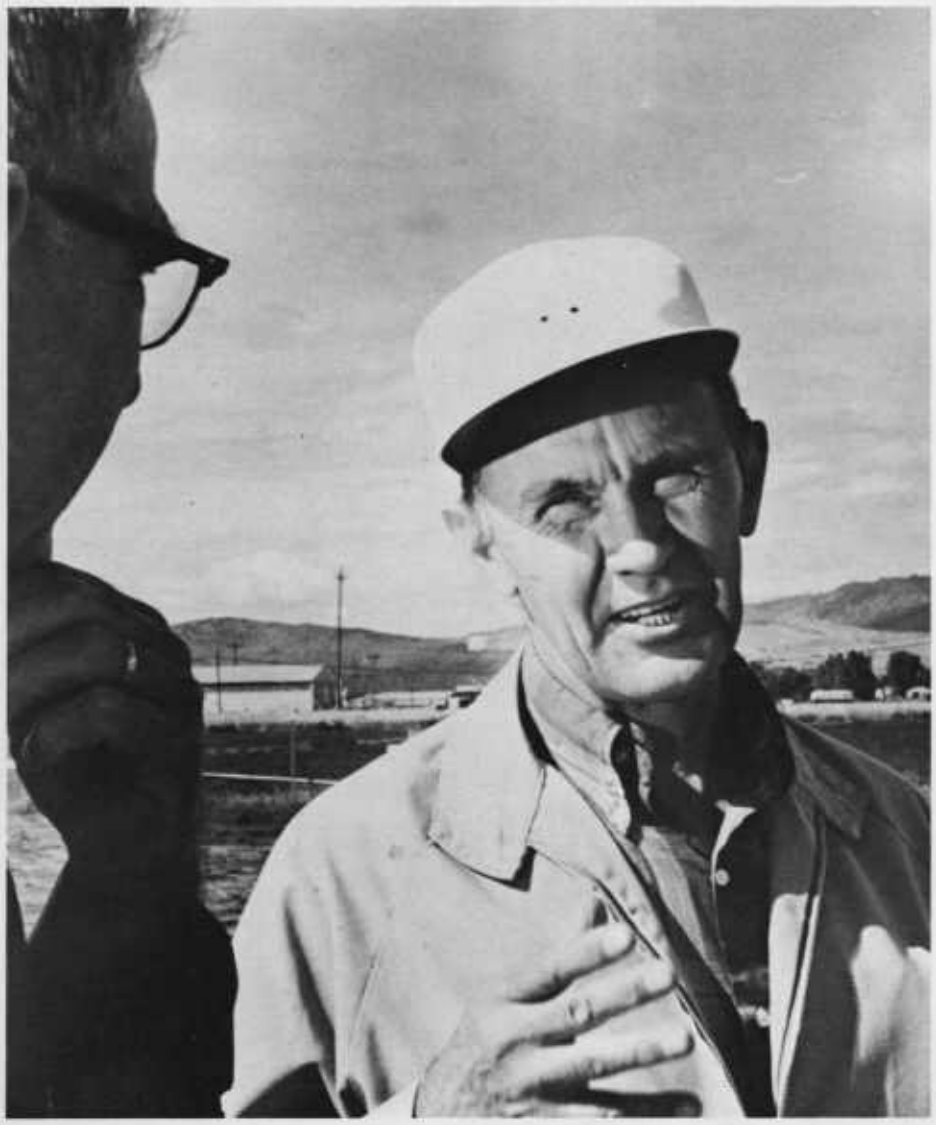
"I think there is a good chance this one is a choice species," said Trappe. "So far I have not been able to gather enough to do anything but laboratory work with it, but I am going to try to find enough to cook a few."

One day Oregon may be known as the truffle capital of North America or even the world because of something that started more than 60 years ago as "pursuit of pure science."

A European shopper reaches for a costly treat (above) while a specially trained dog sniffs out a truffle (below).

Center of interest

Klamath Falls station prods nature into partnership



Klamath Station superintendent George Carter (right) describes plans for a new potato storage building to Central Oregon Station superintendent Malcolm Johnson. The building was put into use last fall.

Getting nature to cooperate with farmers and ranchers has been a constant battle for researchers at the Klamath Agricultural Experiment Station near Klamath Falls in southern Oregon.

Few persons believed any crops could be grown successfully on the 80 acres of salty soil south of Klamath Falls, where station headquarters now is located, when OSU established its branch station there in 1939.

But the crops grew and so did the station. Instead of one site, researchers now conduct a wide variety of experiments on four locations in the Klamath Basin. Station buildings have been financed mainly from Klamath County funds.

The main problem affecting agricultural production in the area is climate. Because the Klamath Basin lies 4,000 feet above sea level, killing frosts can occur at any time of year and the growing season is very short. Soils, too, have mineral deficiencies unlike those in other parts of Oregon. Such deficiencies affect both crop and animal production.

To help farmers and ranchers grow their crops better, research at the branch station is directed into several areas—potato improvement, pasture and related cattle studies and development of superior field crops like alfalfa and grains.

Since potatoes are the largest cash crop grown in the Klamath Basin and bring in an annual gross income of $25 million, potato research is a major emphasis of station research.

Methods of improving irrigation, fertilizer use, weed, disease and pest control and farming practices are investigated by station researchers. Some significant findings in potato research include influencing the change from row irrigation to sprinkler irrigation by area potato growers. Both yield and quality of potato crops have improved with use of sprinkler irrigation, which also can be used for effective frost control.

Elimination of disease in potatoes is important, too, and methods of soil fumigation have been perfected which are helping control root knot and stubby root nematodes.

Cooperative work between branch station scientists and campus researchers may help develop a virus-free potato while branch station scientists continue to test various chemicals to stop disease spread.

One of the worst diseases is potato leafroll virus, spread through potato fields by a small insect called the green peach aphid.

"If no controls were applied, 100 percent of the potato crop would be infected," said George Carter, station superintendent. "Controls are very important."

Several years ago, the main pesticide used to control green peach aphid was removed from the market. However, Station researchers have since identified other chemicals to control the disease.

"Our main worry now is that the aphids will become resistant to the controls, so we are investigating alternatives in case resistance develops," Carter said.

A search is underway, too, for a new potato variety to replace the Russet Burbank. Although the popular variety now dominates potato production in the Klamath Basin, it may not be best suited for production in Oregon. Station researchers in Klamath Falls are working cooperatively with OSU researchers on campus and in Redmond, Hermiston and Ontario on the project.

Other new crop varieties also are tested at the Klamath Station. In cooperation with campus researchers, station scientists are developing good feed grains, determining the best planting dates, nitrogen levels, planting densities, seed treatments and weed control methods for wheat and barley.

One feed barley selection identified by station researchers increased yields by 20 percent over the previous barley variety grown in the area. And studies of small grain fertility and varieties on organic soils in the upper Klamath Lake area showed that 1½ to 2 tons of grain per acre can be produced on land where severe mineral deficiencies previously had prevented production. As many as 15,000 acres of reclaimed lake lands in the area could be brought into production as a result of those findings.

Alfalfa, too, is an important crop in the area and station researchers are testing new varieties, improving control methods for weevils and weeds in the crop.

Lastly, forage quality is an important element of research at the Klamath Basin Experiment Station. In 1944, nearly 80 acres of reclaimed marshland soil were obtained by station researchers from Tulana Farms for research purposes. Studies of pasture on the mineral-deficient soils have helped researchers determine which forage crops will grow best while providing beef cattle with the best balance of nutrients. Mineral intake levels then can be adjusted to correct any nutrient deficiencies of the animals.

Station researchers are also working with researchers at the Oregon Institute of Technology where studies of the Klamath Basin's geothermal energy potential are being conducted. Already, one greenhouse has been constructed and is being heated with hot water pumped from geothermal wells near the Institute campus. Researchers from the branch station will grow vegetable crops in the geothermally heated greenhouse.

In many ways, Klamath station scientists are helping their region grow by proving that nature's limitations can be overcome.

Potato early blight, a foliar disease (above) can be controlled with fungicides. Fistulated animals are helping scientists learn more about forage quality (right).

Cutthroat live by clock in survival race

James Golden, Oregon State University fisheries researcher, lives by two time tables. One is the standard, 24-hour clock which measures each day. The other is a variable temperature controller which governs the survival of cutthroat trout confined to laboratory tanks near Corvallis.

The variable temperature controller instruments are helping Golden understand what happens to fish populations when water temperatures are elevated, as might happen following clearcutting of forests. Clearcutting followed by burning of left over slash has been the traditional method of logging in Douglas-fir forests. Such practices promote more rapid regrowth of tree stands, but may compound the problem of temperature in streams, unless buffer strips are used.

"Several years ago, the Oregon Department of Fish and Wildlife studied part of the Alsea watershed for physical and biological effects of logging," Golden said. "Three creeks were discussed in that study and the one which had been clearcut with no buffer strip alongside the stream had a drop of fish population for several years after logging."

The stream—Needle Branch Creek—had temperature fluctuations with a range of 29 degrees per day following clearcut and slash burn. Minimum temperatures in the stream remained about the same after logging, but eight years passed before the stream dropped back to lower temperature maximums of pre-logging days.

Researchers knew fish could tolerate some temperature fluctuations, but they did not know how much. That was when Golden became involved in the project.

"I wanted to find out how high a temperature fish could tolerate and how much fluctuation in temperature they could withstand," he said.

So far, Golden's two-year research study, which will be completed in July, has revealed cutthroat trout can withstand a maximum temperature of only 27½ degrees Celsius (81 degrees Fahrenheit) for 2½ to 6 days before they die. However, for coastal cutthroat, their previous acclimation history determines what temperature variations are allowed, with little differences seen between hatchery and wild fish.

"The accumulative effects of lethal temperature may make it possible to predict what will happen under a fluctuating temperature regime," Golden said. "If fish had to spend over 200 minutes above 27.5 C at a constant temperature, they would die in one day. Under fluctuating temperature conditions it may take several days for all the fish to die if the exposure time per day at 27.5 C is less than 200 minutes.

A section of Needle Branch Creek shows clear cut areas extending down to the stream's edge.

Many questions about how temperature affects the small, colorful cutthroat remain unanswered. Usually, the fish spend several years in their native streams before traveling to the sea. They return in the fall to spawn and may repeat the cycle for several years before they die. The effects of elevated temperatures on this life pattern are not understood.

After clearcutting occurred on Needle Branch Creek, however, populations of cutthroat trout diminished significantly. Golden hopes his research will find some answers for that decline.

"Fish affected by temperature variations could be more susceptible to fungus or disease," he said. "Fish that have been exposed to extreme temperatures in small tributaries may experience a slower growth rate and be smaller in size, and may not compete well with larger fish further down stream. Smolting could also be adversely affected." (Smolting is the stage of life when the young fish first leaves fresh water and descends to the sea.)

"We know that steelhead smolting may be impaired above 15 degrees Celsius (59 degrees Fahrenheit), and similar things may be happening in cutthroat." Research results may be applied to thermal pollution problems associated with power plants and dewatering as well as logging. Research continues at the Oregon Department of Fish and Wildlife laboratories near Corvallis cooperatively with personnel of the Agricultural Experiment Station.

And when his research is finished, Golden may take some of the time he has been saving up for a little fishing trip.

New varieties put down roots for beer, wine

More fine wines and better beers may have their start in Oregon soon because of grape and hop varieties released by the Agricultural Experiment Station.

Five French wine grapes—Sylvaner, Pinot Blanc, Chasselas Rogue, Gewurtztraminer and Pinot Gris—have undergone inspection and testing at OSU during the last year. Because they showed no signs of virus infections that could lead to damage of other Oregon wine grapes or crops, they have been sent to propagating nurseries where producers will grow enough plants to sell to winegrowers.

"The Oregon growers wanted to test grapes from northern France and Germany to see whether grapes from those cooler regions would be better suited to Oregon's soils and climate than the California grapes now grown here," said plant pathologist H. Ronald Cameron.

Ten more French grapes and some German grapes also are being tested at OSU.

The two new hop varieties, Willamette and Columbia, are expected to bring more brewery business to the state.

"The U.S. hop industry now exports 40 to 60 percent of its crop, while Anheuser-Busch, the nation's largest brewer, imports about 75 percent of its hops from Europe," said Alfred Haunold, USDA-ARS research geneticist stationed at OSU. "The reason for this apparent discrepancy is because American hop growers cannot supply enough of certain varieties some brewers want."

Willamette and Columbia, the new varieties, have all the positive qualities of Fuggle, a hop variety now commanding a premium price, Haunold said.

Last year, Anheuser-Busch tested more than 20,000 pounds of the

Alfred Haunold examines hops growing in an OSU greenhouse.

Oregon-grown hops and told Haunold they "will make perfectly acceptable beer."

Yields of the two new hops also are better than those of Fuggle, and although both do have some susceptibility to downy mildew and verticilium wilt—major hop diseases—Haunold said no problems of disease should occur if Willamette and Columbia are grown in the Willamette Valley.

Because of the release of the two new varieties and a previously released hop variety called Cascade, Anheuser-Busch predicted it will cut hop imports by 25 percent, and the Adolph Coors Company has already drastically reduced imports of hops.

Research team ponders paradox

A medical paradox is being investigated by a team of OSU researchers.

John Schmitz, veterinary pathologist; Ian Tinsley, research specialist on fats and fatty acids; Phil Whanger, who has conducted extensive research on selenium metabolism; and Don Pierce, statistician, are studying the influence of dietary fat on the development of breast cancer as well as possible interactions between dietary fats and selenium on tumor development.

The big paradox involves saturated versus unsaturated fats. For many years, it has been widely accepted that eating unsaturated fats reduces the chance of heart disease. However, recent studies have linked unsaturated fats with development of breast cancer. Fats are either saturated or unsaturated, depending on the kinds of fatty acids they contain.

"These two situations tend to be counterproductive," Schmitz said. "Saturated fats could inhibit tumor growth and enhance cardiovascular problems, and unsaturated fats could have the reverse effect."

Along with dietary fat, researchers will try to determine what part selenium plays on tumor development.

"Evidence that selenium might inhibit tumor development began appearing about 10 years ago," Schmitz said. "Before, it was actually thought to be a cancer producer."

Selenium is a mineral that occurs naturally in soils and consequently in cereal grains, vegetables and other foods grown on those soils. The interaction between selenium and cancer development took on significance when surveys showed areas with low selenium concentration had high cancer-related death rates.

Tests are being conducted with a certain type of mouse which develops breast tumors spontaneously.

"Mammary tumors in laboratory animals are influenced by fat and its composite fatty acids and selenium," said Schmitz. "This paradox of saturated and unsaturated fats is a tough one and there will not be an easy answer. But this study is a step toward understanding the problem."

If it's a girl we'll name her . . .

Everybody has to have a name—even the ugliest fish in the ocean.

A new species of Psychrolutes, discovered in the late 1960s, is being named by David Stein, Oregon State University oceanographer, and Carl Bond, OSU professor of fisheries.

Psychrolutes, a kind of sculpin, is a seawater relative of the sculpins trout fishermen sometimes find on their hooks. The new species first was captured off the Oregon coast in May, 1963.

"At first, there wasn't enough material to pursue the discovery," said Stein. "Only recently have enough specimens been collected to make a proper identification."

Specimens have been taken as far north as the mouth of the Columbia River and as far south as Monterey, California.

At first, researchers thought there was a large species and a small species of Psychrolutes and reasoned perhaps the small one grew into the large one.

"The key to the discovery was some juveniles of the large species," Stein said. "They were different from the small Psychrolutes so we had proof of two separate species."

The new species has a large head and a small tail and lives at depths of 800 to 2,800 meters by developing light bones, large fatty deposits and gelatinous fluids under the skin.

"Our ugly fish is not of any commercial value," said Bond. "But scientifically and ecologically, it is fascinating because it evolved from a shallow-living family of fishes and became adapted to deep water."

The new fish will be named officially soon in a scientific journal published by the Los Angeles Museum of Natural History.

Fisheries researcher David Stein displays the newly named Psychrolutes.

Fatty foe fights cholesterol

Lecithin actually might help reduce cholesterol, researchers at OSU have found.

Graduate students John Halvorson and Lisa Holden, working with home economics foods and nutrition researcher Elisabeth Yearick, studied the effects of lecithin supplements in the diets of 35 middle-aged men.

Lecithin, a fatty substance, appears naturally in egg yolks and soybeans. Commercially, it is used in candy, frosting, cake mixes and other foods to keep fats emulsified.

"We didn't find any lowering of cholesterol in the blood, but we did find a change in form." Yearick said. "Cholesterol appears in two forms in the blood—either free or combined to form cholesterol esters. The ester form may be transported through the body more easily and the lecithin threatment could draw cholesterol out of the blood vessel wall and into the blood stream where it could be more easily extracted from the body."

Male faculty members studied made no changes in their eating or exercise habits. Each gave blood samples and dietary records to researchers before and after the 8-week study period. The only other thing they had to do was take two large capsules containing lecithin before each meal. None of the subjects had history of heart disease.

"The amount of lecithin the subjects took was less than some researchers have used but infinitely more than a person normally would eat," Yearick said.

Two other studies now are in the works as a result of the initial findings. A third graduate student is studying the blood vessels of guinea pigs to see whether the lecithin treatment actually does draw cholesterol from blood vessel walls and a proposed study should help determine whether lecithin helps reduce blood clots associated with heart disease.

Death stalks young ducks in tall grass

The belief that man is the mallard duck's major predator is being shot down by an Oregon State University researcher.

The mallard is one of the most widely distributed and intensively hunted species of ducks in North America, particularly in the Northwest.

It is used as an indicator species in establishing duck hunting regulations but little has been known of the causes and numbers of deaths in young ducklings.

High death rates among mallard ducklings during their first few weeks of life were traced not only to predators but also to inattentive mothers by Larry G. Talent.

Talent, a graduate student in fisheries and wildlife at OSU, radio-tagged mallards in the rolling wetlands near Medina, North Dakota. His research will help determine the home range, habitat use and duckling mortality of mallard broods from hatching to flight.

Even some of the mallard ducklings wore tiny transmitters.

Talent found predators such as striped skunks, red foxes and raccoons raiding more than 90 percent of the nests with eggs, while mink were able to kill almost any brood remaining in the small wetlands within its range. The hen may try to distract the mink, for the brood has no real defense, but the mink often kills more than it can eat.

Seven of 13 wild broods Talent monitored last summer, his first in a three-year study, suffered 100 percent mortality. Five appeared to have been destroyed by predators.

Talent believes the threat of predators may be the reason some of the mallard hens move their brood shortly after hatching.

Mallard broods are very mobile and are capable of traveling considerable distances overland at a young age.

"Most broods traveled at least one mile from the nest site during the first two weeks, and one brood traveled three miles overland, passing through 10 wetlands during their first two weeks, losing only one duckling."

The tall, thick grasses made it impossible to follow the broods from wetland to wetland without the aid of radio transmitters and also made it difficult to determine the cause of the loss of a brood.

Talent also found inattentive hens were responsible for the deaths of two of the broods in his study.

"Mallards are just like any other animal, some make good mothers and some bad. If during a cold and rainy day in early spring, the hen temporarily abandons her brood to feed, the ducklings' body temperature can be sufficiently lowered to result in death due to exposure."

Tiny transmitters helped Larry Talent monitor the movements of mallard ducks.

During the last year of this three-year project, tests will be conducted in a controlled environment chamber at OSU to determine adverse weather's effect on duckling mortality. A specific combination of temperature, humidity and rain will be maintained to simulate weather conditions encountered in prairie pothole regions.

Robert L. Jarvis, assistant professor of wildlife ecology at OSU, is directing the research.

The knowledge obtained through this study will be considered along with the number of potholes, mallard pairs and broods in the prairie pothole regions, when predicting the size of the fall flight of mallards.

POSTAGE PAID
U.S. DEPARTMENT OF AGRICULTURE
AGR 101

Third Class
BULK RATE

Director
Agricultural Experiment Station
Oregon State University
Corvallis, OR 97331

Publication
Penalty for Private Use
$300